

Final Technical report
CLP project ID: 0217910

COMMUNITY AWARENESS AND CAPACITY BUILDING FOR ENDANGERED TURTLE CONSERVATION IN NORTHEAST INDIA



Submitted by

Dr. Chittaranjan Baruah

Team Leader, Turtle Conservation and Research Programme (TCRP), Assam, India

Team members:

Dr. P.K. Sharma, Dr. Luna Phukan, Mr. Sayad Ali, Mr. Abinash Chutia

Supported by



Technical support from:



Final Technical report
CLP project ID: 0217910

Project title
Community Awareness and Capacity Building for Endangered Turtle Conservation in northeast India



Submitted by
Dr. Chittaranjan Baruah
Team Leader, TCRP, Bioinformatics Centre
Department of Zoology, Gauhati University, Assam, INDIA-781014
Phone: 0091-09954294080 (M)
Web: <http://tcrpnortheast.wikispaces.com>

Team members

Dr. P.K. Sharma
Dr. Luna Phukan
Mr. Sayad Ali
Mr. Abinash Chutia

Supported by



Reporting period: April 2010 to September 2011

Published by: Turtle Conservation & Research Programme (TCRP), Assam

For bibliographic purposes, this document may be cited as:

Baruah C., Ali S., Sarma P.K., Phukan L. Chutia A. and Sharma D.K. (2011). Community Awareness and Capacity Building for Endangered Turtle Conservation in Northeast India. CLP project Report, Pp 50.

Conservation Leadership Programme: Project Reporting

Final Report

1. CLP project ID: 0217910

Project title: Community Awareness and Capacity Building for Endangered Turtle Conservation in northeast India

2. Host country and site location: Northeast India

3. Full names of author(s): Chittaranjan Baruah (Team Leader), Sayed Ali, P.K. Sarma,
Luna Phukan, Abinash Chutia

4. Permanent contact address, email and website:

Turtle Conservation & Research Programme (TCRP)

Bioinformatics Centre, Department of Zoology,

Gauhati University, INDIA-781014

E-mail: tcrpnortheast@gmail.com

Web: <http://tcrpnortheast.wikispaces.com>

5. Date when the report was completed: 10th October, 2011

6. Reporting period: April 2010 to September 2011

ACKNOWLEDGEMENTS

This project was supported by the ‘CONSERVATION LEADERSHIP PROGRAMME’

We are grateful to the



We gratefully acknowledge Conservation Leadership Programme for financial support on the endangered turtle conservation program in Northeast India. We are grateful to Dr. Shailendra Singh, Director of the Turtle Survival Alliance – India program for his constant technical support. We are thankful to D.K. Sharma, Peter Praschag, Indraneil Das and Saibal Sengupta for their constant encouragement and support. The team leader gratefully acknowledge William H. Espenshade-III, Director of the ‘Asian Scholarship program for in-situ chelonian conservation (ASP)’ for providing necessary training in different venues of USA. We offer our thanks to Dr. Jayanta Deka , Dr. Susanta Kumar Bhuyan, Dr. Ramesh Nath, Mr. Monim Shah Rahman and Mr. Phalgun Chetia for their continuous support in implementing the project. We acknowledge the State Forest Department, Assam for kind cooperation and necessary permission for egg protection program. We are thankful to the British Chelonian Group for the seed grant support for purchase of camera lens. We are grateful to turtle researchers of the Department of Zoology, Gauhati University for their turtle conservation research efforts and extending support in conducting the field works. We offer our especial thanks to Mr. Bichitra Kumar and Ms. Papari Devi for their constant support. We are also thankful to the villager of 2 No Tengaguri char, Temple pond management committee of Hazo and Kamakhya for their support for nest protection programme.

Team Leader

Chittaranjan Baruah

(Chittaranjan Baruah)

Date: 10.10.2011

Project Team
Turtle Conservation & Research Programme (TCRP)



Dr. Chittaranjan Baruah
(Team Leader)



Sayed Ali



Abinash Chutia



Phalgun Chetia



Monim Shah Rahmam



Dr. Luna Phukan



Dr. P.K Sharma



Prof. D.K Sharma
(Team supervisor)



Habibullah Qaiser



Pranab Malakar

LIST OF PROJECT PUBLICATIONS:

- Baruah, C., Sarma, P.K., and Sharma, D.K. (2010). Status and conservation of Assam roofed turtle *Pangshura sylhetensis* in the Brahmaputra floodplain, Assam, India. *NeBio* 1(3):42–47. [\[PDF\]](#)
- Baruah C. & Sharma D.K (2010) Indian Eyed Turtle *Morenia petersi* (Anderson, 1879) in the Deepor Beel, Ramsar site . ReptileRap Newsletter NO. 9 Pp. 6-7. [\[PDF\]](#)
- Baruah, C., Chetia, P., Bhuyan, S.K. and Sharma D.K. (2012). Diversity of freshwater turtles and their possible conservation in and around the Orang National Park, Assam, India. *Tigerpaper*, 39 (1) pp 24-30. [\[PDF\]](#)
- Baruah, C., Ali Reza, A.H.M. and Sharma, D.K., 2010a. Le Trionyx noiratre, la Tortue de Bostami *Nilssonina nigricans* (Anderson 1875) (Ang: Black softshell Turtle, Bostami Turtle), *Chéloniens*, 18: 33-38. [\[PDF\]](#)
- Noureen, U. and Baruah, C., 2010. Le Trionyx a ocelles *Nilssonina hurum* (Gray, 1831) (Ang: Indian peacock softshell turtle). *Chéloniens* 18: 39-45.
- Singh, S. and Baruah, C., 2010. Le Trionyx a rayures *Chitra indica* (Gray, 1831) (Ang: Indian Narrow-headed softshell turtle). *Chéloniens* 18: 49-53
- Baruah C., Ali Sayed, Sarma P.K and Sharma D.K. (2010). Community participation: A tool for conservation of freshwater turtles in the river Brahmaputra, Assam. *Proc. Nat. Sem. Biodiversity of North East India and Its Future Concern*, pp 187-192
- Sarma P.K., Baruah C. and Sharma D.K. (2010). Distribution and conservation status of Assam Roofed turtle, *Pangshura sylhetensis* in Assam. In: Vasudvan, K. (Ed.). *Freshwater Turtles and Tortoises of India. ENVIS Bulletin: Wildlife and Protected Areas*, Vol 12 (1). pp 43-47
- Baruah, C., Singh S. and Sharma, D.K. (2010). Endangered Freshwater Turtle Conservation Efforts in Northeast India: Achievements and Challenges. In A. Walde, E.Walton and R. Schaffer (eds.) *Program and Abstracts of the Eighth Annual Sumposium on the Conservation and Biology of Tortoises and Freshwater Turtles*. Turtle Survival Alliance, Orlando, FL. pp. 3-4.
- Baruah C. & Sharma D.K (2010) Checklist of turtle fauna so far recorded from northeast India. *NeBIO Research Journal*, 1 (1):10-13 [\[PDF\]](#)
- Baruah, C and Sharma D.K.(2010). Endangered turtle of northeast India- The Assam Roofed turtle. *BioDiverse magazine*, 1(1): 6-10

CONTENTS

	Page No.
1. ACKNOWLEDGEMENTS.....	3
2. PROJECT TEAM	4
3. LIST OF PROJECT PUBLICATIONS.....	5
4. LIST OF TABLES, FIGURES & PLATES.....	7-8
5. SECTION-I: SUMMARY & BACKGROUND.....	9
6. SECTION-II: SUMMARY OF OBJECTIVES, ACTIVITIES AND OUTPUTS.....	13-45
PROJECT OBJECTIVES.....	13
MATERIALS AND METHOD.....	13-15
ACHIEVEMENTS FOR EACH PROJECT OBJECTIVES.....	16-45
7. SECTION-III: SUMMARY OF KEY PROJECT OUTCOMES.....	46
8. RECOMMENDATION.....	47
9. CONCLUSION.....	47-48
10. REFERENCES.....	49-50

LIST OF TABLE, FIGURE & PLATE

Table 1: Diversity and distribution of freshwater turtles and tortoises in northeast India

Table 2: Freshwater turtles recorded in and around the Orang National Park, Assam

Plate 1: The study area belongs to world's greatest turtle richness area

Plate 2: Showing the tributaries of the river Brahmaputra in Assam along with the study sites

Plate 3: Species of conservation focus in the present study

Plate 4: Potential *in-situ* turtle habitats of the present study

Plate 5: Survey in the Brahmaputra River, Assam, India

Plate 6: Survey of fishermen community in Assam, India

Plate 7: Prof. D.K. Sharma delivered a talk on the importance of turtle diversity in an awareness program

Plate 8: Community awareness for clean and safe ex-situ turtle habitat management (Hajo, Assam)

Plate 9: Distribution of Assam Roofed turtle (*Pangshura sylhetensis*) in northeast India and West Bengal.

