

# Extending Chelonian Research, Education, and Conservation in Southwest Cambodia



## FINAL REPORT

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## Prefaces

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With successfully providing results and output from the first year conservation project, the follow-up project was again funded to continue a very young conservation work in Cambodia. Through the support from the BP Conservation Programme and their partners, Tortoise and Freshwater Turtle Conservation in Southwest Cambodia project implemented by Cambodian Turtle Conservation Project (CTCP) was started to conduct research, education and conservation about chelonian in Cambodia with objectives of conserving these globally threatened species through researching, education, partner networking, and environmental awareness about the ecological knowledge, attitudes, values, commitment for action, and ethical responsibilities for the rational use of resources and for sound and sustainable development.

The project was run by a group of students from the Department of Environmental Science of the Royal University of Phnom Penh (RUPP) and funded by British Petroleum Conservation Programme based in London and with technical support from Conservation International. The project was implemented in the Southwest Cambodia where it is isolated for times and damaged by many logging companies that caused a lot of threats to turtle and tortoise species. This project was to find out the distribution, composition abundances, habitat occurrence, and threats to these species, education to local communities and students, government rangers, university students, and produce publicity reports to all stakeholders.

Long time ago and till now, people are little known about the conservation and the important of turtle and tortoise. They only think these are good for food, business, medicines, and pet. No matter what parts of these species people call waste, they take all for their needs. Chinese nation is the popular place which is full of turtle markets importing and exporting to and out of these countries. According to some estimates, as many as 15 million turtles are traded annually in the region, most of these ending up in China (Asian turtle crisis).

In the last decades, Cambodia or even Southwest Cambodia, there is no exact data about these species just a little bit information from local people but no scientific records. Some information was come from illegal hunting confiscated by local authorities exporting to local markets or to neighboring countries.

After this second publication, we hope that the report will strongly benefit to all researchers as their documentation in their next projects and join together to protect these rare species and people will get to know about the important of wildlife conservation as their sustainable resources for the next generations.



## Executive Summary

This publication was focusing on the information and results gathering from the first year and follow-up projects. The project was implemented in Southwest Cambodia in collaboration with some NGOs and authorities. The project was run by Sitha Som, Yoeung Sun, Koulang Chey, and three students from Royal University of Phnom Penh.

The overall aims of the project were to work on the further research on turtle and tortoise species and monitoring on some endangered species in Southwest Cambodia. Another aim was to provide education to local community, students, government rangers, local authority, and university students about turtle conservation and the last one was to set up a national working group to share and collect turtle data between the partnership NGOs who are also working on similar topics.

The methods used in the project were to document and make lesson for training local people and government rangers and local authority with providing some incentives to persuade them in turtle conservation. For the research we tried to study on freshwater turtle and tortoise by using turtle trapping with bait to capture freshwater turtle and timed searches by using team members and local guide and dogs to find mountain tortoise and turtle. As the results we identified eight globally threatened species of turtles and tortoises in the southwest Cambodia which two of them are classified as endangered and five are vulnerable and one is near threatened in 2005 IUCN RedList. We also found a second tortoise and second record for Central Cardamom Protected Forest as we think that this species is being abundant the area and should be monitored in the future. According to the surveys, we did not confirm the presences, either alive or shells or information of big-headed temple turtle in the mountain ranges of southwest Cambodia and Asian giant softshell turtle in the targeted areas. So we thought that there should be no presence of these species in Southwest Cambodia. But instead according to ATCN, reported that this species should be presenting in the northeastern Cambodia bordering to Vietnam. According to the interview with local people, we also discovered another habitat for critically endangered *Batagur baska* in a new river next to the WCS-controlled current habitat. So this might be a good idea to do a survey to look for this species.

**Turtles and tortoises found from the project, either alive and shells (turtle we found are in bracket)**

No	English Name	Scientific Name	No of Individual	IUCN Status	CITES
1	Asian Leaf Turtle	<i>Cyclemys atripons</i>	121 (18)	Near Threatened	Appendix II
2	Asiatic Softshell Turtle	<i>Amyda cartilaginea</i>	3 (9)	Vulnerable	Appendix II
3	Elongated Turtle	<i>Indotestudo elongata</i>	83 (2)	Endangered	Appendix II



4	Giant Asian Pond Turtle	<i>Heosemys grandis</i>	2 (3)	Vulnerable	Appendix II
5	Asian Box Turtle	<i>Cuora amboinensis</i>	3 (13)	Vulnerable	Appendix II
6	Impressed Tortoise	<i>Manouria impressa</i>	7 (2)	Vulnerable	Appendix II
7	Black Marsh Turtle	<i>Siebenrockiella crassicollis</i>	0 (6)	Vulnerable	Appendix II
8	Yellowed-headed Temple Turtle	<i>Hieremys annandalii</i>	3 (3)	Endangered	Appendix II
9	Mangrove Terrapin	<i>Batagur baska</i>	0 (0)	Critically Endangered	Appendix I
10	Asian Giant Softshell Turtle	<i>Pelochelys cantorii</i>	0 (0)	Endangered	Appendix II
11	Big-headed Turtle	<i>Platysternon megacephalum</i>	0 (0)	Endangered	Appendix II
<b>Total</b>			<b>222 (56)</b>		

Significantly, we effectively provided trainings to two different local communities in CCPF where we found to be rich in turtle and tortoise species and that we wanted to monitor the area. Furthermore, we also distributed 2006 turtle calendar, turtle T-shirt, and poster to these communities and local schools as well. We also distributed T-shirt, calendar, and poster to many other stakeholders and government agencies to make them aware of our project activities. As the results, we found that people and students were becoming interesting with our presences in their area and they are pleased to help conserve their turtle species.

The project also recognized that many threats are still occurred in the surveyed areas as most of local people are poor and poorly educated and they are depending on the natural resources to afford their daily livelihoods such as resin, kresna, wildlife hunting, and they always go to forest or fishing but instead when they meet turtle or tortoise they always catch for food and keep turtle parts for selling to middlemen. As the results we found many carapaces and plastrons in villages and from ranger confiscation while they were carrying pass the ranger station or on the ways.

We have also identified some important sites for turtle and tortoise species and many species are threatened and that the area and species should be monitored in the future otherwise they will go extinct and destroyed in the short future.

In conclusion, Southwest Cambodia and CCPF are the area being rich in biodiversity, especially it is the priority area for turtle and tortoise conservation and there should be more conservation strategies to help improve the area by providing education, awareness raising and public education. If we still ignore about this problem, all chelonian and other animals will be extinct in the short future.



## Acknowledgement

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We, Cambodian Turtle Conservation Project, wish to thank to **Fishery Administration (FiA)** and **Forestry Administration (FA)** for their active support and administration during the project implementation.

We would like to express our great thanks to the **British Petroleum Conservation Programme** for their financial and advising support for the team, especially to the BP programme Manager, **Marianne Carter**, and **Robyn Dalzen**, BP Conservation Program Officer and other staffs in the programme as we thought without this valuable support, the team would not achieve such a successful project.

We would also like to kindly thanks to **Conservation International- Cambodia** for their good attitude in collaboration with our project as they permitted us to work in their office and other administrative helps. The project would not run smoothly without their support.

None of the works would have been possible without the commitments and supports from **David Emmett**, CI Biologist-Indo-Burma as he strongly sacrificed his time without getting paid from the project and helped us in such a very great advising. Those included helping in training on research techniques, providing and excellent base of operation for the survey and field research activities, advising, and report writing. We would also love to thank to **Annette Olsson** for her generous performance through offering help and giving advice in the whole of project implementation.

We are to pleased to give our thanks to **Mr. Ouk Kimsan**, CCP Manager, **Mr. Kao Dana**, Law Enforcement Manager, **Mr. Heng Kimchhay**, Deputy program manager, **Mr. Than Bunthet**, Field Commander, and all FA and rangers for their cooperation with our team and helping some advices and field researches.

Even though the team carried out a large number of field surveys, it was impossible to cover every corner of information. Consequently, in formulating this status review we needed many additional data and that were kindly provided by other people and organizations. Many special thanks to **Joe Walston and Peakdey Sorn (WCS)**, **Nareth Chea (WWF)**, **Sharon Brooks**, **Maia Diokno**, and other people for their contribution some information regarding turtle data to the project, and we also thanks to FFI for their collaborating to the team.

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Outside Cambodia, we appreciatively thank to **Douglas Hendrie** and other people working for Asian Turtle Conservation Network (ATCN) who help advertising your field results on their website: [www.asianturtlenetwork.org](http://www.asianturtlenetwork.org)).

Moreover, we would like thank to the lecturers in Department of Environmental Science of the Royal University of Phnom Penh, who have educated us to get knowledge and especially to **Mr. Seak Sophat**, Deputy Head of Department of Environmental Science, which shares his valuable time and give knowledge and good advice to us.

The achievements of this report are the results of collaborative efforts of huge participants from chiefs of commune and village (Tatai Krom, O'Som, Thma Daun Pov, and Rolerk Korng Cheung) and local communities. A great thank to them for their permission and cooperation.

We powerfully send out our thanks to all CI's components such as Community Engagement, Law Enforcement, Research and monitoring (Bear, Other, Pangolin, and Dragon fish projects) for giving information and turtle and tortoise photos to the project. Also thanks to our colleagues, Heng Namyi, Heng Sokrith, Chey Koulang, Sorn Pheakdey, who contributed the survey in numerous ways, making map and shared some good ideas for the project.



# Acronym and Abbreviation

\$	United State Dollar
°F	Fahrenheit
a.s.l	Above See Level
ATCN	Asian Turtle Conservation Network
BC	Before Christ
BP	British Petroleum
BPCP	BP Conservation Programme
CCPF	Central Cardamom Protected Forest
CI	Conservation International
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CR	Critically Endangered
CTCP	The Cambodian Turtle Conservation Project
DNA	Deoxyribonucleic acid
EN	Endangered
FA	Forestry Administration
FFI	Fauna and Flora International
FiA	Fishery Administration
GDP	Gross Domestic Product
GPS	Global Positioning System
ha	Hectare
IMF	International Monetary Fund
IUCN	International Union for Conservation of Nature (the World Conservation Union)
Kg /ha/yr	Kilogram/Hectare/Year
Km <sup>2</sup>	Square Kilometer
Km	Kilometer
MAFF	Ministry of Agriculture, Forest and Fisheries
mm	Millimeter
MoE	Ministry of Environment
NGOs	Non Government Organizations
No.	Number
NIS	Sum- of National Institute of Statistics
NTFP	Non Timber Forest Product
°C	Degree Celsius
RAMSAR	
RUPP	Royal University of Phnom Penh
TSA	Turtle Survival Alliance
UN	United Nation
US	United State
UTM	Universal Transverse Society
WCS	Wildlife Conservation Society
WildAid	WildAid
WPO	Wildlife Protection Office
WTO	World Trade Organization
WWF	World Wide Fund for Nature



## About the Team

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The team was formed in 2004 comprised of 6 students from the Royal University of Phnom Penh and in July 2004, there were three team members leading the first BP project. They are Sitha Som, Koulang Chey, Yoeung Sun. With successful outcomes from 2004 project, the team, in 2005, was encouraged to apply for another follow-up grant to further focus on chelonian conservation in Cambodia and there are three new students from Royal University of Phnom Penh joining in the project to implement the research for their graduate thesis. Right now there are 5 members involving in the project. They are skilled in Environmental Science of Royal University of Phnom Penh. They gained a lot of skills and experiences in field research, office work, report writing, working as a team and other performances. The team is keen to get more knowledge and experiences from the project in the future so that they will be involved in the turtle work.

### British Petroleum Conservation Programme

Since 1985, the BP Conservation Programme has supported and encouraged conservation projects that address global conservation priorities at a local level. The Programme aims to contribute to long-term environmental conservation and sustainable development in priority areas by encouraging and engaging potential leaders in biodiversity conservation, and providing opportunities for them to gain practical skills and experience.



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# Chapter I

## INTRODUCTION

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### Cambodia

#### 1. General Information

The Kingdom of Cambodia is situated in Southeast Asia. It has three neighboring countries: The People's Democratic Republic of Lao to the north, Thailand to the north and west, and the Vietnam to the southeast. In the Southwest of Cambodia, the gulf of Thailand forms a natural border. Cambodia covers a land area of 181,035 square kilometers. Cambodia is also a predominantly rural and forested tropical country, bordering the Gulf of Thailand. About 14% of the country drains directly to the Gulf; the remainder is in the catchments of the Tonle Mekong, which Cambodia shares with Vietnam, Laos, Thailand, Myanmar, China, and Nepal. The cultivable area is approximately 21.6% of the total land area; more than 60% is forested area, but the average rate of loss of forest cover is estimated at 0.5%/annum.

Most of the country part is hilly mountainous around its periphery, but the dominant feature of its landscape is the extensive flood plains of Tonle Mekong, Tonle Sap, and Tonle Sap Lake (the Great Lake). These water bodies are a unique hydrological system. From July to October, when the Mekong level is high, water flows upstream along the Tonle Sap into the Lake, which increases in size from 2,600 km<sup>2</sup> to 10,500 km<sup>2</sup>. In November, the flow reverses, and water drains from the Lake to the Mekong and thence to the Gulf of Thailand- around 500 billion m<sup>3</sup>/annum. The Mekong system represents a valuable resource for Cambodia, particularly in terms of fish production, and a future potential for hydropower.

The official language is Khmer. As regarding foreign languages, some of the older generation speaks French and the use of English is now widespread among the younger generation. French is still used in education system. English is the main foreign language used by Government offices. For now Chinese, English and French are the main foreign languages used for many purposes, especially business.

Administratively, Cambodia has 20 provinces and four municipalities (Phnom Penh, Sihanouk Ville, Kep, and Pailin). Phnom Penh is capital city of the Kingdom.

Cambodia is well-endowed with natural resources including forests, inland and coastal fisheries, different agro-ecological conditions suited to a wide range of crops and livestock and rich biological diversity.

The Cambodia population depends on products from agriculture (mainly rice), livestock, fisheries and forestry for their living. The total output value of the agriculture, forestry and fisheries sector has been increased from 5,191,130 million Riels in 2000 to 5,637,960 million



Riels in 2003 and however, it contributed to total GDP of one-third of 34 percent in the year 2003. Crop value added increased in 2003 by 23%, livestock increased by 3.7%, fisheries decreased 2.3% and forestry also decreased 7.6%. In spite of the rapid growth of the industrial sector, agriculture, forestry and fisheries sector continues to be the main source of employment for nearly 80 percents of the labor force.

Cambodia has valuable forest resources and a long tradition of forest utilization by its population. The forests are an integrated component in the way of life of rural communities, contributing wood and wood products as well as non timber forest products and foods from employment for nearly 80 percents of the labor force.

However, forests in Cambodia have undergone major changes in the recent past, and serious concern has been expressed over their exploitation. The Government has taken efforts to protect forest and adopted a strategy for their exploitation in a suitable manner. In 1969, a forest resource inventory indicated that forests covered 13.2 million ha, covering 73% of the country's territory. Nowadays, about 50% (9 million ha) of its land area is still under forest cover.

The fishery sector plays a significant role in the economy and traditionally in providing the population's protein needs. Fish production comes from inland (rivers, lakes, and floodplain), marine and aquaculture sources.

The great Lake Tonle Sap is a unique natural resource. In addition to its hydrological role, it represents the heart of Cambodia's capture fisheries productivity. One of the richest inland fishing lakes in the world, the Tonle Sap was reported as being nearly 10 times as productive as the best fishing grounds in the North Atlantic, even though reduced fish yields were at least 65 kg/yr if calculated on the basis of the dry season area of the lake. This compares with an average yield of 12 kg /ha/yr in typical tropical rivers.

The total production of inland fisheries in 2003-2004 fishing season is estimated at around 250,000 tons of which 68,100ktons were from fishing lots exploitation; 106,400 tons were from family-scale fishing and 75,000 tons were from rice field fishing. Marine fishing exploitation harvested a total of 55,800 tons equal to 124% of 45,000 tons planned, increasing 1,050 tons compared with year 2003. Fish and shrimp farming, yielded 20,835 tons (20,760 tons fish and 75 tons shrimp); seaweed planting yielded 16,840 tons and crocodile farming yielded 74,820 heads.

## **2. People Livelihood**

Living conditions in Cambodia have improved considerably between 1993 and 2004, the period covered by the Cambodia Socioeconomic Surveys (CSES). Life expectancy at birth increased from 52 to 60 years for men and from 56 to 65 years for women, mainly by rapidly declining infant and child mortality. Material living conditions improved substantially according to indicators on housing conditions and possession of durables. The differences in living conditions are large between urban and rural areas. The standard of living is better in Phnom Penh in almost all respects than in other urban areas, which in turn are better than the rural areas. The present report covers main aspects on selected important subject matter areas.



### 3. Population of Cambodia

The Cambodian people were devastated by war and genocide in the 1970's. After a 15-year period since 1980 with very high fertility and strong population increase there has been a 10-year period with rapidly declining fertility and mortality since 1995. The population increase has been sustained in both periods. New population estimates show that the population increased from close to 11 million in 1994 to 13.5 million in 2004. An estimation in 2005 the total population is around 14,144,000. It is expected to pass 15 million by 2010 according to a revised population projection. The population growth rate is about 2.4% per annum. (MAFF, 2006-2010).

### 4. Background

Most Cambodians consider themselves to be Khmers, descendants of the Angkor Empire that extended over much of Southeast Asia and reached its zenith between the 10th and 13th centuries. Attacks by the Thai and Cham (from present-day Vietnam) weakened the empire ushering in a long period of decline. The king placed the country under French protection in 1863. Cambodia became part of French Indochina in 1887. Following Japanese occupation in World War II, Cambodia gained full independence from France in 1953. In April 1975, after a five-year struggle, Communist Khmer Rouge forces captured Phnom Penh and evacuated all cities and towns. At least 1.5 million Cambodians died from execution, forced hardships, or starvation during the Khmer Rouge regime under POL POT. A December 1978 Vietnamese invasion drove the Khmer Rouge into the countryside, began a 10-year Vietnamese occupation, and touched off almost 13 years of civil war. The 1991 Paris Peace Accords mandated democratic elections and a ceasefire, which was not fully respected by the Khmer Rouge. UN-sponsored elections in 1993 helped restore some semblance of normalcy under a coalition government. Factional fighting in 1997 ended the first coalition government, but a second round of national elections in 1998 led to the formation of another coalition government and renewed political stability. The remaining elements of the Khmer Rouge surrendered in early 1999. Some of the remaining leaders are awaiting trial by a UN-sponsored tribunal for crimes against humanity. Elections in July 2003 were relatively peaceful, but it took one year of negotiations between contending political parties before a coalition government was formed. (Sum- of National Institute of Statistics (NIS), Phnom Penh – Cambodia).

### 5. Economy - overview

In 1999, the first full year of peace in 30 years, the government made progress on economic reforms. The US and Cambodia signed a Bilateral Textile Agreement, which gave Cambodia a guaranteed quota of US textile imports and established a bonus for improving working conditions and enforcing Cambodian labor laws and international labor standards in the industry. From 2001 to 2004, the economy grew at an average rate of 6.4%, driven largely by an expansion in the garment sector and tourism. With the January 2005 expiration of a WTO Agreement on Textiles and Clothing, Cambodia-based textile producers were forced to compete directly with lower-priced producing countries such as China and India. Although initial 2005 GDP growth estimates were less than 3%, better-than-expected garment sector performance led the IMF to forecast 6% growth in 2005. Faced with the possibility that its vibrant garment industry, with more than 200,000 jobs, could be in serious danger, the Cambodian government has committed itself to a policy of continued support for high labor





standards in an attempt to maintain favor with buyers. The tourism industry continues to grow rapidly, with foreign visitors surpassing 1 million for the year by September 2005. In 2005, exploitable oil and natural gas deposits were found beneath Cambodia's territorial waters, representing a new revenue stream for the government once commercial extraction begins in the coming years. The long-term development of the economy remains a daunting challenge. The Cambodian government continues to work with bilateral and multilateral donors, including the World Bank and IMF, to address the country's many pressing needs. In December 2004, official donors pledged \$504 million in aid for 2005 on the condition that the Cambodian government implements steps to reduce corruption. The major economic challenge for Cambodia over the next decade will be fashioning an economic environment in which the private sector can create enough jobs to handle Cambodia's demographic imbalance. More than 50% of the population is 20 years or younger. The population lacks education and productive skills, particularly in the poverty-ridden countryside, which suffers from an almost total lack of basic infrastructure. Fully 75% of the population remains engaged in subsistence farming (<http://www.indexmundi.com/cambodia/>).

## **6. Environments - current issues**

Illegal logging activities throughout the country and strip mining for gems in the western region along the border with Thailand have resulted in habitat loss and declining biodiversity (in particular, destruction of mangrove swamps threatens natural fisheries); soil erosion; in rural areas, most of the population does not have access to potable water; declining fish stocks because of illegal fishing and over fishing.

## **7. Environment - international agreements**

Cambodian also has joined some of beneficial agreements and conventions during the past year until now such as agreement on biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Hazardous Wastes, Marine Life Conservation, Ozone Layer Protection, Ship Pollution, Tropical Timber 94, and Wetlands. <https://www.cia.gov/cia/publications/factbook/geos/cb.html>

## **8. Cambodia Climate**

### **8.1 Geography and geology**

The Cardamom Mountains of Southeast Cambodia span more than one million hectares (over 10,000 km<sup>2</sup>) and comprise chiefly of the Mount Samkos massif, the Central Cardamom Mountains, and the Mount Aural massif. This region extends northwards to the Veal Veng and Kravanh districts in Pursat province, with the Northern slopes of Mount Tumpor extending into Battambang province. To the south it extends towards the gulf of Thailand. To the east it encompasses Mount Sokor and Sre Ambel districts. The western boundary is around the Thai- Cambodian border.

The highest points in this range are Mount Samkos at 1717 m above sea level (a.s.l), and Mount Aural, Cambodia's highest mountain at 1771 m a.s.l. This ancient range comprises largely uplifted grey, yellow or pink Mesozoic sandstone, but some of the highest peaks are formed from plutonic igneous rocks such as granite and rhyolitic basalt. The granite rocks of Mount Aural cover some 1500 km<sup>2</sup> (Ashwell, 1997; Daltry & Momberg, 2000).



## 8.2. Climate

Cambodia has three seasons during the year. The rainy, monsoon season lasts from May to October. From November to January is cold and dry, and February to April is the dry and hot season. The seasonal variations in temperature are small, ranging between 21 to 35 degrees Celsius during the day. The coastal and mountain areas of south-western Cambodia constitute one of Cambodia's three major bioclimatic regions (Fontanel, 1972). The climate is generally monsoonal, with rainfall being largely derived from the south-west monsoon between May and early October. The average temperature per year is 27.5°C, maximum average temperature per year is 30.9°C and minimum average temperature per year is 24.1°C with the hottest month in April is 29.4°C and coldest month in October is 26.6°C. The average temperature of the coldest month of areas above 700-800 meters in elevation is less than 20°C, while those in lower elevations are typically greater than 20°C. During the colder months (January and February) the temperatures, particularly at higher elevations can drop below 12°C during the night (Chheang Dany *et al*, 2002).

The Cardamoms are likely to be the wettest areas within Cambodia as they extract moisture from the monsoon winds. It appears likely that the CCPF receives up to or more than 4,000 mm rainfall annually as the southern slopes of the range induce orographic rainfall from the monsoon winds after they pass over the Gulf of Thailand. The Val d'Emeraude (Emerald Valley) in Phnom Bokor has the highest recorded annual average rainfall of 5,384 mm. and 223 rain days per year (Dy Phon, 1981).

<http://www.climateandweather.com/Climate/Countries/Cambodia>

## 9. History

Very little is known about prehistoric Cambodia, although archeological evidence has established that prior to 1000 BC, Cambodians subsisted on a diet of fish and rice and lived in houses on stilts, as they still do in some places today. From the 1st to the 6th centuries, much of Cambodia belonged to the Southeast Asian kingdom of Funan, which played a vital role in developing the political institutions, culture and art of later Khmer states. However, it was the Angkorian era, beginning in the 8th century, which really transformed the kingdom into an artistic and religious power.

Forces of the Thai kingdom of Ayudhya discharged Angkor in 1431, leaving the Khmers plagued by dynastic rivalries and continual warfare with the Thais for a century and a half. The Spanish and Portuguese, who had recently become active in the region, also played a part in these wars until resentment of their power led to the massacre of the Spanish garrison at Phnom Penh in 1599. A series of weak kings ruled from 1600 until the French arrived in 1863. After some gunboat diplomacy and the signing of a treaty of protectorate in 1863, the French went on to force King Norodom to sign another treaty, this time turning his country into a virtual colony in 1884.

Following the arrival of the French, a relatively peaceful period followed (even the peasant uprising of 1916 was considered peaceful). In 1941 the French installed 19-year-old Prince Sihanouk on the Cambodian throne, on the assumption that he would prove suitably pliable. This turned out to be a major miscalculation as the years after 1945 were strife-torn, with the waning of French colonial power aided by the proximity of the Franco-Viet Minh War that raged in Vietnam and Laos. Cambodian independence was eventually proclaimed in 1953, the



enigmatic King Norodom Sihanouk going on to dominate national politics for the next 15 years before being overthrown by the army.

In 1969 the United States carpet-bombed suspected communist base camps in Cambodia, killing thousands of civilians and dragging the country unwillingly into the US-Vietnam conflict. American and South Vietnamese troops invaded the country in 1970 to eradicate Vietnamese communist forces but were unsuccessful; they did manage, however, to push Cambodia's leftist guerillas (the Khmer Rouge) further into the country's interior. Savage fighting soon engulfed the entire country, with Phnom Penh falling to the Khmer Rouge in April 1975.

The Khmer Rouge was the French name for the communist organization which ruled Cambodia from 1975 to 1979. The organization's official names were Communist Party of Cambodia and later the Party of Democratic Kampuchea. The Khmer Rouge is generally remembered for its violent rule in which many people died.

Over the next four years the Khmer Rouge, under Pol Pot's leadership, systematically killed an estimated two million Cambodians (targeting the educated in particular) in a brutal bid to turn Cambodia into a Maoist, peasant-dominated agrarian cooperative. Currency was abolished, postal services were halted, the population became a work force of slave labourers and the country was almost entirely cut off from the outside world. Responding to recurring armed incursions into their border provinces, Vietnam invaded Cambodia in 1978, forcing the Khmer Rouge to flee to the relative sanctuary of the jungles along the Thai border. From there, they conducted a guerilla war against the Vietnamese-backed government throughout the late 1970s and 80s.

