

Final Technical report
CLP project ID: 03418018
Habitat mapping and Conservation of the horseshoe crab in India



Submitted by
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Section 1:

Summary

The population of the horseshoe crab and their habitats along the northeast coast of India is without doubt declining and degrading respectively at an alarming rate. Territory wise survey and community knowledge reveal less of horseshoe crab number now than ever before (due to accidental capture in fishing gear, poaching of adults and eggs, and degradation of nesting sites due to coastal development and pollution). Pertinent to different anthropogenic activities that render the long term persistence of the species and their habitat unlikely, this project was collaboratively developed. The project aims to stimulate and promote community collective action for horseshoe crab conservation through research, capacity building, and awareness creation. In addition, the project also aims to map all spawning ground along Odisha coast. Workshops and community forums have been initiated and the team conducted bycatch reduction training for 20 community horseshoe crab volunteers from five communities and increased the awareness of over three thousand community members. 20 college students have been trained in basic horseshoe crab research and monitoring protocols. Schools conservation education programs have been undertaken thereby building a youth generation that are agents of change for coastal resource management. Consequently, stakeholder and community support have been generated by project activities to contributing to reducing the threats to horseshoe crab thereby conserving them for both marine ecosystem integrity and enhanced local wellbeing. To conclusively derive any information with regard to such long-lived organisms, Government support is crucial for research organizations and conservation groups, so that they can monitor population health. A lack of support for such fields of research has led to severe lacunae and gaps in the field of knowledge of horseshoe crab from India in comparison to other global populations. For better-informed management decisions, it is imperative for research and management to work together in the coming years. We advocate that efforts should be focused on developing an effective management program that benefits both horseshoe crab and communities through elaborate dialogue and discussions between stakeholders, while simultaneously addressing other developmental needs. Overall, the findings appeared to suggest that local communities in the study area had little knowledge about the incredible marine creature or living fossils.

Background

Tachypleus gigas (Müller, 1795) (the Indian species of horseshoe crab) are present along the eastern coast of Odisha, India. The presence of these crabs in coastal zones indicates environmental health, as only optimal conditions are suitable for their survival, reproduction, and development. Although these crabs are ecologically important, the population of horseshoe crabs is decreasing over the years due to anthropogenic disturbances (e.g. overexploitation, release of untreated sewage, factory effluent, etc.), more than the natural causes (beach erosion) (Chatterji and Shaharom, 2009; Shin et al., 2009; Hu et al., 2010; Cartwright-Taylor et al., 2011). Among others, the physicochemical changes in the coastal environment such as beach morphology (erosion/accretion), sediment texture and water chemistry are severely affecting the horseshoe crab populations and thereby a shift or permanent loss of its spawning grounds at many places (Botton and Loveland, 1989; Penn and Brockman, 1994; Jackson et al., 2007; Hadnan et al., 2010; Hu et al., 2010; Pati et al. 2017; John et al. 2018). Under the sustained human intervention on the coastal habitats on one hand and vanishing breed/nursery grounds on the other, the long-term survival of these crabs is also a major concern to the scientists (Chen et al., 2004; Patti, 2008; Chatterji, 2013; Pati et al., 2015; Pati and Dash, 2016; Pati et al. 2017; John et al. 2018). The Indian Horseshoe crab *Tachypleus gigas* is categorized as “Data Deficient” (DD) in the International Union for Conservation of Nature (IUCN) Red List categories of 2009 and has been declared as a Schedule-IV species under the Indian Wildlife Protection Act (1972), also in 2009.

The populations of the horseshoe crab are recognized to be dwindling under increasing human threat over the years and there is hardly any improvement in this scenario (Chatterji and Shaharom 2009; Shin et al. 2009; Hu et al. 2010; Cartwright-Taylor et al. 2011, Nelson et al. 2015, Nelson et al. 2016b). No single factor is sufficient enough to explain these declining trends but it seems most likely that the negative pressures on horseshoe crab populations have resulted from pollution, degradation and loss of the estuarine spawning habitats, and commercial fishing activities (Berkson and Shuster 1999; Botton 2001; Nelson et al. 2016a; Pati et al. 2017; John et al. 2018; Vestbo et al. 2018). Among these, a major contributing factor is the continuous and increasing destruction of breeding grounds. This problem has been persistent and has been the focus of a large amount of conservation effort (Berkson et al. 2009; Pati et al., 2015; Pati and Dash, 2016; John et al. 2018). In

addition to threats to breeding sites, there have been increasing reports and growing concern regarding the by-catch of the horseshoe crabs due to and in the fishing gear. This is in particular reference to commercial and small scale fishing firms, fishing communities as well and their potential impacts on horseshoe crab populations. Though this is a growing and alarming factor of threat for the horseshoe crabs, still the information on these operations and their damage assessment is scarcely available in the Indian context.

This project aims at the implementation of conservation measures to mitigate impacts on Horseshoe crab populations along the coast of Odisha, India, and focuses on raising conservation awareness among local stakeholders. The aims also include the identification and delineation of HSC spawning beaches, with all their environmental characteristics.

Section 2:

Overall Objectives

The overall goal of this project was to conserve the data deficient population of the Indian Horseshoe crab. This project has two objectives: Objective-I includes the identification and delineation of Horseshoe crab spawning beaches, with all their environmental characteristics. Objective-II includes comprehensive efforts to spread awareness, train and empower the local community in attempts to conserve the Horseshoe crab.

Specific Objectives

(1) To use high-resolution geospatial data to quantify coastal habitat characteristics that are ecologically relevant to Horseshoe crab spawning habitat suitability, and to survey and understand the abundance of Horseshoe crab from random coastal segments, by measuring habitat width and shoreline length.

(2) To build community capacity and conduct bycatch reduction training programs within the community.

(3) To understand the local perceptions and cultural values towards the Horseshoe crab and to assess the level of anthropogenic threats (such as trading, poaching, hunting, etc.) on the Horseshoe crab so that specific conservation and management priorities may be identified.

(4) To spread conservation awareness among the local fisher community and other stakeholders who live around Horseshoe crab breeding areas and nesting sites.

OBJECTIVE 1- To Use High-Resolution Geospatial Data to Quantify Coastal Habitat Characteristics that Is Ecologically Relevant

A total of 62 spots have been identified as horseshoe crab habitats along the Odisha coast and GIS-based maps with boundaries for the horseshoe crab habitats have been prepared. The details of locations, their geographical coordinates and altitude are presented in Plate- 1, 2 which also indicates that there was a well-defined difference in the length and surging of the collection site. (Plate-3)

