

Final Report of
Freshwater Turtle Conservation to A Chindwin River
Segment between Htamanthi Village and Khamthi, and
Mandalay Yadanabon Zoo
September, 2005 - August, 2006



A report submitted to Wildlife Conservation Society, Myanmar
Program



Win Ko Ko, Khin Myo Myo and Kyaw Moe
Turtle Team (Htamanthi Wildlife Sanctuary + WCS)
September, 2006

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Wildlife Conservation Society (WCS)

Abstract

Turtle Team comprised Nature and Wildlife Conservation Division of Forest Department and Wildlife Conservation Society has been implementing turtle conservation program of Myanmar (Burma) endemic turtle species; Myanmar roofed turtle; *Kachuga trivittata*, Myanmar peacock soft shell turtle; *Nilssonina formosa* and Myanmar narrow-headed turtle; *Chitra vandijki* in Upper Chindwin River since last September, 2005. Team activities such as meeting with local authorities, setting up a warning signboards on the nesting sand bank, educative talks and hold discussion with villagers and fishermen about the occurrence of *Kachuga*, setting up mobile library, patrolling during the nesting season; turtle egg collection, releasing live turtles to the habitat and fishing activities at the project area. The Team recorded turtle habitats, collected 235 turtle eggs, 88 hatched out from the turtle eggs, released 2 adults female *Kachuga trivittata*, an sub adult *Chitra vandijkii* and an adult *Nilssonina formosa* to the Chindwin River, handed over a juvenile from the wild of Chindwin River and 16 hatchling *Kachuga trivittata* from the in-situ, to the Yadanabon Zoological Garden and 24 Microchips inserted to the *Kachuga* and obtained blood sample from 8 adult and subadult of *Kachuga* at the Yadanabon Zoo in Mandalay.

1. Introduction

A Turtle Team headed by Dr. Gerald Kuchling from Australia conducted freshwater turtle surveys in Upper Chindwin River in Myanmar during the last three years. Based on the surveys, it was found that Myanmar Roofed Turtle, *Kachuga trivittata*, and some other endemic species were extremely rare in that region (Kuchling, 2004, Win Ko Ko & Khin Myo Myo, 2005 and Khin Myo Myo and Kyaw Moe, 2006).

By the guidance of Mr. Douglas B. Hendrie, Asian turtle coordinator, the Turtle Team has been carrying out turtle conservation activities in Upper Chindwin River since September, 2005 and Wildlife Conservation Society (WCS), Myanmar Program, gave financial support to its activities. The Turtle Team comprises some staffs from WCS and Htamanthi Wildlife Sanctuary which is under the Nature and Wildlife Conservation Division (NWCD) of Forest Department, Ministry of Forestry.

Turtle Conservation and Public Education Program was conducted in Upper Chindwin River by the Turtle Team during September 2005 and June 2006. Main base camp was set up at Linpa village which is about 454 nautical miles from Monywa Town and the Team visited 13 villages and hold round - table discussion at four villages. Hkanti Township and District Peace and Development Councils, Sagaing Division, gave necessary assistance to the Team.

2. Objectives

- ◆ To know the status of *Kachuga trivittata* and some endemic of freshwater turtle at the upper Chindwin River.
- ◆ To increase and protect turtle population and their habitats in the Project Area.
- ◆ To increase knowledge and raise awareness amongst local communities about the threat Myanmar Roofed turtle in order to encourage local participation in helping protect the turtle.

- ◆ To conduct research in releasing juveniles turtle using transponder microchips system for studying home range, habitat and nesting ecology.

3. List of Participants

Sr	Name	Position	Organisation
1	U Khin Maung Myint	Park Warden	Htamanthi Wildlife Sanctuary
2	U Maung Win	Range Officer	Htamanthi Wildlife Sanctuary
3	U Myint Thein	Ranger	Htamanthi Wildlife Sanctuary
4	U Aung Soe Than	Forest guard	Htamanthi Wildlife Sanctuary
5	U Saw Mon Htay	Forest guard	Htamanthi Wildlife Sanctuary
6	Daw Thein Pu	Cook	Htamanthi Wildlife Sanctuary
7	U Win Ko Ko	Coordinator	Wildlife Conservation Society
8	Daw Khin Myo Myo	Program Officer	Wildlife Conservation Society
9	U Kyaw Moe	Project Officer	Wildlife Conservation Society

A total of six staffs from the Htamanthi Wildlife Sanctuary, Forest Department, took part in the field work in Upper Chindwin River. They participated in the Program by rotation since only three staffs participated at a time.

4. Project Area

The area is located between Htamanthi Village to Hkamti town segment of Upper Chindwin River, Hkamti District, Sagaing Division, in Upper Myanmar and the River segment is approximately 50 km in length (Figure 1).

After surveying the Upper Chindwin River by Dr. Gerald Kuchling and Turtle Team from WCS, the segment was proposed to the Forest Department.

Figure (1). Map showing the Project Area.



5. Activities

5.1. Meeting with local authorities.

The Team met with local authorities concerned and discussed matters relating to the Myanmar (Burmese) Roofed Turtle, *K.trivittata*, conservation program. The authorities gave necessary assistance to the Team so as to conduct the program smoothly in their area (Figure 2). The team distributed posters, turtle T-shirt and cap.



Figure (2). Officers from District and Township State Peace and Development Council observed the activities of the Turtle Team.