A 1978 invasion by Vietnamese armies drove the Khmer Rouge into the countryside and touched off almost 13 years of civil war. This regime led to exploitation of Cambodian resources such as damaging illegal logging activities throughout the country and strip mining for gems in the western region along the border with Thailand. These activities resulted in habitat loss and declining biodiversity (e.g. destruction of mangrove swamps which threatens natural fisheries), soil erosion, water pollution (in rural areas, most of the population does not have access to potable water), and declining fish stocks because of illegal fishing and over fishing (Cambodia, 2004).

The 1991 Paris Peace Accords mandated democratic elections and a ceasefire, which was not fully respected by the Khmer Rouge. In mid-1993, UN-administered elections led to a new constitution and the reinstatement of Norodom Sihanouk as king. The Khmer Rouge boycotted the elections, rejected peace talks and continued to buy large quantities of arms from the Cambodian military leadership. In the months following the election, a government-sponsored amnesty secured the first defections from Khmer ranks, with more defections occurring from 1994 when the Khmer Rouge was finally outlawed by the Cambodian government. UN-sponsored elections in 1993 helped restore some semblance of normality and the final elements of the Khmer Rouge surrendered in early 1999 (Cambodia, 2004).

Future stability is tied to improving the country's long-suffering economy, eradicating the entrenched culture of corruption, reducing the size of the military and answering the troubled question of royal succession (Cambodia Lonely Planet, 2000).



# Chapter II

## BACKGROUND

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### 1. The History of Conservation in Cambodia

"Cambodia is one of the great game lands of the world. Considering the number and distribution of big-game animals, one is led to believe that parts of northern, eastern, Southwestern Cambodia are second only to the African game lands in game abundance. As expedition members stumbled through acres of elephant tracks and watched herds of banteng, water buffalo or Eld's deer sweeping across parkland in billowing clouds of dust, it was not only evident that an effort should be made to preserve this phenomenal paradise of hoofed mammals, but that factors responsible for this distribution and concentration should be encouraged." Biologist Charles H. Wharton wrote these words in 1957. Around that time, most of Cambodia and surrounding areas of Southeast Asia were "filled with abundant wildlife." This was the land of the legendary kouprey (*Bos sauveli*), only discovered by western scientists in 1937, as well as many other of the planet's most charismatic species of animals - including elephants, tigers and rhinos (WWF-Cambodia, 2004). As recently as 50 years ago, large numbers of some of the world's most magnificent wildlife species lived in Cambodia. There were Asian elephant, tigers and rhinoceros. Kouprey, gaur, banteng, and wild water buffalo made Cambodia one of the richest places in the world for wild cattle species (WWF-Cambodia). There were many deer species, including the now endangered Eld's deer, hog deer, sambar and several species of muntjac. Some visitors to Cambodia at that time said that only Africa had a greater variety, and larger numbers, of large mammals than Cambodia.

**Figure 1:** Photograph of large turtle carved at Angkor Wat about 1,000 years ago



Long ago, Cambodia was known as a large empire country within the world. Looking to the Angkor Wat period we can see that there were conservation activities in Cambodia even then. During that time the empire of Cambodia was full of Asian elephants. This important animal was used by people for building temples, in all wars, in transportation, and in agriculture. A lot of other animals were also kept or protected by people at that time. To confirm this we can see the statues of elephants in the walls of many temples around Angkor Wat and the other 108 temples across the whole country (Hean Chheang, 1987). Also today we can still see carvings of turtles at Angkor Wat, and people respected and protected



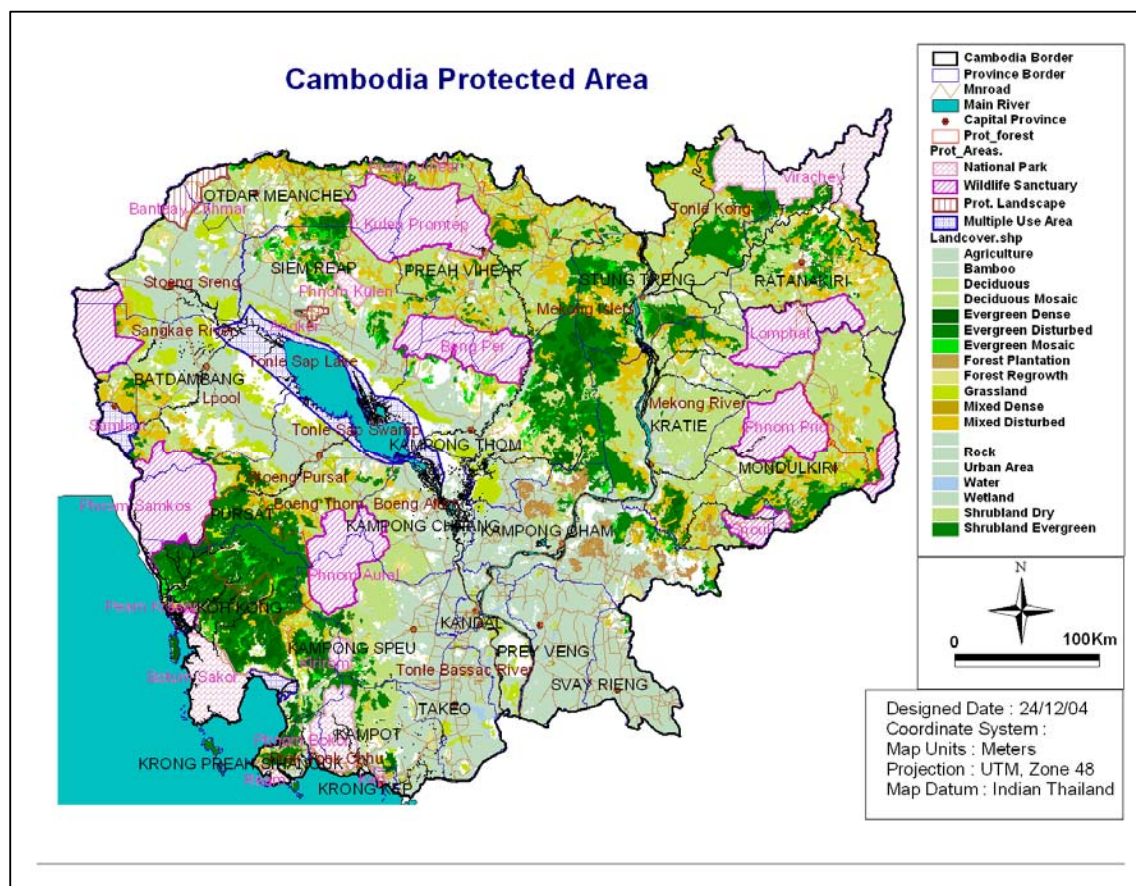


them because of their religious importance, see figure 1. The carvings on temples show us that wildlife conservation and use came to Cambodia long ago.

From 1963-1964 the creation of protected areas as national parks became popular after seeing that the condition of natural resources in Cambodia was becoming a problem. Unfortunately, this effort was stopped during Khmer Rouge 1970s. Cambodia gradually became poorer in conservation. Cambodia had once been known as rich in wildlife, forest, and other natural resources but now had become a country with serious biodiversity loss. It changed the ecology of wildlife and some species are now possibly completely extinct like the kouprey, and extinct in Cambodia like the rhino (Hean Chheang, 1987).

In 1993, twenty-three protected areas were designated in categories under Royal Decree (in Khmer Reach Kret) by the King Norodom Sihanouk, covering 3,273,200 ha, over 18% of the country's total area, see figure 2. They comprised seven national parks, 10 wildlife sanctuaries, three protected landscapes, and three multiple-use areas (Daltry, 2002). **Also see Appendix 1**

**Figure 2.** Map of 23 protected areas in Cambodia



In 2002, three additional conservation areas were designated for biodiversity conservation purposes. His Majesty King Norodom Sihanouk's Royal decree declared these national protected forests to be: 1) the Central Cardamoms Protected Forest in Koh Kong and Pursat, 2) Chheb in Preah Vihea in northern Cambodia, and 3) Koh Nhek to the west of Mondulakiri (Daltry, 2002).



Also, three important wetland areas that have value in conserving natural ecosystem for wildlife habitats of birds, reptiles, and mammals have been designated as RAMSAR sites. These are Boeng Chhmar, Koh Kapei and surrounding areas, and the Mekong close to the Lao border.

Besides these protected areas, to help preserve natural resources, the Royal Government of Cambodia established wildlife regulations such as:

- Forest law
- Kret No. 33, March 1987 on fishery management
- Regulation on supreme system and Cambodian legal code, September 1992
- Preah Reach Kret No. 1296-36, issued in December 24 1996, which declared law focusing on environmental protection and natural resource management
- Article 5 & 6 of Bra Kas No. 1563, 1996, on prohibition of wildlife hunting and trading in all aspects
- Bra Kas No. 1563 on wildlife trade banning for all species in the country
- Declaration No. 3837 on stopping wildlife trade
- Forestry concession management decree, February 2000Forestry community decree, December 2003
- Decision on preparation and implementation of forestry administration, November 2003

Cambodia also signed an agreement with the international convention on biodiversity in June 1992 at the international earth conference talking about Environmental Problem in Rio de Janeiro. Cambodia have signed CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). Also, Cambodia has joined the RAMSAR Convention.

## 2. Threats to Conservation

The biggest threat to Cambodia's natural environment is the logging frenzy which reduced the country's forest coverage from 75% in the mid-1960s to just 49% in mid-1993 - and with the government constantly strapped-for-cash, there's little reason to believe that the stripping of such assets will come to a halt soon. The number of national parks is slowly growing, but with illegal logging as rife as legal concessions, no tree in Cambodia is safe. The parks under severe threat include Bokor, on the south coast; Ream, near Sihanouk Ville; Kirirom, outside Phnom Penh; and Virachay, bordering Laos and Vietnam. A number of endangered species which are elsewhere extinct are thought to be hidden in the more remote habitats, including elephants, tigers, leopards, rhinos, gibbons, bats, turtles, tortoises, and crocodiles. (Cambodia, 2004. lonely planet).

Over the past centuries and decades, until the 1920s, Cambodia has faced a lot of civil war and wars with border countries. Cambodia has had serious problems due to the destruction of natural resources through illegal deforestation, fragmentation, and hunting by Cambodians and people from neighboring countries for the national and international wildlife trade.

Unfortunately, much of Cambodia's wildlife has been destroyed in the last 40 years, mostly because of too much illegal hunting for trading of animals and their parts for Chinese traditional medicine, decoration, food and other purposes. The kouprey, Cambodia's national animal, the rhinoceros and the hog deer may have already become extinct in the country.



Tigers, elephants, wild water buffalo, Eld's deer, and many tortoise and turtle species are also extremely highly threatened with extinction in Cambodia in the next few years, and populations of many other species are now very small and might also disappear in the future unless immediate action is taken (WWF-Cambodia 2004).

Wildlife trade is now becoming an extremely serious threat to all animals in the wild in Cambodia. The main worry of conservationists is increasing levels of illegal wildlife trade activity, even though Cambodia has the wildlife regulations to punish people who commit wildlife crimes in order to do business. Most of the rare and globally threatened animals such as elephants, tigers, bears, pangolins, lorises, gibbons, tortoises and turtles are valuable in trade for hunters, poachers, and middle-men. For example, one turtle in the region, the box turtle *Cuora trifasciata* is worth more than \$1,000 and up to \$3,000 per kg because it is believed in China that they have medicinal cancer-curing properties. Many animal species are exported by traders from Cambodia to international markets such as China and Taiwan through Lao and Thailand and large amounts end up in Chinese markets through Vietnam (MoE, 1998-2002).

Wildlife trading of animals of mammals, birds and reptiles is not only for food but is also for decoration, traditional medicine, and the pet trade. This also uses local and international trade. The main problems are that all traders put high prices on the rare and threatened wildlife that has the most international demand. Add to this poor law enforcement and the fact that there are many poor people and poorly educated people in the country, especially the indigenous people who are living in the rural areas that are rich in biodiversity. This all means that many people are interested in wildlife hunting and sell wildlife to middle men who bring them to market (MoE, 1998-2002).

### 3. Rationale

The distributions of many species are uncertain owing to a lack of records and because almost no records exist for wild tortoises or turtles. Almost all information is from traded confiscated animals. Because turtles are so extensively traded in the region, most records now come from the animals in trade. Although mainland Southeast Asia has long been regarded as a hotspot of chelonian diversity (van Dijk *et al.*, 2000), the turtle and tortoise fauna of Laos, Cambodia, and Vietnam (formerly known as French Indochina) remains poorly known. Decades of civil unrest, political instability, and military conflict have largely prevented fieldwork, and Cambodia become a source for animals rather than a destination or transfer country for trade. Specimens obtained from markets and workers in Cambodia usually originated from that country which has led to confusion on species distributions within the country, with serious biological, conservation, legal, and regulatory implications. Little information is available on the occurrence and distribution of chelonians. The reason is little scientific research and an unstable country (Stuart *et al.*, 2001, Stuart and Timmins, 2000, Touch *et al.*, 2000, Hendrie, 2000).

### 4. Turtle Distribution in Cambodia

Even though Cambodia is a small country but it is rich in biodiversity all over the country. And you will see that Cambodia is located in the Southeast Asia where they considered as the hotspot area for wildlife. In 2004, the BP-funded project discovered a new record of impressed tortoise for Cambodia. In 2006, Vietnamese authorities confiscated a 45-turtle sack being traded to Vietnam and they assessed that these turtles were probably came from



Cambodian territory from the northern. Until November 2006, MoE rangers at Virakchey National Park found an alive of this species in the park. So we completely confirmed the presence of this species. So now regarding freshwater turtle and tortoise species, Cambodia has 12 native species up from 10 in the last three years. These species are Asian leaf turtle, Giant Asian pond turtle, Asian box turtle, black marsh turtle, snail-eating turtle, yellow-headed temple turtle, impressed tortoise, elongated tortoise, mangrove terrapin, Asiatic softshell turtle, Asian giant softshell turtle and big-headed turtle. All of these species are now becoming threatened across the country. **See table 1 page 35**

## 5. Project Description

### 5.1 Core Problem: Destruction and Trade of Cambodia's wildlife

Much of Cambodia's wildlife has been destroyed in the last 40 years, mostly because of too much illegal hunting for national and international trading of animals and their parts for China traditional medicine, decoration, food and other purposes. The Kouprey, Cambodia's national animal, the rhinoceros and the hog deer may have already become extinct in the country. Tigers, elephants, wild water buffalo, Eld's deer, and many tortoise and turtle species are also threatened with extinction in Cambodia in the next few years, and populations of many other species are now very small and might also disappear in the future unless immediate action is taken (BP Project Report, 2004).

Wildlife trade is now becoming an extremely serious threat to all animals in the wild in Cambodia. The main worry of conservationists is increasing levels of illegal wildlife trade activity, even though Cambodia has the wildlife regulations to punish people who commit wildlife crimes in order to do business. Most of the rare and globally threatened animals such as elephants, tigers, bears, pangolins, lorises, gibbons, tortoises and turtles are valuable in trade for hunters, poachers, and middle-men. These species are all exported by traders to international markets such as China and Taiwan through Lao and Thailand and very large amounts end up in Chinese markets through Vietnam (BP Project Report, 2004).

Wildlife trading of animals of mammals, birds and reptiles is not only for food but is also for decoration, traditional medicine, and the pet trade. This also uses local and international trade. The main problems are that all traders put high prices on the rare and threatened wildlife that has the most international demand. Add to this poor law enforcement and the fact that there are many poor people and poorly educated people in the country, especially the indigenous people who are living in the rural areas that are rich in biodiversity. This all means that many people are interested in wildlife hunting and sell wildlife to middle men who bring them to market.

### 5.2. The Asian Turtle Crisis

Research throughout the region has shown that Asia's turtles are being systematically extirpated from nature to feed the insatiable demand from export markets. According to some estimates, as many as 10 million turtles are traded annually in the region, most of these ending up in China. In the last decade, industrialization in China has provided new-found wealth which has generated increased demand for expensive foods and traditional medicines made from turtles. This has caused a dramatic increase in the organized and opportunistic collection of turtles from the wild, greatly depleting the numbers of many species and creating the so-called "**Asian turtle crisis**." Of the estimated 90 species which are native to the region, sixty-





seven are classified as threatened through habitat loss and collection for trade (IUCN, 2004), up from 33 in 1996. On 2003, a report of mixing workshop resulted trade of tortoise and freshwater turtle in Asia. It was held in Phnom Penh in Cambodia. The workshop showed that currently there are 90 species in Asia and 75 percent of once have being threaten.

### 5.3. Turtle and Tortoise Species Findings

The 2004 surveys by the BP team found 5 species of turtles and 2 species of tortoises. One species is Endangered, five species are Vulnerable and one of them is Near Threatened. One of them, the impressed tortoise *Manouria impressa*, had never been recorded in Cambodia alive in the wild before we found it. This species is a very rare vulnerable montane species and it is highly threatened. It is very important for conservation of this species to find this population in Cambodia, and more research and monitoring of this tortoise is very important now.

Some of the other species we found had been never recorded alive in Cardamom mountains before such as the giant Asian pond turtle *Heosemys grandis*, and black marsh turtle *Siebenrockiella crassicollis*. One species, the elongated tortoise *Indotestudo elongata* is Endangered but we found it to be one of the commonest species in the area, showing that the Cardamom Mountains is a site of global importance for this tortoise. This species should be strongly monitored.

According to the community surveys carried out in March 2004 by BP team, there are actually likely to be more than 9 species of turtles and tortoises in Southwest Cambodia. This includes some species that are Endangered but that we could not find in Cardamom Mountains because it was the wrong habitats. This includes Endangered giant softshell turtle *Pelochelys cantorii* that the villagers said is common in the deep water of rivers near the sea in South West Cambodia. It also includes the Endangered yellow-headed temple turtle *Hieremys annandalii* that is also not found in mountain areas but that villagers say is common in lakes and big rivers nearer the sea. The areas where the villagers say these species are found are not inside of any Protected Areas. So it is important first of all to find out where these endangered species are and then to help protect them by working with the government and International NGO's like CI, FFI and Wild Aid to start conservation and protection of these rare turtles.

### 5.4. Threats to turtles

The turtle and tortoise species we also found are facing extinction locally in some areas in the near future because threats we identified such as previous collection for trade in the 1990's that dropped the numbers of turtles in some areas to low levels, and now local collection for food and low levels of trade to nearby towns.

The results showed that all local communities in the areas are presently depending on natural resources such as NTFP, wildlife hunting, fishing, logging, aloe wood collecting, resin extracting, and feeding domestic animals. More over, people often go to forest without supporting food but instead they rely on finding wild animals, especially turtles and tortoises. We found that one of the key threats to turtle and tortoise species are collection by local communities in the field using trained hunting dogs. Dogs are very good at sniffing concealed animals like turtles and tortoises. This is a serious threat to these low levels of turtle



populations because it takes adult turtles and does not let the populations recover so they go extinct in that area.

We found that there had been higher levels of turtle trade in some areas in the past because the interview surveys we did during our first project showed that previously (before 1990) there were many turtles and tortoises at the areas, but the interviews and the current research data from the first year project showed that there now are quite low numbers of most of the species in areas near villages and roads now. But there were more turtles and tortoises in these areas in the past according to the local villagers. In some remote areas we found there are still quite a lot of turtles and tortoises because it is such a huge area and it can be two or three days walking to reach these remote places.

### **5.5. Education and awareness**

Lack of local people awareness is a big factor threatening the turtles and tortoises because the villagers do not understand the importance or biology of turtles and the reasons why if you take out lot of adults you destroy the population. This is because the adults used to live a long time and produce a lot of young, but now people collect them when they are young and the populations are destroyed. We need to tell the villagers this so they understand more about the lives of the turtles and how they should protect them or lose them forever.

### **5.6. Project Objectives**

The Cambodian Turtle Conservation Project (CTCP) has been funded by the BP Conservation Programme (BPCP) for the follow-up project in partnership with BirdLife International, WCS, FFI, and CI. The project is called “Extending Chelonian Research, Education, and Conservation in Southwest Cambodia.” The project started since 2004 with technical support from CI-Cambodia, the Fishery Administration and the Forestry Administration.



The main objectives of the project are:

- i) Education of local students from RUPP, government rangers, and local communities about turtle research and conservation
  - Objectives:
    - + Train and work with three students from RUPP to strengthen their capacity for turtle research through training in techniques and field research methods
    - + Teach local students about turtle conservation at local schools
    - + Raise awareness about turtle conservation to local committees that we already identified from the first project
    - + Teach local police and government rangers about turtle identification, recording data, good release of turtles into the right habitat etc.
- ii) Research on critically endangered and endangered species, especially those not in protected areas and those which have no protection
  - Objectives:
    - + More research on endangered Elongated tortoise-*Indotestudo elongata*, and vulnerable Impressed tortoise-*Manouria impressa*
    - + Look for the endangered Cantor's giant softshell turtle- *Pelochelys cantorii*, and Yellow-headed temple turtle-*Hieremys annandalii*
    - + Survey in mountains to look for Big-headed turtle-*Platysternon megacephalum*
- iii) Setting up a National Working Group and having quarterly meetings and activities where we all learn and communicate and help to form a good communication between turtle and tortoise researchers in Cambodia.
  - Objectives:
    - + Set up a national working group for turtle and tortoise conservation in Cambodia with quarterly meeting to share turtle information among the Gov't departments, NGOs, etc
    - + Compile all turtle data from partners to make sure that we will have enough information about turtles and tortoises in Cambodia
    - + Results from the research published on the BP Conservation Programme website <http://conservation.com> and ATCN website to share turtle data to the whole region [www.asianturtlenetwork.org](http://www.asianturtlenetwork.org)
    - + Create a map for turtle and tortoise distribution across Cambodia

## 5.7. Method

**5.7.1. Community Survey:** In order to get information and ideas regarding turtle and tortoise species distribution, composition, relative abundances, and threats to turtles and tortoises, we also conducted community surveys in 5 different communes from the 2004 to 2006 in three provinces. The communes are: Tatai Krom, Trapaing ROUNG, Chipat, ROLK Kangcheung, and Reusey Chrum. The total families that we interviewed are 80. If we included families from 2004 there were 133 households in Southwest Cambodia. We also prepared set questionnaires for asking local people, local authorities, and government rangers that are working and living related wildlife and depending on natural resources (See Appendix 2). The questionnaires were focusing on threatening activities, species composition and distribution, and relative abundances and we also tried to assess the current habitats in each surveyed area so that we can easily go to survey at the right habitat. Following with questionnaire, we used 12 species of turtle photo sheets that might be occurred in the areas to show interviewees to assess the species. Moreover, we can significantly identify threats to turtles.



### 5.7.2. Shell collection

**Figure 3.** Turtle shells collected from village.



During our interviews we always asked about shells of turtles or tortoises which could be in the villagers' houses. When we found shells we took photograph on the top (carapace) and bottom (plastron), if there were still plastrons present (they are often sold for medicinal purposes) as a proof of identification. Sometimes we asked if we could get the shells and sometimes people asked for money for the shells but

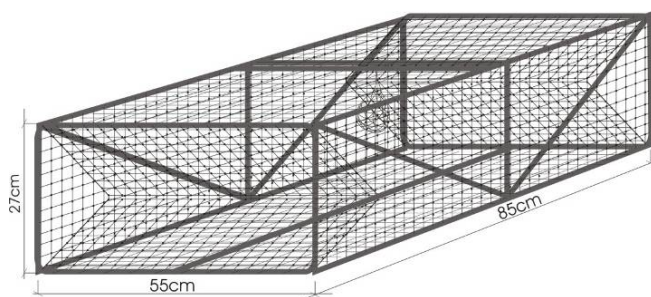
to be in conservation we would not need to give money to people for the shells.

### 5.7.3. Trapping:

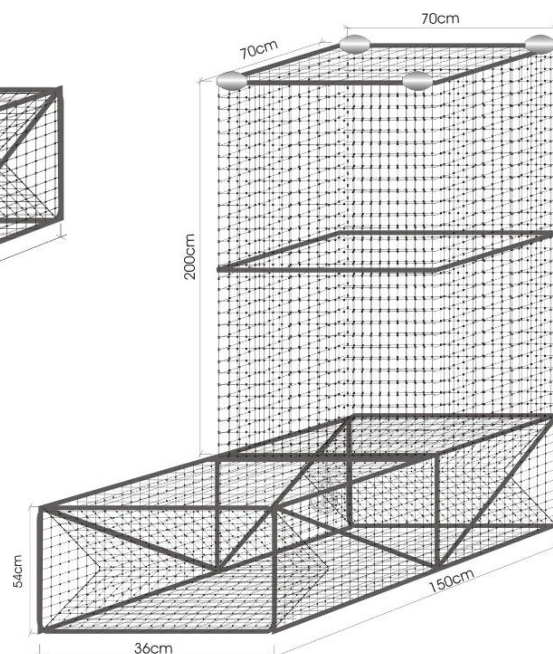
Before commencing trapping turtle, we normally asked for permission from local authority and commune chiefs to make sure they are happy with our activities.