Plate-10: Freshwater turtles of the Orang National Park, Assam

Plate-11: Temple pond turtles of Assam

Plate 12: Local exploitation record of soft-shell turtles for meat in the study site

Plate 13: Turtle painting competition to raise awareness among the school students

Plate 14: Former CCF Mohan Malakar gives his lecture on turtle conservation on World Biodiversity Day

Plate 15: Celebration of world Biodiversity Day, 2011

Plate 16: Stakeholder's participation on the World Turtle Day celebration, 2010

Plate 17: World Turtle Day Celebration

Plate 18: Celebration of the 'Year of the Turtle 2011'.

Plate 19: The turtle conservation education centre in Assam.

Plate 20: Preliminary socio-economic survey in riverine Islands.

Plate 21. Rescued eggs from poachers in one of the single operation with the help of local community.

Plate 22: Turtle nests located with the help of local communities and forest staff

Plate 23: *In-situ* turtle nest protection programme.

Plate 24: The first hatchling of Indian Peacock soft-shell turtle (*Nilssonia hurum*)

Plate 25: Awareness among local youths on rescue and release of turtles

Plate 26: Local researcher's and fishermen's interaction, Biswanath Ghat, Assam

Plate 27: Pranab Malakar, a local youth trained by TCRP team, holds a Narrow-headed softshell turtle

Plate 28: Sayed Ali (right) and Pranab Malakar (left) are in the ex-situ hatchery

Plate 29: TCRP team members in a discussion on the problem faced by the pond turtles in Nag Shankar temple pond.

Plate 30: Awareness stickers

Plate 31: Leaflets- Assamese language

Plate 32: Leaflets- English language

Plate 32: Leaflets- English language

Plate 33: A banner to aware the local people to keep the temple pond clean.

Plate 34: New Book by TCRP Team member : 'Turtles of Assam', where CLP has been acknowledged

Plate 35: An *ex-situ* hatchery constructed in the temple pond corner.

Plate 36: Regular cleaning of temple pond habitat (Hajo, Assam)

Plate 37: Supplementary feeding to the carnivorous turtles

Plate 38: Removal of toxic algae from the temple pond by the help of local community

Plate 39: TCRP banner with CLP Logo with an appeal to the temple pond turtle visitors

Plate 40: Local community helped for ex-situ habitat improvement program

Plate 41: A young TCRP member holds two hatchlings of soft-shell turtles

Plate 42: Pranab Malakar releases the hatchlings of the ex-situ hatchery to the temple pond.

SECTION – I

SUMMARY

At the conjunction of the Himalaya and the Indo-Burma biodiversity hotspots, northeast India is regarded as a major turtle conservation priority area. This region supports a remarkable 22 species of turtles and tortoises, making it one of the most diverse turtle faunas in the world. Many species of freshwater turtles have faced declines in population due to habitat loss, poaching and other threats. This project aims to spread awareness raising, capacity building and community participation regarding conservation of various endangered freshwater turtle species of northeast India, especially *Pangshura sylhetensis*, *Nilssonia nigricans* and *Chitra indica*.

BACKGROUND

The north-eastern region of India (26°10'22.79"-27°39'32.79"N Latitude and 91°26'39.74"-96°15'39.84"E Longitude) covering an area of 2, 62,179 km² (7.6% total area of the country) is a biologically highly diverse area and one of the most important biodiversity hot spots of the world. The region is at the conjunction of the Himalaya and Indo-Burma biodiversity hotspots. This region belongs to world's greatest turtle richness area (Buhlmann *et al.*, 2009). However, the region has been poorly explored scientifically with regard to surveys, conservation and monitoring of turtle fauna. The turtle and tortoise diversity of northeast India is the highest in the country and 22 of 29 species are found in this region (Das, 1995; Das, 2001; Praschag and Gemel, 2002). However, the lack of recent field information has created a gap in conservation and management of turtle species in the region (Gupta and Guha, 2002).

Moll (1986) had reported *Pangshura sylhetensis* (Jerdon, 1870) from Cherrapunji (Khasi hills) and Garo hills of Meghalaya, Cachar dist. of Assam. Choudhury (1995) reported the new locality of *Pangshura sylhetensis* (Jerdon, 1870) in Sadiya, subdivision of Tinsukia district, Kolathua village of Sibsagar district, Assam. The black soft-shell turtle (*Nilssonia nigricans*) is considered to be extinct in the wild by IUCN (2007), but a population was recently rediscovered in Assam Valley, northeast India and occur in several sites, including Kaziranga National Park, Pakke Wildlife Sanctuary, Namdapha National Park, Orang National Park and Nameri National Park. However, no notable work has been reported on *Chitra indica* and as well as conservation of other endangered species in Assam.

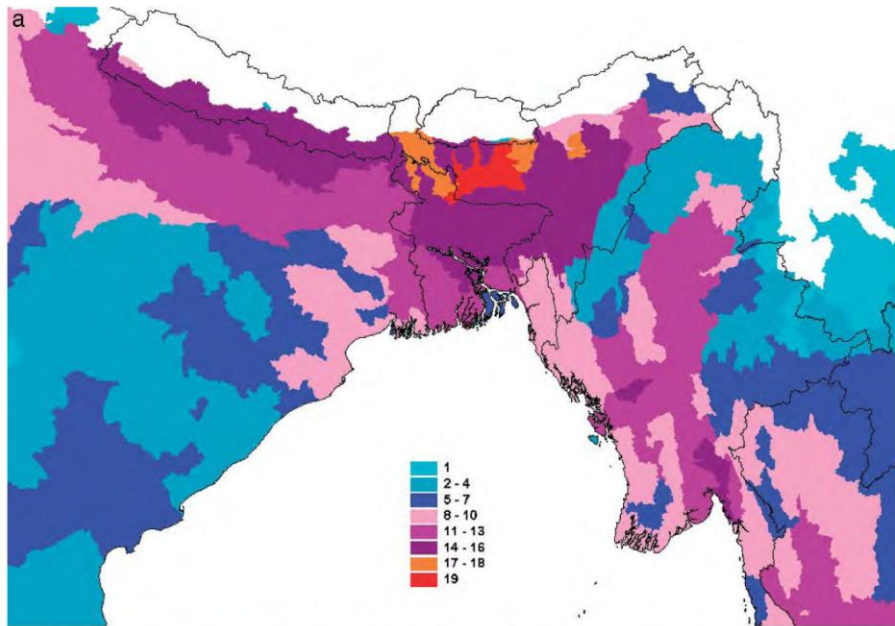


Plate 1: The study area belongs to world's greatest turtle richness area, based on the co-occurrence of species in hydrologic unit compartment in Brahmaputra river system of India in South Asia (Buhlmann *et al.*, 2009).

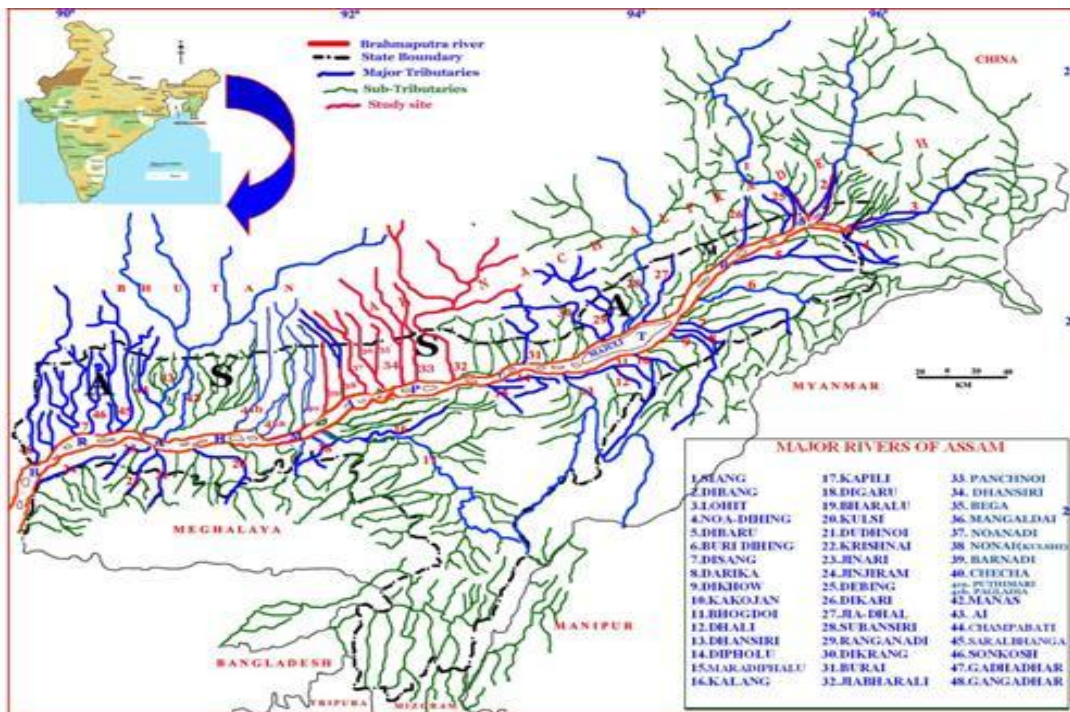


Plate 2: Showing the tributaries of the river Brahmaputra in Assam along with the study sites, red coloured (Map prepared by Dr. P.K. Sarma, team member).