5.2. Warning signboards.

Turtle Team requested permission from District and Township level State Peace and Development Councils to erect signboards at some sand banks where turtles usually laid their eggs. The warning signboards were made of corrugated iron and wooden poles. The warning, "**Your settlement on this sand bank is not allowed**", is written in Myanmar (Figure 3). The Team was allowed to set up 12

signboards on the requested sand banks. The locations of 12 signboards are shown in the following Table (1) describing their nearby village names.

The Team also met with village authorities to propose designated sand banks where turtle usually used as their nesting place and for their suggestion and collaboration in setting up the signboards at places. Signboards were set up successfully at the places in collaboration with the village authorities, villagers and fishermen.



Figure (3). Villagers, fishermen and Turtle Team were setting up a signboard on Heinsun sand bank.

Table (1). Location of 12 signboards.

No	Place or Village	Location	
		Longitude(E)	Latitude(N)
1	Kaunghein, Ponkwe Sand bank	95.42823°	25.64890°
2	Kaunghein, Winha Sand bank	95.24318°	25.68643°
3	Linpa, Ponkwe Sand bank	95.52218°	25.77458°
4	Linpa, Nanphilin Sand bank	95.53104°	25.78794°
5	Linpa, Pagoda Sand bank	95.5322°	25.79063°
6	Linpa, Linpa Sand bank	95.53344°	25.79229°
7	Minenaung, Thayetzwe Sand bank	95.59291°	25.85890°
8	Minenaung, Phayon Sand bank	95.59105 °	25.86197°
9	Heinsune, Sand bank	95.58026°	25.87201°
10	Heinsune, Khaunglawzwe Sand bank	95.57803°	25.87061°
11	Seinnan, Seinnan Sand bank	95.62325°	25.95187°
12	Kadoe, Pagoda Sand bank	95.64451°	25.95397°

5.3. Public awareness.

The Turtle Team made educative talks and hold discussion with villagers at four villages and some temporary fishing camps. Temporary human settlement by fishermen and their families from the dry zone of central Myanmar on all sandbanks including turtle nesting areas increases the chance to find most of the turtle nests by human during the nesting season. Therefore a trip for people's awareness on Myanmar Roofed turtle and other freshwater turtle was launched by education program of the Turtle Conservation Project between the Khamti to Htamanthi segments of the upper Chindwin River.

The Team presented "Status and threats to the turtles and tortoises" to the villagers, and fishermen and their families with the aid of photographs printed on vinyl sheets and turtle shells. It also requested them not to use the turtle sand banks as pastures; not to set up any fishing gears on the banks; not

use blast and poisoning fishing at or near the sand banks. The Team also requested them not to settle on the banks for any purpose.

The villagers and fishermen are Buddhist and most of the local villagers are Shan ethnic. The Team could make friendly and effective discussion with them because some of the Team members were also Shan ethnic and they interpreted in Shan language to the villagers.



Figure (4). Daw Khin Myo Myo and U Kyaw Moe were giving educative talk and presentation at a fishing camp.

A mobile library was set up on the boat by carrying along some books and periodicals which were donated by some well-wishers, to the trip. They were hired free of charge to the peoples during the trip. In collaboration with local peoples, Turtle Team held a sports competition at sports ground of Linpa village's Primary School on 4th January, 2006 (58th Independence Day). The Team gave exercise books, pencils and rulers to the Prize winning students (Figure 5). All the rest non-prize winning students were also gave rulers which were decorated with tortoise and hare pictures, as a gift from the Team.



Figure (5). A commemorative photo showing teachers, prize winning and non-prize winning students of Linpa village's Primary School on 4th January, 2006 (58th Independence Day).

5.4. Patrolling.

River length of the Project area is about 50Km and, therefore, it is difficult to cover the whole length in a day patrol. The Team divided the Project Area into two segments. The Team planned to patrol each segment on every alternate day in order to be effective patrolling and conservation and a boat owned by the Turtle Team was used. Usually, patrolling started at about 08:30 hour in the morning. As it was winter time, mist or fog, locally called "*Hmine*", covered the River and it was not clear to see even other side of the River. Therefore, the Team could not leave base camp in early morning as it was dangerous to them.

5.5. Turtle egg collection and hatchling from the nest.

Turtle footprints on sand banks were searched during the patrol. The footprints can be seen clearly on a sand bank if a

turtle went there (Figure 6). The Team could know whether a sand bank was used for turtle egg laying or not by observing the presence of footprints or not on a sand bank.



Figure (6): The foot prints of *K. trivittata* on the sand bank of Linpa's pagoda.

An experienced man checked the place carefully when the Team found turtle footprints. The man used a stick or cane and thrust it into the foot prints along the tracks on sand bank (Figure 7). The man pointed out where the turtle nest was when he knew the nest and Turtle Team uncovered the eggs gently (Figure 8). When the eggs were found, team members removed the eggs from the nest and put them into plastic or bamboo baskets as its previous laying position.



Figure (7). Thrusting with a stick on a sand bank in turtle egg nest searching.



Figure(8).Turtle eggs were being removed from the nest.

Eggs were carried by the boat and arrangements were made to reduce the affect of boat vibration to minimum. Measurements, length and width, and weight of the eggs, were recorded at the base camp in Linpa village. The eggs were placed in a man-made

nest which was fitted with a temperature logger at night. These eggs will become hatchlings at the beginning of the raining season.