The following bullet-points show the most important descriptions and activities of our methods:

**Figure 4:** Small turtle trap



**Figure 5:** Large turtle trap





- Traps were individually numbered and GPS recorded for monitoring purposes.
- To set the traps in the rivers and lakes we used a boat or canoe. It is easier to get around in a boat as there often is very dense vegetation along the water edge.
- Traps were baited with fish, fruit and aquatic plants. When baiting with fish, we either used fresh fish from the river, or tinned fish. If we used tinned fish, we did not open the tin but we made a hole in it so that the bait smell and oil came out. If we opened the tin, it was easy for small fish to eat the bait and the first turtle in the trap would eat all of the bait.
- Once positioned and set, traps were checked daily and re-baited as required. See Appendix 4
- The trap-period was 10-15 days, to ensure the greatest chance of catching turtles that are present in the area.
- Each trap was placed in an area of shallow, flat water next to the bank, so that the top of the trap was out of the water. This was to ensure that the turtles could get to surface to breathe, so that we did not drown them. The traps would be tied to nearby trees to prevent Siamese crocodiles and large turtles or other animals pulling the trap into deep water, where caught turtles or crocodiles could drown.
- We used small traps, see figure 10. We also used big deep-water traps; see figure 11, designing with a 2-4m long chimney up to the top of the water. If a turtle went into the trap it could come up the top and breathe so that we did not drown it. These big traps were designed for putting in deep slow-moving water to catch soft-shell turtle and other deep water species.
- When we baited traps with fruit, we used a mixture of fruits – papaya, banana, jackfruit, and durian. These fruits were strong-smelling and broke up to release particles that would attract turtles.
- Each trap was baited with the same bait during the trapping session.
- We put the traps on the side of the river where the water was shallowest. It did not matter if we changed sides of the river when we placed the traps, as long as they were about 50-150m apart from each other.
- Traps in rivers were kept about 150 metres apart from each other because the water was moving to downstream and brought the smell with it. In lakes the traps were placed 50-100 metres apart from each other because in lakes the water was still so the smell couldn't spread so far.
- According to the different habitats setting the traps were different, too. we sometimes placed traps in random system if the lake was small or there were many good locations for traps.
- We also used some field equipment for our research. See Appendix 5

#### 5.7.4. Timed Search

Rather than setting up transects through the forest, the surveys consisted of timed searches in one general direction, randomly chosen. During these searches the team walked in a fixed direction along roughly parallel routes looking for tortoises, turtles, tracks, and feces. Every search was timed using a stopwatch, and searches were conducted both during the days and nights according to habitats, seasons, and targeted species. Each team member walked approximately 5-10 meters apart from the next depending on the density of the vegetation. The team needed to walk slowly. The

**Figure 6.** Timed search at grassland



key was to ensure that the area was thoroughly searched and no tortoises were missed and to avoid snakes. The numbers of participants were at least 3 people and to minimize observer variation, the 3 core BP team members were used for all surveys, see figure 12. To make sure there were no turtles missed, we used one to three village hunting dogs trained to find turtles and tortoise to roam between and around the participants. During each trip we did timed searches at least 4-6 days in different habitats where we considered to be the best places for tortoises and turtles.

Each day we spent approximately walking in the forest and marshes at least 1-3 hours for searching tortoises. To identify the distributions and threats to tortoises and turtles from one area to another we multiplied the total hours of searching and the total of participants and the results were men-and dog-hours. At the end we will find the results between one to another habitats.

### 5.7.5. Marking and Handling Turtle

When a tortoise or turtle is found in traps or walk, the date, time, time taken to find it, locality (determined with Garmin-12 or Etrex Venture GPS), habitat, microhabitat, altitude, weather, and air temperature was recorded. The tortoise or turtle was identified to species using field guides (Cox et al., 2001) and its behavior was recorded (i.e. resting head in, resting head out, walking, feeding, combat (male-male), mating (male-female), or nesting).

In addition, its age will be estimated by counting the number of growth rings on the scutes and its sex will also determined based on differences in shell morphology (shape) and tail size. Every turtle and tortoise will be notched using marking international system to avoid catching the same species (**See Appendix 3**). The straight-line carapace length will be recorded using calipers or measuring tape, and a unique mark will be given to each individual by notching the marginal scutes of the carapace, thereby ensuring that recaptures are recognized and recorded. Every tortoise and turtle has to photograph above and below to provide confirmatory evidence of species identifications. Empty shells will also photograph and measure, and will be collected and retained whenever possible. At least one DNA sample (shell fragment or blood sample) will be taken for each tortoise and turtle species, in case there are doubts as to the validity of species identifications.

**Figure 7.** Team notching caught turtle



### 5.7.6 Trapped and Searched Turtles and Tortoises

When the turtle had been and caught and brought to camp, it needed to be measured. The length of shell must be recorded, and the sex and age of the turtle would be recorded whenever possible.

After measuring, the turtle was photographed. The photos should show both the top and the bottom of each turtle, and the head to provide confirmatory evidence of species identifications, **see figure 8**. Empty shells were also photographed and measured, and collected and retained whenever possible. At least one DNA sample (tail-tip, blood sample, or shell fragment) was taken for each tortoise and turtle species, in case there were doubts as to the validity of species identifications.





**Figure 8.** Example of specimen (Asian box turtle *Cuora amboinensis*) photographed above and below.



When the turtle had been measured, photographed and identified, it was uniquely marked, so that it could be identified if recaptured. This meant that we could recognise any turtle we caught more than once. This gave us information on the numbers of turtles, as it stopped us counting the same turtle twice. It also helped us to understand their movements. For example, did they move a long way in the river, or were they territorial and live in the same area? If we caught the same turtle in different traps, we would learn more about their behaviour.

To mark turtles so that we could identify individuals, we had to mark every turtle differently. To do this, we used a special numbering system. **See Appendix 3** for numbering code.

We marked the first turtle with the number 1 by cutting a piece off the scute on the shell on the scute (scale) on the shell that corresponds to the number 1 on the picture. The second turtle is marked by cutting a piece off the scute on the shell that corresponds to number 2. The third turtle is marked by cutting a piece off the scutes on the shell that correspond to 1 and 2. This is because we add the numbers up, so  $1+2=3$ .

We continue this for every new turtle we catch so, for example, the 15th turtle will be marked by cutting the scutes that correspond to number 10, number 4 and number 1 ( $10+4+1=15$ ).

**Figure 9.** A Scute with rings showing turtle's age



In timed search for tortoises and turtles its behaviour was recorded (i.e. resting head in, resting head out, walking, feeding, fighting (male-male), mating (male-female), or nesting). In addition, its age was estimated by counting the number of growth rings on the scutes, see figure 14, and its sex was determined based on differences in shell morphology (shape) and tail size. The straight-line carapace length was recorded using calipers or measuring tape, and a unique mark was given to each individual by notching marginal cutes of the carapace, thereby ensuring that recaptures are recognized. Every tortoise and turtle was photographed above and below to provide confirmatory evidence of species identifications. Empty shells were also photographed and measured, and were collected and retained whenever possible. At least one DNA sample (shell fragment or blood sample) was taken for each tortoise and turtle species, in case there are doubts as to the validity of species identifications.



# Chapter III

## TURTLE ECOLOGY

### 1. What is a Turtle?

In general, turtles are overlooked by wildlife managers in spite of their ecological significance and importance to humans. Turtles are, however, important as scavengers, herbivores, and carnivores, and often contribute significant biomass to ecosystems. In addition, they are an important link in ecosystems, providing dispersal mechanisms for plants, contributing to environmental diversity, and fostering symbiotic associations with a diverse array of organisms. Adults and eggs of many turtles have been used as a food resource by humans for centuries (Brooks et al. 1988; Lovich 1994). As use pressures and habitat destruction increase, management that considers the life-history traits of turtles will be needed.

Turtles are a group of vertebrate animals belonging to the order Testudines. Together with snakes, lizards, crocodilians, and the tuatara, they form the reptiles (Class Reptilia) and animalia kingdom (**See table 1**). Turtles are the oldest living group of reptiles, first appearing about 250 million years ago. Like the other orders of reptiles, turtles are cold-blooded (ectotherms), have scaly skin, and lay eggs with a yolk and tough outer covering (amniotes egg).

**Table 1.** Turtle Genus, Subfamily, and Family

No	English Name	Genus	Subfamily	Family
1	Red-eared Slider Turtle	Trachemys	Deirochelyinae	Emydidae
2	Elongated Tortoise	Indotestudo	Testudininae	Testudinidae
3	Impressed Tortoise	Manouria	Xerobatinae	Testudinidae
4	Asiatic Softshell Turtle	Amyda	Trionychinae	Trionychidae
5	Asian Giant Softshell Turtle	Pelochelys	Trionychinae	Trionychidae
6	Chinese Softshell Turtle	Pelodisus	Trionychinae	Trionychidae
7	Mangrove Terrapin	Batagur	Batagurinae	Bataguridae
8	Asian Box Turtle	Cuora	Geoemydinae	Bataguridae
9	Asian Leaf Turtle	Cyclemys	Geoemydinae	Bataguridae
10	Giant Asian Pond Turtle	Heosemys	Geoemydinae	Bataguridae
11	Yellowed-headed Temple Turtle	Hieremys	Batagurinae	Bataguridae
12	Malayan Snail-eating Turtle	Malayemys	Batagurinae	Bataguridae
13	Black Marsh Turtle	Siebenrockiella	Batagurinae	Bataguridae

Among the differences between turtles and other reptiles, the most exceptional is the presence of shells. The turtle's shell is a covering that encloses the turtle's body. Within this armor, the soft body parts of the turtle are protected. From the shell, project the turtle's head, legs, and tail. The shell of the turtle is divided into two parts, the upper **carapace** and the lower



**plastron.** The two are connected on the sides by the **bridge**. A turtle can not walk out of its shell; the carapace is fused with the ribs of the turtle. The attributes of the turtle's shell can vary greatly, from hard and bony to flexible and leathery. Some turtles have shells with bright markings or unusual shapes.

Turtles have solid skulls without temporal openings. Instead of teeth, they have horny beaks. The beak of a turtle is adapted for its primary diet. Carnivorous species have sharp hooked beaks to grasp and slice animal prey. Vegetarian turtles and those that eat mollusks have beaks with flat, broad crushing surfaces.

Turtles can be found on every continent except Antarctica. They have adapted to a wide range of habitats, including deserts, rainforests, mountains, and rivers. Marine turtles occur in tropical and temperate seas throughout the world. Many of the terrestrial turtles are referred to as tortoises. In the United Kingdom and many other countries, freshwater turtles are called terrapins. In the United States, this name is used for a species that lives in brackish water.

## 2. Freshwater Turtle and Tortoise Features

**Easier** - Turtles are reptiles whose soft body is covered by a hard shell. Most turtles can pull their legs, tail, and head into the shell for protection. Different turtles live on land, in water, or both on land and in water. Some turtles that live on land are called tortoises. A terrapin is a turtle that lives in or near freshwater or partly salty, coastal water. The name terrapin is only used for a group of North American turtles.

**Harder** - Turtles can be grouped into seven main types: (1) mud and musk turtles, (2) pond and marsh turtles, (3) sea turtles, (4) side-necked turtles, (5) snapping turtles, (6) soft-shelled turtles, and (7) tortoises. Like other reptiles, all turtles are cold-blooded; their body temperature about matches the temperature of their environment. They are found living in deserts, forest, grasslands, lakes, marshes, ponds, wetlands, coastal areas, and in the oceans. Turtles live in almost all geographic regions except those which are cold year-round. They cannot remain active in cold weather, so species in regions that have harsh winters must hibernate. Some desert species survive the hot, dry periods by going into a related state of limited activity called estivation. Sea turtles spend most of their life in the water. Other species live mainly on land or in fresh water or spend about an equal time on land and in water.

There are over 300 different turtle species; about 90 live in Southeast Asia (**See figure 10**). Between species, turtles vary in size from the bog turtle of about 4 inches long (10 centimeters) to the huge leatherback sea turtle, which can mature to 4 to 8 feet lengths (1.2 to 2.4 meters). Many turtles spend their entire life within a short distance from where they were hatched, but most sea turtles migrate thousand of miles. Sea turtles are also fast swimmers; but on land most kinds of turtles are slow, lumbering creatures. However, some land turtles like the smooth soft-shell specie can sometimes outrun a human. Most turtles are omnivores, which are they eat both plants and animals but the exact foods consumed vary between the species. For instance, green sea turtles and tortoises feed almost entirely on plants. A few freshwater species including the map turtle and soft-shelled turtles eat mainly other small animals.



**Figure 10.** Turtle distribution in the world

Today over 40 species of turtles including most sea turtles and many types of tortoises are endangered, and if turtle conservation and protection does not improve, certain species will become extinct. People are their greatest threat. Historically people have sought turtle eggs and meat for food. Turtle shells have been used for ornamentation. Rare exotic turtles have been shipped and trafficked as pets. Turtles are still hunted and captured today; turtle nests are plundered. People further harm turtles by eliminating their natural living areas as forests, swamps, and other areas are transformed for farms and urban growth. Further endangerment comes from continued pollution of their living areas.

### 3. Temperature

Turtles are reptiles - cold-blooded creatures, i.e., their bodies depend on outside sources of heat to maintain a favorable temperature. It is critical therefore that the habitat provides them an optimal temperature. Be generous with warmth. Many turtles get sick and die because they were too cold for too long.

In their natural habitats, a wide range of temperature zones are available, in a gradient between dry, warm, sunny places and moist, cooler, shady nooks. While it is difficult to provide the wide range of temperature and

humidity zones in a captive habitat we can definitely try and provide a temperature gradient so that the turtles can manage their body temperature requirements themselves.

**Figure 11.** Turtle Basking-*Heosemys grandis*



Before elaborating on creating a temperature gradient, remember that it is essential that the temperature of the tank doesn't fall below 21.1 °C (70 °F). The ideal range for water area: 21.1 °C - 26.6 °C (70 °F-80 °F) and land area: 26.6 °C - 32.2 °C (80 °F-90 °F). To Convert [ °F to °C : (°F-32)/1.8 ] and [ °C to °F : 32+ 1.8(°C)]

All this was the information for daytime temperatures. At night make sure you have switched off the basking light, and let the tank temperature drop by approximately 3 °C (5 °F) but do not let the temperature fall below 17 °C - 20 °C (62.6 °F-68 °F).

#### 4. Turtle Sexing - Male or Female

Telling apart a Male from a Female can be pretty hard if the turtle is at a young stage, but easier as the turtle grows older into juveniles and adults. It doesn't really rely on age, but rather by size. These features will be easily visible on turtles of 4" or larger, depending on over all average size of your species of turtle. Note: This Male/Female information can be applied to sliders and other turtles of similar race. Not all turtles will display these features.

**Figure 12.** Concave and Convex plastron



First off, the male turtle usually tends to have a concave plastron (bottom shell). The reason for this is because he has to stay on the female's carapace (upper shell) to breed. It would be rather hard to do this task if the shell was flat. He would be slipping and falling off of her. Another attribute the male has is a much longer and thicker shell, then that of the female. The anal hole is also usually past the carapacial rim (end of shell). He must slide his tail under hers to copulate. On some species, longer fore claws

are prevalent. Some species that have them are Painted, Sliders, Cooters, and Map turtles. These claws are used in some sort of breeding ritual. The male will show the appearance of caressing the female cheeks. Of course they have more purposes than just breeding. They are used in showing dominance to another turtle, stating "This is my territory, I'm telling you to stay out of it," or just a simple "Hi, how are you doing?" Coloration in some species is also an indicator of sex. In male Box turtles, the male tends to have red eyes. In Spotted turtles, males have tan chins and brown eyes.

**Figure13.** Tail features- male (left) and female (right)



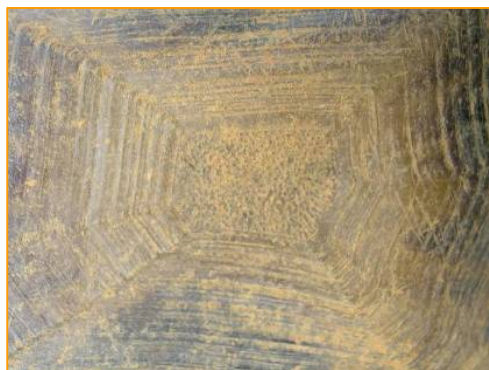
There are also ways to tell if your turtle is a female. The first of course is to look at the plastron, females are flat or slightly convex. The reasoning behind this is because, she has to hold the eggs, and she wouldn't have enough room to do so if she was like the male and it was concave. The tail of a female is short and the anal opening is before the carapacial rim. In most species of turtle, the female's front claws are short; they do not have to show breeding rituals because the female doesn't have to convince the male who she is. The one that says who breed is the female. Coloration is also an indicator in this gender as well. Female Box turtles usually have brown eyes.

Those are the easiest and most basic ways to tell if you have a male or female turtle. Almost all species follow these rules, but not all. Some female Box turtles have red eyes, while some males have brown eyes. Some male specimens have shown a short tail. The above is what the majority show. Baby turtles do not usually display these characteristics until they mature.

## 5. Ageing turtle

It is not possible to determine the exact age of a turtle, unless you know its birthday. You cannot determine a turtle's age by the rings on the scutes. A turtle may grow several rings in a good year, when it is young, and it is growing fast and no rings at all in a bad year or when it is fully grown. But counting rings on the scutes is the popular way eventhough it is not so accurate but we can use in general.

**Figure 14.** Rings of turtle scute



You can also estimate a turtle's age in the following way. What you are really doing is a bit better than guessing.

- Find out what the adult size for the turtle would be.
- Measure your turtle.
- Find out what the maximum age limit for the turtle would be.
- Guess...
- Subtract some years, if the turtle was raised in

captivity, because captive turtles grow faster.

- Look at the scutes. Has the turtle grown recently? A mature turtle grows slower and won't show much new growth.

- Has the turtle bred? To do that, it must be mature. Water turtles become sexually mature around 5-8 years of age, depending on species and environment. (For tortoises it varies and can be as late as 20 years.)

- For omnivorous species: Does the turtle eat/prefer vegetables? Older water turtles eat more vegetables. (But that is not always true. I have a mature male Reeve who eats no veggies, and a juvenile female Reeve who loves veggies.)

- For Sliders and Reeves, the shell gets darker as the turtle gets older. Dark shells are mature individuals.

- Disposition: Adult female sliders can be pretty aggressive.

- Know the gender of the turtle. Females usually grow bigger than males, and a female will often be larger than a male at a given age.





- Quality of shell. A mature turtle that grows slowly usually doesn't outgrow scratches, pits, or chipped off pieces quickly, so older turtles, especially in the wild, have more "stressed" shells.

## 6. Physical characteristic of turtle

Most turtle have a bony shell made up of many plate. The top part of the shell is called the carapace. The bottom part is called the plastron. They also have short leg and head can move in or out.

## 7. Distinguishing characteristic and adaptations

Turtle have adapted certain physical features that help them survive in nature. Show some examples of turtles and how some special adaptation helps them:

Water dynamics: the long tail and sleek design of *platysternom* for fast-moving streams.

Soft-shell turtle, large webbed feet and swimming dynamics.

## 8. Thermoregulation

Like other reptiles, turtle are cold blooded. A turtle's temperature is dependent upon the Environment. Unlike warm-blooded mammals like human which can regulate their body temperature independently of their environment. When it is cold, human always generates heat and sweat when hot to release heat. Turtles do not have this ability, and must seek an environment that suits their temperature needs. When it is too cold, they must seek the warmth of a sheltered area. Turtle will often back to warm their bodies, turtles are left exposed to the sun without shelter, and they will quickly overheat and die. In the wild, a turtle may burrow in mud or beneath the edge of a log in order to avoid the heat.

## 9. Habitat

The habitat requirements differ for each species. Among of turtle can live in semi-aquatic (Stream, lake, canal ...) and tortoise live in grassland or green forest on the mountain.

### 8. Reproduction

Turtle lay eggs. The turtle lay eggs according to difference species on the season. Each species can lay eggs from 4 to 8 or 10 to 40 eggs in the times according to species. Eggs are laid under the soil and vegetation.

## 10. Predator of Turtle

In natural, turtle face a lot of predators. Such as lizard, wild pigs, rats, ants, bird, and snake and other species. Turtle don't look after eggs after nesting. Because of these, both eggs and juveniles are faced to be eaten by predators.



# Chapter IV

## RESULTS

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### 1. Stoeng Kep Survey

Stoeng Kep, the two-day walking area from Tma Bang district, which located in the East of Thma Bang is a quite remote area as it is far from local people and villages. It is a big river flowing from the Cardamom Mountains connecting with other small streams before flowing to the sea. The forest around the river is full of bamboo and other trees as some local people said rich in big animals such as sambar, wild pig, bear, gibbon, etc. The area is about 300 to 450 meters altitude. According to the interview with local guides said that because of it is far from the village so a few people go there for fishing just only in dry season and we think that it is true because when we walked there the old track was full of fallen bamboo and we needed to cut along the way to the river. **See Appendix 9 for distribution map and appendix 12 for survey photos**

Our objective for this field trip was to look for the endangered giant softshell turtle (*Pelochelys cantorii*) and Asiatic softshell turtle (*Amyda cartilaginea*) and other possibly species.

#### 1.1. Results

**1.1.1. Trapping:** During this trip we spent 5 days trapping in the Stoeng Kep River using two big traps and 16 small traps in some good habitats of the river where we thought it was good for Asian giant softshell turtle (**See appendix 4 for trap location**). But we didn't trap any turtles but instead we caught many fish. See distribution map

**1.1.2. Timed Search:** The numbers of participants in this timed search were 5 people. They were three BP team members, one local guide and one policeman. In addition, three local hunting dogs were used in the survey. In total we spent about 9 hours of doing timed search finding tortoise and turtle in the forest with 5 people and three dogs. So we spent about 72 men-and-dog hours in this trip. See distribution map

In timed search we still didn't find any tortoise or turtle even though we used a lot of participants including dogs and more times in the survey.

#### 1.2. Discussion

The river is very big and surrounding by good forest that we think should be some species of tortoises and turtles there. Also a lot of people and rangers in Thmar Bang said that not many people went there for hunting- just a few during dry season. We didn't find any other species in the area but we found many footprint of some animal such as endangered wild dogs,



sambar, and others. We also didn't see any hunters or poachers in the area but we saw a burnt wild pig along the beginning road to Stoeng Kep but not close to the river. We never saw old tracks in and around the river. But people said before ago there were some fishermen come and hunt softshell by using line hooks. Be aware that this time of the year the river is full of water and some parts of the river is moving very fast and sometime along the edge of the river is also full of water. We think that now there should be no hunting there. Also, on the up stream of this river there are many critically endangered Siamese crocodiles there and people used to see softshell turtle in there so down stream must have this species, too.

### 1.3. Conclusion

We still think that Stoeng Kep should be good habitat for softshell turtle. The reasons are maybe because of hunting in the past or a lot of water in the river that has a lot of food for them for eating. There should be more surveys in the dry season because it is easy for trapping.

According to fisherman mentioned that on the other side of the river is more likely good for turtles and tortoises because it is not easy to get there and quite far and this time of the year we can't across this river without the boat.

We still need to determine if the *Pelochelys cantorii* is being presented in Stoeng Kep, so we will do surveys nearer to the sea where the river is larger and deeper.

## 2. Tatai Krom Survey

### 2.1. Survey area

Tatai Krom is located in Koh Kong district, Koh Kong province. Tatai Krom is located to the southern of the fourth ferry crossing from Phnom Penh to Koh Kong. We did survey down the river from the ferry. There are two villages in the area with 218 families and most of the families are depending on non-timber forest product (NTFP). Most of the people are living along the Tatai Krom River which flows into the sea. The river is very big compared to the rivers we previously surveyed. All the areas close to the river are flooded with freshwater during the rainy season and salt water during the dry season. **See Appendix 9 for distribution map and appendix 12 for survey photos**

The main purpose for this trip is to find out the presence and status of the endangered yellow-headed temple turtle, Asian giant softshell turtle, snail-eating turtle, mangrove terrapin and other species possibly found in this area.

### 2.2. Methods

#### 2.2.1. Household survey

We chose one important Tatai Krom commune with two villages to do interview by using formal questionnaire and turtle photo sheets. Families were selected by the commune and village head. Eighteen households were interviewed. We only interviewed people who are being involved or used to be involved in extracting forest product, especially hunters, aloe wood collectors, resin extractors, fishermen, and farmers.

#### 2.2.2. Trapping

We did trapping in the flooded forest where people told about the presence of these species. The traps were individually numbered and GPS recorded for monitoring purposes. We set the traps in two marshy flooded areas, Boeng Sre Chin (E 295975, N 1274064), Boeng Thong Kadon (E 296970, N 1271872) and one small stream connecting to the sea. Traps were baited



with fresh and rotting fish, and smelling fruits. When we baited traps with fruit, we used a mixture of banana, papaya, and jackfruit.

During this trip we used two kinds of traps: small and big. We set the big traps in deep water for catching softshell turtles.

We spent eight days trapping turtles. We used 30 traps during the survey, 28 small traps and 2 big traps. (See Appendix 6)

### 2.2.3. Timed Search

During the trip, the survey consisted of timed searches using local dog and guide and our team in one general direction, randomly chosen. We walked in a fixed direction along roughly parallel routes about 5-10 metres apart looking for tortoises, turtles, tracks, and feces to make sure that no tortoises were missed. To record the time we spent, we used stop watch. We used local dogs to roam between and around the team members in the forest. There were 7 people in the timed searches; 3 core turtle team members, 3 students, and one local guide with two dogs. We spent two days of doing timed searches.

## 2.3. Results

**2.3.1. Interviews:** We spent two days conducting interviews with 18 households in the both villages. Most of the interviewees were men selecting from those who are working closely with forest and fishing. According to the interviews we got some interesting results. The villagers confirmed about eight different species of turtles in and around the areas. The results appeared to be reliable as during the interview we found 47 shells and 3 live turtles in households being kept even for food, medicine or trade, and nine of 47 shells were taken by our team. The three live turtles were: one Asiatic softshell turtle *Amyda cartillaginea*, two Asian leaf turtles *Cyclemys atripons* and one Asian leaf turtle was given to FA/WildAid rangers to release back to the wild. We currently identified six of eight species through live and shells at the villagers' houses and trapped turtles. These species are Asian leaf turtles *Cyclemys atripons*, black marsh turtle *Siebenrockiella crassicolis*, giant Asian pond turtle *Heosemys grandis*, yellow-headed temple turtle *Hieremys annandalii*, elongated tortoise *Indotestudo elongata*, and Asian box turtle *Cuora amboinensis*.

Among the interviewed people gave the information on threats that before 1990 the numbers of turtles were much more than at this present time because of small numbers of population in the areas and that it was the period of civil war (Lon Nol, Pol Pot regime) and murdering. Also it was the difficult time to trade animals as roads were very difficult. 100% of interviewees said that the numbers of turtle now are very low and some species they have never seen since that time. Following the 1990 decade many outsiders came to villages and bought turtles and other species selling to markets (Koh Kong, Phnom Penh, Thailand) and no effective controlling action or confiscation were taken in action. Until now people are changing their attitude in trading turtle they stop hunting directly maybe because of WildAid rangers and other NGOs cracked down but they always catch turtles for food instead and sell turtles at village, or plastron, and other parts of turtles to trader. To prove these we found two sacks of plastrons in villages. Villagers always take dogs to forest to find turtles, metal stick to excavate turtle in mud, turtle hook to fish softshell turtle, and turtle trap as well. Interview also showed that when people caught turtles they rarely release back to the wild. About 80% of interviewed people catch turtle for food and nearly 20% of them they release turtle back to natural habitat according to traditional belief.