A. Narrow-headed softshell turtle (Endangered)



B. Black softshell turtle (Extinct in the Wild)



C. Assam Roofed turtle (Endangered)

Plate 3 (A, B, C): Species of conservation focus in the present study.



a. Brahmaputra river, Orang National Park, Assam



b. Brahmaputra river, Biswanath Ghat.



c. Kulshi River, Assam-Meghalaya Border, India

Plate 4 (a,b,c): Potential in-situ turtle habitats of the present study.

SECTION- II

Summary of Objectives, Activities and Outputs

PROJECT OBJECTIVES:

Objective 1: To assess the present status, habitat, and distribution of endangered turtle species.

Objective 2: To determine current threats to *Nilssonia nigricans*, *Chitra indica* and *Pangshura sylhetensis* population and their habitats.

Objective 3: To conduct conservation education and awareness programmes for local people and determine the perception of local people towards turtle conservation.

Objective 4: *In-situ* egg protection program through community participation.

Objective 5: To assist the current community pond habitat management in creating sandbanks for *N. nigricans* and *P. sylhetensis* nesting.

MATERIALS AND METHODS:

Survey: The surveys for turtle habitats were done by the team members on trails guided by knowledgeable local guides, and using questionnaires and photo sheets. Observations were recorded in a data sheet and all relevant information was recorded. Basking turtles were spotted from a distance by binoculars (20x50) from boat or by walking along the bank. For identification of the species, Das (1995, 2002) were followed. Poachers, traders and collectors will be interviewed to learn more about their distribution, habitat and extent of exploitation. During extensive survey period, visual inspection of the forest floor, shrubberies, grasses, wetlands, Sandy River beds of the river Brahmaputra in nearby park areas and fringe riverine chars (islands) along with the forest guards of the park with prior permission. Dead turtle specimens and turtle carapace were identified following Smith (1933). Taxonomy and nomenclature are followed after Various measurements *viz.* straight line carapace length (CL), carapace width (CW), plastron length (PL) and shell height (SH) were taken using the Vernier Calipers. Specimens were weighed (M) to the nearest gram using digital spring balance. Scute and bone terminology of the shell were followed after Zangerl (1969). Subsequently the live specimens were released in their respective natural habitat.



Plate 5: Survey in the Brahmaputra River, Assam, India



Plate 6: Survey of fishermen community in Assam, India

Community Awareness: Awareness campaigns have been carried in riparian village communities, including local schools. Various sections of the river Brahmaputra in and around the ONP were surveyed to identify locations with evidence of nesting turtles (e.g. tracks in silt or sand, nests, predated eggs, and presence of turtles in potential breeding areas). In such localities, local people are being encouraged to protect turtles and their nesting habitats. A series of group discussions were carried out with local people and their acceptable view point has been taken into consideration for preparing and implementing future conservation strategies.



Plate 7: Prof. D.K. Sharma delivered a talk on the importance of turtle diversity in an awareness program on turtle conservation (Chandubi beel, Assam, 1st January 2011).



Plate 8: Community awareness for clean and safe ex-situ turtle habitat management (Hajo, Assam)

Participatory In situ conservation & egg protection: Various sections of the Brahmaputra River in Assam were rapidly surveyed, to select locations for evidence of turtles such as tracks, holes, nests, predated eggs, and the presence of turtles. An *in situ* egg protection programme was initiated with the participation of local communities. An island (Char) in the river Brahmaputra within the district Morigaon, Assam was selected for hatchery due its habitat suitability. During the two nesting periods (in the year 2010 and 2011), using old fishing nets and a thorn brush barrier (a defense against jackals, the primary threat to turtle nests in this area), 250 square meters were enclosed by nylon nets with stiff support to create an *in situ* hatchery for enhancing hatching success. The nests were dug at a depth of 24 cm and distance was maintained at 100 cm apart. A total of 51 nests were protected during the incubation periods. Plastic boards displaying clutch number, size and date of collection of each nest were fixed for identification. Local people are being motivated towards the protection of turtles and their nesting habitats.

ACHIEVEMENTS FOR EACH PROJECT OBJECTIVE:

Objective 1: *To assess the present status, habitat, and distribution of endangered turtle species*

- **Activity 1: Training of project team-** The training of team members were completed successfully. The team leader participated in a study of advanced turtle conservation research techniques at different venues around the USA under the 2010 Asian Scholarship Program for *in-situ* Chelonian Conservation (ASPin-situCC). The knowledge acquired at the Conservation Leadership Programme Award Winner's training in Calgary has been shared with the team members. Apart from that, two of the team members were trained in the Madras Crocodile Bank's turtle conservation programme.
- **Activity 2: Active survey and preliminary data collection by the trained team members-** In some riverine Islands, day and night surveys were carried out to find out turtle species. Hideouts like bushes, leaf litters and gaps in roots of large trees were searched for hiding or hibernating turtles or tortoises. Hill stream beds and river banks were surveyed to search for turtle tracks, following which sometimes yields the specimens. Besides, the fishermen and local communities were interviewed and the fresh water turtle species were identified from the by catch of fishermen. Sporadic records of seizure of turtles and market survey were conducted during the study period to assess the threat to some of the species due to trading.

Outputs from objective 1:

The present study revealed that the riverine Chars (islands) of the Brahmaputra are the best potential habitats for Black softshell turtle (*Nilssonia nigricans*) and Narrow-headed softshell (*Chitra indica*). The present field survey has identified following potential habitats of *Pangshura sylhetensis* in Assam, India i.e. Nameri National Park, beel near Beseria village, near Gabharu river, Gahigaon wetland, Gohpur wetland of Sonitput district of Assam., Kaziranga National Park. The population of *Pangshura sylhetensis* suffered a 90% decrease in the last decade and IUCN justifiably placed this species as endangered (IUCN, 2007; IUCN, 2010). However, our ongoing investigation shows increased in numbers of *Pangshura sylhetensis* in Nameri National Park, Biswanath ghat, Gomirighat and Kuruwa ghat areas, probably due to habitat conservation as protected area and

awareness campaign organized in and around the habitats. The black soft-shell turtle (*N. nigricans*) has been listed as Extinct in the Wild in the IUCN Red list for long time. However, as an output of the present study we have recorded several wild living Black softshell turtles and the species has been placed to Critically Endangered category in the IUCN Draft Red list (IUCN, 2011). The status evaluation for Narrow-headed softshell (*Chitra indica*) is still ongoing under the aegis of TCRP. A total of 22 species of freshwater turtles have been recorded from northeast India (Table 1).

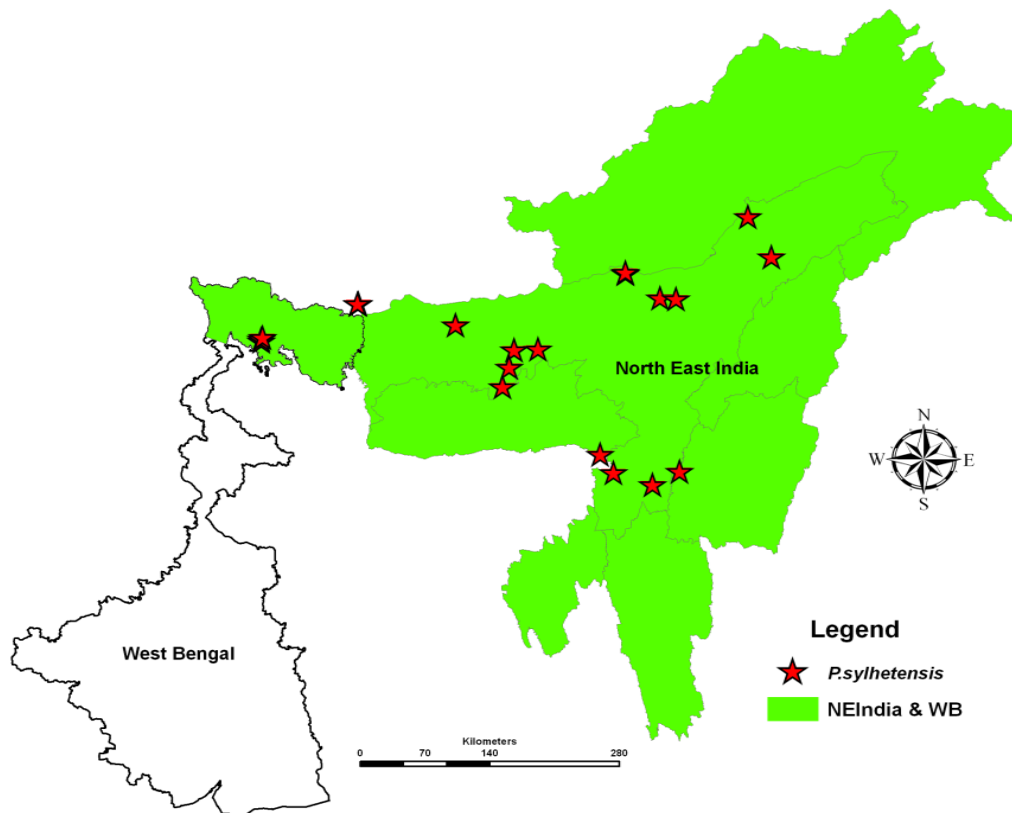


Plate 9: Distribution of Assam Roofed turtle (*Pangshura sylhetensis*) in northeast India and West Bengal. Green shading = projected distribution based on GIS-defined hydrologic unit compartments (HUCs) constructed around verified localities and then adding HUCs that connect known point localities in the same watershed or physiographic region and adjusted based on authors' data. Red stars = Observations in the present study.