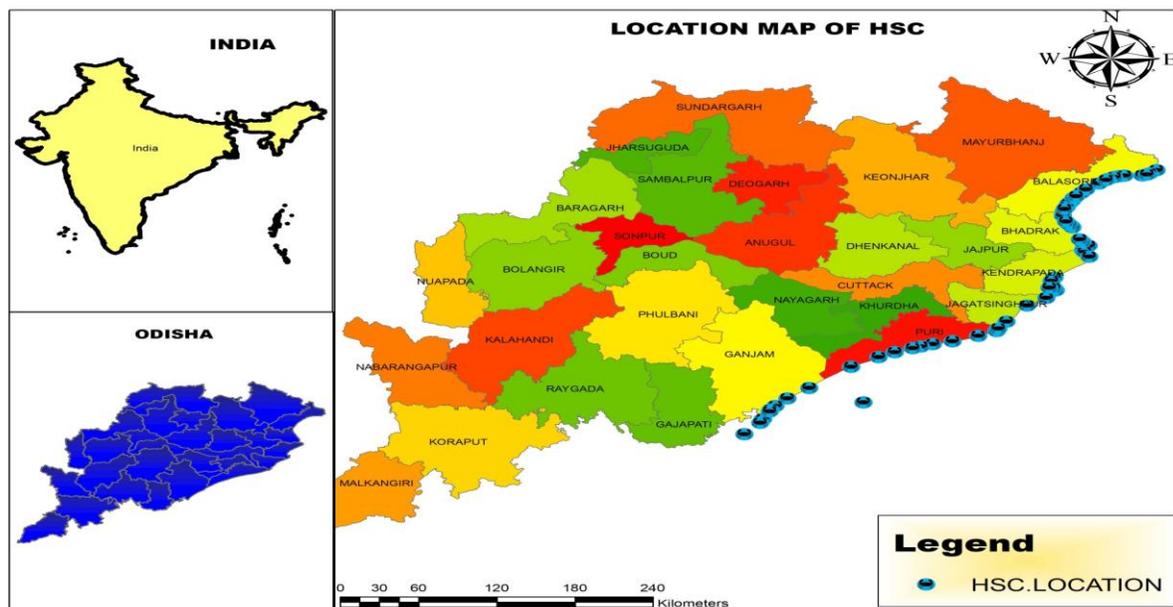


Plate-1: Location map of horseshoe crab



Plate-2: Density map of horseshoe crab

S/No	Latitude	Longitude	Rightlength	Leftlength	Surginglength	S/No	Latitude	Longitude	Rightlength	Leftlength	Surginglength
1	21.36229	87.27589	7.833	9749	5364	35	20.46367	86.58409	1798.27	1517.92	819.03
2	21.34222	87.25186	1.878	73144.95	905.6	36	20.43154	87.01208	1012.14	1436.1	1080.41
3	21.34133	87.23194	294.4	2032.35	2246.56	38	20.30208	86.45438	2059.04	2060.92	447.54
4	21.34229	87.22271	156.16	178.01	161.51	39	20.28831	86.44379	3506.99	1009.17	2545.44
5	21.33153	87.21421	136.17	181.74	101.75	40	20.23553	86.43384	1764.4	548.24	463.98
6	21.32579	87.14233	545.67	400.97	160.11	41	20.23548	86.45233	736.14	695.2	206.03
7	21.32456	87.12542	346.84	527.9	421.35	42	20.22343	86.46819	1631.76	2037.88	3304.58
8	21.32455	87.12286	1056.52	1349	1805.66	43	20.17481	86.42149	414.21	460.8	201.6
9	21.32105	87.10263	1542.13	700.23	1531.07	44	20.13488	86.34767	529.97	567.9	162.4
10	21.30484	87.74719	288.36	42083	238.76	45	20.13	86.2548	905.48	684.3	78.39
11	21.30286	87.7331	166.31	495.38	103.65	46	19.58585	86.22396	88.16	139.9	48.38
12	21.28164	87.41403	284.73	212.4	220.93	47	19.5721	86.21449	515.48	744.23	133.41
13	21.24367	86.58464	450.91	591.72	130.39	48	19.54421	86.14421	1109.1	921.63	116.26
14	21.22319	86.56485	90.52	140.16	101.43	49	19.51108	86.34231	1467.6	3205.28	1054.38
15	21.20184	86.54429	232.4	168.92	66.06	50	19.49231	85.55263	3033.33	2119.12	475.66
16	21.19954	86.53306	162.55	175.36	57.6	51	19.47545	85.50173	444.83	721.93	145.82
17	21.17359	86.52555	346.08	404.83	34.13	52	19.46495	85.46501	323.94	215.14	87.56
18	21.16442	86.52131	622.36	674.47	361.11	53	19.44234	85.39134	619.73	796.56	122.21
19	21.153	86.51237	124.72	1264.71	192.38	54	19.4123	85.32484	466.85	523.67	117.94
20	21.13473	86.50387	175.77	1265.69	156.87	55	19.274789	85.44303	160	100	100
21	21.12301	86.49559	322.09	434.51	128.32	56	19.15504	84.5504	701.18	758.54	90.55
22	21.8241	86.49108	217.24	237.44	30.94	57	19.11503	84.50091			
23	20.53467	86.56603	237.94	22489	26.42	58	19.71931	84.47181			
24	21.44608	86.50233	185.74	179.91	10.91	59	19.71033	84.4722			
25	21.31795	86.51298	244.33	259.95	111.15	60	19.3521	84.44474			
26	21.25976	86.51465	165.97	370.38	20.37	61	19.0425	84.42288			
27	21.15047	86.52442	360.06	364.25	46.12	62	18.58179	84.41632			
28	21.11177	86.53862	257.01	254.78	34.64						
29	20.5259	86.56417	153.69	203.29	53.74						
30	20.52133	86.57254	368.22	457.92	73.82						
31	20.51319	86.5746	5382.52	2478.06	4533.05						
32	20.51189	86.57487	3517.69	3676.05	6257.19						
33	20.49532	86.595	1831.7	1546.95	2098.83						
34	20.47117	86.57313	1406.31	1082.14	551.29						

Plate-3: Showing 62 spot having latitude, longitude and their habitat length

Delineating a species range is challenging because many factors interact at multiple spatial scales to affect a species distribution. Species distributions models (SDM) can be used to identify factors mostly associated with a species presence and therefore, potentially define a range edge. We evaluated the utility of one popular SDM approach, maximum entropy models (e.g., MaxEnt) for determining the range edge for the horseshoe crab spawning habitat. A total of 62 sighting points were used in the Maxent modeling. The area under curve (AUC) value was higher than 0.987 (fig-5,6). Using the mapping and analysis software ArcGIS, we constructed and validated SDMs with 19 environmental predictor variables (Table-1). The potential distribution of horseshoe crab was predicted by the Maxent model for present and the upcoming hypothetical (2028) climatic scenario (Fig-7, 8). The approach used in this study is considered useful in predicting the potential distribution of horseshoe crab and can be an effective tool in conservation planning. The results show that there is a significant impact under future bioclimatic scenarios on the potential distribution of horseshoe crab along Odisha coastline in India.

A flowchart was prepared to summarize the full workflow and it serves as the basis of the analyses (Plate-4). In brief, first the data were summarized and environmental variables were selected. Next, Maxent modeling was completed, followed by predicting the current and future distribution of the horseshoe crab. Lastly, the resulting data comprehensively evaluated.

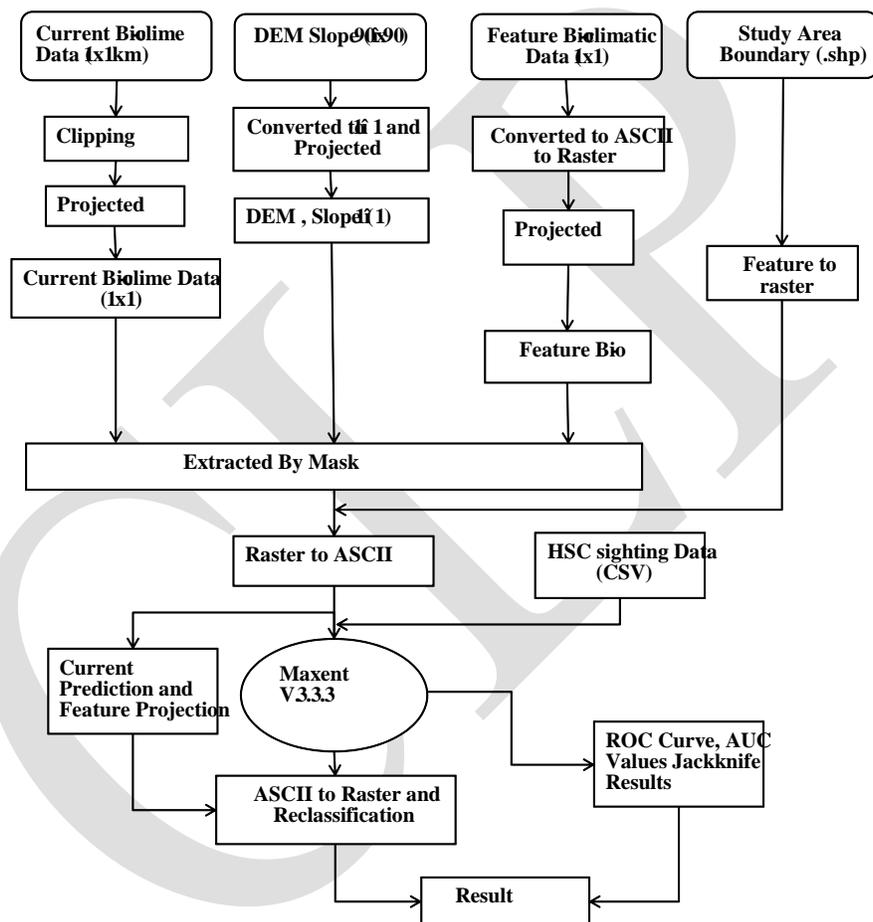


Plate-4: Processing methodology showing a summary of the full workflow

Table-1: Environmental variable used for modeling the habitat suitability distribution of *T.gigas* in this study

Code	Environmental variables	Unit	% contribution	Permutation importance
Bio-1	Annual mean temperature	°C		
Bio-2	Mean diurnal temperature range	°C	0.8	
Bio-3	Isothermality	-	44.3	22.5
Bio-4	Temperature seasonality	C of V	0.5	4.3
Bio-5	Max temperature of the warmest month	°C		
Bio-6	Min temperature of the coldest month	°C		
Bio-7	Temperature annual range	°C	9	
Bio-8	Mean temperature of wettest quarter	°C	13.2	
Bio-9	Mean temperature of driest quarter	°C		
Bio-10	Mean temperature of warmest quarter	°C	7.8	57.5
Bio-11	Mean temperature of coldest quarter	°C		
Bio-12	Annual precipitation	mm		
Bio-13	Precipitation of wettest month	mm	1.9	3.2
Bio-14	Precipitation of driest month	mm		
Bio-15	Precipitation seasonality(coefficient of variation)	Dimensionless	1	0.6
Bio-16	Precipitation of wettest quarter	mm	0.2	0.1
Bio-17	Temperature annual range	mm	17.9	11.6
Bio-18	Precipitation of warmest quarter	mm		
Bio-19	Precipitation of coldest quarter	mm		

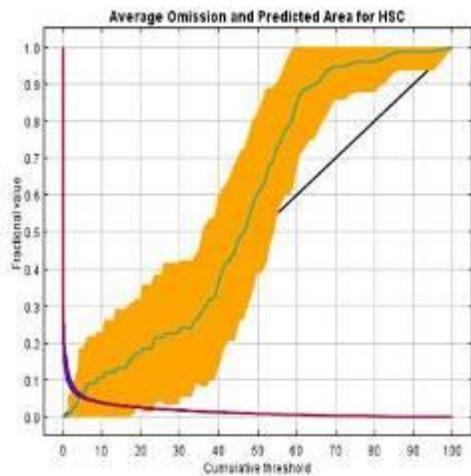


Fig-02 Average omission and Predicted area for HSC
The analysis of this graph reveals the omission rate and predicted area as a common function of the cumulative threshold. The omission rate is calculated both on the training presence records and on test records. According to the definition of the cumulative threshold the omission rate should be closer to the predicted omission. Here the AUC is 0.983

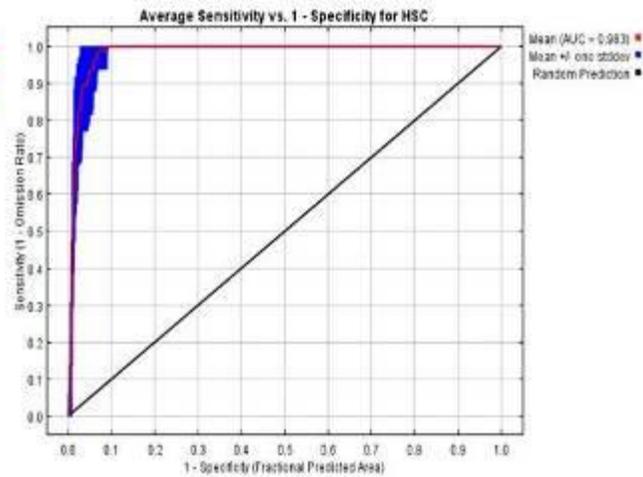


Fig-03, Receiver operating characteristic (ROC) curve
This fig shows the Receiver Operating Characteristics (ROC) for the data modelling. Specificity for habitat conformation can be defined by using predicted area rather than true commission .