We also found that about 50% of interviewees confirmed about one species that shell is soft, small side, the carapace is a bit curve and live in small stream in the mountain. We have not



been sure about the name of this species and we thought maybe it is a new species in Cambodia. We would like to find.

The interviews were also used to find out about the globally critically endangered mangrove terrapin or royal turtle, *batagur baska* as the area is close to the habitat of this species. But there was one villager provided this information and that he used to find a dead one down to the sea a bit far from the area during the year of 1997. So we thought that this species maybe used to be here many years ago. We also found three *batagur baska* were kept in captivity for raising family prosperity in Koh Kong town.

### 2.3.2. Turtle Trapping

We spent nine days trapping turtle with 28 small and two big traps in two big lakes and one small stream of flooded forests and grasses with a lot of big tree. We caught four different species among the eleven turtles we trapped. These are Yellow headed temple turtle, black marsh turtle, Asian box turtle, and Asian leaf turtle. In those, we caught seven Asian box turtles *Cuora amboinensis*, two Asian leaf turtles *Cyclemys atripons*, one black marsh turtle, *Siebenrockiella crassicollis*, and we also trapped a new record of yellow-headed temple turtle, *Hieremys annandalii*. It is the new live record for the area as before only information from local people and shell are confirmed. We also found that this species are much endangered because of catching for food by local people. This turtle is classified as endangered in 2005 IUCN Red List.

### 2.3.3. Timed Search

We spent 12 hours with 7 people and 2 dogs walking in the diverse places, evergreen forests, low land area, wet forest, and the grass veals (meadows or clearings). So we spent about 108 men-dog-hours but we did not find any tortoises or turtles.

## 2.4. Conclusion

Results from the interviews showed that there should be eight species in the areas. We found six of them and we hoped that the two species: *Manouria impressa* and Malayan snail-eating turtle *Malayemys subtrijuga* should be also in the area. About 55% of people confirmed about the *Manouria impressa* and 18% of household confirmed about *Malayemys subtrijuga*. We also tried to make sure that whether they were quite good on these species and we thought the results can be reliable because all species confirmed during interview we already found six.

One people confirmed about the Asian giant tortoise, *Manouria emys* (endangered species) because he just caught last December 2004. He also guided us to find shell on the mountain but we did not find.

The areas we did survey are very good for turtle because most of the areas are flooded in the rainy season with freshwater and in the dry season with salt water pushing freshwater away and the freshwater becoming less and less. This can be a threat to turtle as not so much freshwater and it is easy for people to catch turtle for food or trade. But we thought that there should be more turtles in the two lakes because we trapped turtle only 9 days but we caught 11 turtles so if we spend more days there will be a lot of turtles would be caught. We found that in and around the lakes there used to be Chamkar (cropped fields) and they are also close to village.

Even though the area is under controlled by FA/WildAid, many threats still happen regularly because of the area is closed to Koh Kong town and the border with Thailand. Other way



there is a water way that is easy to take the turtles and tortoises to the other areas, and sometimes the traders come to buy not only the turtles and tortoises but also other wild animals at the villages.

There are still threat to turtles and tortoises as we found a lot of shells in the villages and some of the shells were very fresh and even small turtle, people still catch for food and sell for daily food. We also found and heard a lot of new cutting trees in the forest during our timed search in the montane. This activity can be also threatened to turtle species as well because they occasionally depend on wild animals to support their live in forest including turtles.

## 2.5. Discussion

Based on the interviews showed that there are a lot of interesting and suitable habitats for turtles such as lakes and flooded forests in and around the survey areas and down to the sea. There is one lake in the mountains that people use to catch turtles in dry season and the lake is being rich in turtle as in dry season people always step on turtle if they go into the lake. So we think that if can trap turtle there it would be great.

We thought that more population of people in the areas, there will be more threats to turtles and tortoises as people always catch for food, trading, and medicine.

There should be more species of turtles and tortoises in the area because there is few turtle survey in the areas.

The people in the area are low understanding about turtle conservation so village or commune chief or other NGOs should provide training to them on this issue.

## 2.6. Recommendations

There should be more surveys in the areas to find out the other species that people have confirmed such as impressed tortoise and snail-eating turtle.

FA/WildAid, the enforcement team, should take more actions to stop illegal catching turtle for food and selling because during our survey we found many shells in the villages and should stop people catching turtle in dry season because this time is the serious threat to turtle.

There should be conservation training to local people there, especially on turtle issues because people don't really understand about the important of wildlife yet.

We would need local authority to control the area and security during our trip survey.

## 3. Khnang Krapeu Mountain Survey

### 3.1. Survey Area

The team did survey on the top of a mountain range in southeast of Central Cardamom Protected Forest (CCPF). The area located in Taing Bampong village, Rolerk Kangcheung commune, Kampong Speu province. To get to the mountain, we started from Taing Bampong village by walking and we needed to spend one day walking from low to high attitude along logging road and food pass. From village to mountain we can access water only on mid road and on the top. There were a lot of streams on the top of the mountains. On the top of the mountain was full of original pine trees and grassland. **See distribution map and appendix 12 for survey photos**

The main purpose for this trip was to find out the presence and status of the endangered big-headed turtle *Platysternon megacephalum* and others possibly found in this area.





## 3.2. Methods

### 3.2.1. Household Survey

Before commencing the survey we spent one day in the village to find out the distribution, abundance, composition, and threats to turtles and tortoises in the areas. The survey was using turtle photo sheets and informal interview with local villagers. We did interview with 7 households in the village and most interviewees were men who are closely going in the forest. We also observed some houses to find out whether they have turtle shells so that we can identify the distribution of the species in the area.

### 3.3. Biological Survey

#### 3.3.1. Trapping

We used two traps along with the tortoise timed search in stream, forest, and Veal. The traps were using baits such as banana, papaya, and fish to attract turtle. The traps were put in one stream top of the mountain. The distance between one trap to another was about 100 metres where we thought it was a good place for big-headed turtle. The reason we used only 2 traps because the hill is in high altitude, very difficult footpath. See Appendix for trap location

#### 3.3.2. Tortoise Timed Search

We used local dogs to roam between and around the team members. There were 5 people in the timed searches; 2 core turtle team members, 2 students, and one local guide with two dogs.

## 3.4. Results

**3.4.1. Interviews:** According to formal and informal interviews with some local people in the village showed that there were probably about 8 turtle and tortoise species in the surveyed area. These species were Yellow-headed temple turtle *Hieremys annandalii*, Elongated tortoise *Indotestudo elongata*, Impressed tortoise *Manouria impressa*, Asian box turtle *Cuora amboinensis*, Asian giant pond turtle *Heosemys grandis*, Black marsh turtle *Siebenrockiella crassicolis*, Asian leaf turtle *Cyclemys atripons*. We observed two shells in a household hanging on the kitchen (one elongated tortoise and one Asian leaf turtle). Most of the people said that villagers always catch turtles and tortoises for food and plastrons always sell to traders who always come to buy in the village. One kilogram of plastrons costs about 20,000 Riels (US\$ 5).

#### 3.4.2. Turtle Trapping

After 4-day trapping in a stream using baits such as banana, papaya, fish we did not trap any turtle.

#### 3.4.3. Tortoise Timed Search

We spent 8 hours and twenty minutes during the whole trip with 5 people and two dogs. During the trip we also spent 2 hours (8.20 hrs) at night looking for big-headed turtle along a medium flowing stream with a lot of big caves. Furthermore, we spent 1 hour and twenty minutes in the early morning looking for tortoises and turtles in grass field and forest nearby. So there were about 58 men-and-dog hours finding turtles and tortoise.

Unluckily, our team did not find any turtles or tortoises during our searches. Instead, we found a lot of snares for catching wild pig, red muntjac, wild chicken, and others. Our team also found a 2.5-meter skin of python hanging in the forest (48P 367046, 1293855) and a dead hog badger *Arctonyx collaris* was caught in a snare (48P 370862, 1292178). Furthermore, we found one camp with no people and one burnt wild pig hanging on a stick probably for food or for bait to catch big animal (48P 367832, 1293670). Most of the surveys we always saw many wild pig, red muntjac, and stump-tailed macaque.



### 3.5. Conclusion

Even though we didn't find any turtles or tortoises but we still thought that there should be 8 turtle and tortoise species because most of villagers that we did interview they were very sure with the turtles and tortoises and to prove this we found two shells of two species that were newly eaten. They also mentioned about the endangered yellow-headed temple turtle in their area so if this is true we can conclude that there will be 8 species of turtles and tortoises in the Central Cardamom Protected Forest (CCPF).

### 3.6. Discussion

According to our observation along the road and villages we recognized that there are still a lot of threats to wild animal especially turtle and tortoise such as logging, hunting, mining, and land clearance.

Most of people said that on the top of Khnang Krapeu there were many turtles and tortoises but when we did survey there we did not reach our purpose so we thought that this was because there were many hunting there and also maybe because the area is full of predators such as wild pig that this species can eat turtle and tortoise eggs when they hatch in the forest. We did not find more shells in village maybe because shells always trade to middleman.

Also, many resin extractors went to forest and they normally depend on wild animal for food so if they find turtles or tortoises they always catch for their daily food.

Comparing to other areas we did timed search before with the similar spending times we thought that this area is being excellent for turtles and tortoises but we did not find.

We surveyed in 4 different streams in the mountain, some small and some big with rock caves both night and day but we still couldn't find big-headed turtle so we thought that maybe this is not a good habitat for this species.

### 3.7. Recommendation

There should be more surveys in the areas to find out the other species that people have confirmed such as impressed tortoise, yellow-headed temple turtle, Asian box turtle, Asian giant pond turtle, and snail-eating turtle.

Many cutting trees in the forest along the road from village to Khnang Krapeu mountain (48P 371032, 1291989) and 5 ox carts in the forest close to the village (48P 373699, 1295469) are very active in the forest so we need to stop these illegal activities so that we can help conserve our wild animals.

CI should establish a ranger station at that area to stop logging road, hunting and wildlife trading from the village to market.

## 4. Prek Yuon and Prek Angkunn Survey

### 4.1. Survey Area

Prek Yuon is divided from Areng river at down stream. The river can row up from Trapaing Rong ferry crossing and can take about three hours. Prek Angkunn village is located along the Trapaing Rong river continuing from Areng river and is very close to the sea and surrounded by flooded forest and forest. This survey was to mostly assess the possible presence of two endangered species, the Cantor's giant softshell and the yellow-headed temple turtle. **See appendix 12 for survey photos**



## 4.2. Methods

During the trip we used three methods: formal interview following a set questionnaire, live-trapping using bait, and timed searches using local trained dogs and guides. We conducted surveys in two different places and habitats. Those areas were Prek Youn for finding Cantor's giant softshell turtle and Prek Angkunh for surveys of the Yellow-headed temple turtle. The areas were confirmed to be rich in turtle species through interviews with local people by our team from the last trip at Tatai Krom. So we decided to do survey there to confirm the interview findings.

There were 7 people joined in this trip, including one BP team member, three students from RUPP, a local guide, a policeman who would help find turtles and tortoises by walking transects with us, and also helping in case of meeting poachers in the forest, and a cook who would help at the camp and cooking food when we were tired from the field.

We spent 11-days (10<sup>th</sup> to 21<sup>st</sup> Feb 2006) trapping and doing timed searches. We trapped at Prek Youn for 8-day and Prek Angkunh for 3-day. We used 52 small traps and two big traps by putting them in the river and in the small marshy lakes around the areas.

We also did tortoise timed search along the forest nearby. The method was to find out the presence of some terrestrial tortoises and concealed turtles. We used a local dog to help find turtles and tortoises, as they were very good at sniffing hiding tortoises.

## 4.3. Results

**4.3.1. Household interviews:** We did interviews with 15 families in Prek Angkunh village and 5 families at Trapaing Rong village and we found some reliable information. One hundred percent of interviewees at Prek Angkunh village strongly confirmed about the presence of seven species of turtles. These species are Elongated tortoise, yellow-headed temple turtle, giant Asian pond turtle, black marsh turtle, Asian box turtle, Asian leaf turtle, and Asiatic softshell turtle. Interviewees at Trapaing Rong identified six species of turtles and tortoise. Those species are Elongated tortoise, Asian giant softshell turtle, giant Asian pond turtle, black marsh turtle, Asian box turtle, and Asian leaf turtle. But there was no confirmation about the yellow-headed temple turtle at Trapaing Rong. This was maybe because the area is a bit far from the flooded forests and the area is located at the higher position than Prek Angkunh.

### 4.3.2. Turtle trapping

**4.3.2.1. Prek Youn:** All of the traps were put along the edge of the very deep river (it was up to 3.5 meters deep) with UTM recorded. We spent 8 nights trapping turtles we caught 1 Asian softshell turtle at the second night (**See: Appendix 6**). We also caught many fish in the traps and 4 traps were broken by animals. The softshell turtle was released back to the river after recording and measuring.

**4.3.2.2. Prek Angkunh:** We used 12 traps to catch turtles in the seasonally flooded forest in the rainy season and canal in forest (**See: Appendix 6**). The reason we used 12 traps due to there was not many places to put traps because it is the dry season as ponds and canals became dry everywhere. The baits we used were only fish and banana. After 3-day of trapping we caught three Asian leaf turtles in two different traps. After marking and recording we released them back at the same habitat with Buddhism inscriptions.

### 4.3.3. Tortoise timed search

**4.3.3.1. Prek Youn:** We did timed searches in different vegetation of habitats such as grasslands; flat areas, hill stream, semi-evergreen forest. These areas ranged from sea-level to



about 115 meters. We conducted line walks for tortoises and turtles with 5 men and two dogs for two hours so in total we spent approximately 19 men-and-dog hours in the forest. As the result we found no tortoise and turtle but we found some signs of elephant's dung and tracks instead.

**4.3.3.2. Prek Angkunh:** We searched turtles and tortoise using dogs at flooded forest close to the sea to survey the presence of tortoises and turtles. But our team did not catch any turtles or tortoise. According to local people, they said that the surveyed areas were very rich in turtles in the rainy season, but in the dry season the turtles were hiding underground.

#### 4.4. Discussion

According to our observation we thought that Prek Youn is still rich in Asiatic softshell turtles because we still caught a juvenile Asian softshell turtle in the river. On the other hand, we importantly found that the areas are being under threats because we found that along the river's edge there were ten bamboo sticks of lining hooks putting along the river for catching softshell turtles. Also, people from Veal Tapou and Trapaing Rong sometimes come and fish at the area. Our team met a turtle hunter at Trapaing Rong village and said that he just caught two of Asiatic softshell turtles and sold to an outside trader. We just stayed at village one day but found two turtles in the village, so we think that some of people at Trapaing Rong and Veal Tapou are still frequently hunting turtles. According to police who accompanied with us, he recognized that in Trapaing Rong there is a turtle trader who always buys turtles from hunters and then re-sells to others from outside.

Even though the area was difficult to go because of hard moving water current, people still get there to find animals. The guide said that last year there was a Vietnamese motor boat came and poured poisonous chemical to the water and after that there were many fish died including eels that floated up to the water surface. So this was a very big threat to turtles and other animals living depending on water.

Prek Angkunh is one of the confirmed areas during our interview to be rich in turtle species such as black marsh turtle, giant Asian pond turtle, Asian leaf turtle, elongated tortoise, yellow-headed temple turtle, Asian box turtle, and others. We surveyed there only 3 days but we found two Black marsh turtles in the village and three Asian leaf turtles during trapping. So this place is still rich in turtles.

We did not find the endangered yellow-headed temple turtle because people said that in the dry season this species always goes to hide under the ground and one more reason is that there is less water at this time so they need to hide instead of moving around. People said that surveying for turtles in rainy season we will discover lots and we did agree with them, as we surveyed similar areas nearby last rainy season and found five different species including the Yellow-headed temple turtle.

According to Village chief, there was less threat to turtles at Prek Angkunh because most local people are depending on fishing in the sea for their personal income. But we observed that the area is becoming serious threats to turtle because the area now is under control by a Chinese company and that they are clearing the forest for their plantation.

Black marsh turtles were also found in Prek Angkunh where it is a flooded and flat area and we used to find this species in similar habitats such as Koh Andeth village, Areng valley. So



we thought that if we go to Prek Angkunh in the rainy season we could find many of these species in the wild.

People said they rarely found giant Asian pond turtle in the dry season because it is the time for them to hide from their predators and the dryness and heat.

In the rainy season the area will be full of freshwater, pushing the salt water to the sea. The villagers said that at that time the turtles always come down the rivers along the current to lay eggs and find food in the flooded forests.

#### **4.5. Conclusion**

**4.5.1. Prek Youn:** According to our results we could conclude that Prek Youn was the good place for Asiatic softshell turtles and Asian leaf turtles because the river is very deep along with forest and mountains nearby. But there are many threats to softshell turtle through hunting using the turtle-line-hook to fill the market demand and we thought that if there is no immediate action to stop these illegal activities, softshell turtles may be almost extinct from that area of river in the near future.

**4.5.2. Prek Angkunh:** There should be seven turtle species in the area according to interviews and field research. Based on household surveys and trapping we could assume that the area is still rich in turtles and that information from local people could be reliable because we already found and proved three among the seven they confirmed. We did hope that the yellow-headed temple turtle could be there because all people were sure about this species and it is endangered.

We thought that the best time to find turtles is in rainy season because this time all species are active and come out to find food and lay egg. But in the short future the area will face a serious problem because of forest clearance for plantation by Chinese company.

One more threat to turtles was that when people caught turtle they rarely release back to the wild they always consume it as food or sell it to traders instead.

#### **4.6. Recommendations**

**4.6.1. Prek Youn:** WildAid and local authorities could take actions to patrol the river because we found many turtle hooks that are a kind of illegal material to catch the IUCN-classified Vulnerable Asian softshell turtle.

One more threat to hard and softshell turtle was that people use iron sticks with three sharpened spikes. Hunters push it into the ground where they thought turtles are hiding, in order to spike them and capture them.

We talked friendly with guide, cook, and police and they acknowledged that people have a lot of tricks to escape from WildAid and FA teams because they have a hunting network. More importantly, they said that even local polices are also committing illegal hunting on wildlife.

According to the policeman, he said that in Trapaing Rong there is currently a wildlife trader that is always collecting the illegal hunting wildlife products to re-sell to the market.

**4.6.2. Prek Angkunh:** We recognized that the most serious threats to turtle and tortoise were in the rainy season but in the dry season was mostly just a threat to Asian leaf turtles because this species always lives in a pond or stream and does not hide, so when there is not much water in the dry season it is easy to find them.





The Chinese company should be stopped because they now deforest the area for a commercial plantation. This will destroy the habitat of seven turtle species including two IUCN endangered species and four vulnerable species.

## 5. Phnom Bakan Survey

### 5.1. Survey Area

Phnom Bakan is one of the highest mountains in southwest Cambodia. It is about 1400 meters altitude. It is located in the northern of CCPF. Looking into aerial photos showed that the area is more isolated comparing to other areas in CCPF with a very suitable habitat such as open grassland, every green forest and it also showed that the area is being rich in mountain stream and river flowing to other rivers before going to the sea. Significantly, the area is considered as the abundant location for research as there has never been researched in this area before by scientists. **See Appendix 9 and appendix 12 for survey photos**

Our objective in this survey was to find the endangered big-headed turtle- *Platysternon megacephalum* because we thought it was an appropriate habitat as it is an area rich in rocky streams with high altitude. More significantly, we would like to confirm the presence of the vulnerable impressed tortoise- *Manouria impressa*.

After a 12-day survey in the forest, we found some interesting results. We did timed search both in the days and nights in the streams and evergreen forest to look for big-headed turtle (*Platysternon megacephalum*), and impressed tortoise (*Manouria impressa*) and other species. In total, we spent 10 hours with three people (no dog) both in the days and night about 30 men hours to look for turtle and tortoise. We looked in some very good and suitable streams with a very high altitude and very wet weather. To look for big-headed turtle we used a scoping net for catching turtle but we did not catch any turtle. We also found that in the stream there was no fish or crabs which we thought there were not enough food for big-headed turtle. So we acknowledged that these streams there should be no big-headed turtle because even the guide who had been a hunter for years he completely didn't know about this species.

According to our interview with a guide provided that the montane is being rich with impressed tortoise and to prove this we also found one fresh eaten shell both carapace and plastron of this species at the hunter's camp. The shell was completely burnt for food. We also did timed searches in the forest and we found that all of the forest are still very good for this species such as high altitude, full of food (mushroom), and cold whether (permanent wet) with a very suitable habitat of evergreen forest. We also found a pile of impressed tortoise's dung in front of hiding hole under the root of a big tree. The guide said that this species should be around but we did not find tortoise.

During our timed search we also found two adults in the day time and one juvenile in the night time of Asian leaf turtles- *Cyclemys atripons* along the flowing streams that we have thought should not be in such a high altitude like that but we successfully identified it. We also found one shell of this species at a hunter's camp, which was hunted for food.

Furthermore, the survey also found a lot of frog species that some of them were identified to be new species in Central Cardamom Protected Forest as well as in Cambodia.

Since our research started we concluded that one serious threat to tortoise and turtle is that people use their trained hunting dog for finding concealed animals such as turtles and tortoises. But according to our observation and guide, in this area, hunters don't take their dog along because they are afraid that their dogs would step on their cable snares and converted mining snares. So we thought that even turtles have always been caught for food in the forest



by hunters but it is not serious threats like using dogs for finding animals and that case there should be still tortoises and turtles in the area, especially impressed tortoise.

We recognized that the area is being threatened by poachers using effective equipments to snare preferred animals. So in this case the government rangers should take immediate patrol to stop these activities, otherwise, our animals in this area will be extinct in the short future.

## **6. Chiphat Survey**

### **6.1. Study area**

Chiphat is located in Tma Bang district, Koh Kong province. We can access to Chiphat on national road 4 and stop on the second ferry crossing and keep going by boat up to the right. Three hours will be taken from Andoung Toek to Chiphat commune. Before 1979 Chaphat was a district town but from 1979 the capital of district was moved to Tma Bang until now. Chiphat is close to Areng Valley, which people can travel from Chiphat to Areng by motor. It is an area that most of conservation NGOs thought being the hot area in hunting and trading animal for food and supplying market demands. Most of people living in Chiphat, they migrated from other provinces such as Takeo, Prey Veng, Kandal, etc.

Chiphat commune has four villages, Toek La Ork, Chiphat, Chumsla, and Kamlot villages. Teok La Ork village is located along the way down stream to Andoung Toek and the water is mixed between fresh and salt water. We selected two villages for interviewed-Toek La Ork and Chipat villages because they are close to the river.

### **6.2. Survey Objective**

According to some people reside in Tma Daunpov commune where we distributed T-shirt last month said that they used to catch Royal Turtle- *Batagur baska* in the river around Chiphat commune. So this trip was to discover the presence of this critically endangered species. Also, we would like to get information on some other species that can possibly find in this area, especially the endangered Asian giant softshell turtle because it is about the habitat of this species.

### **6.3. Method**

We used set questionnaire for interviewing with local people who are mostly depending on NTFPs and other natural resources from the river. We used the semi-structure interview with the local people and middlemen who have being bought wild animals. Interview will be also used turtle photograph to show people for clarifying the turtle species whether they are presenting in their areas. Aside interview, we observed the situation in and outside residence of local people to be able to access threats to turtle and other animal such as turtle traps, snares, turtle hook, and shells.

### **6.4. Results**

After we interviewed with the local people in Chiphat commune we found that it is a very suitable habitat for many wild species, especially the river is being good for the critically endangered species-*Batagur Baska*. We also found that all the people living there are depending on farming by shifting forest into cultivation and collecting wildlife product for food and trading. They are usually used dogs, fishing spears, and traps for hunting and fishing turtles. During interview, we saw many parts of animals such as water monitor being burnt for local consumption, meats of wild pig and red muntjac. Significantly, we also found ten plastrons and carapaces of Asian leaf turtle and elongated tortoise that people kept in their house for selling after taking the inside out for food.



Some people confirmed that there are four middlemen (figures1) in the commune and they always export animals to outside, especially to Andoung Toek, Koh Kong town and Phnom Penh for food and other demands such as medicine and some are exporting to neighboring countries. The species that are putting in high price in market are turtle and pangolin. For the low price animals, they just sell to their neighbors for food and sometime for medicine such wild pig, turtle, red muntjac, water monitor etc.

Furthermore, we observed along the river from Andong Toek to Chiphat we acknowledged that the habitat is being suitable for mangrove terrapin or Royal turtle. Most of people living along the river, they know clearly about this species because they just caught a juvenile of this species in about last two months and it was escaped by over rain in the village. People said that there is a river connected from Sre Ambel area and Sre Ambel is being rich in this species. The river is called Stoeng Praot. Fishermen normally catch batagur Baska every year from January to March because there is not much water in the river.

Beside of this species, there are other 7 species presented in the area including elongated tortoise, Asian leaf turtle, giant Asian pond turtle, black marsh turtle, yellow-headed temple turtle temple, Asiatic softshell turtle, and Asian box turtle.