Freshwater turtles of the Orang National Park, Assam: During this investigation 10 species from the family Geoemydidae and five (5) species from the family *Trionychidae* of which one is Critically Endangered (CR), 2 Endangered (EN), 7 Vulnerable (VU) and 5 Lower Risk species were recorded. Interestingly, all the four species of large softshell turtles *viz.* *Nilssonina gangetica*, *Nilssonina hurum*, *Nilssonina nigricans* and *Chitra indica* were encountered in and around Orang National Park (Table 2).

Table 1: Diversity and distribution of freshwater turtles and tortoises in northeast India (Source: present study)

SI No.	Family	Common Name	Scientific name	AP	AS	NL	MN	MZ	ML	TR	SK
1	Trionychidae	Black soft-shell turtle	<i>Nilssonia nigricans</i>	+	+	-	-	-	-	+	-
2	Geoemydidae	Assam roofed turtle	<i>Pangshura sylhetensis</i>	+	+	+	+	+	+	-	-
3	Geoemydidae	Keeled box turtle	<i>Cuora mouhotii</i>	+	+	-	+	+	+	-	-
4	Geoemydidae	Three-striped roof turtle	<i>Batagur dhongoka</i>	-	+	-	-	-	-	-	-
5	Trionychidae	Narrow-headed soft-shell turtle	<i>Chitra indica</i>	+	+	-	-	-	-	-	-
6	Testudinidae	Elongated tortoise	<i>Indotestudo elongata</i>	-	+	-	-	+	+	-	-
7	Testudinidae	Asian brown tortoise	<i>Manouria emys phayrei</i>	+	+	+	+	+	+	-	-
8	Geoemydidae	Tricarinate hill turtle	<i>Melanochelys tricarinata</i>	+	+	+	-	+	+	-	+
9	Geoemydidae	Indian eyed turtle	<i>Morenia petersi</i>	-	+	-	+	-	-	-	-
10	Trionychidae	Asian giant softshell turtle	<i>Pelochelys cantorii</i>	-	-	-	+	-	-	-	-
11	Geoemydidae	Crowned river turtle	<i>Hardella thurjii</i>	+	+	-	-	-	+	-	-
12	Geoemydidae	spotted pond turtle	<i>Geoclemys hamiltonii</i>	+	+	-	-	-	+	-	-
13	Geoemydidae	South Asian box turtle	<i>Cuora amboinensis</i>	+	+	+	+	-	-	-	-
14	Trionychidae	Indian peacock soft-shell turtle	<i>Nilssonia hurum</i>	+	+	-	+	-	+	+	-
15	Trionychidae	Gangetic soft-shell turtle	<i>Nilssonia gangatica</i>	+	+	-	+	-	-	+	-
16	Trionychidae	Asiatic soft-shell turtle	<i>Amyda cartilaginea</i>	-	-	-	+	+	-	-	-
17	Geoemydidae	Brown roofed turtle	<i>Pangshura smithii</i>	+	+		-	-	+	-	-
18	Geoemydidae	Indian black turtle	<i>Melanochelys trijuga</i>	-	+	+	-	+	+	-	+
19	Geoemydidae	Assam leaf turtle	<i>Cyclemys gemeli</i>	+	+	-	+	+	+	-	-
20	Geoemydidae	Indian roofed turtle	<i>Pangshura tecta</i>	+	+	-	-	+	+	-	-
21	Geoemydidae	Indian tent turtle	<i>Pangshura tentoria</i>	+	+	-	+	+	+	+	-
22	Trionychidae	Indian flap-shelled turtle	<i>Lissemys punctata andersoni</i>	+	+	-	+	-	+	+	+

‘+’ = present; ‘-’ = absent; AP= Arunachal Pradesh; AS= Assam; NL= Nagaland; MN= Manipur; MZ= Mizoram; ML= Meghalaya; TR= Tripura; SK= Sikkim.

Table 2: Freshwater turtles recorded in and around the Orang National Park, Assam

Sl No.	Family	Common Name/ Local Name	Scientific name	Egg/cluster	WLPA schedule	CITES Appendix
Critically Endangered						
1	Trionychidae	Black soft-shell turtle Barmunia; [Om]	<i>Nilssonina nigricans</i> (4M+6F)	30-40 Spherical	IV	I
Endangered						
2	Geoemydidae	Assam roofed turtle Asomi Dura; [Om]	<i>Pangshura sylhetensis</i> (8M+10F)	oval	I	II
3	Trionychidae	Narrow-headed soft-shell turtle Baghia Kaso; [Om]	<i>Chitra indica</i> (6M+4F)	65-190 Spherical ranged	II	II
Vulnerable						
4	Geoemydidae	Tricarinate hill turtle Bamuni Dura;[Om]	<i>Melanochelys tricarinata</i> (3M+3F)	4-8	IV	I
5	Geoemydidae	Indian eyed turtle Bangla Dura;[Hb]	<i>Morenia petersi</i> (4M+8F)	6-10 Elongated	Not listed	Not listed
6	Geoemydidae	Crowned river turtle Bor Dura;[Hb]	<i>Hardella thurjii</i> (4M+3F)	8-19 Ellipsoidal	Not listed	Not listed
7	Geoemydidae	spotted pond turtle Nal Dura; [Ca]	<i>Geoclemys hamiltonii</i> (5M+8F)	18-30 Oval	IV	I
8	Geoemydidae	South Asian box turtle Jap Dura [Om]	<i>Cuora amboinensis</i> (3M+5F)	1-4 Elongated	Not listed	II
9	Trionychidae	Indian peacock soft-shell turtle Bor Kaso [Ca]	<i>Nilssonina hurum</i> (2M+6F)	20-30 Spherical	I	I
10	Trionychidae	Gangetic soft-shell turtle Ganga Kaso; [Ca]	<i>Nilssonina gangatica</i> (3M+4F)	8-85 Spherical	I	I
Near Threatened						
11	Geoemydidae	Brown roofed turtle Muga Dura;[Om]	<i>Pangshura smithii</i> (8M+10F)	6-12	Not listed	II
12	Geoemydidae	Assam leaf turtle Sepela Dura;[Om]	<i>Cyclemys gemeli</i> (4M+9F)	2-4 Elongated	I	Not listed
Least Concern						
13	Geoemydidae	Indian roofed turtle Futuki Salika Dura; [Om]	<i>Pangshura tecta</i> (8M+7F)	3-12	I	I
14	Geoemydidae	Indian tent turtle; [Om]	<i>Pangshura tentoria</i> (7M+10F)	3-8	Not listed	II
15	Trionychidae	Indian flap-shelled turtle Benga Kaso; [Om]	<i>Lissemys punctata andersoni</i> (4M+9F)	2-16	I	II

‘M’ = Male; ‘F’ = Female; ‘Om’= Omnivorou; ‘Ca’= Carnivorous; ‘Hb’= Harbivorous

Plate-10 (1&2): Freshwater turtles of the Orang National Park, Assam, India

(1) Hard-shell turtles



A.



B.



C.



D.



E.



F.



G.



H.



I.



J.

Family: Geoemydidae. A. *Pangshura tentoria*, B. *Pangshura smithii*, C. *Pangshura tecta*, D. *Pangshura sylhetensis*, E. *Melanochelys tricarinata*, F. *Cuora amboinensis*, G. *Geoclemys hamiltonii*, H. *Hardella thurjii*, I. *Morenia petersi*, J. *Cyclemys gemeli*.

(2) Softshell turtles



K.

L.

M.



N.

O.

Family: Trionychidae. K. *Nilssonia hurum*, L. *Nilssonia gangetica*, M. *Nilssonia nigricans*, N. *Lissemys punctata andersoni*, O. *Chitra indica*.

Plate-11
Temple pond turtles of Assam



(A)



(B)



(C)



(D)



(E)



(F)



(G)



(H)

(A): *Kacha Pukhuri* ; (B): *Jor Pukhuri*; (C): *Geoclemys hamiltonii*; (D): *Pangshura tectum*; (E): *Pangshura tentoria*; (F): *Nilsonnia gangeticus*; (G): *Nilsonnia nigricans* and (H): *Nilsonnia hurum*

Objective 2: *To determine current threats to Nilssonina nigricans, Chitra indica and Pangshura sylhetensis population and their habitats*

- **Activity 1: Habitat survey-** The survey for turtle habitats were carried out by the team members on trails guided by knowledgeable local guides, and using questionnaires and photo sheets (**Annexure-1**).