Plate-5: Omission rate, predicted area and ROC for the data modeling of horseshoe crab

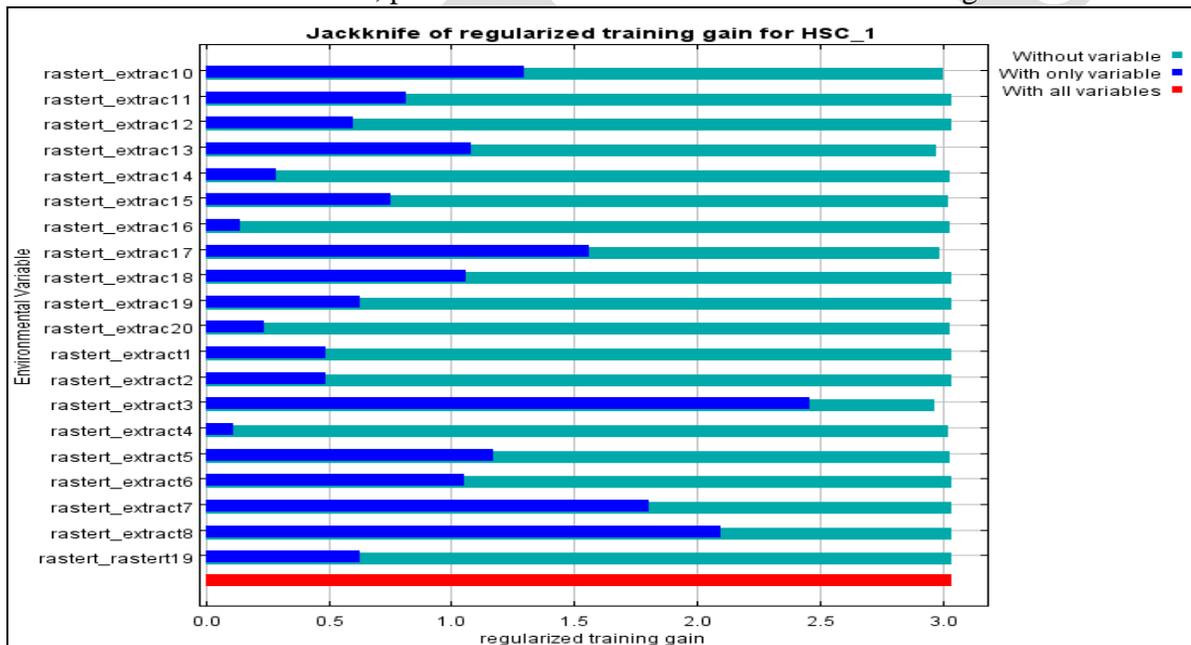


Plate-6: Results of the jackknife test of variables' contribution in modeling horseshoe crab habitat distribution. (The regularized training gain describes how much better the Maxent distribution fits the presence data compared to a uniform distribution. The dark blue bars indicate that the gains from using each variable in isolation, the light blue bars indicate the gain lost by removing the single variable from the full model, and the red bar indicates the gain using all of the variables).

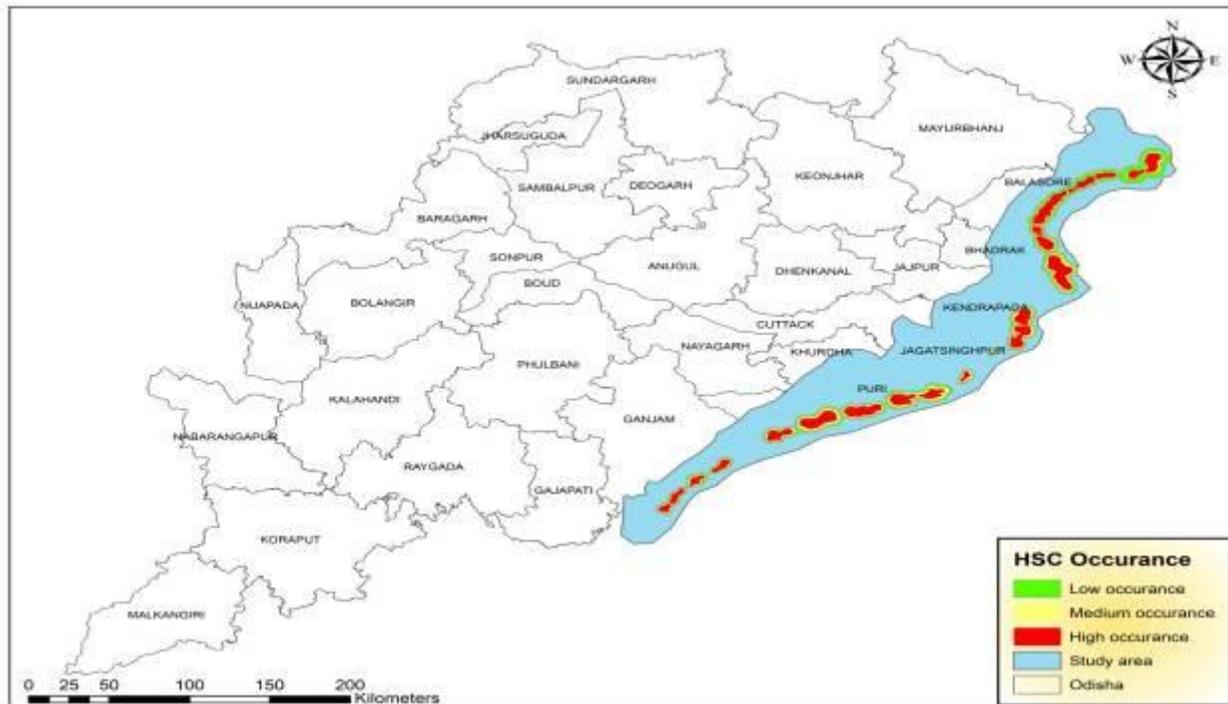


Plate-7: Showing the distribution and habitat suitability for HSC 2018

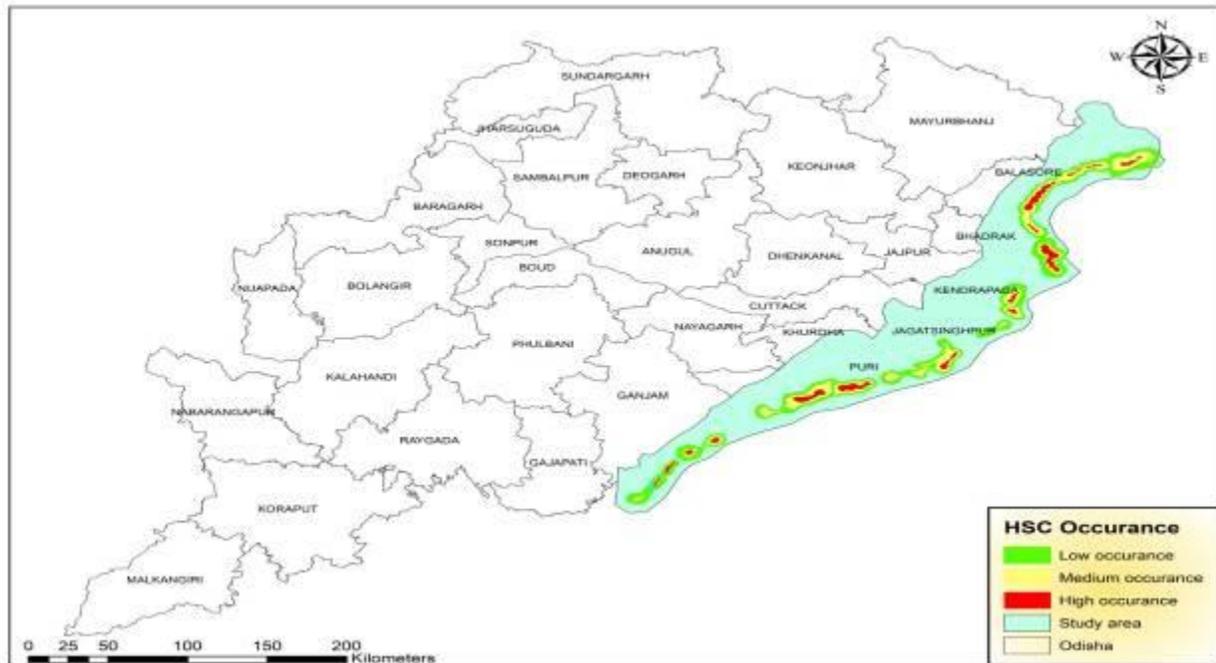


Plate-8: Showing the distribution and habitat suitability for HSC 2028

Objective-2: Building community capacity and conduct of bycatch reduction training programs within the community.