### Main Threats on Turtle

- Catching by fisherman using fishing spear, trap, fishing net.
- Hunter using dogs for finding concealed turtles in the forest
- High price in market
- Catching for food

**Table 2.** Turtle Price in local village

No	Name of Turtle	Price (Riels)		
		Carapace (Riels/kg)	Plastron (Riel/kg)	Alive (Riel/kg)
1	Asian Leaf Turtle	3000	15,000	3,000-5,000/Kg
2	Black Marsh Turtle	5000	20,000	30,000/One
3	Elongated Tortoise	5000	20,000	10,000/Kg
4	Mangrove Terrapin	N/A	N/A	3,000/Kg
5	Giant Asian Pond Turtle	5000	5000	5,000/Kg
6	Asiatic Softshell Turtle	3,000	N/A	3000-5,000/Kg
7	Yellow-headed Temple Turtle	N/A	3,000	5000-15,000/One
8	Snail-eating Turtle	5,000	10,000	20,000-50000/One
9	Asian Box Turtle	5,000	10,000	3,000-10,000/One
10	Impressed Tortoise	Back spur for medicine and plastron 5,000/Kg		

**Source:** Interviewed with local people, 2006

**Exchanged rate:** 1\$= 4100 Riels



**Table 3.** Location of turtle species

No	Name	Area (Koh Kong)	UTM		Date	Observation
			(East)	(North)		
1	Yellow Headed Temple Turtle	Stung Proat, ChiPhat	330150	1254140	10/1/2002	Interview
2	Mangrove Terrapin	Stung Proat, ChiPhat	330247	1254050	22/12/2003	Interview
3	Mangrove Terrapin	Stung Proat, ChiPhat	333898	1251509	28/11/2004	Interview
4	Yellow Headed Temple Turtle	Stung Proat, ChiPhat	330483	1253899	12/11/2004	Interview
5	Asian Leaf Turtle	Stung Proat, ChiPhat	333786	1237566	1/2/2005	Interview
6	Black Marsh Turtle	Stung Proat, ChiPhat	331016	1254535	2/1/2005	Interview
7	Asian Leaf Turtle	Stung Proat, ChiPhat	332702	1251484	10/1/2005	Interview
8	Mangrove Terrapin	Stung Proat, ChiPhat	330954	1254167	23/2/2005	Interview

## 7. Big-headed Turtle (New record)

According to confiscation information from the Environment for Education- Vietnam (ENV) along the border between Cambodia and Vietnam recorded many cases regarding turtle trades going across the border in order to import into Chinese markets. In April 2006, Vietnamese authority confiscated 45 big-headed turtles from traders being escaped from checking point. The authority said that these turtles were exported from northeastern Cambodia. In June 2006, the team led by David Emmett did a field survey at Virachey National Park in Rattanakiri province to discover this endangered species in the wild. However, we did not find the present of this species in the wild but we still got some information from local people and park rangers regarding this species to be occurred in the park.

A recent patrol in November 2006 of Virachey National Park, in northeastern Cambodia, by Ministry of Environment rangers produced a rare record and photographs of the big-headed turtle *Platysternon megacephalum*. This is the first confirmed record of this endangered turtle in Cambodia, and it is highly significant from a conservation standpoint. The turtle was found in a high altitude every green mountain stream during their patrolling in the area. We brought the turtle to Phnom Penh city for studying and feeding it with fish and shrimps. It was also kept in a very cool water tank as it can't survive in normal water. We kept the turtle in Phnom Penh for a week and then we took it back to release and photographed at the point of capture.

So we think that it is a great chance to discover this species in Cambodia and that Cambodia has 12 species of freshwater turtles and tortoise including this rare species. Furthermore, we would like to follow up this finding with surveys both in that area and in other suitable habitats in and around Virachey National Park.

## 8. Market survey

On 20 November 2005 my colleague, Sorn Pheakdey working for WCS, Cambodia and I, CTCP, did a market survey at Tom Nob market that located in Toul Kork district, Phnom Penh, Cambodia. It is just a small market and during our visit we found three different turtle species among 33 live turtles were putting in a small bowl and selling to marketers. We also identified that there were 17 vulnerable Asian box turtles *Cuora amboinensis*, 15 Malayan snail-eating turtles *Malayemys subtrijuga* and one endangered yellow headed temple turtle



*Hieremys annandalii*. In total there were about 2 kg of turtles of 33 turtles. All turtles were brought from Prek Phnov Lake where located in about 20 Kilometers to the North of Phnom Penh. The seller said that they used fishing traps to catch turtles.

We recognized that all turtle were very small because the biggest one was just 6.5 cm in length and some were very small. We found that most people they bought turtles for releasing and place that they are releasing are in pagoda ponds. We met a woman who bought a pair of turtles said that the reason she bought turtle because she had a pity on these turtles as they were so small.

The price of turtle was 1500 to 2000 Cambodian Riels (0.4-0.5USD) for one turtle and the price would come up if they sell on every Buddhist day and especially on full moon day because people are believing that if they release turtles on those days it means that they absolved their sins with turtles and they would achieve their goodness or merit.

## 9. People Belief

On 10<sup>th</sup> Oct 2005, we went to survey at the Prasat Raingsey pagoda in Kandal province observing on an impressed tortoise- *Manouria impressa* that many people are worshipping. According to the information from believing people said that this species was caught when it was floating in the river by a fisherman, living in Kampong Cham province, during his trapping in a river near a lowland mountain. Than he kept in his house only one night but his family couldn't perform well because it seemed like there was a strange thing came to their dream. So after that night he and his family decided to take it to keep in Kampong Cham pagoda. In the night later, another laypeople living in the village where the pagoda is, dreamed that this species was from heaven to help poor people who pray this strange tortoise and said that it didn't want to stay at this pagoda and told the name of the pagoda called Prasat Rangsey where she want to live. Cambodians believe once they caught the turtle from the wild, they would send to the temple or pagoda for good luck.

**Figure 15.** People worshipping *Manouria impressa*



For this powerful and lucky tortoise, crowd of cheerful people together filling with traditional Khmer music made a ceremony parading this tortoise to the pagoda. It is now keeping for worshipping in old Buddhism belief for people from outside and inside. This pagoda is also raising a lot of money from this tortoise because many people have relief on Buddhist. When sick people want to be better they come to cure there by drinking that people plashed on the tortoise in a bowl. The pagoda monk chief said that it's sure to treat many kinds of illness.

All people had to pray tortoise when they were in the temple so that the tortoise, people believed as the guard of Buddha, will not be angry and will give prosperity, and good luck. This was the rule from the pagoda's head and monks.

We observed that there were many risks to tortoise. In the day, people kept tortoise on a flat with the same size of the tortoise together with bowl full of water on the bottom. She was staying nearly all day on a flat. They didn't provide enough food just only a few lotus flower and mushroom. In the night she was kept in a closing room. People did not understand about the behaviour of this species at all because sometime they put her in water.





# Chapter V

## EDUCATION

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### 1. Ranger Training

**Figure 16.** Gov't rangers participated in turtle training



On Monday 17<sup>th</sup> October 2005, CambodiaN turtle team held a training course in Phnom Penh in collaboration with Conservation International. There were 35 participants including our team joined the course. The participants were from WildAid (Mobile Team Unit), WCS, FFI, and government agencies (FiA, FA) and most of them were patrolling rangers. The course consisted of four main topics: The Ecology of Turtle, the Asian Turtle Crisis, Turtle Identification, and Turtle Handling and Releasing Turtle. We also included two turtle tests in the

course about how to identify the 11 confirmed species and one introduced species. We provided this course to rangers because in the whole country there are many wildlife trades and when they confiscated turtles, tortoises and other wildlife they are not so sure where to release the animals and most of them are poor in identify turtle species.

In October 20, 2006, the team also provided training course to government rangers who are working in CCPF with financial support from Conservation International. There were six rangers joined in the course as some of them were in forest patrol. So in total, we completely provided training regarding turtle and tortoise conservation to 41 government rangers.

#### 1.1. Turtle Ecology

This topic was to give some better knowledge to them about how the turtle adapt to the nature, classification of turtle, sex determination, age measurement, habitat, diet, breeding strategy, and predators of turtles and tortoises.

#### 1.2. Asian Turtle Crisis

This section was focused on the turtle trades in Southeast Asia. We wanted to show to participants that how people are taking advantages from turtles and tortoises, especially neighboring countries and China. In addition, we also included the Cambodia's wildlife law that took place for protecting the wild animals. Most of the course was about threat to turtles such as habitat destruction, hunting, trading, cultural and religious belief on turtle.



### 1.3. Turtle Identification and Handling

This section was to provide better understanding on turtle identification. This is a very important topic because we want to make sure they are quite in identifying turtle species and their habitats and releasing sites. After the power point slide show we gave a test to all participants to test themselves.

### 1.4. Conclusion

After the training course we gave a feedback form to evaluate the course. The results showed that all the participants said that the course was very important for their work and the most important part of the course was identification section and releasing sites. We concluded that about 90% of participants could easily identify the 11 Cambodia's native species and one introduced species.

### 1.5. Recommendations

- There should be more turtle training to people working on turtles or tortoises, especially government rangers and provide more short report and turtle pictures to them because it is very important for their work and we can share information.
- Turtle specialists should study about the suitable habitat and releasing sites for turtles or tortoises and the released sites have to be secret and need to identify which habitat is safe for releasing and not safe for turtles because when turtles were confiscated they are not so sure where to release back to the nature.
- Releasing need to clearly mention about the time, location.
- The rangers requested a Cambodian turtle guide book with details about each species and the establishment of the book has to be involved from specialized department and turtle specialists.
- They wanted to include about the length of laying eggs, hatchling of each species.
- We need to identify the sources of export and import from each province and country and who mostly involved in the trade
- We should confirm the presence of species not listed in the book that have been identified by local people
- They wanted to know other species in the neighboring countries, Asia, Europe and the way they conserve these species.
- We need to create as many as education program to the public so that we will more understand the important of conservation.
- There should be turtle survey along Mekong River and Tonle Sap Lake because many people used to confirm about catching these species.
- It is essential to collaborate with local authority so that they can help in protecting turtles

## 2. Community Training

We selected two different communes to provide education and awareness to local people. The communes we selected were O'Som and Tma Daun Pov. The communes were the places that we found to be rich in turtle species and that are needed to give education to the communities so that they would be happy to help conserve their valuable wildlife. In total, we choose 48 students, 22 people and 4 teachers in O'Som and in Thma Daun Pov we trained 33 students and 43 people including local community staffs and village chief. So in both areas, we completely trained 150 people and students in the CCPF.

O'Som is a commune in Veal Veng district, Pursat province and it is a rich commune in terms of biodiversity. In 2004 we did research at two different habitats (Veal Veng and Srepraing)



to look for the abundances of tortoises and freshwater turtles by conducting formal interview with local people and biological research for the presence of turtle species. After our surveys, we successfully found the presence of the endangered *Indotestudo elongata*, the vulnerable *Amyda cartilaginea*, *Heosemys grandis*, *Cuora amboinensis*, and *Manouria impressa*, and the near threatened *Cyclemys atripons*. Furthermore, we thought that it is still rich in turtle composition because during our survey we found many turtles.

Significantly, the commune (Veal Veng marsh) is also considered as the richest biodiversity in the world for the critically endangered Siamese crocodile.

We visited the commune to undertake training to community members in the importance of turtle conservation.

## 2.1. Training

We divided participants into two groups: 1) student training and 2) local people and teacher training. We performed like that because if we mixed together between the participants it would make it complicated for the students and people to get appropriate knowledge and culture.

### 2.1.1. Student Training

We have criteria to choose students participating in the course. We selected only students in higher grade from 3<sup>rd</sup> to 6<sup>th</sup> grade (the biggest level in the commune) and the students have to know how to read and write so that we can explain, teach, and discuss. We selected 48 students in O'Som and 33 students in Thma Daun Pob from different levels in the school.



**Figure 17.** Team with students (above) and people (below)- O'Som

### 2.1.2. People Training

For local people we asked the commune chief to select people, both men and women, from the 4 villages. We got 22 villagers and 4 teachers in O'Som and 43 people in Thma Daun Pov attending the course. All these people are living depending on doing shifting agriculture, planting rice, collecting NTFP such resin, wildlife and fishing.



### 2.1.3. Methods of Training

Before teaching we prepared training lessons in Phnom Penh and wrote each main idea and answers onto cardboards. We divided each lesson into six parts, including general information about conservation, understanding about turtle conservation, turtles in Cambodia and in the world, current threats to turtles, the turtle trade in Asia, and threat reduction. Some parts of the lesson we separated participants into groups for group discussion. We did that because we wanted all the trainees to share ideas and be active in turtle conservation. After each group discussion, they would write their answers and show to the other groups. At the end of the training we arranged some incentive presents to encourage people and students in conservation. We offered participants crafts, T-shirts, notebooks, story books, pencils, shampoo, salt, and hats to make them happy and remember our lessons about turtles and tortoises.

We also used turtle photos to ask and attract participants and to find out how many species in their areas.



We had some questions to students: “1) How many turtle and tortoise species in their area? 2) What are threats to turtle and tortoise in their areas as well as across Cambodia?” 3) What are possible solutions to save turtles and tortoises?”

**Table 4.** Turtle species to be occurred in the commune

Species	No of people confirmed about turtles
Impressed tortoise	19
Giant Asian pond turtle	17
Asiatic Softshell turtle	26
Elongated tortoise	26
Asian box turtle	26
Asian leaf turtle	25

We also asked people about the threats and threat reduction to turtles and tortoises to identify how much people know about how their behaviour affects turtles.

#### **Threat Factors:**

- Using dogs as their hunting partners
- Using fishing nets, hooks, fishing spear, etc.
- Poaching for selling
- Converting forest or marshes for agriculture
- Firing forest and grass land for farming and catching wild animals and turtles
- Deforesting for housing

#### **Threat Reduction** (suggestions given by the adults)

- Stop using electric fishing equipment
- Stop using fishing nets, hooks for turtles and fishes as well
- Stop catching turtle and tortoise for food
- Stop selling turtles species for food
- Stop deforesting or destroying their habitats
- Stop collecting their eggs for food
- Release turtles back into their habitats

#### **Threat Reduction** (suggestions given by the students)

- Stop deforesting and burning forest
- Reduce catching turtles for food
- Stop selling turtle and tortoise
- Conserve turtle species
- Stop using fishing nets and hook for catching turtle
- Stop taking dogs into forest
- Stop destroying their habitat
- Stop collecting their eggs for food
- Don't burn around the marshes and lakes
- Don't using electric equipments for shocking turtles

## **2.2. Conclusion and Recommendations**

So in conclusion, we recognized that all trainees enjoyed joining the training and they were very aware about the advantages of species conservation, especially turtle conservation, threats to turtles, and ways to conserve turtle very well. Significantly, they acknowledged that



many kinds of turtle species are living in their territory, of which people themselves threaten them.

The local students were excellent at knowing about threats to freshwater turtles and tortoises such as habitat loss, turtle trading, methods of hunting, and they also understood about conservation and they know some kinds of turtle species living in their forest and marshes. The students finally suggested that it was very important to help conserve turtles and tortoises for next generation otherwise they would be extinct in the near future.

As a result, we think that all students and people were very happy having such a good training because they could earn some benefit and knowledge. So there should be more training courses to their community, as it is a kind of helpful conservation not only useful for turtles but also for general biodiversity conservation.

### **3. University Students Training**

The project significantly trained three students from Royal University of Phnom Penh on turtle conservation and we also provided them some grant for their university thesis by providing technical, financial, and some other support during their implementing researches. Currently, they have involved with the project by helping research, report writing and administrative task.

Further more, we just completely offered training to other seven students from two different university regarding turtle and tortoise conservation. The purpose was to share knowledge and awareness to them so that they might probably share these advantages to their friends and families. All of these trainings we found that it was a very valuable training course to be happened in the future as it is a very important strategy to save our turtle species through public education.





# Chapter VI

## PUBLICATION

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### 1. Radiata

During performing our project, in 2005 we wrote a report focusing on impressed tortoise behaviors in captivity. The report was published in a magazine called “Radiata”. The magazine is a very popular one in turtle conservation around the world. The following is about what we wrote in the paper.

During biological fieldwork in the mountains of southwest Cambodia in July 2004, we found an adult female Impressed Tortoise (*Manouria impressa*) that had been captured by a local person for personal consumption. This was the first record of a live Impressed Tortoise in Cambodia; a very significant find as this species is classified as Vulnerable (IUCN, 2005) and global populations appear to be in decline due to trade. The tortoise was confiscated by government rangers and given to our research team to release. Before returning it to the wild, we kept it in captivity for three weeks to learn more about its feeding behaviour and activity patterns. After that time, we hiked up into the mountains for several days until we reached a suitable altitude and habitat to release the tortoise. After it was released, we observed its behaviour in the wild for two days.

#### Results

During its time in captivity, we observed the following:

- 1) It was offered a choice of tomato, green salad, green pepper, baby sweetcorn, cucumber, oyster mushrooms, straw mushrooms, slices of fresh bamboo shoot, apple, papaya and watermelon. It refused almost all food except for oyster mushrooms, though it occasionally ate small pieces of straw mushroom and bamboo shoot.
- 2) When it refused food (as it did for the first three days and occasionally thereafter), it was provoked into opening its mouth by touching it under the chin, then a piece of oyster mushroom was quickly put into the mouth. On almost all occasions, this stimulated it to feed.
- 3) The tortoise, which weighed 3.5 kg, was always given an excess of food and typically ate over a quarter of a kilogram of oyster mushrooms every day (although we do not know how long it had been in captivity without food prior to being confiscated, so this may be a higher figure than normal).
- 4) It did not eat mushrooms that were lying flat on the ground, and rarely ate any mushrooms that were lower than about 3 cm. It was seen struggling to reach food on the ground on several occasions, but was unable to easily put the head down because it has an up-turned plastron beneath the head.



- 5) It was most active around dawn and dusk, and it would only feed when light levels were low. It hid from direct sunlight.
- 6) It drank water that dripped from leaves, and appeared to enjoy being sprayed and cooled with water (it extended the neck and legs so water could run under the shell).
- 7) It occasionally entered a large pool of water and submerged itself until only the head was showing, but only when the ambient temperature rose above about 30C. When kept in an air-conditioned room at 20-25C, it did not bathe and was noticeably more active.

This behaviour reflected the environmental conditions found in its natural habitat during the wet season. It is normally found in montane evergreen forest above about 800 m altitude (Stuart et al, 2001). The montane forests of Cambodia where this tortoise lived were wet and cool during the wet season (we recorded temperatures of 16-21C at night, 21-25C in the day over 10 days). It rained almost continuously, the clouds often blanketed the forest, and the humidity was extremely high. There was almost no standing water on the forested slopes.

After it was released back into the wild, we observed the following:

- 1) The tortoise mostly ate mushrooms that were growing on fallen logs (at a height of about 5-10cm) and free-standing brown spongy mushrooms, full of maggots, which were similar in appearance to the *Boletus* mushrooms of temperate climates. On one occasion, the tortoise was observed eating a large dark brown, spongy mushroom that was growing in the leaf litter and muddy soil in the montane forest. The mushroom measured over 20cm in diameter and likely weighed well over 0.5 kg, and was entirely consumed.
- 2) It was never observed attempting to eat vegetation.
- 3) It was active during the day when there was heavy rainfall or low cloud cover, and was observed searching for food in the leaf litter.
- 4) It was seen drinking rain-water as it ran off the leaves.
- 5) When resting, it hid beneath thick vegetation or in the leaf litter.

### **Recommendation**

We recommend that captive Impressed Tortoises should be given a choice of food but should be fed predominantly on fungi, and that the food should not be placed directly onto the ground or in a bowl, but at a height of 3-10cm above the ground. If the tortoise refuses food, gently provoke it into opening its mouth, and then quickly insert a piece of mushroom. This should stimulate it to start feeding.

We strongly recommend that, that if captive Impressed Tortoises are not feeding properly or are losing weight, they are offered fly-blown oyster mushrooms or *Boletus* mushrooms. It is very possible that accidental consumption of maggots and other insects within mushrooms forms an important part of the diet of this tortoise. It could provide a source of protein that is lacking in captivity.

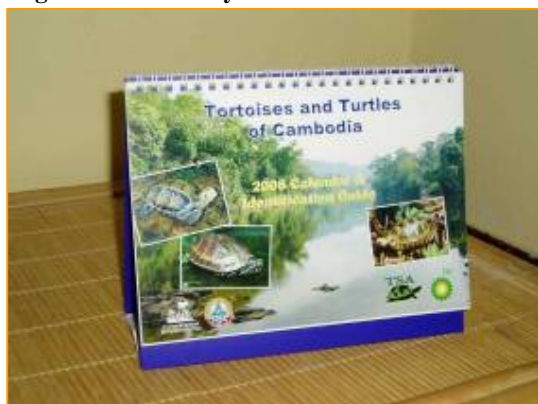
We also recommend that this tortoise species is provided with plenty of shade (preferably vegetation), it is fed at dusk, and that it is kept in high humidity at an ambient temperature of 20-25C and sprayed frequently with water. If possible, it should also be given the opportunity to drink water as it runs off leaves.

These recommendations will closely replicate the natural conditions for this species.



## 2. Calendar

**Figure 18. A round year 2006 turtle calendar**



To make the public aware and understand about the turtle conservation, we created a round year turtle calendar for 2006. The calendar was included all 11 native turtle and tortoise species of Cambodia and one introduced species that scientists considered as invasive species from North America. It was not only for year calendar but also for Identification Guide that would be benefit to mostly government rangers to identify species they confiscated from illegal traders. The calendar was co-funded by British Petroleum Conservation Programme (BPCP) and Turtle Survival Alliance (TSA) and with

collaboration with Conservation International and government agencies such as Fishery Administration (FiA) and Forestry Administration (FA). We produced calendars in two languages, Khmer and English version. We produced 520 copies in Khmer version and 480 in English version. So in total we printed one thousand copies that we sent out Khmer version to Cambodian nationality, especially for local communities in Central Cardamom Protected Forest and the English version were sent to all relevant stakeholders in Cambodia and some to donors and turtle specialists in around the world. Furthermore, some calendars were sold to interested people and the money gained from selling was sent to charity center to save Cambodia children.

**Table 5. Calendar Delivery**

<b>Khmer Version: 520 copies</b>		
<b>English Version: 480 copies</b>		
<b>Organization</b>	<b>No of Khmer</b>	<b>No of English</b>
<b>Local NGOs</b>		
Mlup Baitang	4	7
Pack	4	4
CEPA	3	
WPMU Viseth	20	3
Learning Institute	5	
Batagur baska project		60
WCS Sovannara	40	
<b>International NGOs</b>		
WWF Andy	40	
TSA		50
CI-Washington		5
US-UK		10
Env-ATCN		40
BP-UK	1	3
WildAid Thailand	32	5
FFI (Carl)	5	5
FFI	10	
UNDP	10	10
WCS	10	10



CI ranger	4	
Sharon Brook	3	7
BridLife	1	5
WildAid	6	10
<b>Scientists</b>		
Nepal scientists		2
Kai Olaf	5	3
Wayne, CI	2	1
<b>Ministry</b>		
Ministry of Environment	6	
Fishery Administration	110	60
<b>University</b>		
RUPP	10	15
Students	5	5
CTCP	140	
<b>Total</b>	<b>472</b>	<b>313</b>

### 3. Leaflet

In September 2006, the project in collaboration with other components of Conservation International created a combining leaflet in order to offer knowledge and awareness to the public. We also included all our activities and achievement onto the leaflet.

### 4. T-shirt

The project was also published a very important Tee shirt focusing on turtle conservation and the Tee shirts were mostly distributed to local communities, government rangers, and local authorities in and around Central Cardamom Protected Forest (CCPF). Importantly, we gave some of T-shirt to all other related NGOs who are working on wildlife conservation in all parts of the country such as NGOs forum for Cambodia, Conservation International, Wildlife Conservation Society, World Wide Fund for nature, Fauna and Flora International, and BirdLife International. We distinguished the big drawing turtle photo on the back with the five logos below the picture and in front of t-shirt on the right side we added the same turtle picture with our conservation message below.

**Figure 19.** Turtle T-shirt made by the project



## 5. Poster

In order to raise awareness to people and the publics, we significantly produced a 500 (size A2) turtle posters for the project. The poster was added all the twelve species onto the poster in order to make sure that people get understanding of what species they have in their home country and especially we also included some messages saying about banning people not to hunt turtle, about people belief on turtle and the departments that are being responsible of controlling these species and contact numbers in case of they meet any illegal activities. The posters were distributed to restaurants, ranger stations, local stores, commune office. We also offered them to partnership NGOs working on wildlife conservation such as CI, FFI, WCS, BirdLife International, WWF, ATCN, local NGOs such Save Cambodia Wildlife, Mlup Baitang, NGO Forum, CEPA, MRC, UNDP, and we especially sent to communities in the surveyed areas such as Tatai Krom, Trapaing Rong, Reusey Chrum, Thma Daunpov, Chumnoab, Chamnar, O'Som and other communes. We sent also to Wildlife Sanctuary, National Park, and Protected Forest in Cambodia.

**Figure 20.** Turtle poster made by the project





## Chapter VII

### NATIONAL WORKING GROUP

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We set up a National Working Group for the project. We held a big meeting with a lot of researchers in Cambodia from international organizations, government agencies, and local NGOs such as FFI, CI, WCS, WWF, WildAid, Wildlife Protection Office (WPO), and Fishery Administration (FiA). These people were very happy to have this group of networking on turtle issues in Cambodia. We organized two meeting between staffs from different organizations to inform about what we wanted them to distribute idea, data, conservation measures to the project. Aside that, the project always went to meet related organization staffs at their office to collect turtle data from their working areas. We gained quite a lot of data confirming about turtle distribution in many parts of Cambodia where they are working. We collected all kinds of data such as species distribution, species abundant, habitat, threats to turtle, areas of finding, etc. From these activities and the results from our project we also produced a turtle and tortoise distribution maps for each species. **See appendix 8 and 11.** We could include that there is now only 12 species in Cambodia as before there were only 11 species in Cambodia. We just discovered a new species for Cambodia through our effort in collaboration with other partners. This species was caught by rangers who are working for Vireakchey National Park in Northeast Cambodia. There were some confirmations during last and beginning of this year but we were still not sure till this time we caught an adult one for proof.

We will continue performing this activity to the future because we think that it is a kind of saving our globally threatened species in Cambodia.

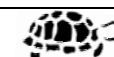
#### Asian Turtle Network and Environment Nature- Vietnam

Our results were also published on Asian Turtle Network website. It is the website focusing on turtle issues in Asian region. Through the website we also found a lot of interesting information regarding new species for Cambodia (*Platysternon megacephalum*), turtle trading between Cambodia and Vietnam. The Environment Nature- Vietnam was compiled a lot of data that were confiscated along the Cambodia-Vietnam border (See table below). The data showed that there are many threats to turtle and people are taking advantages from turtles to support their families. The ENV showed that trading turtles always re-export from Vietnam to support Chinese markets as Chinese people strongly believe in traditional medicine making from turtles and other animals.