- **Activity 2: Monitoring of local trade**

Poachers, traders and collectors are being interviewed to learn more about the distribution and habitats and conservation status of the turtle population.

Outputs from objective 2:

Identification of current threats to existing turtle population

The present study has recorded five major threats to *Nilssonina nigricans*, *Chitra indica* and *Pangshura sylhetensis*-

i) Habitat destruction and pollution: forests and wetlands are declining in the study area. Deforestation and resultant soil erosion has led to increased siltation of lakes and other wetlands. The deep pools that are the favoured habitats are rapidly becoming shallow and choked with silt, leading to a decline in habitat quality.

ii) Exploitation for food: Indigenous inhabitants consume turtle and meat and eggs (mostly the Narrow-headed softshell and Black softshell turtles). The study found that every year from the first week of October to the first week of February, a huge number of turtle eggs are collected by the inhabitants of the Brahmaputra chars (Riverine islands) and sold in local markets. The killing of adult female freshwater turtles and incidental catch of adults has created particular pressure on the turtle population (Gupta, 2000).

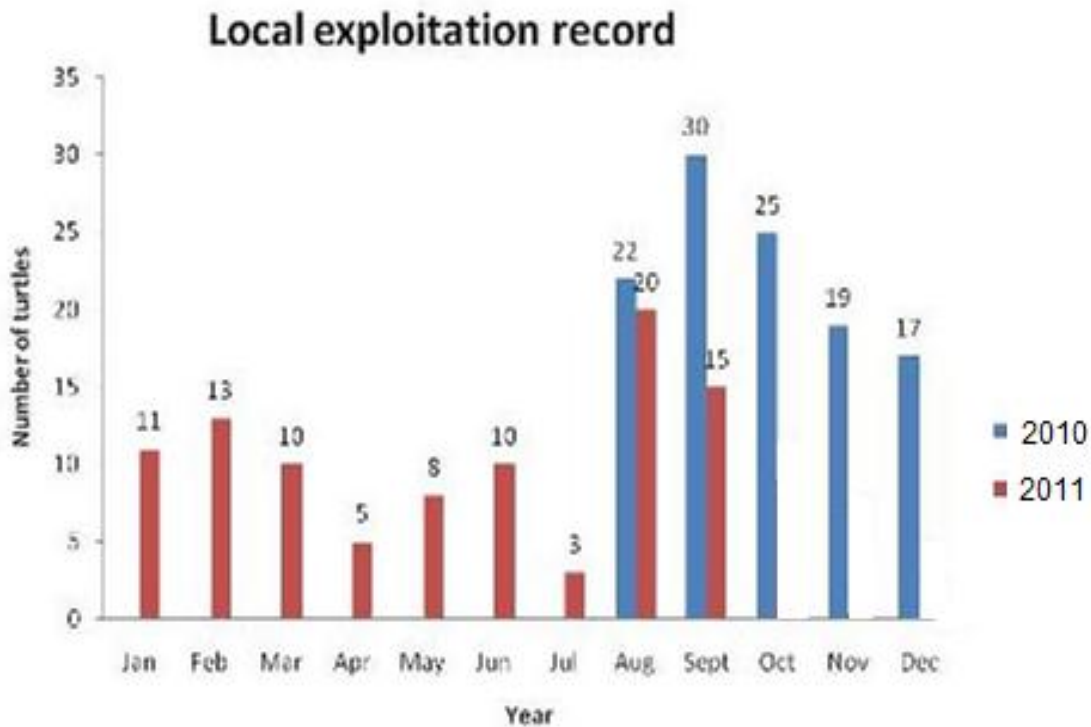


Plate 12: Local exploitation record of soft-shell turtles for meat in the study site (August 2010-September, 2011). The exploitation level is lightly decreased in the year 2011, probably due to the local community awareness campaigns during this project. Total number = 208 [out of which *N. hurum*, *N. gangeticus* & *N. nigricans* = 12 nos.; *Chitra indica* = 2 nos. (2010) & 5 (2011); *Lissemys punctata andersoni* - 6 nos.]

iii) Pet trade: a heavy illegal pet trade is contributing to declines of Assam Roofed turtle.

iv) Superstitious beliefs: Hanging a carapace in a cattle-shed is believed to bring good as well as luck, and to keep snakes and burglars away from the premises. We are in the process of trying to dissuade the local people from continuing their customs related to the killing of turtles.

v) Use as ethno-medicine: Both the flesh and eggs of turtles are believed to be a remedy for gout and arthritis, while the carapace of Assam roofed turtle and other turtle species is also used as ‘medicine’ for other ailments including asthmas. Due to decline of catch, traders are offering increasingly high (very lucrative) prices to tribal hunters and fishermen for carapaces.

Objective 3: *To conduct conservation education and awareness programmes for local people and determine the perception of local people towards turtle conservation.*

- **Activity 1: Conservation education and community participation**

Awareness campaigns were being carried out among the riparian village communities, including local schools, across Assam. Recently, we celebrated ‘Endangered species Day’, ‘World Biodiversity Day’ and ‘World Turtle Day’ in different parts of Assam to educate the community in turtle conservation. Several events were organized to involve all the age groups, making them excited about the role of turtles in our environment.

- **Activity 2: Preparation of education material**

Turtle posters, brochures and stickers were designed to educate communities.

Outputs from objective 3:

Several events are being organized to involve all the age groups, making them excited about the role of turtles in our environment. These celebrations helped to plan for a series of follow-up meetings in “Year of the Turtle 2011”, in an effort to save the regional turtle diversity. Through this project we developed a very good linkage with the local communities residing in and around identified important turtle habitats of northeast India.

The TCRP created dialogue with regional conservation organizations as well as local researchers, in an effort to build strong partnerships and networks for a wider turtle conservation programme in the region. Training on various aspects of turtle biology and conservation viz. survey techniques, egg collection, and hatchery management has been given to more than 31 youth volunteers. So far, over 3000 people from 21 villages were included in eleven awareness campaigns.



Plate 13: Turtle painting competition to raise awareness among the school students (Celebration of Endangered species Day).



Plate 14: Former CCF Mohan Malakar gives his lecture on turtle conservation on World Biodiversity Day, 2010,



Plate 15: Celebration of world Biodiversity Day, 2011



Plate 16: Stakeholder's participation on the World Turtle Day celebration, 2010.



Plate 17: World Turtle Day Celebration.



More Year of the Turtle Collaborating Partners



The Turtle Conservation & Research Programme (TCRP) is a scientific society dedicated to safeguarding freshwater turtle species in northeast India. The TCRP seeks global input for local solutions to saving endangered turtles. Since its inception in 2009, the TCRP has initiated a freshwater turtle conservation program in the state of Assam and has started a community awareness and capacity building project for safeguarding the region's turtle. tcrpnortheast.wikispaces.com

Plate 18: Celebration of the 'Year of the Turtle 2011'.

Turtle Conservation Education Centre: The *Turtle Conservation and Research Programme (TCRP)*, Assam in association with the *Nature's Friends Club*, Dhemaji has recently inaugurated the first Turtle Conservation education Centre of the northeast at Bordolopa, Kacharipather Dhemaji, Assam. The new educational facility is located at the Turtle Conservation Centre, along the Brahmaputra flood plains. The landmark event was held on 22nd May, to celebrate both World Biodiversity Day 2011 and the World Turtle Day 2011.

The Turtle Conservation (Education & Interpretation) Centre has been developed under the Conservation Leadership Programme (CLP) to mark the Year of the Turtle 2011 and was generously supported by the CLP's Future conservationist Award and British Chelonian Group. The centre aims to create awareness among the local communities and other stakeholders regarding the conservation of regional threatened freshwater turtles, river Dolphins and other aquatic wildlife through a range of education and training programs in future.



Plate 19: The turtle conservation education centre in Assam. The centre was established by the TCRP on the World turtle Day, 23rd May'2011.

- **Activity 3: Socioeconomic survey**

In Char area of Brahmaputra river of Lahorighat, Morigaon District of Assam, We conducted a socio-economic survey near the riparian community of our study area. The name of the study area is 2 No tengaguri char under Lahorighat police station and The GPS location of the area is N 26°29'01.6'' and E 092°20'41.5''. A total seven char area were surveyed (including study area) during February to April, 2010, survey time starting from 7 am- 5 pm. The chars are namely - Nangeli Char, 1 No tengaguri Char, 2 No tengaguri char, Selmari Kosari gaon char, Dhekeramari char, Nonk tengaguri char and Hamur char.

The people of that char area are very familiar about turtle and their eggs but they don't know about the status of the turtle. The people are all Muslim communities so they don't consume turtle's meat or eggs because of religious believe. But some people try to sell the turtle and turtle's egg for money. According to people of that area turtle are available in that area past few years back. But now it's going to threats. According to villager it may be due to fooding, supply of turtle and turtle's egg, poaching, killing etc. All people are interested in conservation of turtle and we are getting good response from them for conserved the turtle's egg in their particular local area.