We organized and executed several activities which proved highly effective in improving and building the capacity of the local people and developing a thorough understanding of the project, horseshoe crab biology, ecology and conservation in general.

Series of educational activities were successfully completed, each helping to increase the capacity of the community, providing them with the skills and knowledge required to conduct horseshoe crab protection and monitoring:

1. Walk and talks
2. Horseshoe crab bio-ecology talks
3. Ward-member training session
4. Merge scientific approach with community view and share with community again

In India, gillnets, set nets and bottom trawling nets are used in the continental shelf, open-ocean waters (beyond the Exclusive Economic Zone) and near estuaries to catch different types of pelagic fishes (Luther et al. 1997). Horseshoe crabs are known to be regularly caught as bycatch species in fishing nets (Kai and Morikawa, 1999; Iwaoka and Okayama, 2009; Smith et al., 2009; Pati et al. 2017; John et al. 2018). This has been a regular, first-hand observation of the present authors (Fig. 1). However, the quantification of horseshoe crab entangled in gillnets fisheries on this coast is yet to be done. Here, we have aimed at documenting the horseshoe crab bycatch using observer data (trained skippers) on the fishing net from 2018 to 2019. Additionally, this report highlights an ongoing program that is being implemented to ensure the safe release of entangled horseshoe crabs in gillnet operations. The section of this project is to make available new information regarding the incidental bycatch of *T.gigas* along the Balasore coast.

The coast of Balasore is stretched along the Bay of Bengal coast in an area of around 81 kilometers. This region has many rivers, canals, and rivulets that merge with the Bay of Bengal. The developmental map of the Balasore coastline is continually marked by incidents of sea erosion, groundwater depletion, water, air and solid waste pollution, unregulated tourism, and

industrialization— all fairly recent occurrences in history with significant implications for the fishermen communities. There are four major estuaries known for horseshoe crab (*Tachypleus gigas*) breeding ground. Balaramgadi estuary and its surrounding area are located 6 kilometers to the north of Chandipur, the well known, picturesque location. Balaramgadi is located at a latitude of 21°28'07.54"N and longitude 87°04'08.52"E in Balasore district. Mahisali estuary is the second estuary with the highest spotting of horseshoe crabs. It is located around 11.3 km away from Balaramgadi, towards the south direction with the coastal beach located at 21°24'32.92S"N and 86°58'47.89"E. Kantiachira estuary is 16.5 km away from Balaramgadi estuary at the latitude of 21°22'30.69"N and 86°05'50.78"E longitude. The highest number of horseshoe crabs are found at Khanda estuary, located at 21°20'15.69"N and 86°54'46.42"E in Balasore. It is about 22.17 km away from Balaramgadi. Of late all these estuaries are being highly exploited and used as commercial fishery landing sites, having a large number of mechanized boats for fishing activity, point-source irrigation, jetty construction and other human disturbances which have lead to beach degradation and heavy pollution along with the high rate of unnatural and mechanical interference.

For this study, in each event, the observers have recorded whether the horseshoe crab was (i) entangled (E), (ii) dead (D) and (iii) whether it was released alive (L), or discarded or died and decomposed. Data were collected by trained observers as part of a program to monitor the discarded bottom set gillnets. 1408 specimens of horseshoe crab were rescued from different parts of the Balasore coast (Plate-10). In the majority of the cases, the specimens were sighted and collected by the volunteers as part of routine checks during the year, which was performed along the coasts of Balasore. Usually, the volunteers carry out the horseshoe crab monitoring activities along the coasts, periodically twice in a month.

Thus, a survey was conducted twice in a month along the 81 kilometers the shoreline, closest to the horseshoe crab rich areas described here. All horseshoe crabs found were individually observed, identified and marked. Data recorded on each stranded individual includes the following: observer's name, stranding date, species, and horseshoe crab number by the day, location, condition of the carcass (decomposition state), the gender of the carcass (as externally observed) and field notes by the observers. All animals were segregated on the shore and kept in a separate dry area to avoid recounts.

It was then followed by untangling and releasing each individual and assessing its basic life conditions (whether it is alive, inactive/drowned or dead). Those individuals recorded as inactive/drowned were rescued and kept in a saline water tank till its full activeness was restored. It was then released into the wild, natural waters.

For statistically comparing each horseshoe crab in entanglement, live and dead with seasons and years, Student's t-test was performed using GraphPad InStat Version 3.0. Box plot was performed using SPSS version 23.0 (Statistical Package for Social Sciences, Inc., Chicago, III). The level of significance was at $p < 0.05$. (Plate-9)

The data obtained in this study highlight the significance of incidental catch, bycatch and continually hampering of the Indian horseshoe crabs due to the unceasing and longline fishery along the coast of Balasore district of India. Though, there are many threats that persist to horseshoe crab populations on Odisha coast, including high predation by wild animals and loss of breeding habitat due to anthropogenic and coastal developments (Mishra et al. 2015; Behera et al. 2015; Pati and Dash 2016), our study strongly indicates that bycatch is one of the prominent, direct threat to the Indian horseshoe crabs.

The number of the entangled individual was substantially high during winter, a time when there is no restriction in fishing activity. The bycatch was low during summer since the Government of the region bans fishing activity during this period, to allow for natural breeding in the marine animals. The reduction in the number of bycatch in the rainy seasons could be attributed to the restriction on fishing by the government during the late summer and early rainy seasons.

The need of the hours is working for, nurturing, synthesizing and implementing developed solutions in the best practices. This includes the routine activity of the fishermen, in the development and design of fishing gear and their manufacturers, creating and sustaining coordinated efforts and synergy among researchers, the regional government and non-government organizations. This can bring about and apply specialist knowledge for the development of solutions for reducing bycatch and successful mitigation strategies that can be implemented to reduce and gradually stop the direct and indirect fatal occurrences for the horseshoe crabs.

We increasingly partnering with fishermen and their community as a whole, with the Sarpanch (A sarpanch is a decision-maker, elected by the village-level constitutional body of local self-government called the village government in India) and conducting bycatch rescue training programs to reduce the incidence of harm to the horseshoe crabs (Pati 2019). Complementing this research and drawing from the field of community-based surveys, we designed a suite of outreach initiatives to educate and train the fishermen and their families to reduce bycatch. This enables us immediate and timely rescue and release of the horseshoe crabs, as and when they are entrapped in the fishing processes. Our approaches have grown to form a community conservation network that unites all the residents of the local coastal regions, the fishermen, regional politicians and administrators and create a combined and sustained effort of conservationists in the Balasore coast (Pati, 2017). Informative workshops for regional sea-based workers, professionals and fishing firms are also being done along with a novel effort of curriculum enrichment for schoolchildren in the coastal belt, which makes them educated and aware of the need and importance of the horseshoe crab conservation along with the menace of bycatch. In order to augment our efforts and add a scientific approach to this an innovative step for fishing nets is being developed, wherein the aim is to modify the manufacturing materials of nets and redesign them in such a way that, even while fishing, the horseshoe crabs would avoid coming near them. This may include structural changes and inclusion of repellants specific for the horseshoe crabs, which would enable them to keep them far from the fishing net. Over and above all this we are supplementing these efforts by sharing them across all communities of the entire coastal and adjoining areas wherein the locally resonant media and formed local committees are helping us. On the qualitative front, organization of public events such as regional festivals (Raskhya bandhan, Banner exhibition in Ganesh Puja mandap, Leaflet distribution in Baroni Bath), parades, and art competitions is being gradually started and encouraged to spread the maximum knowledge of the horseshoe crabs of India.