**Table 6.** Trade Case Report

No	Case Title	Incident Date	Location	Shipment Origin	Shipment Destination	Species List	Case source
12	Trade seizure	Nov 10, 2004	Thanh Hoa	Nghe An Possibly Cambodia or Laos origin	Hanoi	3 Heosemys grandis 2 Heiremys annandalii 47 Cycelmys tcheponensis	Hotline: telephone
17	Wildlife Seized	April 3, 2005	Thanh Hoa	Long An Most likely Cambodia	Ha Noi	Soft - shell turtle: 156 kg snakes: 433 kg monitor lizard: 472 kg pangolin: 898 kg Turtle - mainly Heosemys grandis and Indotestudo elongata (3596 kg)	Hotline: telephone
48	Wildlife caught	May 27, 2005	Tay Ninh	Cambodia	unknown	Mangrove Terrapin (Batagur baska) Elongated tortoise (Indotestudo elongata) Giant Asian pond turtle (Heosemys grandis) Other Turtle (unidentified species)	Hotline: email
102	Turtle seized	Oct 3, 2005	Nghe An	Quang Tri Probably Cambodia.	Ha Noi	1 Giant Asian pond turtle (Heosemysgrandis) (4 kg) 7 Yellow-headed temple turtle (Hieremys annandalii) (11.4 kg) 112 Elongated tortoise (Indotestudo elongata) (197.6 kg) Monitor lizard (Varanus sp. ) (10 kg) 10 Impressed tortoise (Manouria impressa) Indochinese rat snake (Ptyas korros) (10 kg) Pangolin (Manis sp.) (10 kg)	Hotline: telephone



No	Case Title	Incident Date	Location	Shipment Origin	Shipment Destination	Species List	Case source
103	Turtle seized	Oct 10, 2005	Nghe An	The south Most probably Cambodia	The north	7 Giant Asian pond turtles ( <i>Heosemys grandis</i> ) (9.8kg) 3 Yellow headed temple turtles ( <i>Hieremys annandalii</i> ) (11.4 kg) 85 elongated tortoises ( <i>Indotestudo elongata</i> ) 12 Asian leaf turtles ( <i>Cyclemys tcheponensis</i> ) (72 kg) 8 Malayan snail eating turtles ( <i>Malayemys subtrijuga</i> ) (7 kg) 5 black marsh turtles ( <i>Siebenrockiella crassicolis</i> ) (4 kg) 1 Indochinese box turtles ( <i>Cuora galbinifrons</i> ) 3 Asian box turtles ( <i>Cuora amboinensis</i> )	Hotline: telephone
201	Macaques seized in Phu Yen province	March 29, 2006	Phu Yen	Binh Phuoc Possibly Cambodia	Vinh City, Nghe An Province	70 crab-eating macaques ( <i>macaca fascicularis</i> )	Newspaper/ media
220	Turtles confiscated and released	April 18, 2006	Kon Tum	Cambodia	Vietnam	45 big-headed turtles ( <i>Platysternon megacephalum</i> )	Newspaper/ media
225	Wildlife seized in Quang Ninh Province	May 7, 2006	Quang Ninh	Hai Duong Box turtles from south	Mong Cai, Quang Ninh	22 impressed tortoises ( <i>Manouria impressa</i> ) 7 Asian box turtles ( <i>Cuora amboinensis</i> ) Snakes (unidentified)	
228	Wildlife seized from trade	May 10, 2006	Nghe An	Possible Laos Or Cambodia		Pangolins ( <i>Manis</i> sp.) 18kg Monitor lizard ( <i>Varanus</i> sp.) 15 kg 3 Turtle (unidentified species, "rua da" in Vietnamese)	



No	Case Title	Incident Date	Location	Shipment Origin	Shipment Destination	Species List	Case source
239	Wildlife seized	Jun 4, 2006	Phu Yen	Khanh Hoa Province Possibly Cambodia for some animals	Da Nang City	Pangolins ( <i>Manis</i> sp.) : 37,2 kg monitor lizards ( <i>Varanus</i> sp.) : 84 kg king cobra ( <i>Ophiophagus hannah</i> ) : 4 kg 22 turtles which were 17.5 kg in weight including: Elongated tortoises ( <i>Indotestudo elongata</i> ), Giant Asian pond turtles ( <i>Heosemys grandis</i> ), Asian box turtles ( <i>Cuora amboinensis</i> ), Big headed turtles ( <i>Platysternon megasephalum</i> )	Hotline: email
246	Wildlife seized	Jun 11, 2006	Dak Lak	Unknown (Cambodia?) Police say collected near Cambodia border	unknown	Monitor lizard ( <i>Varanus</i> sp.): 235 kg 1 Pangolin ( <i>Manis</i> sp.): 3 kg Indochinese rat snake ( <i>Ptyas korros</i> ): 50 kg Giant Asian pond turtle ( <i>Heosemys grandis</i> ) Elongated tortoise ( <i>Indotestudo elongata</i> ); Impressed tortoise ( <i>Manouria impressa</i> )	Newspaper/ media
250	Wildlife seized	Jun 26, 2006	Da Nang	Ho Chi Minh Probably Cambodia	The north	150 Elongated tortoise ( <i>Indotestudo elongata</i> ) 4 Yellow-headed temple turtle ( <i>Hieremys annandalii</i> ) 19 Giant Asian pond turtle ( <i>Heosemys grandis</i> ) 2 Asian box turtle ( <i>Cuora amboinensis</i> ) 3 Asian stripe-necked leaf turtles ( <i>Cyclemys pulchriata</i> ) 1 Asian leaf turtle ( <i>Cyclemys tcheponensis</i> ) 47 Clouded monitor ( <i>Varanus bengalensis</i> ): 109 kg 60 Spot billed duck ( <i>Anas poecilorhyncha</i> ): 22.5 kg Common rat snake ( <i>Ptyas mucosus</i> ): 121 kg	Hotline: telephone



No	Case Title	Incident Date	Location	Shipment Origin	Shipment Destination	Species List	Case source
300	Wildlife seized from trade	Sep 23, 2006	Ha Tinh	Laos	Hanoi	Turtle (Unidentified species, but described as "rua da" in Vietnamese) 187 kg Chinese soft-shell turtle ( <i>Pelodiscus sinensis</i> ) 4 kg 5 Python ( <i>Python</i> sp.) 50 kg Monitor lizard ( <i>Varanus</i> sp.) 59 kg Python's skin ( <i>Python</i> sp.) 1.5 kg Turtle shell (Unidentified ) 10 kg	News
315	Wildlife found at resident's house	Oct 7, 2006	Ho Chi Minh	Na Most probably from Cambodia	na	Pangolins ( <i>Manis</i> sp.) Monitor lizards ( <i>Varanus</i> sp.) Asiatic soft shell turtle ( <i>Amyda cartilaginea</i> ) Masked palm civets ( <i>Paguma larvata</i> ) Turtle (Unidentified) Snakes [including many-banded krait, radiated rat snakes, cobra] ( <i>Bungarus moloticincitus</i> , <i>Elaphe radiata</i> , <i>Naja naja</i> )	
	Pangolins confiscated from trade	Oct 8, 2006	Thanh Hoa	Reportedly Myanmar or Malaysia	Unk	Pangolins ( <i>Manis</i> sp.)	



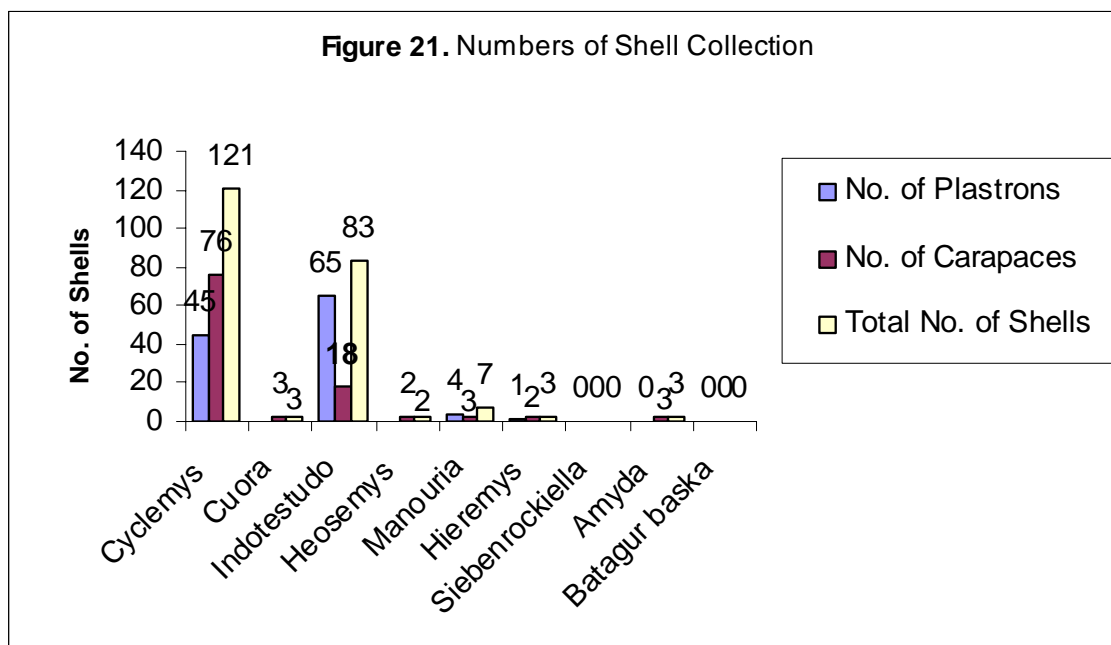


## Chapter VIII

### CONCLUSION, RECOMMENDATION AND NEXT STEPS

#### 1. Conclusion

##### 1. 1. Household Interview



We successfully interviewed with people in five communes in three different provinces. These communes were Tatai Krom, Trapaing ROUNG, Reoleak Kang Chheung, Chiphath, and Reusey Chrum. The total households we did interviews were 80 and if included from 2004 the total household were 133. During the interviews, we also found 11 turtles in villagers' houses in different villages in the surveyed areas, of which 6 of them were Asian leaf turtles, 2 black marsh turtles, 2 Asiatic softshell turtles, and the second alive vulnerable impressed tortoise. This was showing about the threats to turtle in the areas. From 2005-2006, we significantly discovered 104 shells in villages during our interviews and including shells from government ranger confiscation. These shells we asked from local people without paying money to avoid that people might think we are the traders. The graphic below is showing about the numbers of carapaces and plastrons that we found in the surveys to show that there are many threats to turtle now and we should take more actions to reduce threats to turtles.



## 1. 2. Turtle Trapping

In trapping period, the project selected 6 different places and habitats to trap and identify the presences of vulnerable and endangered species of turtles in Southwest Cambodia. The trapped sites were Boeng Sre Chin, Prek Yuon, Prek Angkunh, Stoeng Kep, Stoeng Tatai Leu, and Stoeng Toch.

In Stoeng Kep, we did not trap any turtles or other animals but we trapped fish instead. We found that even we caught nothing but people confirmed about *Amyda cartilaginea*, *Cyclemys atripons*, *Heosemys grandis*, *Indotestudo elongata*.

In Tatai Krom, we successfully captured 11 turtles in traps, of which four species were identified in the area and we also found one *Amyda*, *Indotestudo* shells, *Cyclemys* shells, *Hieremys* shells, and *Cuora amboinensis* shells in villages as well. So there should be 7 species in this important coastal area that we have to pay more control to stop all illegal activities because we recognized that there are many threats to turtles by local people.

In Prek Yeun, we trapped one juvenile *Amyda cartilaginea* and we didn't catch any other species. As for Prek Angkunh, we caught 3 *Cyclemys* in traps during our three-day trapping. The area is also close to the sea and Tatai Krom area where we found many turtles. We thought that the reason we caught a few turtles because probably in the dry season turtle are going hiding underground. But we still found three species in village. Those were *Cyclemys atripons*, *Amyda cartilaginea*, and *Siebenrockiella crassicolis*. So it should be also a good place to do education and conservation in the future.

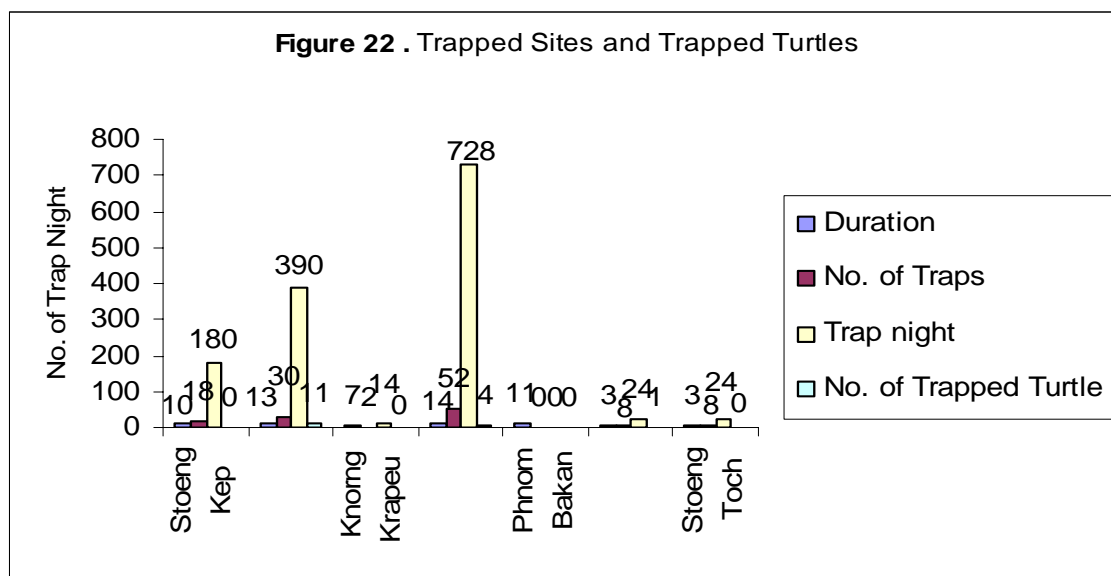
We also trapped at Stoeng Touch and Stoeng Tatai Leu but we caught only one *Cyclemys atripons*. According to interviews, people said that this area is still rich of *Amyda cartilaginea*, *Cyclemys atripons*, *Heosemys grandis*, and *Indotestudo elongata* and to prove this we found many shells of these species in villages that they were eaten and kept shells for selling to middlemen.

As the results, we totally used 118 traps and spent around 1360 trap-night. As the result, we captured 16 live turtles in traps that eleven of them were caught at Boeng Sre Chin, 4 were trapped at Prek Yuon and Prek Angkunh, and 1 was captured at Stoeng Touch. These species were Yellow-headed temple turtle- *Hieremys Annandalii*, black marsh turtle- *Siebenrockiella crassicolis*, Asian box turtle- *Cuora amboinensis*, Asiatic softshell turtle- *Amyda cartilaginea*, and Asian leaf turtle- *Cyclemys atripons*. In those 16 turtles, there were 5 different species of turtles, of which one of them was an endangered species and it has never recorded in southwest Cambodia, 3 were vulnerable and 1 near threatened species.

We didn't confirm the endangered *Pelochelys cantorii* in these areas so there should not present of this species in this area but we would recommend doing more survey for this species in other parts of the country. **See Appendix 7**

We trapped another new endangered species (*Hieremys annandalii*) for Southwest Cambodia that it was also a first record in the coastal site. Not only this species but the project also found other six species are habituated in the area. We also found that the site is being threatened by illegal activities that we need to stop these kinds of hunting so that we can save them for long.

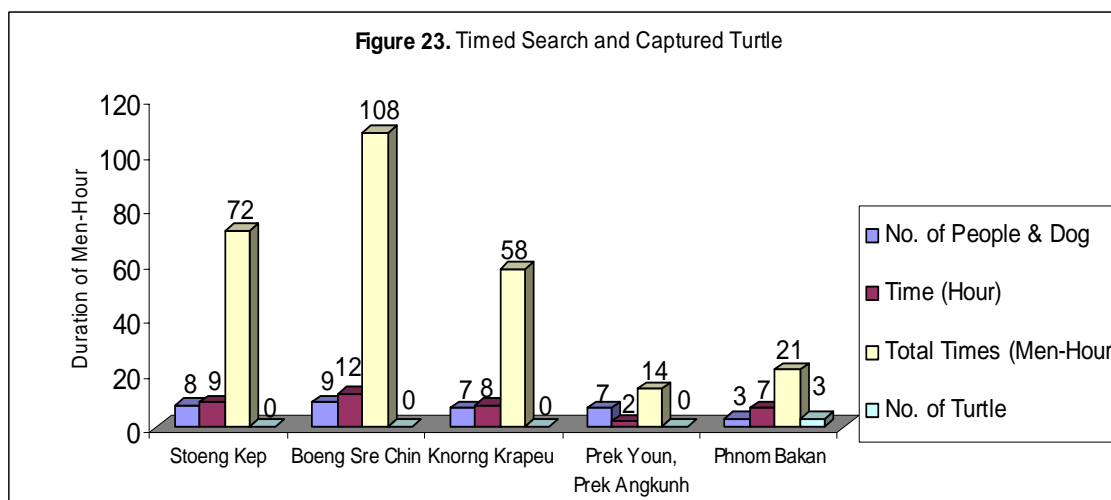




### 1. 3. Timed Searches

During implementation of project, another method was to look for tortoise and turtle species in streams, grassland, and mountainous forest. We did timed searches in 6 different places and habitats such as rocky streams, evergreen forest, grass and marshy fields, and other kinds of forest. Every search we did both in day time and dark time to look for different species and according to the species behaviour. The surveyed sites were mostly to look for endangered *Platysternon megacephalum*, *Manouria impressa*, *Indotestudo elongata*, and other possible species. We chose very suitable habitats before performing the survey in each location and the elevations were from low to very high attitudes up to 1,200 metres above sea level according to species we wanted to look for. These surveys, we hardly spent about 273 men-and-dog hours to search for tortoise and turtle in forest. As the result, we only found 3 Asian leaf turtles on the top of the Phnom Bakan mountain that is located very far and high attitude from villages. **See Appendix 7**

We could conclude that there should be no *Platysternon megacephalum* in the protected area but we identified a very good habitat for *Manouria impressa* and that we need to start conservation strategy in the area to monitor this species.



So in conclusion, the results from interviews, trappings, timed searches, and information from National Working Group we could assume that Southwest Cambodia is the most important site for turtle conservation as it contains nearly all of Cambodian species except the endangered *Platysternon megacephalum*, *Pelochelys cantorii* where we also tried our best to discover in this area but we did not find any information but according to information sharing from other NGOs, they confirmed *Pelochelys cantorii* in Stoeng Treng province and *Platysternon megacephalum* is truly presenting at Northeast Cambodia.

According to interview with people at Chiphat, they confirmed a habitat for the critically endangered *Batagur baska* and this we should do survey for this species in the area so that we can include the area into the *Batagur baska* project conservation.

## 1.4. Education

Two communes were selected and provided training course regarding turtle conservation to local people, students, teachers, and police. After training we acknowledged that people understand of turtle conservation and they said that they will stop hunting turtle for food or other demands. They also recommended to us to take more activities to help save their natural resources, especially wildlife.

Many government rangers were trained that they were from varying NGOs. The training was focused on turtle identification, ecology, Asian Turtle Crisis, turtle handling, and releasing fact sheet for rangers. After the training, they were keen to have such a training to help their skill in the future as they were not good at wild animals.

Three students from Royal University of Phnom Penh were trained and join with the project right now. They become the turtle researchers in Cambodia now and they gained many skills and benefit from the project.

We produced 500 T-shirts to distribute to the publics and all of them were sent to communities and stakeholders.

## 2. Recommendation

### Further Research

- Further research on turtle distribution of big head turtle, which live in isolated montane area in Cambodia where we did not explore around the Central Cadamom Mountain yet and the other protected area but was newly confirmed in Northeastern Cambodia.
- To understand how to manage of the natural resources especially wildlife resource management by the community through decentralization planning.
- The potential area should be protected where we found endangered species, Yellow-headed turtle temple and other turtle species.
- Provide the technical cropping and animal raising to community instead of wild hunting and illegal NTFPs to put into turtle conservation action in the community.
- Creation of national regulation to protect turtle in Cambodia is the best deal in turtle conservation.
- Some areas should be monitored to help conserve important species we found.



**Community**

Most of communities we went are poor and poorly educated and they are depending on natural resources to afford their family economic. So education program should be taking place in their area and help them to conserve their wildlife by themselves.

Public awareness should be brought to local communities to provide knowledge and ideas of conservation importance.

**Government**

Wildlife laws are still poor and need to enforce as soon as possible otherwise, all important species will be extinct in the short future.

Government agencies should take more actions to conserve wildlife in their protected areas to stop all illegal activities.

Rangers should take more actions to patrol in the forest or stations patrolling to make sure no illegal activities are missed.

**Organizations**

More affectively action conservation in Cardamom Mountain should cooperate with partnership and the local people to improve the conservation action.

The project should determine the potential area for conserving key wildlife, especially endangered species *Yellow headed turtle temple*, *Indotestudo elangata*, vulnerable, *Batagur baska*, critically endangered species that are surviving in the threatened areas.

**3. Future Work**

The first rounds of funds helped us get the team together and get training and experience needed to do the fieldwork and understand about conservation. We also found seven redlisted turtle species. The second round of funds meant that we did surveys in KBAs and other sites in southwest Cambodia and found a globally important population of the endangered *Hieremys annandalii* and a priority site in flooded forest where we found many turtles of seven different species. It is near the site where *Batagur baska* (CR) are found. We worked with villagers at these sites to see what conservation education they needed. They wanted us to help them conserve their wildlife. This area is protected but some people collect turtles. We need to do something fast to keep this place important for turtle conservation in Cambodia and allow all these turtle species to survive in the wild. So we want to work with villagers and rangers to protect the site.

We found the first wild Impressed Tortoise in Cambodia and now we need to protect this rare tortoise. It cannot be kept alive very easily in captivity like other turtles can, so we need to protect wild populations in the forest. The population we found can be protected if we train rangers and work with villagers, and monitor to see if it is working.

With our second grant we also learnt about community education and have been on training courses, so now we really can make a difference and work with local villagers. The local people know and trust us because we gave education to their children and equipment to schools.





We made a turtle calendar/guide for government and NGOs and it was very popular. The current field guide is out of print and outdated so we would like to make a proper Field Guide. This will be really useful for turtle conservation work in the future. We made t-shirts and a poster to help turtle conservation. We have been involved in a lot of projects around Cambodia and have set up a good network of communication with the government and NGOs.

There have been no gaps between funding.

There is a need and urgency for this project. Every month, government rangers confiscate turtles being exported to neighboring country like Vietnam. We need a national redlist to protect them by law. We also found that in Cambodia a big threat to turtles is that rural people are poor and poorly educated, pushing them to hunt for their livelihood. We found 222 carapaces and plastrons of turtles and tortoises in our village surveys (BP report, 2006), showing that we need to control this threat to conserve Cambodia's turtles.

Another problem is that rangers are less understanding of turtle and tortoise identification and conservation than other wildlife, so they often release them in unsuitable habitats. We need to produce an official Release Protocol so that we do not see any more cases of things like rangers releasing critically endangered Mangrove Turtles into mountain forest where they die.



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# Appendices

## Appendix 1: MoE 23 Protected Areas (1993)

	Area (ha)	Locality
<b>National Parks</b>		
Kirirom	35,000	Kompong Speu and Koh Kong
Phnom Bokor	140,000	Kampot
Kep	5,000	Kampot
Ream	21,000	Kompong Som
Botum- Sakor	171,250	Kampot and Kompong Som
Phnom Kulen	37,500	Siem Reap
Virachey	332,50	Rattanakiri and Stung Treng
<b>Wildlife Sanctuaries</b>		
Aural	253,750	Koh Kong, Pursat, Kompong Chhnang, and Kompong Spett
Beng Per	242,500	Kompong Thom
Peam Krasop	23,750	Koh Kong
Phnom Samkos	333,750	Koh Kong
Roniem Daun Sam	178,750	Battambang
Kulen-Promtep	402,500	Siem Reap and Preah Vihear
Lomphat	250,000	Rattanakiri and Mondolkiri
Phnom Prich	222,500	Mondolkiri
Phnom Nam Lyr	47,500	Mondolkiri
Snoul	75,000	
<b>Protected Landscapes</b>		
Angkor	10,800	Siem Reap
Banteay Chhmar	81,200	Banteay Meanchey
Preah Vihear	5,000	Preah Vihear
<b>Multiple Use Management Areas</b>		
Dong Peng	27,700	Koh Kong
Samlaut	60,000	Battambang
Tonle Sap	316,250	Kompong Chhang, Kompong Thom, Siem Reap, Battambang and Pursat



## Appendix 2. Questionnaire

### Pre-survey

- Politely introduce the group and outline why you are in the Cardamoms and the village.
- Ask the person whether they would be willing to be interviewed.
  - The interview will take about 1 hour.
  - Their name is not required.
- The information provided will be very helpful to the student turtle research project (not related to CI's enforcement work).

### Survey Record

Survey Number: \_\_\_\_\_ Date/Time of Interview: \_\_\_\_\_  
 Village: \_\_\_\_\_ Commune: \_\_\_\_\_

### Family Information

Sex: ☐ M ☐ F Age: \_\_\_\_\_ Single: ☐ Y ☐ N Widow/widower ☐ Y ☐ N

Divorce: ☐ Y ☐ N

Number of family members in this household:

Head of household: ☐ M ☐ F Number of children in household:  Male  Female

Were you born here? ☐ Y ☐ N When did you return (after war)? \_\_\_\_\_

Observation  Very poor  Poor  Medium  Rich  Other

### Turtle and Tortoise Survey

Show the person the photo sheets and work through the following questions:

#### Species Composition

1. Which turtles are present in this area?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

- If not on photo sheet describe appearance, where found, still present? Are there many around?

#### Relative Abundance

- Seed exercise: give all the seeds to the person and tell them to place them onto the photos of turtles they have in the forest. The amount of seeds placed on each picture has to represent how many of that kind of turtle is around relative to the others. More beans = more turtles.

Species and number of seeds:

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

#### Abundance

1. Are there some turtles that you used to see but now do not? ☐ Y ☐ N

Which turtles did you used to see but now do not?

☐ ☐ ☐ ☐ ☐





2. Why are these turtles not around now?

3. Using the seeds to please indicate how many turtles were around in each of the years. (30 beans)

1975

1997

Present

### ***Species Distribution***

1. Can you name the places find each kind of turtle? Where are they **MOST** easy to find?

Spp	PLACES FOUND	BEST LOCATIONS

### ***Ecology***

1. For each kind of turtle, please explain where it is usually found (habitat), what it eats (food), when it lays eggs (nesting season), and where it lays eggs (nest location).