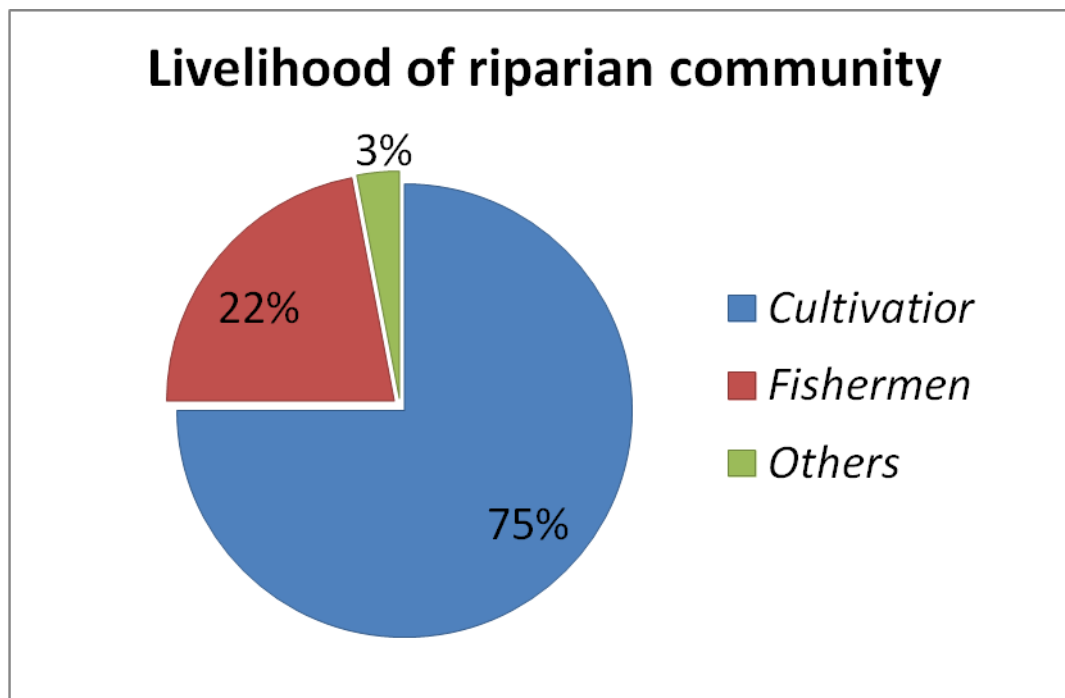


Plate 20: Preliminary socio-economic survey in riverine Islands. Total Islands surveyed = 7; Total families = 448; Total population = ~ 3584 .

Many people are dependent on agriculture and fishing. The people are not formally educated. Only 5% (~out of 2000 people of 18+ age groups) are formally educated (means 8th & 9th passed). Most of the people rely on agriculture and fishing as a form of livelihood. The people are cultivated vegetables depending their livelihood like potato, tomato, onion, turmeric, zinger, chilly etc. mustered, jute, gehu etc. in every seasonal year.

Objective 4: *In-situ* egg protection program through community participation

- Activity 1: Establishment of field stations for intensive survey
- Activity 2: *In situ* nest protection



Plate 21. Rescued eggs (250 nos.) from poachers in one of the single operation with the help of local community.



a.



b.

Plate 22: Turtle nests located with the help of local communities and forest staff. (a) Nest of Assam Roofed turtle, (b) Eggs of Black softshell turtle. The nests were further protected from predator till hatching by wire fencing.

- Activity 3: Rehabilitation of poachers

Outputs from objective 4:

Community-based in-situ conservation efforts: A total of 51 turtle nests were protected of which 18 (91 eggs) from *P. sylhetensis*, 21 nests (178 eggs) for *P. tentoria*, 2 nests (24 eggs) for *Nilssonia nigricans*, 4 nests (32 eggs) for *Nilssonia hurum* and 1 nest (10 eggs) for *Nilssonia gangetica* and the relative humidity was at 78-82 % throughout the incubation period. The hatching successes were recorded at 60% hatchlings for *P. tentoria*, 50% for *P. sylhetensis*, 21% for *N. hurum*, 10% for *N. gangetica* and 6 % for *N. nigricans*. The number of success was 38 out of the total 51 nests. Most of the eggs began to hatch at the end part of April or first part of May of the year. The hatchlings were measured and selectively photographed, and released in to the Brahmaputra River, near the hatchery area. Releases were made early in the morning (between 6 and 7 am) or late evenings (between 5 and 6 pm), mainly to reduce heat stress and the risk of depredation. This model experiment has evoked an excellent response amongst the community and may be useful for conservation.



Plate 23: *In- situ* community-based turtle nest protection programme.



Plate 24: The first hatchling of Indian Peacock soft-shell turtle (*Nilssonia hurum*)

Ex-situ conservation efforts: Suitable sand-banks have been created in the corners of the pond for turtle basking and nesting. So far, more than 15 nests of Black softshell turtle are found in the newly created sand-banks. Turtles are basking peacefully in the sandbanks. Similar kind of activities will be replicated in two more temple ponds in northeast India very soon.

Trainings on various aspects of turtle biology and conservation viz survey techniques, egg collection, and hatchery management was offered to 20 student volunteers. Over 3,000 people from 21 villages attended the 11 awareness campaigns, and 12 local youths had been introduced to field techniques. Three poachers (egg collectors) have been identified with the help of local communities and rehabilitated as field assistants in the turtle conservation project for a period of 6 months with a minimum incentive of Indian Rs. 3000 for rehabilitation of each poacher. The poachers have been further motivated and converted to small scale Agri-businessman by the end of this project.



Plate 25: Awareness among local youths on rescue and release of turtles



Plate 26: Local researcher's and fishermen's interaction, Biswanath Ghat, Assam

Objective 5: *To assist the current community pond habitat management in creating sandbanks for *N. nigricans* and *P. sylhetensis* nesting*

- **Activity 1: Conservation education and community participation:** Communities residing near the religious temple tanks are excited with the awareness that the pond turtle of the temple are certainly the pride and prestige of that area and being locals it is the need of the hour to protect them.



Plate 27: Pranab Malakar, a local youth trained by TCRP team, holds a Narrow-headed softshell turtle (*Chitra indica*) in the turtle basking site of a community temple pond at Hajo, Assam.



Plate 28: Sayed Ali (right) and Pranab Malakar (left) are in the ex-situ hatchery with Black softshell turtle (*Nilssonia nigricans*) eggs.



Plate 29: TCRP team members in a discussion on the problem faced by the pond turtles in Nag Shankar temple pond. We are interested to extend TCRP's ex-situ habitat management program to this temple pond in our next CLP project.

Educational Resource Material published:

We published education and awareness materials- leaflets, stickers etc. both in English and local languages. We are designing posters cum field identification guides for the turtle fauna of the northeast India.