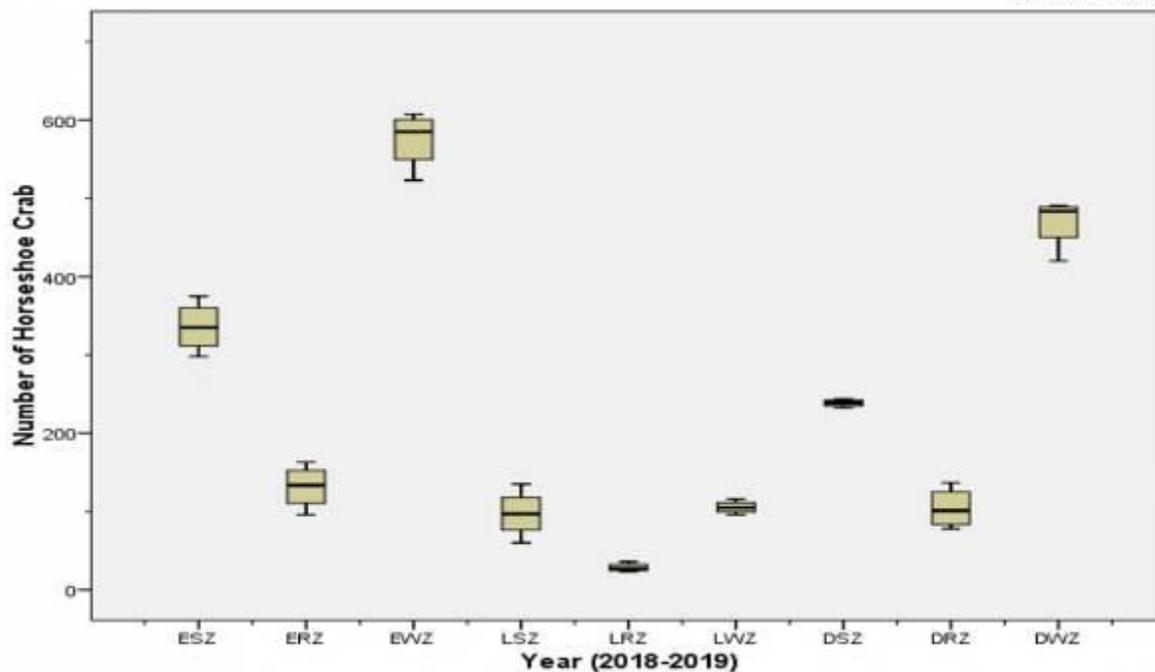


Plate-9: Boxplot of *T.gigas* stranded in fishing nets during 2018-2019

Boxes represent the 25% and 75% quartiles, the horizontal line is the median (50% quartile), the bars are 95% confidence intervals, and the dots represent outliers. E –Entangled, L – Live, D – Dead, S – Summer, R- Rainy, W- Winter, Y – (2017-18), Z – (2018-19)

Table-2: Showing horseshoe crab entangled in types of fishing nets

Net types	Mesh size:	Mesh type and material
Kabala jaal	2 cm	Monofilament, nylon
Koni / Ghagrajaal	13.5 cm	Multifilament, high-density polyethylene
Ilishjaal	6.5 cm	Monofilament, nylon
Chandijaal	13.5 cm	Monofilament, nylon
Bhetkijaal	15–20 cm	Multifilament, nylon
Disco jaal	14 cm,	Multifilament, cotton



Plate-10: Bycatch assessment and rescue of injured entangled horseshoe crab



Plate-11: Team member and expert during horseshoe crab rescue programme at Balaramgadi

Objective-3: Understanding the local perceptions and cultural values towards the horseshoe crab and to assess the level of anthropogenic threats (such as trading, poaching, hunting, etc.) on the horseshoe crab.

The assessment of stakeholder perception was done by conducting questionnaire surveys in the fishing villages along with the Indian horseshoe crab habitat in the region. The local community had suffered heavy losses due to continuous natural calamities in the area, therefore delay in the fieldwork helped in the normalization of the situation at the field and the respondents gave us their valuable time for the questionnaire (Approx. 45 mins per interview) and provided unbiased information (Plate 12-14). To achieve this, we consciously worked on rapport establishment with the locals. The people appreciated the effort of the team and CONSERVATION LEADERSHIP

PROGRAMME (CLP) on supporting towards the conservation of horseshoe crabs and understanding the human dimension in its conservation. After every interview people were asked how they felt about the interview, and we got 97.7% positive responses.

Interviews were focused upon the fishing-based communities located near the horseshoe crab habitat in Subarnarekha river estuary, Panchupada-Bardia River estuary and Budhabalanga River Estuary. In total, 388 interviews were conducted with local households (n=388) in Odia languages, following structured sampling for household selection and snowball sampling for key informant selection. Unstructured interviews and conversations with the locals during the pilot survey were used to guide the framework for the semi-structured questionnaire, consisting of open and close-ended questions. Key Informants were individuals residing/ working at the project site upon various social activities and had a basic understanding of conservation and other awareness activities. They had a good understanding of local issues and what approach can be taken to tackle the issue.



Plate-12: Interview with fishermen



Plate-13: Interaction with young community member



Plate-14: During TEK interview at a coastal village

Overall perception:

93.5% of the respondents were able to identify the Indian horseshoe crabs when pictorial aid was shown to them with different crab species, but only 3.1% were able to differentiate between the two species.

According to 50.8% of the respondents, the population of Indian horseshoe crab has decreased over the last 10 years, while 25.4% were unaware of the population trend. When asked if the Indian horseshoe crab should be conserved, 67.7% of the respondent positively and when asked why Indian horseshoe crab should be conserved, the most common answer was “Existential Value” by 44.8%

respondents. Other common answers were “Commercial Value” (16.3 %) and “Ecological Value” (3.9%).

Trading assessment

Hundreds of horseshoe crabs are killed in Odisha, the only home of these animals in the country, for its meat and shells which are supplied to Jharkhand, Bihar, Chhattisgarh and other states. Many indigenous community, believe that horseshoe crab meat has aphrodisiac qualities. Myths suggest that consumption of the meat can also ensure a longer life. However, there is no scientific theory to support this. Many quacks (quacks that dishonestly pretend to have medical skills and knowledge) also crush the crab shells and mix them with water to prepare a paste, which is applied to scars and some quacks sell crab blood mixing with mustard oil for joint pain etc

During the survey, six poachers have been identified with the help of local communities and appointed as an executive volunteer in the CLP conservation project for a period of 6 months with a minimum incentive of Indian Rs. 2000 for the rehabilitation of each poacher. The poachers have been further motivated and converted to small scale aquaculture farmers by the end of this project. (Plate15-16)



Plate-15: Person selling horseshoe crab in the local market in Jharkhand



Plate-16: Certain discussion with fishing villagers to reduce the mortality rate of endangered horseshoe crabs

OBJECTIVE-4: Spreading conservation awareness among the local fisher community and other stakeholders who live around horseshoe crab breeding areas and nesting sites.

Implemented Activities

By-catch release

The project has released trapped horseshoe crab back to the sea. Hundreds of live Horseshoe crabs that were trapped in fishing nets and jetty stones were removed and released into seawater to avoid heavy mortality. Additionally, the fishermen, surrounding population and boat person, in particular, were made aware of the urgency of the situation for the protection of horseshoe crab and its breeding ground by team ABC (Plate-17).



Plate-17: Removing of the trapped horseshoe crab and releasing back into the wild environment

Beach patrolling

Beach patrols have been conducted during the new moon and full moon day in Mahisali, Khandia, Khapra, Bahabalpur, Balaramgadi, Kantiachira estuary. During patrolling Beach surveys are being done to record any stranded Horseshoe crab carcasses(Plate 18-19).



Plate-18: Beach monitoring and hydrological assessment by CLP team



Plate-19: Beach survey by CLP HSC team

Education and awareness

In order to propagate awareness about the need of conserving horseshoe crab, a living fossil, a group of people from different walks of life having concern for the environment, observed Raksha Bandhan in a unique manner in different coastal villages along Balasore coast. The Awareness was organized by the project team from the Association for Biodiversity Conservation & Research (ABC). They celebrated the whole day by doing several awareness activities on the theme of Horseshoe crab to create awareness among students, youth and the local community. The initiative is aimed at inspiring a growing generation, knowledgeable and motivated to take positive actions to conserve Horseshoe crab. In order to bring more awareness among the People especially among the young group (School students) about the unique crab and its conservation, a series of Young Voices Arts competition was conducted and a wall art competition was carried out and to encourage the participants, the certificates and memento was given to the best three winners of this competition (Plate 20, 21, 23 24, 25). Moreover, the conch playing competition was held among the coastal women to add the cultural value of these unique crabs in their minds. Educational programs have so far been conducted in 10 schools, 4 colleges'and seven coastal communities. First time in India, Std

IX student of Saraswati Sishu Vidya Mandir, Remuna Ku. Krishna Priya Barik exhibited a Horseshoe crab project at a School level science exhibition (Plate-22).



Plate-20: 2nd Horseshoe crab conservation ceremony



Plate-21: Wall painting competition for Community Awareness along with coastal villages



Plate-22: Horseshoe crab project at school level science exhibition by a student



Plate-23: Art Competitions under the banner “Know me, save me”



Plate-24: Interaction between CLP team and School student for Horseshoe crab conservation



Plate-25: Celebration of Wildlife week on the theme of Horseshoe crab conservation

Art is one key method that helps people feel the importance of horseshoe crab. Through the power of true pieces of art, the viewer's eyes open and appreciate the beauty and, through this, the wonderful uniqueness and preciousness of this living fossils horseshoe crab. Art offers not only visual beauty but also a therapeutic sense of serenity; connecting emotions through the interpretation of what one see in any particular piece of art. The art done by CLP team member Kesu Das has very special meaning and a special message (connection between Varunani/Jaldevi/Goddess of sea and horseshoe crab) to society (Plate-26, 27).