Spp	HABITAT	FOOD	NESTING SEASON	NEST LOCATION

2. Do you see more turtles at certain times of the year?

☐ Y

☐ N

3. What time of year do you see the most turtles? Why do you see more turtles?

Spp	TIME OF YEAR	REASON FOR SEEING MORE

### ***Local Use***

1. Does your family sometimes collect turtles?

☐ Y

☐ N

2. How many people collect turtles in your family? Who are they?

3. Does the person who collects turtles go to the forest specifically looking for turtles or is it done secondary to other activities?

Specifically for turtles

Secondary activities.

Both



Explain:

.....

.....

4. Have you ever released turtles?

☐ N

☐ Y

Why? .....

5. Why does your family collect turtles?

Personal

Trade

☐ Food

☐ Medicine

☐ Food

☐ Medicine

☐ Other

.....

6. What do you collect the most? (30 beans)

☐ Adult turtles

☐ Juveniles

☐ Eggs

☐ Dead Turtles

☐ Shells

☐ Other

Explain: .....

.....

7. Do you collect all the eggs from a nest?

☐ Y

☐ N

If "NO", how many eggs do they usually leave? Why?

8. How do people catch turtles?

☐ Dog

☐ Bait + Hook

☐ Trap

☐ Net

☐ Other

Explain: .....

.....

9. Which catching methods are best or used the most?

Spp	METHODS

10. How many turtles does your family collect each month?

☐ 0

☐ 0-5

☐ 6-10

☐ 11-20

☐ 20+

11. Which kinds of turtles do you collect the most? (Rank the photos of each species. from most to less.)



12. What time of year do you collect most turtle?

.....

.....



13. What are 3 most preferred types of turtles? Why?

Spp	REASON FOR BEING MOST PREFERRED

14. Does your family rely on turtles for food?

☐ Y

☐ N

### ***Hunting***

1. Do people from outside (Rursat, Kravanh, Kamong Speu/Aural, Chi Phat, Koh Kong) collect turtles in your area?

☐ Y

☐ N

2. Which outsiders collect the most turtles?

3. Do outsiders collect more turtles than local people?

☐ Y

☐ N

4. Which turtles do the outsiders collect most?

5. Do outsiders collect juveniles and eggs?

☐ Y

☐ N

6. What do they do with the turtles they collect?

### ***Trade***

1. Do people in your village sell turtles?

☐ Y

☐ N

2. Who buy the turtles?

3. Where do the buyers come from?

4. How often do they come?

5. What happens to the turtles they buy?

6. Do they prefer certain kinds of turtles?

- If 'Yes' what species do they prefer?

☐ Y

☐ N

7. Do they also buy eggs or juveniles?

Eggs

Juveniles

8. What do they use the eggs or juveniles for?

☐ Y

☐ N

☐ Y

☐ N


9. How much do they pay? (Adults, juveniles, eggs, shells, etc)

	COST				
Spp	Adult	Juvenile	Eggs	Shell	Other (explain)

10. Do they purchase dead or alive turtles?

☐ Dead

☐ Alive

☐ Both

11. Of the turtles that get caught, what happens more?

☐ Turtles get sold to businessmen

☐ Local people use turtles

#### ***Other Threats***

1. Have you ever found turtle dead after burning grass or forest?

☐ Y

☐ N

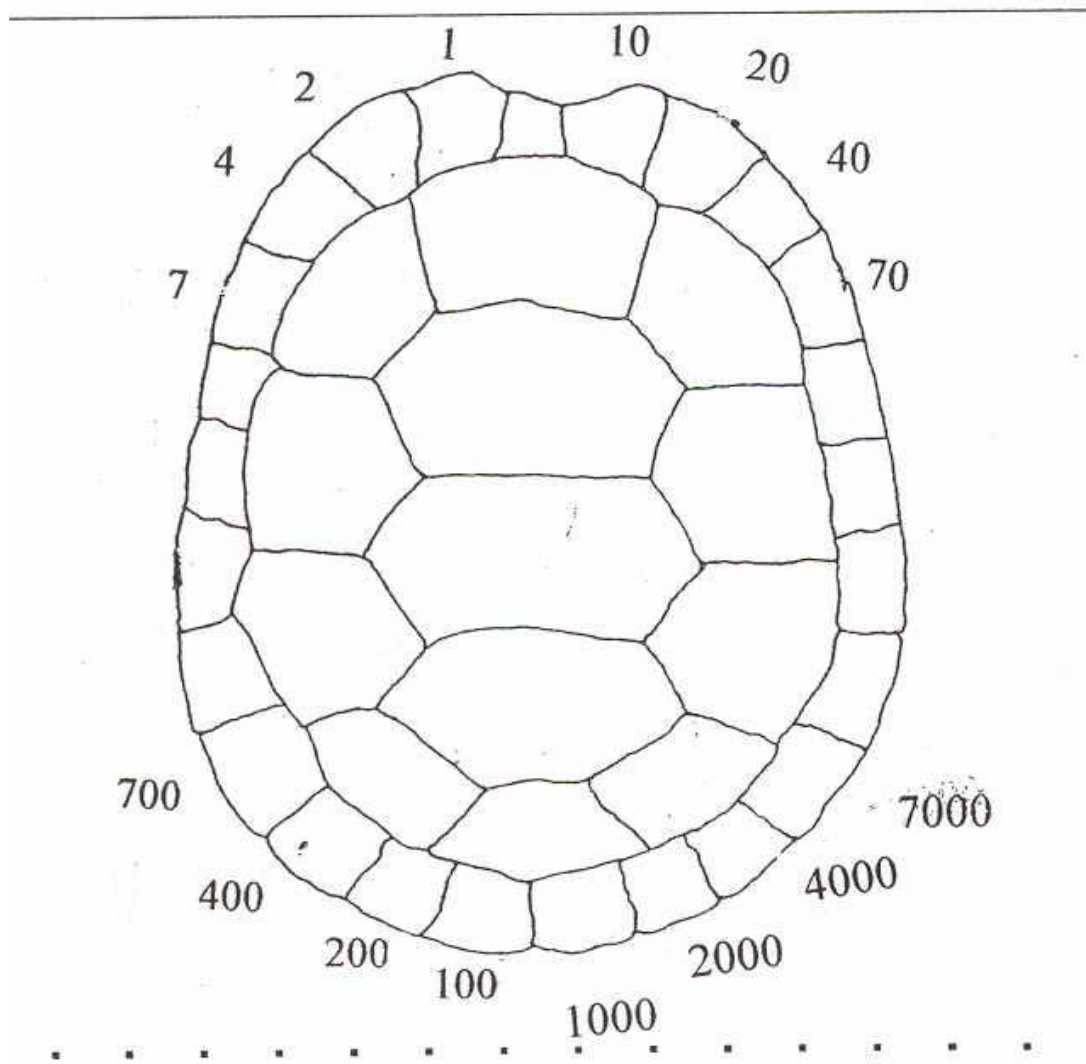
- Rarely/ a lot?

2. Have you ever caught turtles in your nets when fishing?

- Rarely/ a lot?



### Appendix 3: Marking System







Survey start date: ..... Location:.....  
End Date:..... Weather:.....

[illegible]

**Tortoise Timed Search Data Sheet**

Specimen #	1	2	3
<b><u>GENERAL INFORMATION</u></b>			
<b>Date:</b>	05 <sup>th</sup> Dec 04		
<b>Time:</b>	2.30pm		
<b>Time on stopwatch:</b>			
<b>UTMs - Easting:</b>	0314806		
<b>UTMs - Northing:</b>	1349166		
<b><u>HABITAT INFORMATION</u></b>			
<b>Habitat:</b>	Grassland/ Stream.		
<b>Microhabitat:</b>	Grassland		
<b>Altitude (m):</b>	563		
<b>Weather:</b>	Sunny		
<b>Temperature (°C):</b>	18 °C		
<b><u>TORTOISE INFORMATION</u></b>			
<b>Species:</b>	Asian box turtle		
<b>Tortoise behaviour:</b>	Walking		
<b>Tortoise age:</b>	7 years		
<b>Sex:</b>	Female		
<b>Length (cm):</b>	19cm		
<b>Mark code:</b>	01		
<b>Photo number:</b>			
<b>DNA number:</b>	01		

**KEY**

**Habitat:** lowland evergreen, dry deciduous, pine, grassland, montane evergreen (>800m), wetland (lake, marsh, river)

**Microhabitat:** On leaf litter, in grass, under log, in mud, on bare earth, etc.

**Weather:** Raining or dry, cloudy or sunny, windy or still.

**Tortoise behaviour:** Resting head in, resting head out, walking, feeding, combat (male-male), mating (male-female), or nesting.

**Age:** Number of growth rings on scutes.



## Appendix 5: Field research equipment list and camping and personal equipment

### Field Research Equipment List

<i>Science equipment</i>	<i>Uses</i>
Digital camera and memory card	128Mb+
GPS	
Satellite phone and spare battery (and list of emergency telephone numbers)	It's good to have it during in the forest
Stopwatches	For timed searches – waterproof if possible
Torches and spare bulbs	Using at night
Batteries - AA, AAA, and D	For torches, GPS, camera, icom, etc
Maps	1:50,000 if possible
Compasses	Easy to find direction
Whistles	In case of emergency
Pocket knife	Useful for cutting rope, make food, etc
Binoculars	For seeing animal far for direction
Weighing scales	1kg, 5kg, and 10kg if possible
Callipers	30cm if possible
Tape measures	For measuring animals
Thermometer	For air temperature
DNA tubes containing buffer	EDTA or 90% alcohol
Dissecting kit	Including scalpel, forceps, scissors, mounted needles, syringes
Specimen labels	To keep animal specimen
Clippers or small saw	For notching scutes
Cloth bags	For temporary storage of turtles and tortoises, or to collect other animals as necessary
Thick gloves	For handling softshell turtles
Chloretone and euthasol euthanasia solution	To euthanize reptiles and amphibians
Formalin	For preserving voucher specimens
Waterproof containers	1 - 5 litre, for specimen storage
Turtle traps	The size and number will be dependent on the species and site
Roll of marker tape	To tag traps, paths, etc
Bait	Bananas, papaya, jackfruit, durian, chicken, fish
Field guides and reference material	To identify species
Data sheets, photo sheets	To record species
Waterproof notebooks	Searching is mostly in the wet area
Pens, pencils, permanent markers	Noting, writing, etc



## Camping and Personal Equipment

<i>Camping equipment</i>	<i>Uses</i>
Hammocks	Sleeping
Tarpaulins	For covering hammocks and food storage area
Mosquito nets	For preventing disease cause by mosquito
Blankets and/or sleeping bag	To make body warm and preventing mosquito
Rope and string	For hammocks, tarpaulins, tie traps, etc)
Cooking equipment	Pots, bowls, mugs, cutlery, washing-up bowl, sampoo, etc
Water-collection and storage containers	15-litre buckets or jerry-cans for cook and washing
Small gas bottle and stove-head	Optional, based on logistical constraint, good to use in rainy season
Shovel head	For digging rubbish pits and toilet
Machetes	For cook and cutting rope
Cigarette lighter	For cook, and making fire
Candles	Light at night
<i>Personal equipment</i>	
Waterproof jacket and trousers	Good for using in wet season, preventing insect bite.
Strong walking boots	For preventing snake bite, easy to walk up the montane, etc
3-5 changes of clothes	Depending on time in forest
Leech-proof socks	Preventing from leech and insects bite
Strong, large backpack and smaller day-pack	Putting clothes, book, and equipment
Medical kit	Basic first-aid kit, plus malaria tablets
Food canister	For carry lunch
Water bottle	At least 1 litre, though 2 litres is ideal
Water purification tablets	Treating disease in water
Toiletries	Toothbrush, toothpaste, razor
Small towel	Washing body
Mosquito repellent	Applying on skin to protect mosquito
Hat	Protecting head during, etc
<i>Food – essentials</i>	
Rice	
Dried meat	fish, small shrimps, beef, shredded pork
Dried mushrooms and chilli	Keep fresh long time
Vegetables	'Hard' vegetables are best, such as onions, potatoes and cabbage)
Sauces	fish sauce, soy sauce, chilli sauce
Tea and coffee	Three-in-one coffee is easiest
Salt, sugar, spices, limes	For cook, many uses





## Appendix 6: Trap Location

### Traps Location in Prek Angkunh

Trap No	UTM Easting	UTM Northing	Altitude (m)
Trap 1	1259512	303733	46 m
Trap 2	1259515	303736	37 m
Trap 3	1259514	303730	34 m
Trap 4	1259506	303696	22 m
Trap 5	1259503	303695	22 m
Trap 6	1259492	303663	18 m
Trap 7	1259502	303432	4 m
Trap 8	1259526	303417	32 m
Trap 9	1259506	303701	28 m
Trap 10	1259539	303366	43m
Trap 11	1259543	303339	42 m
Trap12	1259534	303379	12 m

### Traps Location in Prek Youn

Trap No	UTM Easting	UTM Northing	Altitude (m)
Trap 1	1272324	313597	28 m
Trap 2	1272378	313621	18 m
Trap 3	1272372	313632	22 m
Trap 4	1272418	313642	22 m
Trap5	1272457	313669	15 m
Trap 6	1272486	313678	18 m
Trap 7	1272553	313668	17 m
Trap 8	1272588	313665	18 m
Trap 9	1272622	313682	17 m
Trap10	1272603	313671	15 m
Trap 11	1272648	313664	16 m
Trap 12	1272672	313676	19 m
Trap 13	1272221	313570	23 m
Trap 14	1272206	313551	21 m
Trap 15	1272186	313543	18 m
Trap 16	1272172	313519	18 m
Trap 17	1272164	313497	15 m
Trap 18	1272133	313469	
Trap 19	1272089	313407	15 m
Trap 20	1272033	313369	16 m
Trap 21	1272027	313342	19 m
Trap 22	1272357	313620	18 m
Trap 23	1272020	313327	16 m
Trap 24	1271992	313304	20 m
Trap 25	1271973	313292	15 m
Trap 26	1271645	313124	16m
Trap 27	1271872	313252	16 m
Trap 28	1271843	313248	10 m
Trap 29	1271822	313228	14 m
Trap 30	1271788	313208	12 m



Trap 31	1271755	313194	11 m
Trap 32	1271726	313167	7 m
Trap 33	1271724	313155	19 m
Trap 34	1271695	313159	17 m
Trap 35	1271645	313124	18m
Trap 36	1271645	313124	19m
Trap 37	1271596	313111	20 m
Trap 38	1271576	313100	18 m
Trap 39	1271542	313094	12 m
Trap 40	1271524	313091	11 m
Trap 41	1271503	313067	14 m
Trap 42	1271497	313099	15 m
Trap 43	1271527	313118	12 m
Trap 44	1271561	313137	13 m
Trap 45	1271658	313153	16 m
Trap 46	1271684	313169	11 m
Trap 47	1271700	313173	13 m
Trap 48	1271763	313219	15 m
Trap 49	1271930	313290	12 m
Trap 50	1271951	313299	11 m
Big trap 51	1271949	313286	17 m
Big trap 52	1271610	313146	14 m

### Traps Location in Tatai Krom

Trap No	UTM Easting	UTM Northing	Altitude Meters
Trap1	1274013	295740	10
Trap 2	1273985	295723	5
Trap 3	1273958	295747	5
Trap 4	1273980	295777	0
Trap 5	1274014	295803	3
Trap 6	1274045	295821	14
Trap 7	1274059	295821	10
Trap 8	1274050	295879	5
Trap 9	1274026	295880	5
Trap 10	1274059	295947	8
Trap 11	1274048	295975	2
Trap 12	1274064	295977	-2
Trap 13	1274080	295997	10
Trap 14	1274072	296022	0
Trap 15	1274046	296044	1
Trap 16	1274015	296033	0
Trap 17	1273999	296066	0
Trap 18	1274005	296115	-1
Trap 19	1274019	296128	0
Trap 20	1274004	296140	3
Trap 21	1274016	296152	9
Trap 22	1273813	295465	-15
Trap 23	1273818	295337	10
Big trap 24	1273818	295337	8
Trap 25	1273828	295281	21
Big trap 26	1273795	295124	9



Trap 27	1273809	295313	7
Trap 28	1273664	295540	6
Trap 29	1273734	295474	10
Trap 30	1273766	295474	7
Trap 22	1273518	295806	0
Trap 23A	1271861	296856	-5
Trap 25A	1271856	296927	0
Trap 27A	1271872	296970	11
Trap 29A	1271819	297001	33
Trap 30A	1271865	297018	4

### Traps location in Soeng Kep

Trap No	UTM Easting	UTM Northing	Altitude (m)
Trap1	1298587	321083	
Trap 2	1298553	321083	309m
Trap 3	1298524	321084	
Trap 4	1298523	321027	314m
Trap 5	1298529	320988	313m
Trap 6	1298529	320908	312m
Trap 7	1298522	320882	315m
Trap 8	1298467	320789	315m
Trap 9	1298408	320728	315m
Trap 10	1298196	320728	309m
Trap 11	1298185	320661	355m
Trap 12	1298139	320644	298m
Trap 13	1298095	320625	297m
Trap 14	1298020	320578	284m

### Trap Location in Knorng Krapeu

Trap No	UTM Easting	UTM Northing	Altitude (m)
Trap 1	1293222	366722	925
Trap 2	1293237	366751	913



## Appendix 7: Found of turtles and tortoises in and out of the studied areas

**Khmer Name** : Andoeuk Saom  
**Common Name** : Giant Asian Pond Turtle  
**Scientific Name** : *Heosemys grandis*  
**Synonyms** : *Geoemyda grandis*  
**Vernacular Name** : Andoeuk Sakal  
**Type** : Turtle  
**IUCN Status** : Vulnerable  
**Place found** : Marshes in the Areng valley,  
 Veal Veng  
**Habitat** : Aquatic, streams and  
 freshwater marshes at  
 low to mid elevation.



**Khmer Name** : Andoeuk Ka-ek  
**Common Name** : Black Marsh Turtle  
**Scientific Name** : *Siebenrockiella crassicollis*  
**Vernacular Name** : Andoeuk Ka-ek  
**Type** : Hard Shell Turtle  
**IUCN Status** : Vulnerable  
**Place found** : Marshes in the Areng  
 valley, Tatai Krom,  
 Trapaing ROUNG  
**Habitat** : Aquatic. Slow moving or  
 still bodies of freshwater at  
 low elevations, such as  
 ponds, canals, ditches, and  
 swamps.



**Khmer Name** : Andoeuk Prich  
**Common Name** : Elongated Tortoise  
**Scientific Name** : *Indotestudo elongata*  
**Vernacular Name** : Andoeuk Prich  
**Type** : Tortoise  
**IUCN Status** : Endangered  
**Place found** : Areng valley; hillside  
 between Areng and Thma  
 Bang; Veal II forest;  
 Khnang Sral, Pramoy,  
 Khnang Krapeu, O'som  
**Habitat** : Terrestrial. Dry, open forest



**Khmer Name** : Andoeuk Toek  
**Common Name** : Asian Leaf Turtle  
**Scientific Name** : *Cyclemys atripons*  
**Vernacular Name** : Andoeuk Toek  
**Type** : Turtle  
**IUCN Status** : Near Threatened  
**Place found** : Marshes at Areng; Stoeng  
 Tatai, Veal Veng, Thma  
 Bang, Tatai Krom, Trapaing  
 ROUNG, Khnang Krapeu  
**Habitat** : Mainly aquatic. Streams  
 in lowland and hill forests.





**Khmer Name** : Andoeuk Bit Muk  
**Common Name** : Asian Box Turtle  
**Scientific Name** : *Cuora amboinensis*  
**Vernacular Name** : Andoeuk Bit muk  
**Type** : Turtle  
**IUCN Status** : Vulnerable  
**Place found** : Marshes in Veal Veng, Srepraing, Tatai Krom, Trapaing Rong  
**Habitat** : Aquatic and terrestrial. Streams & marsh in lowland forest, rice paddies and mangrove creeks, sometimes found quite far from water.



**Khmer Name** : Andoeuk Meas  
**Common Name** : Impressed Tortoise  
**Scientific Name** : *Manouria Impressa*  
**Vernacular Name** : Andoeuk Meas, Andoeuk Khnal, Andoeuk Khnay.  
**Type** : Tortoise  
**IUCN Status** : Vulnerable  
**Place found** : Khnang Sral mountain, O'som commune  
**Habitat** : Terrestrial. Hill evergreen forest over 600m altitude



**Khmer Name** : Kantheay Ah see  
**Common Name** : Asiatic Softshell Turtle  
**Scientific Name** : *Amyda cartilaginea*  
**Vernacular Name** : Kantheay Ka-ek  
**Type** : Soft shell turtle  
**IUCN Status** : Vulnerable  
**Place Found** : Stoeng Areng and associated backwaters; Stoeng Tatai; Veal Veng, Tatai Krom, Trapaing Rong, Prek Youn,  
**Habitat** : Aquatic. Most water bodies, from marsh and estuaries to montane



**Khmer Name** : Andoeuk Sakal  
**Common Name** : Yellow-headed Temple Turtle  
**Scientific Name** : *Hieremys annandalii*  
**Vernacular Name** : Andoeuk Kror Bi Kbal Loeung  
**Type** : Hard shell turtle  
**IUCN Status** : Endangered  
**Place Found** : Tatai Krom, Chiphat, coastal marsh  
**Habitat** : Aquatic, marshes in lowland and coastal area.



**Khmer Name** : Andoeuk Sorsay  
**Common Name** : Royal Turtle  
**Scientific Name** : *Batagur baska*  
**Vernacular Name** : Andoeuk Luong  
**Type** : Hard shell  
**IUCN Status** : Critically Endangered  
**Place Found** : Sre Ambel, Chiphat  
**Habitat** : Aquatic. Coastal mangrove estuaries and creeks



**Khmer Name** : Andoeuk Kbal Thom  
**Common Name** : Big-headed Turtle  
**Scientific Name** : *Platysternon megacephalum*  
**Vernacular Name** : Andoeuk Kbal Thom  
**Type** : Hard shell  
**IUCN Status** : Endangered  
**Place Found** : Vireak Chey, Rattanakiri  
**Habitat** : Aquatic. Rocky streams in forest at mid to high elevation





**Appendix 8: Turtle and Tortoise Distribution in Cambodia**

No	Species (Number)	Area	UTM-E	UTM-N	Date	Observation	Source
1	Elongated Tortoise	Mondulkiri	0711057	1361901	4/5/2002	Observation	WCS
2	Elongated Tortoise	Mondulkiri	710075	1373995	18/5/2002	Track	
3	Elongated Tortoise	Mondulkiri	709892	1374006	18/5/2002	Track	
4	Tortoise (2)	Koh Kong			4/8/2002	Trade	Maia
5	Tortoise (1)	Koh Kong			14/8/2002	Trade	
6	Tortoise (4)	Koh Kong			19/8/2002	Trade	
7	Tortoise (11)	Koh Kong			2/12/2004	Trade	
8	Turtle spp.	Preah Vihear	533256	1561109	29/1/2003	Observation	WCS
9	Turtle spp.	Kulen	422935	1561157	30/5/2003	Observation	
10	Turtle spp.	Kulen	440876	1540700	4/6/2003	Track	
11	Turtle spp.	Mondulkiri	699707	1378402	4/5/2003	Observation	



12	Elongated Tortoise	Mondulkiri	715749	1365529	1/5/2003	Observation	WCS
13	Elongated Tortoise	Mondulkiri	709817	1356733	4/2/2003	Sign/scratch	
14	Elongated Tortoise	Mondulkiri	705600	1368683	19/3/2003	Sign/scratch	
15	Asian leaf turtles (4)	Areng			23/3-5/4/2004	Traps	CTCP
16	Elonged tortoise (1)	Areng			23/3-5/4/2004	Time Search	
17	Asiatic softshell turtle (1)	Areng			23/3-5/4/2004	Trap	
18	Asiatic softshell turtle (5)	Areng			23/3-5/4/2004	In local	
19	Elonged tortoise (1)	Thmar Bang			23/3-5/4/2004	Time Search	
20	Black mash turtle (2)	Areng			23/8-3/9/2004	Time Search	
21	Impressed tortoise (1)	Areng			23/8-3/9/2004	In local	
22	Giant Asian pond turtle (1)	Areng			23/8-3/9/2004	In local	
23	Asiatic softshell turtle (1)	Veal Veng, O'som			26/10-9/11/2004	Trap	



24	Asian leaf turtles (1)	Veal Veng, O'som			26/10-9/11/2004	Time Search	CTCP
25	Asian leaf turtles (4)	Srepraing, Osom			3-17/12/2004	Trap	
26	Asian box turtle (5)	Srepraing, Osom			3-17/12/2004	Trap	
27	Asian box turtle (1)	Srepraing, Osom			3-17/12/2004	Time Search	
28	Giant Asian pond turtle (2)	Srepraing, Osom			3-17/12/2004	Trap	
29	Asian Leaf Turtle	Kulen	441503	1539921	15/9/2004	Observation	WCS
30	Turtle spp.	Preah Vihear	523289	1545757	31/9/2004	Observation	
31	Turtle spp. (1)	Mondulkiri	731625	1366434	15/8/2004	Hunting	
32	Tortoise (1)	Koh Kong			15/09/2004	Trade	Maia
33	Turtle (18)	Pursat			5/4/2004	Trade	
34	Turtle (4)	Pursat			8/6/2004	Trade	
35	Turtle (1)	Pursat			10/06/2004	Trade	
36	Turtle (28Kg)	Pursat			11/12/2004	Trade	



37	Turtle (35Kg)	K. Kong			19/11/2004	Trade	Maia
38	Turtle (15Kg)	Pursat			21/11/2004	Trade	
39	Turtle (3.5Kg)	Pursat			21/11/2004	Trade	
40	Turtle (2)	Kratie			21/10/2004		WWF
41	Elongated Tortoise (1)	Di o Preah	767300	1433260	27/5/2004		
42	Elongated Tortoise (2)	Trapeang Promat	768070	1430201	30/6/2004		
43	Elongated Tortoise (1)	Trapeang Romeang	759506	1445825	3/7/2004		
44	Elongated Tortoise (2)	Trapeang Promat	767878	1430235	28/7/2004		
45	Asian box turtle	Boeng Sre Chin	296022	1274072	22/09/2005	Trap	CTCP
46	Asian box turtle	Boeng Sre Chin	295977	1274080	23/09/2005	Trap	
47	Asian box turtle	Boeng Sre Chin	297001	1271869	24/09/2005	Trap	
48	Asian leaf turtle	Boeng Sre Chin	295224	1273795	24/09/2005	Trap	
49	Asian leaf turtle	Boeng Sre Chin	295224	1273795	24/09/2005	Trap	