A total of five man-made nests fitted with five temperature loggers were built during the program. These 5 temperature loggers are donated by Mr. Brian. D. Horne, a PhD student at Ohio University. He accompanied with Bill Holmstrom and Dr. Rick Hudson and visited Yadanabon Zoological Garden, Mandalay, in October 2005.

The Team found that a female turtle made 3 to 7 clutches to lay her eggs and 1 to 11 eggs at a clutch. But it was found that one female laid up to 52 eggs. Some villagers explained their experience that a female could be laid 3 times in a year. Turtle Team collected 235 Roofed Turtle eggs from 10 females not including flooded nest at Kadoe sand bank) in the Project Area: 132 eggs in Linpa, 64 eggs in Minenaung, 28 eggs in Kaunghein and 11 eggs in Kadoe. Among 235 eggs, 30 was damage which represented 13%(Figure 10,11, 12 and 13).

Most of the villagers believe that turtle lays her eggs in 7 clutches resembling the 7 stars of the Plough in the sky. That is the reason why they call it seven star turtle in Myanmar language.

10 Females *Kachuga* laid many clutches of 235 eggs (not including flooded nest at Kadoe sand bank) Appendix (1). Among them 88 hatched out from the nest during the first week to third week of May (Figure 9). The eggs were soft shelled, very thin layered and oval shape. Average measurements of hatchling turtles were taken in centimetre as carapace length (CL), carapace width (CW), plastron length (PL), plastron width (PW), shell depth (SD) and weights were taken in grams Appendix (2).



Figure (9). *Kachuga* hatchling comes out from the nest.

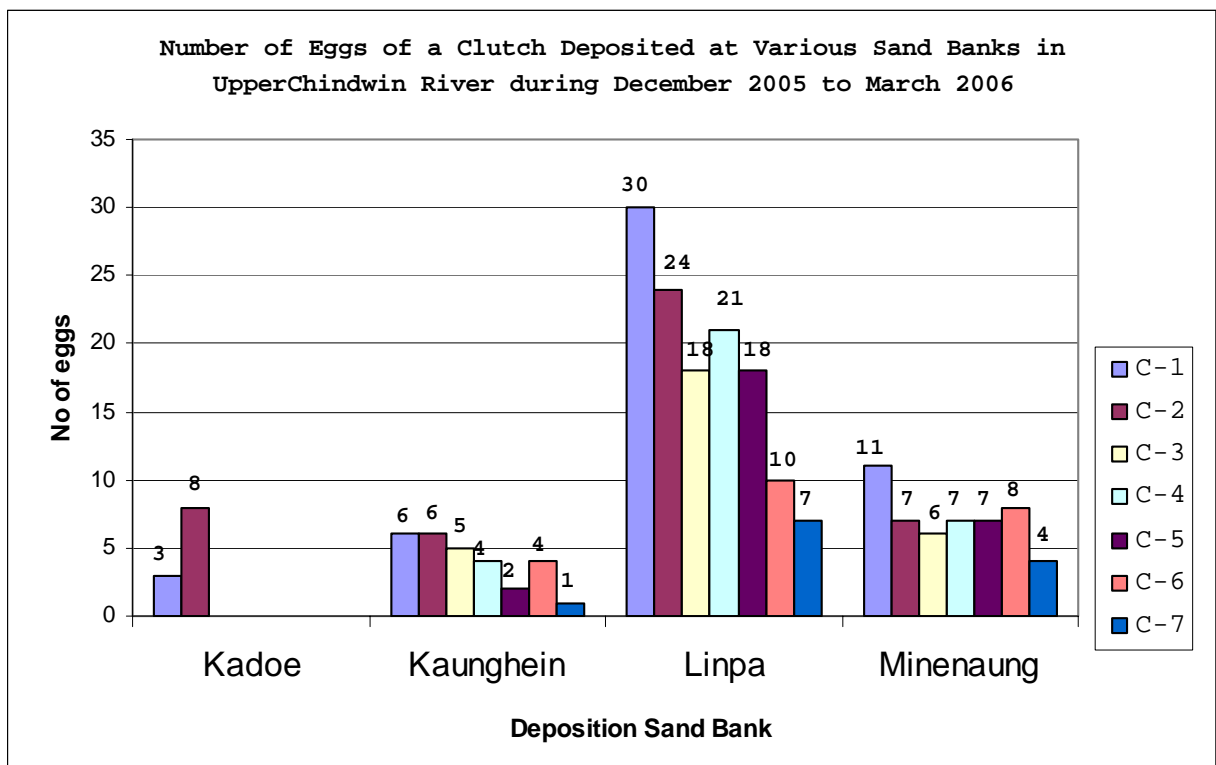


Figure (10). Number of eggs of clutch deposited at various sand banks in Upper Chindwin River during December 2005 to March 2006