Plate-26: Painting shows the bond between Sea and Horseshoe crab and the holistic approach to create a good affinity among community and tourists towards Horseshoe crab

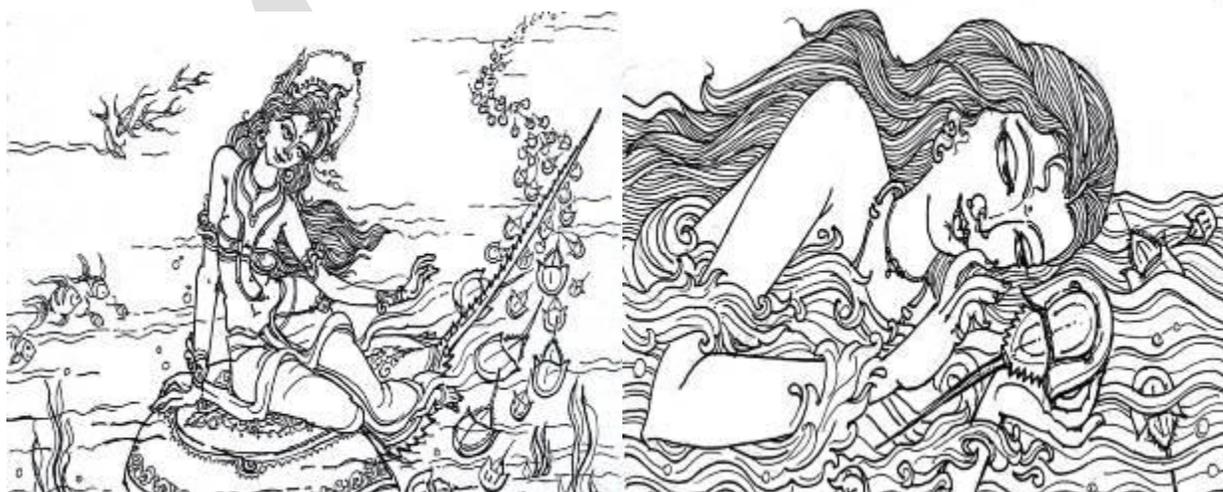




Plate-27: Arts connecting emotions and giving special message to the society
Beach cleaning event

In an effort to facilitate nesting and to conserve the living fossil, “Horseshoe crab” in the different estuary in Balasore district, the team executes an awareness cum cleaning event about five km stretch along the sea beach. Members of the Association for Biodiversity Conservation & Research (ABC), in association with National Service Scheme (NSS) volunteers of Fakir Mohan University, conducted a beach-cleaning program in a bid to safeguard marine flora and fauna along the Balasore coast (Plate-28).

Seventy volunteers from the ABC and the F. M. University, along with wildlife activists and other stakeholders, took part in the drive and cleaned a huge quantity of garbage from the beach in order to

make the place suitable for the horseshoe crab. Apart from members, some local fishermen also took part in the drive carried out at Horseshoe crab breeding ground. The students got a beautiful exposure to the Biodiversity of the Coastal Balasore along with practical lessons in Conservation from team ABC and the faculties of the Fakir Mohan University.



Plate-28: Habitat cleaning event for Horseshoe crab breeding

Distribution of leaflets

We have distributed leaflets in local language among the people in coastal areas during village festivals and local festivities such as Baroni- Snana where thousands of Devotees across the Odisha took a holy dip, to create awareness to conserve the valuable species (Plate-29).

Conservation with spiritual value

On the occasion of Sri Ganesh puja, Raising broader awareness of the efforts of local communities and Indigenous people linking culture and spirituality with Horseshoe crab Conservation at Koshamba Nagar, Balasore, India (Plate-30)



Plate-30: Raising awareness of the efforts of local communities and Indigenous people linking culture and spirituality with Horseshoe crab conservation



Plate-29: Leaflet distribution in the fishing market and landing areas

The team also organized a writing poem contest with the theme “Only for horseshoe crab” at Utkala, NoCCi business part. For this poetry contest on the topic “only for horseshoe crab”, we received numerous entries in Oriya language. The team is planning to combine all poems and release a book for reader.

Section 3:

Achievements and Impacts

Through related project activities, a body of skilled and knowledgeable community members have been secured and stimulated to support community collective action to protect horseshoe crab and their habitats (Plate-31). Over three thousand (3000) individuals comprising school students and community members have been reached through awareness and capacity building programs. Community members and fishermen who previously did not appreciate the importance of horseshoe crab; especially the feeding relationship between the horseshoe crabs, jellyfish and fish are now well acquainted with the relationship. They now understand that more availability of horseshoe crabs is more availability of fishes. College student groups, numbering about 100, studying biology and biodiversity in different colleges in Balasore Coast were trained in horseshoe crab protection and management thereby inspiring knowledge transfer in their respective communities. They were subsequently recruited for different educational programs. Accordingly, they are serving as agents of change for the communities. They were involved with data collection, education, etc. They have also acquired immense research skills and knowledge for their future conservation work. Different local artist groups numbering 40 were engaged in a learning sharing platform to determine their role in conserving the horseshoe crab and over 5000 leaflets made and distributed. Overall, the project has increased the understanding of locals on horseshoe crab populations and their habitat and also helped in influencing local community action through the volunteer group. 10 The partnership has been created particularly amongst the communities and the different organization (Balasore Kalakendra, Horseshoe crab foundation, Horseshoe crab research unit at FM University, Yuva Vikas, The New HOPE, Banadhulira Phula) as both have been involved in every stage of the project and their roles spelled out to them. This ultimately will help in meeting the project purpose thereby contributing to the sustainable conservation of the horseshoe crab. The IUCN has accepted group leader Dr. Siddhartha Pati as SSC member and Dr. Pati is actively working with IUCN to upgrade the IUCN status of horseshoe crab.



Plate-31: Impact of our work

Problems encountered and lessons learned

The project team learned the following lessons during project implementation:

- It does not take only funds but also strong local commitment is needed and/or required for intensive consultations and economic-related activities (to gain trust and accelerate the empowering processes)
- Recognition/adoption of customary regulations and reinforcing self-determination is a key requirement for community collective action
- Livelihood supports and capacity building (e.g. skills to increase economic production; and explore ways to resolve limited market access) is very fundamental to getting the rural poor to act.
- Communities desire a recognized local level governance system with authority and self-management as they proposed among other things a community-based horseshoe crab station.

Future planned activities

Recommendation

- Species population data and habitat characterization:
- The volunteer team should constantly be empowered, motivated to continue the drawn monitoring program. This will always make data available for efficient and effective management decisions.
- Other projects should address the by-catch interaction problems
- Future work should envisage building a community-owned ecotourism center to regulate tourism in the area.
- Small water vessels should be acquired to aid the research of inaccessible but potential nesting sites.
- Other projects and organizations should collaborate with the ABC to facilitate alternative livelihood training programs in the horseshoe crab nesting area.

LOOKING FORWARD

The team has started a very important community-based participatory process in horseshoe crab conservation in Sundarban. The team would work collaboratively with WTI, WWF, MOEF and also the team wishes to liaise with other bodies in sourcing funds to mitigate threats of fisheries interaction and over-exploitation of marine life. The team is liaising with Fakir Mohan University and different coastal colleges to encourage more students to undertake their under-graduate thesis work on horseshoe crabs to better build relevant data for holistic management processes.

Section 4:

Media article/coverage in both local and English language for awareness and knowledge



BHUBANESWAR | TUESDAY | AUGUST 28, 2018

Raksha Bandhan celebrated in B'war For horseshoe crab protection

UBACHAK MOHANTY ■
BALESWAR

In order to propagate awareness about the need of conserving horseshoe crabs, a living fossil, a group of people from different walks of life having concern for environment observed Raksha Bandhan on Sunday in a unique manner. They celebrated the whole day by doing several awareness activities among students, youths and local community.

A 'Young Voices Arts Competition' was conducted holding a wall art test and certificates and mementos were given to the best three winners. Besides, a conch play-

ing competition was held among coastal women to add cultural value about the unique crabs.

Baleswar DFO (Wildlife) Biswaraj Panda, Head of the Department Bioscience and Biotechnology of Fakir Mohan University Prof Bishnu Prasad Dash, executive director of Association for Biodiversity Conservation and Research (ABC) Siddhartha Pati, social activist Sarita Singh, convener of the event artist Kesu Das, Senior Reader Gobinda Chandra Biswal of Siddheswar College, Dr Sasmita Dash of Fakir Mohan Autonomous College and representative of different



organisations were present as key persons or guests.

Awardee of CLP Future Conservation award 2018, Pati who is working on a project supported by the Rufford foundation, UK, explained about the ecological and economical importance of this valuable species and how countries like

Japan and the USA are protecting the species and even Japan has declared this animal as its national monument.

The executive director of Baleswari Kala Kendra explained the awareness of this species in terms of ecological and socio-cultural.

The rare species estimated to be at least 300-million-year-old, till a few years back, was found in abundance along the Chandipur coast while nowadays only dead crabs are found there, said Biswal. Unrestricted trawler and mechanised boat movement is causing their deaths and hindering their incoming to the base, the speakers observed. Notably, the blood of the crab helps fight dreaded diseases.