Plate 30: Awareness stickers

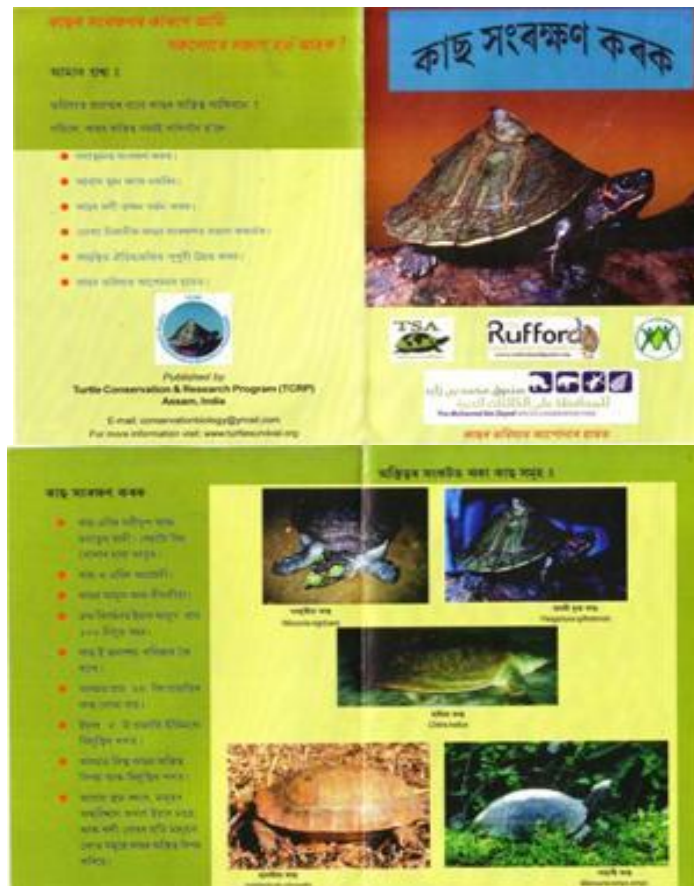


Plate 31: Leaflets- Assamese language

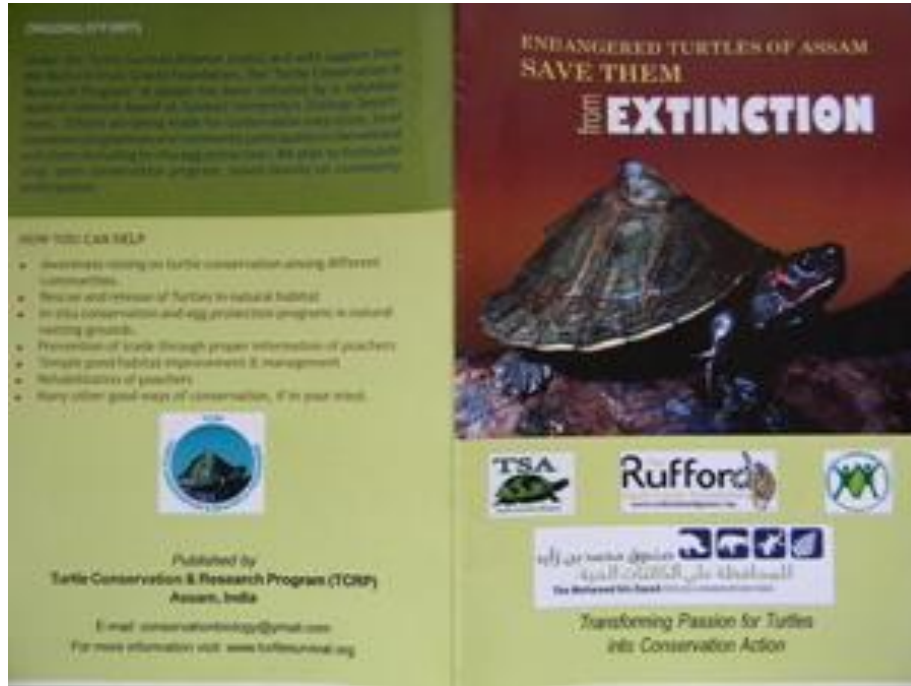


Plate 32: Leaflets- English language



Plate 33: A banner to aware the local people to keep the temple pond clean.

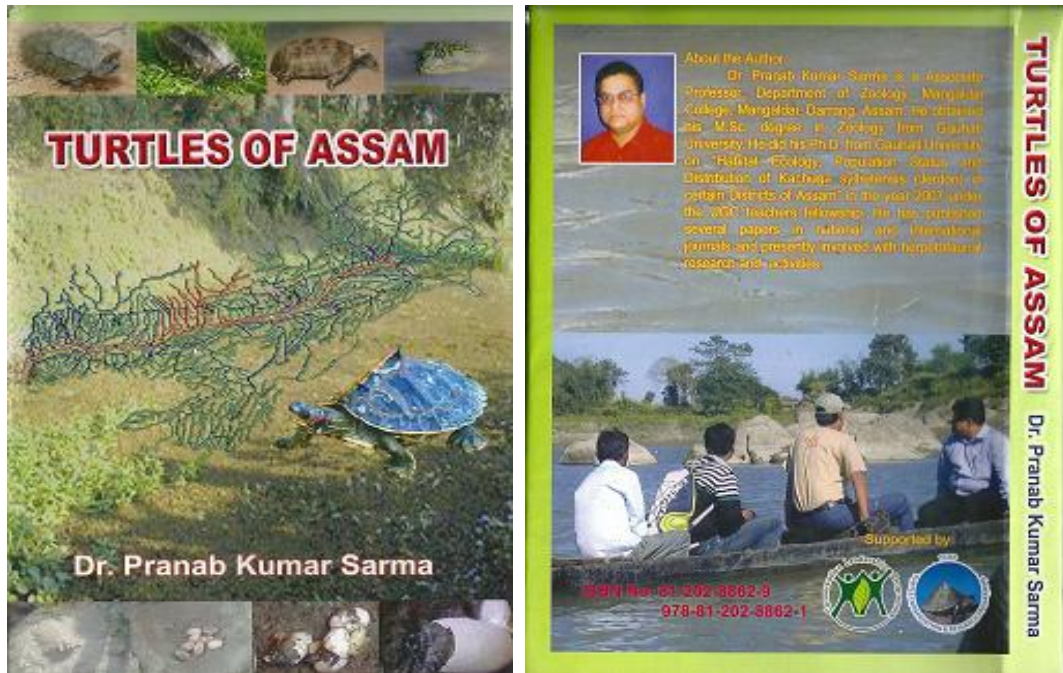


Plate 34: New Book by authored by TCRP Team member : ‘*Turtles of Assam*’, where CLP has been acknowledged.

- **Activity 2: Ex-situ habitat improvement**

Recently, we started the ex-situ habitat development programme for Black softshell turtle in two religious temple pond of Assam. We created suitable sand-banks in the corners of the pond for turtle basking and nesting. More than 25 nests are being protected and hatchlings are expected in early next year, since gestation take place in some soft-shell turtle eggs. The carnivorous turtles of temple ponds of Kamakha temple are fed with goat meat and viscera supplied by the Kamakhya Devuttor Board. However, by the help of CLP funding we have raised small fishes, fries and fingerlings, prawns etc. in the temple pond of Hajo, Assam, to maintain the dietary balance of the turtles. However, continuous financial support is yet to be achieved to continue to supply turtle food. Further, most of the old temple ponds of Assam are filled with algae. We make efforts on partial removal of toxic algae from the temple pond of Hajo, Assam, India.



Plate 35: An *ex-situ* hatchery constructed in the temple pond corner.



Plate 36: Regular cleaning of temple pond habitat (Hajo, Assam)



Plate 37: Supplementary feeding to the carnivorous turtles



Plate 38: Removal of toxic algae from the temple pond by the help of local community as a part of temple pond habitat improvement.



Plate 39: TCRP banner with CLP Logo with an appeal to the temple pond turtle visitors to make the habitat clean, on the occasion of Assamese Bihu festival.



Plate 40: Local community helped for ex-situ habitat improvement program (Kamakhya temple pond, Assam).

Outputs from objective 5:

So far, 25 nests of Black softshell turtle are found in the newly created sand-banks. Turtles are basking peacefully in the sandbanks.



Plate 41: A young TCRP member holds two hatchlings of soft-shell turtles in the Kamakhya temple pond (*N. nigricans* & *N. hurum*)



Plate 42: Pranab malakar releases the hatchlings of the ex-situ hatchery to the temple pond.

Future activities planned: i) The above activities under objective 5 will be continued and expanded to two more temple ponds in Assam; ii) Establishment of more *ex-situ* hatchery.

Media support received:



The screenshots show three pieces of media coverage:

- Sentinelassam.com:** An article titled "World Wetland Day observed" dated Feb 6, 2016, reporting on an awareness meeting at Chhaygaon Higher Secondary School in Guwahati, organized by the Turtle Conservation and Research Programme (TCRP) in collaboration with the Khabadrom Foundation.
- Assam Tribune (Newspaper):** A headline in Assamese: "লাহৰীঘাটত বিপন্ন কাছৰ সংৰক্ষণ আৰু গৱেষণা" (Conservation and research of polluted ponds in Lakharihat).
- Assam Tribune (Newspaper):** An English article titled "Awareness on turtle conservation" by a staff reporter, detailing the TCRP's awareness campaign in Chandubi, Assam, involving students and faculty from Gauhati University and Barduar-Bhola-gaon Anchalik Rabha Students Union.

To what extent have project activities continued beyond the end of the project period?

We developed “Turtle Conservation & Research Programme (TCRP)-Network” to continue our future conservation activities. Conservation efforts are being continued in northeast India. Field survey has been conducted on the status and distribution of Black soft-shell turtle and *ex-situ* egg protection programme. We have initiated endangered Asian Brown Tortoise (*Manuria emys papyrei*) conservation in the northeastern state Manipur, which has been supported of the Turtle Survival Alliance. The TCRP seeks global input for local solutions to saving endangered turtles.

TCRP has provision for internship opportunities for post-graduate or graduate students, in its ongoing conservation programmes particularly aimed at research and conservation of Turtle.

SECTION –III

Summary of Key Project outcomes and problems encountered

a. Linkage development: Through this project we developed a very good linkage with the local communities residing in and around identified important turtle habitats. However, the religious practice of scarifying turtles are yet continuing and we are in the process of initiating special awareness and motivation programs against such practice with the help of temple pond management committees in Assam. Special discussion on the role of turtles on aquatic environment and ethical issues were arranged among the local NGOs and local communities to motivate people against such practice.

b. Awareness increase: With the help of our trained members of “*Turtle Conservation & Research Programme (TCRP)*”, we are conducting awareness campaign simultaneously in and around the riverine islands (chars) of Brahmaputra, which increased the level of awareness among local communities towards protecting ‘their’ nearest turtle habitats. We have made a questioner cum photographic surveys at the beginning and ending of the project. The initial level of awareness was almost zero while we have started our project. However, our survey by the end of this project has noted the increase of awareness among all students, youth and local fishermen substantially and they were found to be motivated toward conservation of biological diversity on the earth.

c. Enhancing the endangered turtle species protection: The experiences acquired from the visit to various contemporary turtle conservation projects teach us that involving the local communities residing around turtle habitats is the best approach at the current situation in Brahmaputra Valley. Therefore, we are in the process of involving them in the protection of turtles, through the nest protection programme, extending strict monitoring service for the prohibition of poaching, ex-situ temple pond habitat managements.

d) Scientific communications: Recently, an account of ongoing turtle conservation activities under this project has been presented at the 8th Annual Symposium on the Conservation and Biology of Tortoises and Freshwater Turtles held in Orlando, Florida (August 16-19, 2010) which was co-hosted by the Turtle Survival Alliance and the IUCN Tortoise and Freshwater Turtle Specialist Group. Manuscripts are under preparation from the presentation of project findings.