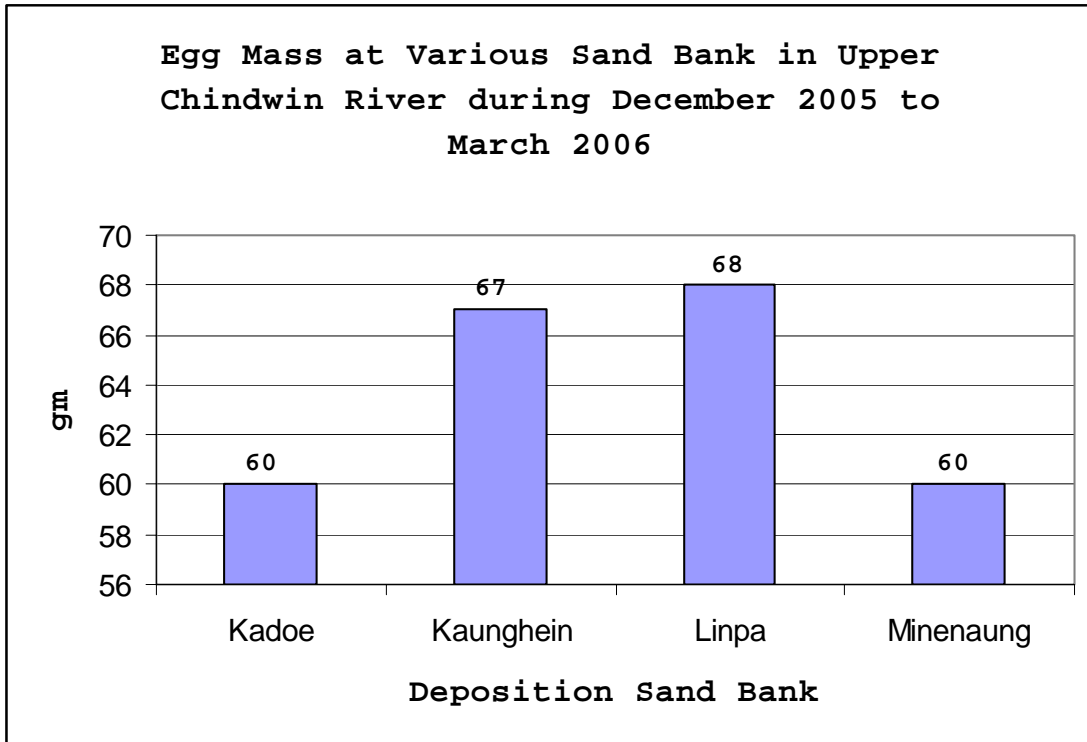


Figure (11). Egg mass at various sand banks in Upper Chindwin River during December 2005 to March 2006.

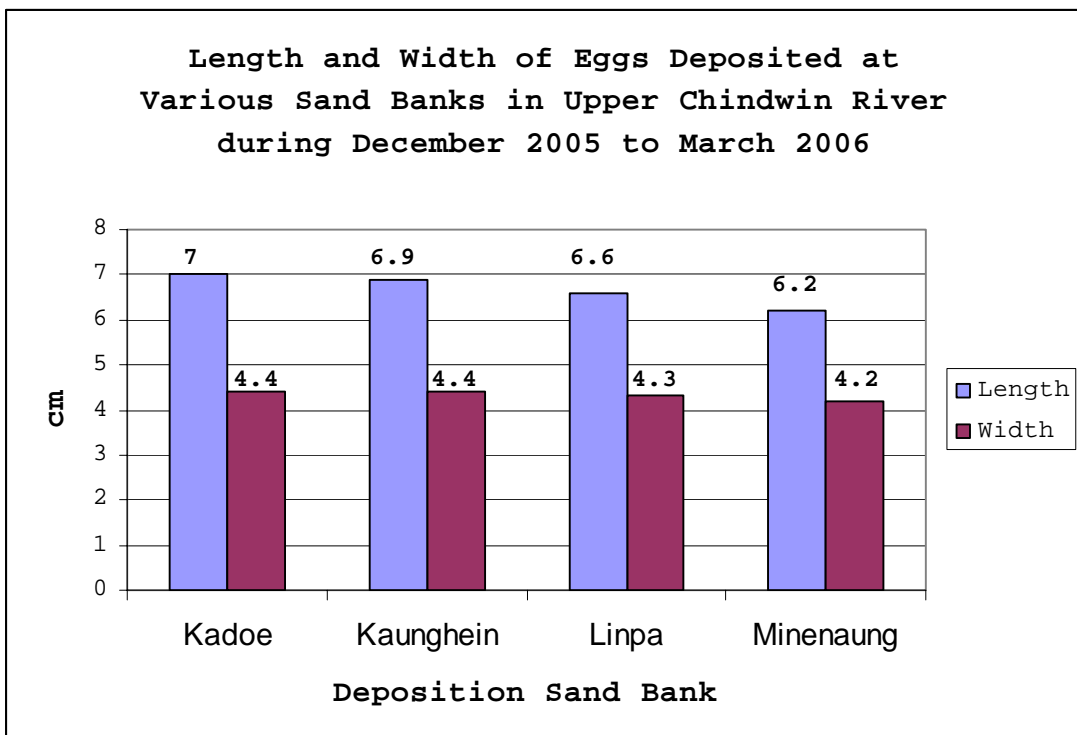


Figure (12). Egg measurement of length and width of various sand banks in Upper Chindwin River during December 2005 to March 2006.