ଜୈବ ସଂରକ୍ଷଣ ପାଇଁ ଆନ୍ତର୍ଜାତିକ ସମ୍ମାନ ପାଇବେ ସିଦ୍ଧାର୍ଥ ପତି

ବାଲେଶ୍ୱର, ୧୧.୦୮.୧୮ (ସଞ୍ଚୁ): ଜୈବ ସଂରକ୍ଷଣ ପାଇଁ ଆନ୍ତର୍ଜାତିକ ସମ୍ମାନ 'ୟୁଏଚିଏସ୍ ଜନଜର୍ଭେସନସିପ ଆଡ଼ାଡ଼' ପାଇବେ ଫକୀରମୋହନ ବିଶ୍ୱବିଦ୍ୟାଳୟର ଜୈବ ପ୍ରଯୁକ୍ତିବିଦ୍ୟା ବିଭାଗର ଗବେଷକ ତଥା ସାମୁଦ୍ରିକ ବିଶେଷଜ୍ଞ ସିଦ୍ଧାର୍ଥ ପତି। ଆସନ୍ତା ୧୩ରୁ ୨୯ ତାରିଖ ପର୍ଯ୍ୟନ୍ତ ଇଣ୍ଡୋନେସିଆର ସୁଲାଓୱେସାରେ ଥିବା ବୋଟାନିକାଲ ନେଚର ରିସର୍ଚ୍ଚରେ ଏହି ସମ୍ମାନ ପ୍ରଦାନ ଉଦ୍ଦେଶ୍ୟ ନୁହେଁ ତ ହେବ। ଆନ୍ତର୍ଜାତିକ ସ୍ତରରେ ସିଏସ୍‌ସି (ଜନଜର୍ଭେସନ ଲିକ୍‌ଚରସିପ ପ୍ରୋଗ୍ରାମ) ପକ୍ଷରୁ ପ୍ରତିବର୍ଷ ବିଭିନ୍ନ ଦେଶରୁ ଗବେଷକମାନଙ୍କୁ ସମ୍ମାନିତ କରିବା ପାଇଁ ଚୟନ କରାଯାଏ।



ଏହି ଜନଜର୍ଭେସନ ଏକ ସଂଗ୍ରହ ଓ ଏହାକୁ 'ବାର୍ଡ଼ି ଲାଇଫ ଇଣ୍ଟରନେସନାଲ', 'ପରମ ଏକ୍ସ ପ୍ଲେନା ଇଣ୍ଟରନେସନାଲ' ଓ 'ବ୍ଲୁଲକ୍ସ ଲାଇଫ ଜନଜର୍ଭେସନ ସୋସାଇଟି' ପକ୍ଷରୁ ଗଠନ

କରାଯାଇଛି। ଚଳିତ ବର୍ଷ ଭାରତରୁ ତଥା ଓଡ଼ିଶାରୁ ପ୍ରଥମ ଥର ପାଇଁ ସମ୍ମାନିତ ହେବା ପାଇଁ ଶ୍ରୀ ପତିଙ୍କୁ ମନୋନିତ କରାଯାଇଛି। ଶ୍ରୀ ପତି ଏକାଧାରରେ ଜଣେ ପ୍ରକୃତା ପ୍ରେମୀ, ଯୁବ ବୈଜ୍ଞାନିକ ତଥା ପରିବେଶଚିତ। ଲୋପ ପାଇବାକୁ ଯାଉଥିବା ଜୀବଜଗତ ସଂରକ୍ଷଣ ପାଇଁ ରହିଥିବା ସଂଗ୍ରା 'ଆସୋସିଏସନ ଫର ବାଏ ଡାଇଭର୍ସିଟି ଜନଜର୍ଭେସନ'ର କାର୍ଯ୍ୟକାରୀ ନିର୍ଦ୍ଦେଶକ ଭାବେ ସେ କାର୍ଯ୍ୟ କରୁଛନ୍ତି। ଜାତୀୟ ଓ ଅନ୍ତର୍ଜାତୀୟ ସ୍ତରର ପରିକାରେ ତାଙ୍କର ଲେଖା ପ୍ରକାଶ ପାଇବା ସହ ଅଳ୍ପ ସମ୍ମାନରେ ସମ୍ମାନିତ ହୋଇଛନ୍ତି।

ନୀଳରତ୍ନ କଙ୍କଡ଼ାଙ୍କ ସୁରକ୍ଷା ପାଇଁ ରକ୍ଷାବନ୍ଧନ ଉତ୍ସବ

ଭୁବନା, ୧୬୩୮(ଡି.ଏନ୍.ଏ.)

ନୀଳରତ୍ନ କଙ୍କଡ଼ାର ସୁରକ୍ଷା ଦିଗରେ ସରକାର ଯତ୍ନବାନ ହେବାର ସମୟ ଆସିଛି। ବିରଳ ଓ ବିଲୁପ୍ତପ୍ରାୟ ଏହି କଙ୍କଡ଼ାର ସୁରକ୍ଷା ଓ ତା ସମ୍ପର୍କରେ ସଚେତନତା ପାଇଁ ବାଲେଶ୍ଵରରେ ଏକ ସଚେତନତାଗାର ପ୍ରତିଷ୍ଠା କରୁଣା ବୋଲି ରକ୍ଷାବନ୍ଧନ ଉତ୍ସବରେ ଉପସ୍ଥିତ ସଚେତକ ଓ ଅତିଥିମାନେ ମତଦାୟକ କରିଛନ୍ତି। ବାଲେଶ୍ଵର ସଦର ବ୍ଲକ ଅନ୍ତର୍ଗତ ସାଥୀ ବାଂଶୀ ବନାରେ ସୁରୁତାର ନୀଳରତ୍ନ କଙ୍କଡ଼ାର ସୁରକ୍ଷାର ସଚେତନତା ପାଇଁ ତୃତୀୟ ବାର୍ଷିକ ରକ୍ଷାବନ୍ଧନ ଉତ୍ସବ ଅନୁଷ୍ଠିତ ହୋଇଯାଇଛି। ମୁଖ୍ୟଅତିଥି ଭାବେ ଏଫଏମ୍ ବିଶ୍ଵବିଦ୍ୟାଳୟ ଶ୍ରେଣୀ ବିଜ୍ଞାନ ଓ ପ୍ରଯୁକ୍ତିବିଦ୍ୟାର ମୁଖ୍ୟ ପ୍ରଫେସର ବିଷ୍ଣୁପ୍ରସାଦ ଦାସ ଯୋଗଦେଇ ବାଲେଶ୍ଵରରେ ସଚେତନତାଗାର ପ୍ରତିଷ୍ଠା ହେଲେ ନୀଳରତ୍ନ କଙ୍କଡ଼ାର ସୁରକ୍ଷା ଓ ସଚେତନତା କ୍ଷେତ୍ରରେ ଅଧିକ ସୁଯୋଗ ସୃଷ୍ଟି ହୋଇପାରିବ ବୋଲି ମତଦାୟକ କରିଥିଲେ। ବାଂଶୀ ଯୁଧ୍ଵ କରିବି ସରାପତି ବରୁଣା ଜୁନୀର ସାହୁ ଏହି ଉତ୍ସବରେ



ନୀଳରତ୍ନ କଙ୍କଡ଼ା ସୁରକ୍ଷା ସମ୍ପର୍କିତ କାର୍ଯ୍ୟକ୍ରମରେ ଉପସ୍ଥିତ ଅତିଥି।

ପୌରୋହିତ୍ୟ କରିଥିଲେ। ମୁଖ୍ୟବକ୍ତା ଅମରୀ ଦିବେଶ୍ଵର ମହାବିଦ୍ୟାଳୟର ପ୍ରାଧ୍ୟାପକ ଓ ଗୋବିନ୍ଦଚନ୍ଦ୍ର ବିଶ୍ଵାଳ, ସମ୍ମାନନୀୟ ଅତିଥି ଭାବେ ଆସୋସିଏଟନ ଫର୍ ବାୟୋଡାଇଭର୍ସିଟି କଞ୍ଚରଭେଶନର ନିର୍ଦ୍ଦେଶକ ଓ. ସିଦ୍ଧାର୍ଥ ପତି, ହର୍ଷ କ୍ରାବ ପାଇଠେଶନର ନିର୍ଦ୍ଦେଶକ ପୁଧାକର ସେଠା, ନୀଳରତ୍ନ କଙ୍କଡ଼ା ସୁରକ୍ଷାର ସୁରୁତ୍ଵ ଓ ଆବଶ୍ୟକତା ସମ୍ପର୍କରେ ଉଲ୍ଲ ଭାବେ ହୃଦବୋଧ କରିଥିବା କରିଥିଲେ। ହର୍ଷ କ୍ରାବ ପୋରମ

- ବାଲେଶ୍ଵରରେ ଗବେଷଣାଗାର ପ୍ରତିଷ୍ଠା କରୁଣା
- ସୁରକ୍ଷା ପାଇଁ ଶପଥ ନେଲେ ମହାଧିକାରୀ

ଅନ୍ତର୍ଗତ ଜିଲାର ପ୍ରମୁଖ ସଙ୍ଗଠନ ଏବିସି, ବାଲେଶ୍ଵର କଳାକେନ୍ଦ୍ର, ଉଷୋପିଡିସ୍ ଚୁମ୍ବାଟୋଲଡି ପାଇଠେଶନ, ମୁଦ୍ ବିକାଶ, ଦଶଧିକାର ପୁଲ, ଅମର ଯବାନ

ସଙ୍ଗଠନ ଓ ଉତ୍ତରାଞ୍ଚଳ ବାହାଘର ଉତ୍ସବ କରିବିର କର୍ମକର୍ତ୍ତା ଯୋଗଦେଇ ସାଥୀରେ ଜନସାଧାରଣ ଓ ପରାମର୍ଶ ମଧ୍ୟରେ ରକ୍ଷାବନ୍ଧନ ଉତ୍ସବ ପାଳନ କରି ନୀଳରତ୍ନ କଙ୍କଡ଼ା ସୁରକ୍ଷା ଦିଗରେ ଶପଥ ନେଇଥିଲେ। ଏହି ଅବସରରେ ସମସ୍ତ ନିକଟ ସାଥୀ ମୁହାଣକୁ ଅତିଥିମାନେ ଯାଇ ବହୁ ମୃତ ନୀଳରତ୍ନ କଙ୍କଡ଼ା ଉଦ୍ଧାର କରିଥିଲେ। ଶେଷରେ ଯୁଧ୍ଵ କରିବି ସମ୍ପାଦକ କମଳାକାନ୍ତ ମଣ୍ଡଳ ଧନ୍ୟବାଦ ଦେଇଥିଲେ।

HASHMI BEHRA DAS, OP

For much of human history the phenomenal life beneath the ocean's surface was a distant, unattainable world. Thanks to many curious and courageous individuals, however, marine science has grown into a vast and exciting field. While there are many who have contributed to save marine life, Siddhartha Pati stands out as an exceptional pioneer. Siddhartha, the founder of The Association for Biodiversity Conservation and Research (ABC) is leading Horseshoe crab research and conservation in India. Recently, he was among three Indians selected to receive the Future Conservationist Award given by the Conservation Leadership Programme (CLP) in Indonesia. The annual award supports the work of early career conservationists for over 25 years. CLP is a partnership that includes the Wildlife Conservation Society, Fauna & Flora International, Bird Life International, and Conservation International. In an interview, Siddhartha expresses his concern about the dwindling number of Horseshoe crabs in Orissa, and on the Chandipur beach in particular.