Unforeseen difficulties that arose during the period: Some of the project activities were hampered by local climatic conditions (high flood) and political conditions at some stages of the project.

RECOMMENDATION:

As a part of the conservation of genetic diversity of turtles, the following studies are recommended:

1. Study should be extended to other parts of northeast India to examine the possible threats to the turtle species due to habitat loss, forest fire and poaching.
2. Study of reproductive cycle of endangered turtle species is important.
3. Developmental activities and destruction of turtle nesting sites due to rampant sand mines should be stopped or regulated to give protection to the species.
4. Steps to be taken to stamp out the ongoing fresh water turtle trade.
5. Creating awareness programmes among the communities in the other northeastern states to curb illegal trade of turtles and their parts will be helpful.
6. Community conservation efforts should be properly recognized and management guidelines can be developed for better management of the turtles.
7. Development of molecular markers for species identification and molecular phylogeny to analyze the polymorphism and evolutionary history.
8. To introduce conservation breeding programme for the endangered turtles of northeast India.

Further, important chelonian habitat should not only be limited to the nesting site, but also needs improvement of the basking site and feeding area. Earlier, Lindeman (1996) reported that musk turtle diversity positively correlated with the deadwood quantum, since the anthropogenic removal of dead wood log from the river is a likely deleterious to the turtle population (Moll and Moll, 2004).

CONCLUSION:

Surveys indicate that vast areas of riverine habitats are being degraded or lost in all of the study sites. As well as habitat loss, over-exploitation for food and an illegal pet trade are contributing to the rapid decline in freshwater turtle populations in Assam. Immediate adoption of conservation measures is essential for the survival of many turtle species in Assam and also elsewhere in

northeast India. A very important conservation component is to educate local people about the decline of tortoise and freshwater turtle population. As a part of the conservation measures we emphasize the need of the participatory conservation initiatives with further research to find alternative means of supporting livelihoods of the many impoverished rural communities in the region. Future planned initiatives include further surveys and ecological research along the rivers with potential turtle habitat in northeast India, establishment of captive breeding centres and release of hatchlings into the wild and wider management and protection of nest sites. We are publishing the conservation account of the endangered turtle species.

WHAT NEXT?

We would like to continue the survey and conservation in other parts of northeast India. It is quite essential to develop a better understanding on diverse aspects of the turtle fauna apart from the status and diversity in particular and biodiversity conservation in general. Being a turtle priority conservation area, continuous long-term support is essential for conserving the imperiled turtle fauna of northeast India. We developed “*Turtle Conservation & Research Programme (TCRP)-Network*” to continue our future conservation activities. The TCRP team has also initiated a new conservation journal titled “[Asian Journal of Conservation Biology](#)” (ISSN: 2278-7666) to publish conservation issues related to Asian biodiversity with special emphasis to conservation research on turtle and tortoises.

For more information, contact Dr. Chittaranjan Baruah (Team Leader), TCRP, Assam, India
e-mail: chittaranjan_21@yahoo.co.in

Other Team Member Contact Details:

Name	Email	Telephone
Mr. Sayad Ali	cool_alisayed@rediffmail.com	091-9864285245
Dr. P.K. Sharma	pranab.zoology@gmail.com	091-9435087690
Dr. Luna Phukan	conservationbiology@ymail.com	091-9435143459
Mr. Abinish Chutia	abinashc6@gmail.com	091-9435463988

News links from the project:

1. [Turtle Conservation Programme Launched by CEC Young Professional 26 September 2010 | News story](#)
2. [Conservation of Turtle Diversity in India](#)
3. [Ex-situ habitat development for temple pond turtles of northeast India: A new initiative by the TCRP](#)
4. [Endangered Turtle Conservation in Northeast India: The TCRP Celebrates Year of the Turtle in Assam, Year of Turtle News, No. 3, March 2011, p. 13.](#)

REFERENCES:

- Buhlmann K.A., Akre T.S.B., Iverson J.B., Karapatakis D., Mittermeier R.A., Georges A., Rhodin A.G.J., van Dijk P.P. & Gibbons J.W. (2009) A global analysis of tortoise and freshwater turtle distributions with identification of priority conservation areas. *Chelonian Conservation and Biology*, **8**, 116-149.
- Choudhury, A.U., 1995. Some freshwater turtles from Lakhimpur district, Assam. *Cheetal*, 34(3and4):18–24.
- Das, I., 1995. Turtles and tortoises of India. World Wide Fund for Nature- India. Bombay: Oxford University Press. 176pp.
- Das, I., 2001. Die Schildkröten des Indischen Subkontinents. Frankfurt am Main: Chimaira pp. 181.
- Das, I., 2002. A photographic guide to snakes and other reptiles of India. New Holland Publishers (UK) Ltd, Garfield House, 86-88 Edgware Road, London w2 2EA, UK. pp.144.
- Gupta, A., Guha, K., 2002. Tradition and conservation in Northeastern India: an ethical analysis. *Eubios Journal of Asian and International Bioethics*. 12, 15-18.
- IUCN., 2007. Turtles in Trouble: Asia's Most endangered tortoises and freshwater turtle, IUCN/SSC. IUCN/SSC. IUCN/SSC Tortoise and Freshwater Turtle Specialist Group., 2010. A study of progress on conservation of and trade in CITES-listed tortoises and freshwater turtles in Asia. CITES CoP15 Inf. pp. 22-34.
- IUCN., 2011. IUCN Red List of Threatened species version 2011.1 (www.iucnredlist.org).
- Jerdon, T. C., 1870. Notes on Indian Herpetology. Proceedings of the Asiatic Society of Bengal. March, pp. 66-85.
- Lindeman, P.V. 1996. Distribution, relative abundance and basking ecology of the razorback musk turtle, *Kinosternon carinatum*, in the Pearl and Pascagoula river drainages. *Herpetological Natural History* 4: 23-34.
- Moll, E.O., 1986. Survey of the freshwater turtles of India. Part I: The genus *Kachuga*. *Journal of the Bombay Natural History Society* 83, 538–552.
- Moll, D. and Moll, E.O., 2004. *Ecology, exploitation and conservation of river turtles*. Oxford University Press, USA. 420pp.
- Praschag, P. and Gemel, R., 2002. Identify of Black soft-shell turtle *Aspideretes nigricans* (Anderson, 1875) with remarks on related species (Reptilia: Testudines; Trionychidae). (Translation: Jarmo Perala). Band 23 Ausgeben : 5: 87 – 116.
- Smith, M.A., 1933. The fauna of British India, including Ceylon and Burma. Reptilia and Amphibia. Vol. 1 Loricata, Testudines. Today and Tomorrow's Printers and publishers, New Delhi.
- Zangerl, R., 1969. The Turtle Shell. In: *Biology of the reptilian*. Vol. 1. Morphology. A. C. Gans, A d'A. Bellairs, and T. S. Parsons(eds). Academic Press, New York pp. 311-339.

ANNEXURE-I

Questionnaire for interview with local communities and fishermen

Date of Survey _____ **Time start** _____ **Time End** _____

Survey area _____

Population of the survey area _____

Observer _____

Occupation of interviewee: _____

1. Name of the Person:
2. Educational background:
3. Village: _____ District: _____
4. Age: _____ Date: _____
5. Detail Communication Address:
6. Community: _____ ST / SC / Others (.....)
7. Livelihood: _____
8. Do you know about *turtle & turtle's egg*: _____ Yes/No
9. If yes how many types of turtle you have seen in your area?
10. What are the different types of eggs seen in last one year?
11. Highest nos. of egg observed/ which species?
12. Eggs recently observed/ which species?
13. Have you seen Dura kacha, Black softshell turtle, or any other turtles? _____ Yes/No
14. Name of the species (Ass/Ben/Bodo) _____
15. Do you know the status of this species? _____ Yes/No
16. Are they found in large numbers in your area? _____ Yes/No
17. Were there more or less in earlier years?
18. What is the probable reason for their increase or decline?
19. Do you/local community consume this species? _____ Yes/No
20. Are this species available in local market? _____ Yes/No
21. Can poacher collect turtle's eggs? _____ Yes/No
22. Are you interested in turtle conservation? _____ Yes/No
23. How can you help us in conservation?
24. Your comments on turtle conservation:
 - (i)
 - (ii)
 - (iii)



—SAVE TURTLES—