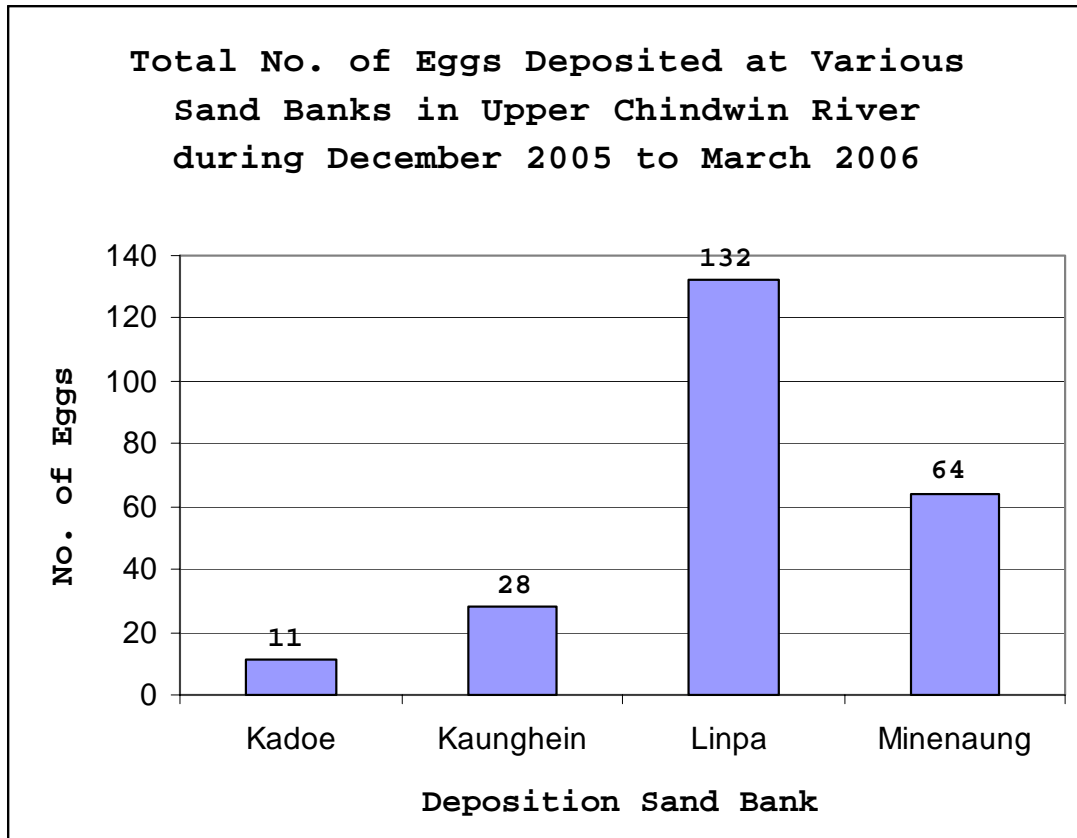


Figure (13). Total of eggs deposited at various sand banks in Upper Chindwin River from December 2005 to March 2006

5.6. Releasing live turtles.

The Team announced during the trip that anyone who could show the location of turtle egg nest would be given Kyats 5000 in cash as an incentive. Besides the incentive, the Team also gave 200 Kyats per egg to the one who showed the nest place. In response to the announcement, children from some villages and fishermen gave live turtles to Team. The turtles were caught accidentally by their beach seine nets. Team wrote "FD+ WCS" on their carapaces with paint and released them into the River.

A fisherman from Phalakaung fishing camp, informed accidental entanglement of a turtle with his fishing nets. On the tip of his information, the Team went to the site immediately and checked the turtle. It was found to be a female and then recorded measurements of the turtle. The Team also painted marking, "FD + WCS 02, 2005", on its carapace and released the turtle into the

River (Figure 14 & 15) and also an subadult *Chitra vandijkii* and an adult *Nilsonia formosa* to the Chindwin River,



Figure(14): U Hla Htut, fisherman releasing Myanmar roofed turtle to the River at Phalakaung fishing camp.



Figure (15). U Hla Htut , fisherman releasing Myanmar roofed turtle to the River.

Similarly, fisherman U Kyaw Than from Tone lon sand bank, near Htamanthi village, also handed over a *Kachuga trivittata* juvenile to the Team (Figure 16 & 17). That turtle was transferred to U Ye Myint, Park warden, Yadanabon Zoological Garden, Mandalay, on the 5th March 2006.



Figure (16). A Juvenile *K.trivittata* was handed over to Turtle Team in Tone lon sand bank.



Figure (17). Closed up view of the *K. trivittata* which was transferred to the Mandalay Zoo through the Turtle Team.

5.7 Using New method to Make Marking for *Kachuga trivittata*

Mr. Rick Hudson (Co-chair, IUCN Turtle Survival Alliance, Conservation Biologist, Fort Worth Zoo) and Paul P. Calle, Senior Veterinarian, Wildlife Health Sciences, Wildlife Conservation Society) visited Yadanabon Zoological Garden at Mandalay on 21 to 25 August 2006. This trip was organised by turtle team in cooperation with Yadanabon Zoo staff. The purpose of the trip are to place transponder microchips for permanent identification in hatchling Myanmar Roofed turtle (*Kachuga trivittata*) and monitored the progress of newly constructed facilities for captive breeding, head-starting and rearing at Yadanabon Zoo.

Turtle Team handed over 16 juvenile brought from the base camp at Chindwin River to the Yadanabon Zoological Garden and 24 Microchips inserted to the *Kachuga* at that Zoo (Figure18). The rest of 72 hatchlings remained at the base camp near the Chindwin River will be inserted with microchip before releasing some to the natural habitat and some will be retained for 3 years for head-starting before releasing to natural habitat.

During our visit, Forestry Department confiscated 2100 turtles from China border and temporarily kept at the Zoo. This confiscated turtles included four species yellow tortoise (*Indotestudo elongata*), Asian leaf turtle (*Cyclemys* spp.), 2 species endemic in Myanmar, Myanmar eyed turtle (*Morenia ocellata*) and Myanmar flapped shell turtle (*Lissemys scutata*).