50	Black marsh turtle	Thong Kadon	297018	1271865	24/09/2005	Trap	CTCP
51	Asian box turtle	Boeng Sre Chin	296022	1274072	25/9/2005	Trap	
52	Asian box turtle	Boeng Sre Chin	295747	1273958	25/9/2005	Trap	
53	Asian box turtle	Boeng Sre Chin	297001	1271869	25/9/2005	Trap	
54	Asian box turtle	Boeng Sre Chin	297018	1271865	25/9/2005	Trap	
55	Yellow-headed temple turtle	Boeng Sre Chin	295740	1274013	26/9/2005	Trap	
56	Turtle spp. (85kg)	Preah Vihear	494300	1571500	23/3/2005	Trade	WCS
57	Turtle spp. (1)	Mondulkiri	706992	1355206	12/10/2005	Hunting	
58	Turtle spp. (1)	Mondulkiri	711230	1342428	12/10/2004	Hunting	WCS
59	Turtle spp. (2)	Mondulkiri	707374	1342106	18/11/2005	Hunting	
60	Turtle spp. (2)	Mondulkiri	713057	1373002	25/11/2005	Trade	
61	Turtle spp. (3)	Mondulkiri	694803	1365657	9/12/2005	Trade	
62	Turtle spp. (3)	Mondulkiri	692858	1349367	29/12/2005	Hunting	



63	Turtle spp. (2)	Mondulkiri	717192	1359974	22/2/2005	Hunting	WCS
64	Turtle spp. (1)	Mondulkiri	708622	1357513	3/6/2005	Hunting	
65	Turtle spp. (2)	Mondulkiri	703403	1348122	5/6/2005	Hunting	
66	Turtle spp. (8)	Mondulkiri	712699	1352639	15/6/2005	Hunting	
67	Turtle spp. (1)	Mondulkiri	705176	1346918	20/11/2005	Trade	
68	Turtle spp. (1)	Mondulkiri	707011	1340367	15/10/2005	Trade	
69	Turtle spp. (1)	Mondulkiri	708959	1342100	12/3/2005	Hunting	
70	Turtle spp. (1)	Mondulkiri	700736	1376725	23/3/2005	Hunting	
71	Turtle spp. (1)	Mondulkiri	698549	1370576	26/3/2005	Hunting	
72	Turtle spp. (2)	Mondulkiri	729384	1362794	28/3/2005	Hunting	
73	Turtle spp. (1)	Mondulkiri	706438	1344094	16/6/2005	Trade	
74	Turtle spp. (1)	Mondulkiri	707617	1341726	25/6/2005	Trade	
75	Turtle spp. (1)	Mondulkiri	695775	1340788	19/7/2005	Trade	





76	Turtle spp. (24)	Preah Vihear	552139	1558394	10/7/2005	Hunting	WCS
77	Malayan Snail-eating Turtle	Veal Trasok	349252	1449184	27/8/2005		Sharon Brooks
78	Asian Box Turtle	Kbal Toal	361628	1437055	12/10/2005		
79	Malayan Snail-eating Turtle	Kampong Thom			9/11/2005		
80	Elongated Tortoise (1)	O Lmit	761929	1433817	19/12/2005		WWF
81	Tortoise (3)	Mondul kiri	734685	1383214	8/4/2005		
82	Giant Asian Pond Turtle (10)	Kratie			30/12/2005		
83	Malayan Snail Eating Turtle(3)	Kratie			30/12/2005		
84	Asian Box Turtle (3)	Stung Treng	605014	1495655	16/6/2005		
85	Giant Asian Turtle (57)	Stung Treng	605014	1495655	16/6/2005		
86	Malayan Snail Eating Turtle(1)	Stung Treng	605014	1495655	16/6/2005		
87	Asiatic Softshell Turtle (3)	Stung Treng	605014	1495655	16/6/2005		
88	Tortoise (3)	Mondul kiri	730188	1390176	17/5/2005		



89	Tortoise (3)	Mondul kiri	734685	1383214	8/4/2005		WWF
90	Tortoise (1)	Mondul kiri	730336	1389864	20/3/2005		
91	Tortoise (1)	Mondul kiri			14/3/2005		
92	Asiatic Softshell Turtle (2)	Kratie			29/11/2005		
93	Malayan Snail Eating Turtle(5)	Kratie			29/11/2005		
94	Elongated Tortoise (17)	Kratie			29/11/2005		
95	Giant Asian Pond Turtle (5)	Kratie			29/11/2005		
96	Malayan Snail Eating Turtle(1)	Kratie			29/11/2005		
97	Tortoise (6)	Mondul kiri	676912	1386383	29/8/2005		
98	Tortoise (7)	Pursat			18/6/2005	Trade	Maia
99	Tortoise (1)	Pursat			3/6/2005	Trade	
100	Tortoise (2)	Koh Kong			24/11/2005	Trade	
101	Tortoise (4)	Pursat			6/12/2005	Trade	
102	Turtle (45kg)	Pursat			4/3/2005	Trade	



103	Turtle (1)	K.Kong			5/6/2005	Trade	Maia
104	Turtle (4)	K.Kong			16/9/2005	Trade	
105	Turtle (1)	Pursat				Trade	
106	Asian softshell turtle	Prek Yuon	311899	1271299	7-21/2/2006	Trap	CTCP
107	Black marsh turtle	Prek AngKunh	313597	1272324	7-21/2/2006	Trap	
108	Asian softshell turtle	Prek AngKunh	304944	1259894	7-21/2/2006	Trap	
109	Black marsh turtle	Prek AngKunh	313590	1272374	7-21/2/2006	Trap	
110	Asian leaf turtle	Prek AngKunh	313669	1272457	7-21/2/2006	Trap	
111	Asian leaf turtle	Prek AngKunh	313666	1272470	7-21/2/2006	Trap	
112	Asian leaf turtle	Prek AngKunh	313666	1272470	7-21/2/2006	Trap	
113	Asian leaf turtle	Prek AngKunh	313651	1272448	7-21/2/2006	Trap	
114	Turtle spp. (1)	Mondulkiri	719467	1360664	14/1/2006	Hunting	WCS
115	Turtle spp. (17)	Mondulkiri	685290	1364448	14/2/2006	Trade	
116	Turtle spp. (2)	Mondulkiri	692168	1353106	19/2/2006	Hunting	



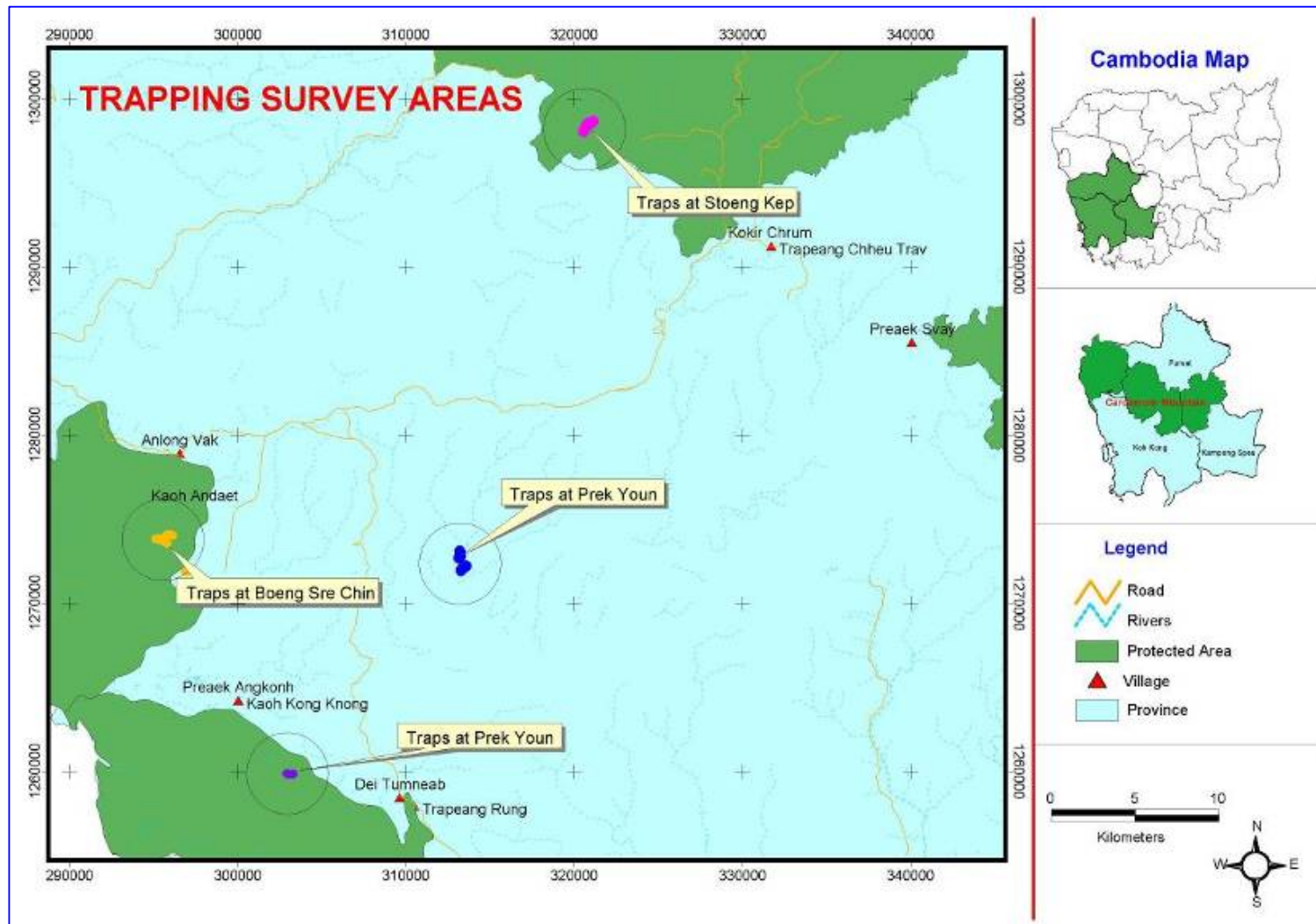
117	Turtle spp. (14)	Mondulkiri	694419	1375088	23/2/2006	Hunting	WCS
118	Turtle spp. (2)	Mondulkiri	707619	1346688	18/5/2006	Hunting	
119	Turtle spp. (3)	Mondulkiri	707385	1342087	1/6/2006	Hunting	WCS
120	Turtle spp. (2)	Mondulkiri	715860	1346930	20/5/2006	Trade	
121	Turtle spp. (1No.No.	Mondulkiri	709771	1337571	26/4/2006	Trade	
122	Yellow-headed Temple Turtle	Veal trasok	352714	1446532	30/3/2006		Sharon Brooks
123	Turtle (1kg)	K. Speu			6/7/2006	Trade	Maia
124	Turtle (1)	K. Speu			6/7/2006	Trade	
125	Turtle (1)	Pursat			21/7/2006	Trade	
126	Turtle (3)	Pursat			24/7/2006	Trade	
127	Elongated Tortoise (1)	Mondulkiri	758397	1457978	9/2/2006		WWF
128	Elongated Tortoise (1)	Mondulkiri	764289	1446287	30/3/2006		

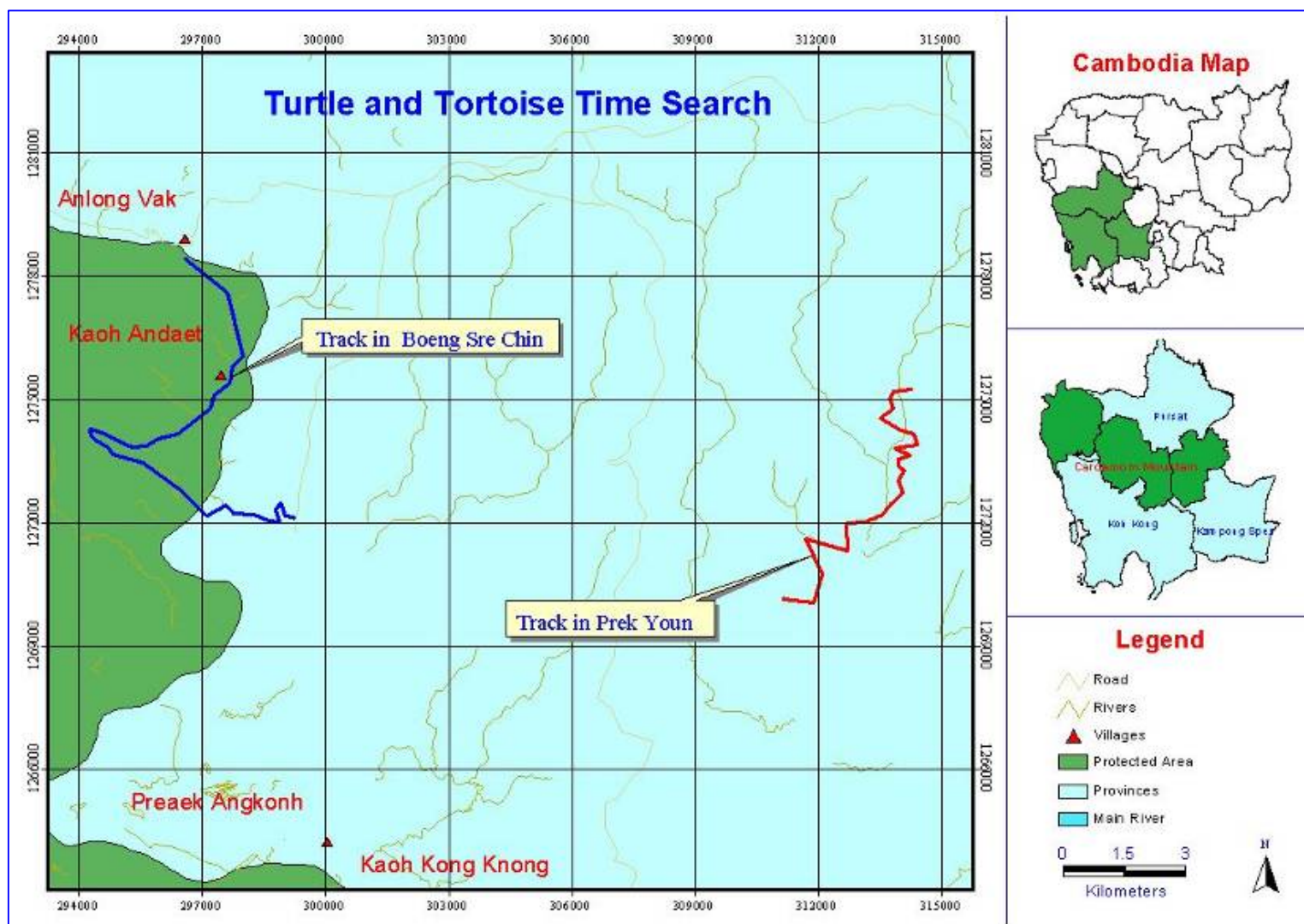
**Note:** Turtle spp or Turtle = recorder doesn't know the species



## Appendix 9: Maps of Survey Results

### a. Turtle Trapping Site



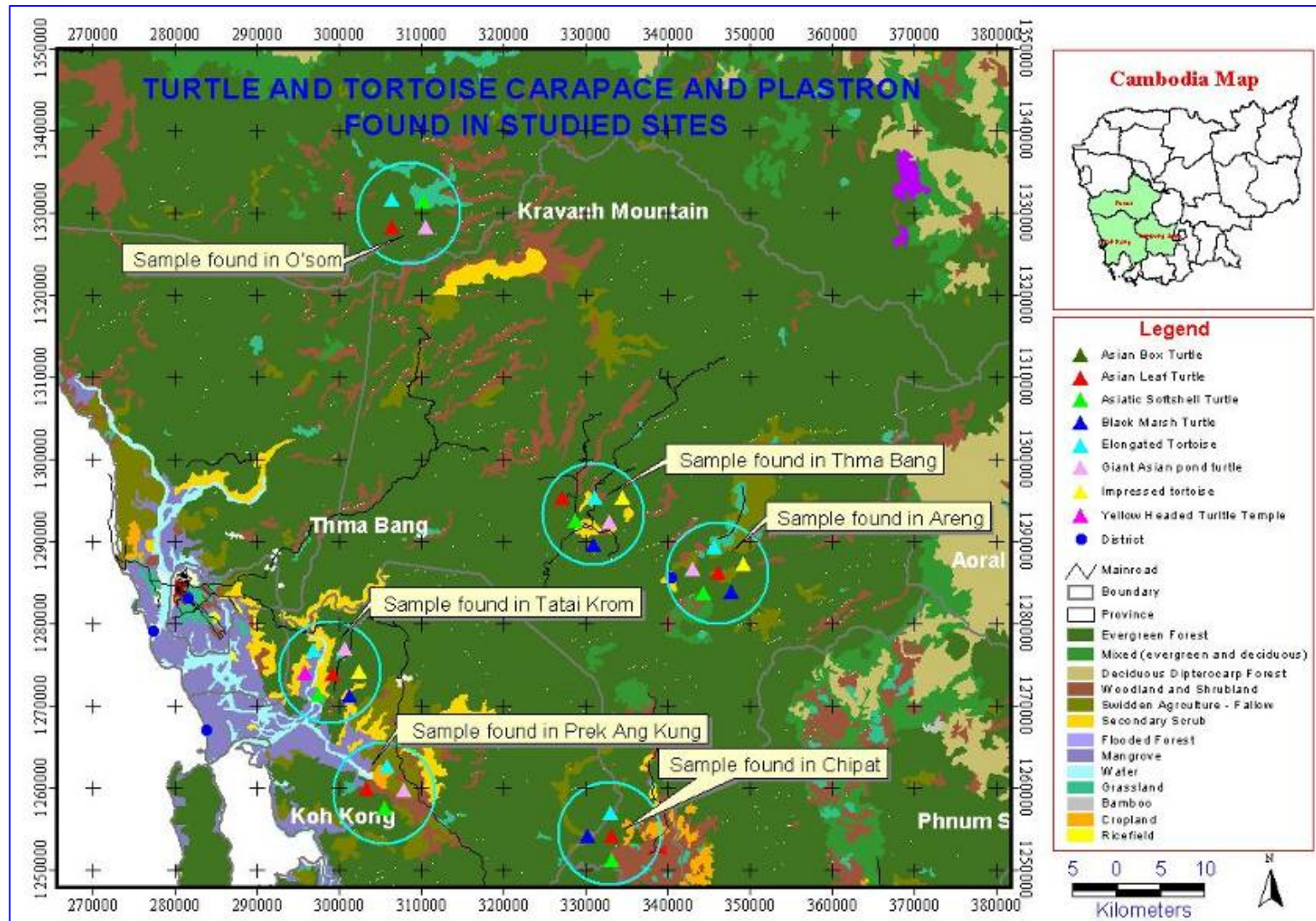
**b. Tortoise Timed Search Sites**



### c. Surveyed Sites

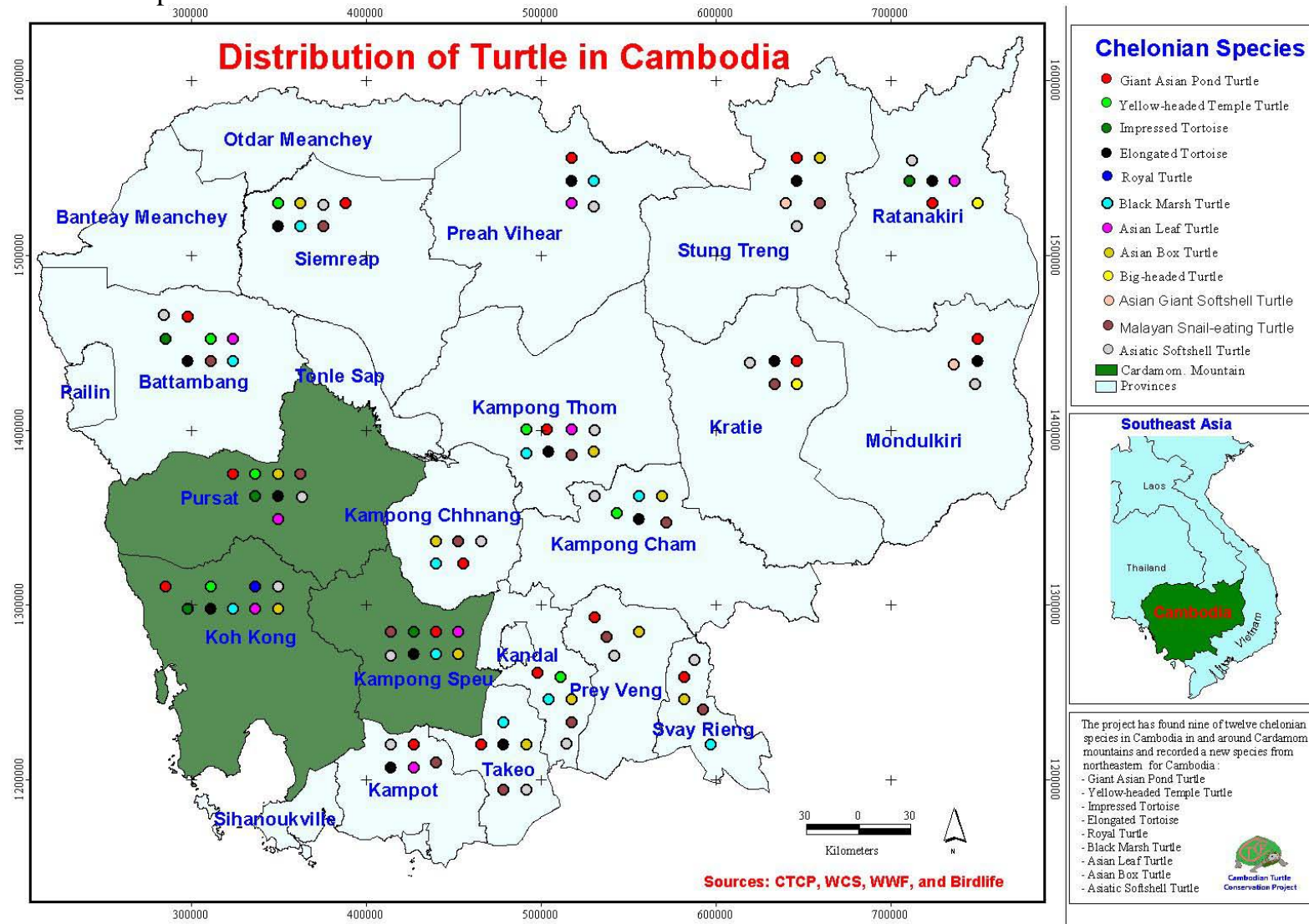


#### d. Specimen (Plastron and Carapace) Found in Studied Sites





## Appendix 10: Maps of Turtle Distribution in Cambodia



## Appendix 11: Survey Photos

### Shells and alive species of turtles and tortoises we found



Turtle shells and *Hieremys* head collected from local people at Tatai Krom in Koh Kong province.

Shells collected by BP team at Tatai Krom, September 2006.



*Manouria impressa* found in village, 2004



*Cuora amboinensis*, Tatai Krom, 2005



*Amyda cartilaginea* found in village at Tatai Krom, 2005



*Heosemys grandis* found at Areng valley, 2004







*Cuora amboinensis* in Kratie province, 2006 (WWF)



*Cuora amboinensis* in Kratie province, 2006 (WWF)



*Cyclemys atripons*, Tmar Bang, Koh Kong, 2004



*Cyclemys atripons*, Tmar Bang, Koh Kong, 2004



*Cuora amboinensis* caught in trap at Tatai Krom, September 2006.



*Cyclemys* and *Cuora* caught in trap at Tatai Krom in Koh Kong, 2005







*Platysternon megacephalum* caught by ranger at Vireakchey National park, December 2006



Mangrove Terrapin in captivity for pet at Koh Kong town



*Hieremys annandalii* caught at Tatai Krom, 2005



*Siebenrockiella crassicollis* caught at Tatai Krom, 2005



*Cycllemys* and *Indotestudo* at Thmar Bang in Koh Kong province, 2005.



Photos of turtle exhibition during Traditional Khmer Ploughing Day from Kampong Chhnang, Phnom Penh 2005





## Other species and illegal things we found in the surveys sites



Softshell turtle hooks at O'som village, March 2006.



A lizard found at Bakan mountain in Pursat province, April 2006.



A frog found at Bakan mountains in Pursat province, April 2006



Cable snares and animal bones found at Bakan mountains, April 2006







A frog at Bakan mountain in Pursat province, April 2006



Butterfly found at Bakan mountain, April 2006



A lizard at Bakan mountain Pursat province, April 2006



A lizard at Bakan mountain in Pursat province, April 2006



A snake found at Bakan mountain, April 2006



Logging activities at Knang Krapeu in Kompong Speu province, November 2005





A tree frog at Bakan mountain in Pursat province, April 2006.



A snake at Bakan mountain in Pursat province, April 2006.



Sun bear skull at Bakan mountain in Pursat province, April 2006



Red muntjac at Bakan mountains in Pursat province, April 2006



Wild pig skull at Bakan mountain in Pursat province, April 2006





## Activities of CTCP team in trapping and chelonian record



Team preparing turtle trap



BP team preparing trap to put in Steng Kep river August 2005.



Team member put turtle trap



Team setting traps at coastal area, 2005



Trapped *Hieremys annandalii* at Tatai Krom in Koh Kong province.



Team marking turtle after catching turtle



## Activities of training and teaching to people and rangers and students



Activities of BP team in teaching local students at O'som school



BP team with all students in O'som school after teaching



Government rangers training in Phnom Penh 2005



BP team delivered Posters to local people at O'som, Pursat province, March 2006.



T-shirt distribution to local people after training



### Interviewing with local people, commune, and village chief



Team, lecturer, and FiA meeting with commune committee to ask for permission



Team interviewing with local people at Tatai Krom

### Other activities with CI staff and villagers



BP team and motordup drivers lifting motors across river at O'som, Pursat province, May 2006.



BP and CI team on the top of Bakan Mountain 2006.



BP team with Annette Olsson looking on map at Bakan Mountain, Pursat province, April 2006.



BP team and guide with dogs at Stoeng Kep August 2005.







People worshipping *Manouria impressa*, Kandal province, 2005



Team releasing turtles after trapping at Tatai Krom,  
Coastal area, 2005



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Cambodian Turtle  
Conservation Project