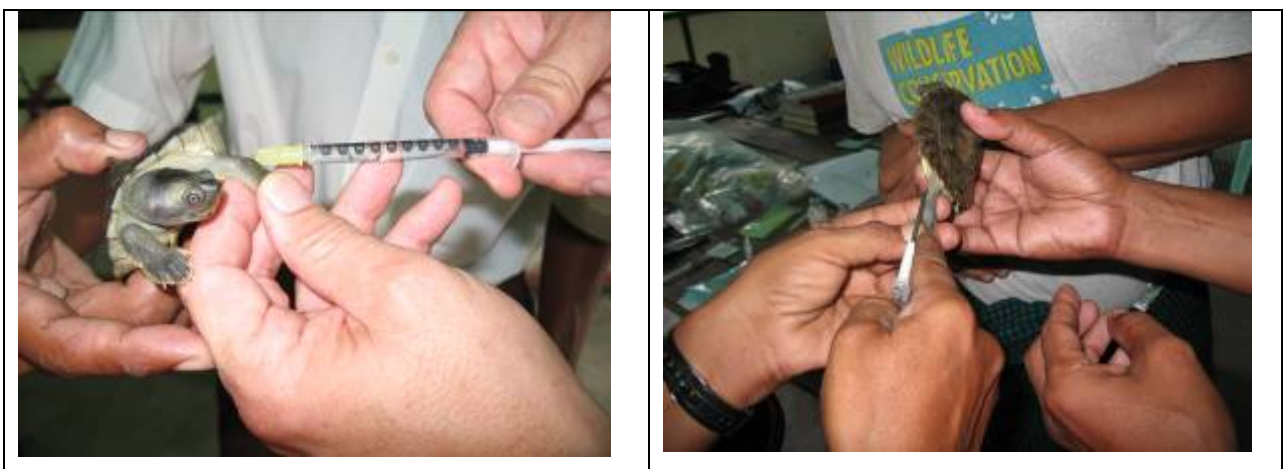


Figure 18. Transponder microchips for permanent identification in hatchling Myanmar roofed turtle (*Kachuga trivittata*).

5.8 Obtained Blood Samples from *Kachuga*

During our visit, duplicated blood samples were collected from the 8 adult and sub adult *Kachuga* at Yadanabon Zoological Garden at Mandalay between 21 and 25 August 2006. These will eventually be exported for future genetic analysis. Now proposal for issuing permit for this blood samples by the Forest Department has been put up to the authority.

6. Discussion

The Turtle Team has been studied the status of Myanmar turtle and tortoises in Upper Chindwin River since 2003. The Team was, first, headed by Dr. Gerald Kuchling from Australia and the Team submitted reports to the WCS.

Based on the surveys, out of seven Myanmar endemic turtle species, three endemic species, *Kachuga trivittata*, *Nilssonina formosa* and *Chitra vandijki* were found in the Project Area. They were very low population and at the brink of extinction if they were not conserve in time. Booming River gold mining in the Chindwin River, accidental entanglement in fishing gears especially gillnets, over exploitation on turtle eggs for consumption, temporary human settlement on River sand banks and illegal trading on live turtles and carapaces mainly for export were found to be major threats to the turtles. They are assumed as the main factors for habitat lost, poor recruitment resulted in low turtle population and they can lead to turtle extinction in near future.

Realizing the needs to conserve the animals and to educate local peoples on turtle conservation, the Turtle Team conducted "Turtle Conservation and Public Education Program" in the Upper Chindwin River.

Local residents have been consuming turtle eggs for a long time ago. Most of them can predict where and when the eggs will be laid correctly. Therefore, every morning local residents go and check the egg laying places before sunrise in accordance with

their experiences in the past which was passed from generation to generation. It is common that four or five villagers reach to the same place in a morning. Local residents consume turtle eggs very eagerly because they said that they could get a chance to eat them just once a year only.

Therefore, it is not safe to keep the eggs at the place where they are laid. Peoples can easily find them and they will collect the eggs for consumption. The Team, first, planned to hire a watchman to look after the nest from local exploitation by checking around the places daily. But, the Team had an experience in last December that eggs were taken away by someone before the Team arrived there. Later, the Team was informed that a local resident in Linpa village took the eggs. That issue was solved peacefully by the Team and village authority.

Very few information could be collected from a man in Mine naung village in previous surveys. Therefore, the Team assumed the Mine naung village and its neighbourhood was not a suitable place for turtle nesting. The Team did not hope to find turtle nests on the west bank of Mine naung village when the Program was planned. Therefore, no signboard was planned to set up on the sand bank at Mine naung. But, the Team found unexpectedly 64 eggs from 3 nests there. The Team could realize that why the interviewee from the Mine naung did not give correct information to the Team. Because, he collects and eat the eggs!

There are over 300 fishermen resided in the Project Area. They are, in fact, not local residents. They come from central Myanmar. U Thein Win is an entrepreneur and he has been doing in fishery business for 25 years. He invested heavily in Upper Chindwin River. He is the main smoked fish exporter to India via Tamu(Figure 19).



Figure (19). U Thein Win was explaining smoked- fish procession to a member of Turtle Team in Ngaminetaung sand bank in Upper Chindwin River .

He is also an authorized person in his community and therefore he helped the Team very much by persuading other fishermen to conserve the Turtles. As a result of his organizing, U Hla Htut, a fisherman from Phalakaung fishing camp, handed over a female turtle which is accidental caught in his fishing nets. The Team painted a marking, "FD + WCS 02, 2005", on its carapace and released the turtle into the River (Figure 14 & 15). A turtle was also released almost at the same place with "FD + WCS 01, 2005" marking which was released in April, 2005.

The Turtle Team already released two adult female turtles, with "FD + WCS" marking on carapaces made by the Team, into the Chindwin River in April and December. They were accidentally caught in fishing nets and fishermen informed to the Team. During this trip to Upper Chindwin River, children and fishermen handed over some turtles which they accidentally caught in their fishing. Those turtles were also released after written "FD+WCS" on their carapace. It indicates that peoples become more realize our aim and object than previous and their active participation in turtle conservation program.

The Team also handed over some turtles from the Chindwin area to the Yadanabon Zoological Garden in Mandalay in the past and, at present, a total of eight Myanmar Roofed Turtle, *K.trivittata*, has been rearing at the Zoo.

It was found that the mobile library was a useful tool for organizing the local peoples and fishermen as it could gave direct contact with them. The Team could organized local peoples very well and could make a good friendship with them during the Program. Turtle Team set up a library in Kaung hein village, Hkamti District, Sagaing Division, with over 200 books and periodicals in 2005. Arrangements have also been made to donate some books and periodicals to Naga Traditional Culture library in Hkamti and Linpa village library.

The activities of Turtle Team was documented by U Tun Shaung from WCS Myanmar Program in February 2006 by shooting video clips and taking photographs (Figure 20). It is need to record again in coming June when the eggs are hatched.



Figure(20). U Tun Shaung recorded activities of Turtle Team in Upper Chindwin River by video filming.

Three staffs from Htamanthi Wildlife Sanctuary of Forest Department (one Range Officer, one Ranger and one Driver) participated in the Turtle Team activities since October 2005.

The duties of 3 staffs were terminated at the end of March 2006. But, the staffs from WCS will continue these works in Upper Chindwin River and three staffs from Htamanthi Wildlife Sanctuary of Forest Department will recruit again in December 2006 to the Team's activities.

Government made a ten-year plan to build a Hydro Electric Multi-purpose Dam in Tazone village, Homalin Township in Upper Chindwin River. At present, seven local companies have been felling wood in catchments area of the dam. Some villages which are located on the left and right banks of Chindwin River will be shifted beyond the catchments area. Some turtle habitats will also be lost.

There is no base camp building for the Turtle Team so far. Arrangement is made to build a permanent building in Linpa village in a few months. It is, in fact, urgently need to build a turtle pond and a building for the Team before the winter. A building (25'x15') with corrugated zinc roof, wooden floor and bamboo splits sides is a sufficient place for the Team as a shelter to stay. A turtle pond is also planned to build there for turtle hatchery with turtle eggs from the Project Area. The pond is a replica of Cuc Phong National Park in Vietnam. Dimension of the Pond is 30'x15'x2' and it will be fenced by 2"x2" iron mesh. A 500 gallons capacity over head water tank for turtles and staffs will also be build at the base camp in Linpa village.

Turtle Team should also conduct public awareness trip to the remaining villages and temporary fishing camps to make round table discussion and to give educative talk to the peoples.

The Team will try to have more cooperation and collaboration with local peoples and fishermen in future than the present. The concerted effort of the WCS and local peoples will be put on the development of villages in parallel with turtle conservation so as to get "Win - Win" situation.

7. Future Plan

The Team was informed that eggs laying season in the Project Area was from December to March. The same egg laying season was observed by the Team and, therefore, it is verified and confirmed. Eggs laid from female on Linpa sand bank are found to be the biggest, most weigh and clutches number than the others. Location is thought to be the main factor for the above significant facts. Linpa sand bank is situated on an island which is on the middle of the Chindwin River and a Pagoda is built on the island. Due to its location, Linpa sand bank has difficult access to the villages and, consequently, less trespassing and human disturbances.

Minenaung sand bank is in the western part of Chindwin and there are many plantations. Besides, most of the hawkers from Hein sune village were wandering around the area to sell their goods. Turtle Team patrolled in this area daily and the hawkers from Hein sun village gave information every day to the Team on turtle egg laying on the sand bank. The Team could collect 64 eggs from the Minenaung sand bank ranking second place in abundance Figure (3) to (6). It will be more convenient if a villager from Minenaung is employed for turtle Team to take care of the sand bank.

Kaunghein village is the largest village in the Project Area but it ranked third place in turtle place in abundance. Figure (3) to (6). The Team donated 200 books to the village library. The Team could build very good relationship with the village. A seasonal staff of the Team for the village played an important role in building relationship and turtle conservation activities.

Certain amount of money in cash was given to those who showed the eggs or nests to the Team and the Team also gave some money per egg basis. But, as it can encourage them to collect more eggs for the bonus money, the Team will not practice such system of payment in future. Instead, it will pay double to those who show the eggs or nests in lump sum but no more on per egg.

The Team had many years experience in crocodile rearing in captive. In combination with knowledge and experiences of local peoples, the Team has taken venture in turtle hatchery in the Project Area. However, the Team does need suggestions from the other scientists on turtle hatchery.

Serial number will be written by paint on the carapace of female which comes to the bank for laying her eggs. The numbers are very convenient for monitoring the turtle for conservation.

There is a need of transponders microchip and additional transponder readers for future not only for *Kachuga* hatchlings and adult, but also for other freshwater turtle endemic in Chindwin River.

Turtle Team was based at Linpa Village and nursery pond is still under construction for juvenile *Kachuga*. It will be completed before the next breeding season.

The government is now planning to build huge Hydropower plant with the help of India government by building the dam across the Chindwin River. It is learnt that this hydropower project has been started. When it is completed, the area where we are working now will be submerged. There is in need of knowing the status of *Kachuga trivittata* between the Htamanthi village to the confluence of Chindwin (lower part of Chindwin) and Ayeyawady River. Those regions haven't been surveyed yet. We can get further information for the current status of *Kachuga trivittata* and other Chelonian species if we can conduct further study in those areas.

8. Acknowledgement

This work was funded through a grant from the Batchelor Foundation to the Turtle Survival Alliance, by a grant from the Panaphil Foundation and by WCS. We are grateful to them all.

We are very grateful to U Than Myint, Country Director of WCS Myanmar Program, since this project would not have been possible without his assistance.

Mr. Douglas B. Hendrie, Asia Region Turtle Conservation Coordinator WCS at Vietnam, was most appreciated for his advice, comments and recommendation.

Thanks are due to the Nature and Wildlife Conservation Division, Forest Department, for granting permission to conduct the Project in Htamanthi WS in the Upper Chindwin River.

Dr. Gerald Kuchling, Mr. Bill Holmstrom, Dr. Rick Hudson and Mr. Brain Horne are also thanked for their assistance to the Project.

Special thank is due to Hkamti District and Township Peace and Development Councils, Sagaing Division, for providing necessary assistance to the Team.

Dr. Naing Naing Oo (Managing Director, Shwe Mya Nanda Co. Ltd.), U Phoe Than and U Ohn Myint (Linpa village), U Kan Thein (Kaung hein village), U Aung Paw and U Saw Khun Shwe (Mine naung village), U Maung and U Kan Sein (Hein sune village), U Khin Maung (Sein nan village), and U Hla Pe (Naga Traditional Culture Society in Hkamti town), are thanked for their help in the field and sharing their experiences with turtles.

We also appreciate U Tun Shaung, U Tint Tun and U Zaw Win of WCS for their help in preparation of this report.

Finally, we would like to thank our colleagues, U Khin Maung Myint, U Maung Win, U Myint Thein, U Aung Soe Than, U Chit Htay, U Myo Win, U Saw Mon Htay and Daw Thein Pu for their active participation in turtle conservation.

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Appendix 1. List of deposition places, no. of eggs in clutches, egg measurements and egg masses recorded from Upper Chindwin River.

Nest No.	Place of deposition sand bank	Date	Deposition of eggs in clutch							Damage eggs	Total eggs	Measurement of eggs			Logger No
			C-1	C-2	C-3	C-4	C-5	C-6	C-7			Length (cm)	Width (cm)	Mass (gm)	
1	Linpa temple	4/12/05								4	4	7	4.2	64	
2	Kadoe	20/1/06	3	8							11	7	4.4	60	369708/4-00
3	Linpa temple	31/1/06	9	4	5					7	18	7	4.3	65	500389/8-01
4	Minenaung	17/2/06	11	7	6	7	7	8	4	2	50	6.2	4.2	60	500387/8-01, A-28, B-22
5	Linpa temple	21/2/06	11	8	5	9	3	4		6	40	6	4	62	500386/8-01
6	Kaunghein	24/2/06	6	6	5	4	2	4	1		28	6.9	4.4	67	500390/8-01
7	Linpa pone thaung	26/2/06	6	7	2	6	6	2	7	9	36	6.8	4.6	80	
8	Minenaung	26/2/06									14				
9	Kadoe	3/3/06									?				
10	Linpa temple	26/3/06	4	5	6	6	9	4		2	34	6.3	4.4		
	Total		50	45	29	32	27	22	12	30	235	6.7	4.3	65	

Note. Nest No.9 didn't dig out the egg from the natural nest in Kadoe sand bank. After that the nest were flooded from Chindwin River.

Appendix 2. Average Measurement of *Kachuga* hatchling at Upper Chindwin River.

First Period

Nest No.	Date of Hatch	Incubation period	No. of Hatch	Average Measurement of Hatchling (cm)					
				CL (cm)	CW (cm)	PL (cm)	PW (cm)	SD (cm)	Mass (g)
1	3/5/06	151	2	6.2	6.7	5.7	3.5	3.3	45
2	Damage								
3	21/5/06	110	12	5.8	5	5.5	3.3	3.1	40
4	Damage								
5	21/5/06	80	1	5.9	5.4	5.6	3.3	3.1	40
6	Damage								
7	21/5/06	85	33	5.9	5.7	5.6	3.5	3.1	40
8	20/5/06	84	8	5.9	5.6	5.5	3.4	3.1	40
9	Flooded								
10	21/5/06	57	32	5.9	5.8	5.4	3.5	3	40

Appendix 2. Continued

Second Period

Nest No.	Date of data Collection	Average Measurement of Hatchling (cm)					
		CL (cm)	CW (cm)	PL (cm)	PW (cm)	SD (cm)	Mass (g)
1	11/8/06	7.6	7.4	7.2	4.2	3.8	60
3	11/8/06	7.2	7	6.6	4	3.5	53
5	11/8/06	6.7	6.5	6.4	3.5	3.6	55
7	11/8/06	7.2	6.4	6.7	3.9	3.6	53
8	11/8/06	7.5	7.2	7	4	3.8	60
10	11/8/06	7.1	6.8	6.4	3.9	3.4	53