Hailing from Balasore, Siddhartha grew up in a village near the Subarnarekha river known for its biodiversity. That is where he developed a passion for wildlife conservation. Siddhartha, who works as a research scholar in the department of bioscience and biotechnology at the Fakir Mohan University is also the investigator in a project for the conservation of the horseshoe crab supported by the Mohammed Bin Zayed Species Conservation Fund, Abu Dhabi, United Arab Emirates (UAE). His expertise lies in the area of restoration ecology and wildlife management, biodiversity conservation, and environmental ethics. Siddhartha has worked with WWF-India and the Malakal Institute of Marine Studies, Goa, where he was able to combine his passion for history and hiking with his commitment to protect India's wildlife.

Siddhartha says, "Apart from many prized species of flora and fauna, Orissa also has a living fossil to boast of. The Horseshoe crab, which is widely found along the coast of Chandipur, existed long before the arrival of dinosaurs. Two decades ago, Horseshoe crabs were found in large numbers along the coastal belt, but now the species is confined to specific pockets

WILDLIFE WARRIOR

SIDDHARTHA PATI WAS AMONG THREE INDIANS SELECTED TO RECEIVE THE FUTURE CONSERVATIONIST AWARD GIVEN BY THE CONSERVATION LEADERSHIP PROGRAMME IN INDONESIA

like Kaikakula beach, Balarampur; the Chandipur beaches of Balasore district and Fukukula areas of Kendrapada district."

He elaborates on the Horseshoe crab, "The horseshoe crab is an amazing creature and considered to be the oldest living fossil in the world. It has descended from mud dwelling primitive arthropods, named trilobites, which lived in the Precambrian seas, nearly 600 million years ago. After 130 million years or so, the Horseshoe crab evolved into its present shape. While so many animals, including dinosaurs and many other late-comers to the Mesozoic era, are completely extinct, it is a wonder how the humble Horseshoe crab has survived for such a long period. It seems that this animal can overcome all

kinds of adverse situations in its estuarine and coastal shallow habitat. It can also tolerate wide ranges of temperature, salinity desiccation and submergence."

Siddhartha explains how Horseshoe



in bio-medical sciences. The crab is in high demand worldwide for its therapeutic value. Its blood is used in making drugs for illnesses like mental exhaustion and gastroenteritis. Its blood cells can be extracted and crushed to provide a lysate - a chemical uniquely sensitive to bacterial toxins - that can be used to check for microbial contamination. However, most people here are unaware of these facts," says the researcher. That apart, it is suspected that such crabs are being smuggled from the Bay of Bengal through Thailand and Malaysia.

Siddhartha adds, "Fishermen in India are ignorant of the commercial importance of the species and they generally throw Horseshoe crabs back into the sea when they are caught in the net while fishing. Additionally, the degradation of the crabs' breeding grounds due to estuarine and anthropogenic activities has also resulted in mass depletion of the crab population along the coast. I would like to call for effective measures to protect these valuable breeding beaches along the coast. My project aims at implementing conservation measures to mitigate impacts on horseshoe crab populations along the coast and also focuses on raising conservation awareness among local stakeholders."

Siddhartha, whose articles on Horseshoe crabs have been published in magazines like *Science Reporter*, *Science Horizon*, and *Zoo Print Magazine*, is also the recipient of many awards from organisations such as the World Wide Fund for Nature, India, Mohamed Bin Zayed Species Conservation Fund, UAE and Rufford Foundation, USA. That apart, he has also received the Biju Patnaik Award for Wildlife Conservation from the state government.



Siddhartha with other conservationists as part of a beach cleanliness drive



Siddhartha rescuing a trapped chick on Chandipur beach



Releasing a horseshoe crab into its natural habitat

Fishing takes a toll on horseshoe crabs, researchers worried

EXPRESS NEWS SERVICE
@Kendrapara

UNREGULATED fishing of horseshoe crabs along Odisha coast, one of the few places in the country where the species is found, has led to the decline in its population raising concern among the conservationists.

The State is home to two of four varieties of the species found globally. Those are found along the north-east coast of Balasore and Kendrapara districts.

The crabs used to migrate in large numbers regularly to breed. But, unregulated fishing activities along the coast and lack of awareness among local fishermen about horseshoe crab's economic importance are leading to their declining population, said Dr Anil Chatterji, a noted horseshoe crab researcher and former scientist of Biological Oceanography Division of National Institute of Oceanogra-

phy (NIO), Goa.

Though known for their medicinal properties and in high demand among the biomedical companies, little effort is made by the Government to conserve the horseshoe crabs.

Every year, horseshoe crabs die in large numbers after getting entangled in fishing nets. Recently, the scientists had found around 500 crab carcasses in Balasore district.

Nearly three decades back,

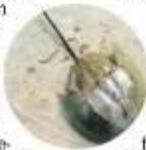
the horseshoe crabs were found in large numbers across the coast but now their presence is limited to pockets like Balarangadi, Chandipur beach, Khandia estuary of Balasore district, Eakakula, Madali and Hukitola beach in Kendrapara district.

Scientists of NASA have been researching on the horseshoe crab, said Dr Chatterji adding it is high time for the Government to help horseshoe crab researchers, one of them being Dr Siddhartha Pati of Fakir Mohan Univer-

sity, to conserve the marine species.

The Association of Biodiversity and Conservation, with the help of Wildlife Trust of India (WTI), has been involved in horseshoe crab conservation and research work in Odisha.

Horseshoe crab blood contains a chemical that makes its blood clot in the presence of even the most minute trace of bacteria as a result many biomedical companies throughout the globe use the crab's blood to make vaccines.



Bio heritage tag sought for horse shoe crabs

POST NEWS NETWORK

Balasore, July 16: In the face of global outcry over disintegration of endangered horse shoe crabs, a group of experts got together at a programme jointly organised by NOCI Cultural Academy and Kanya Anmol on the marine species here Tuesday.

The participants urged government to accord bio-heritage tag to the species. Prof Buishnupradad Das of the Biotechnology department of FM University, lecturer Gobinda Chandra Biswal, Dr Sidharth Pati, poet Rabinarayan Das and artist Kesu Das emphasized the need to protect the horse shoe crabs.

“Several countries have initiated steps to protect the species. The Centre and the states have done little to protect the marine species,” they noted adding that the government has major role to protect the endangered crabs.

ପୂଜା ମଣ୍ଡପରେ ନୀଳରକ୍ତ କଙ୍କଡ଼ା

ବାଲେଶ୍ଵର ସିଡି, ୪୮୯ (ଆ.ପ୍ର): ବାଲେଶ୍ଵରରେ ନୀଳରକ୍ତ କଙ୍କଡ଼ା ପୁରୁଣା ବର୍ଗା ନେଇ ‘ହର୍ଷବୁ ଗ୍ରାହ ଫୋରମ’ ପକ୍ଷରୁ ସାବୋତି ଗଣେଶ ପୂଜା ମଣ୍ଡପକୁ ଫେରାଇ ଏକ ଅଭିନବ ପ୍ରତିଯୋଗିତା ଆରମ୍ଭ ହୋଇଛି । ବିଭିନ୍ନ ନୀଳରକ୍ତ କଙ୍କଡ଼ାଙ୍କ ଫାଷ୍ଟା କମ୍ପିଟିଗ ରେଳ ଏହାର ପୁରୁଷ ପାଇଁ କେଶମ୍ବ ନଗର କୁଡ, ଓଡି ରୋଡର ଅଭିଭୂତ ଅନୁଷ୍ଠାନ, ମଣିଷମରା ଧୁମଧାମ୍ କୁଡ, ତାଳବୋରାରେ ଦି ରଥାନା କୁଡ, ରାଜିଙ୍ଗ ଝରା କୁଡ, ବାହାଦୁରୀ ପୁରୀ ଆଞ୍ଚଳିକ ମହାବିଦ୍ୟାଳୟ ଓ ସାମ୍ରାଜ କୁଳଦେବୀ ମହାବିଦ୍ୟାଳୟ ଏଥିରେ ଅଂଶ ଗ୍ରହଣ କରିଥିଲେ । ବ୍ୟାଜରା, ବସିତା, ଦୁରନ୍ଧରା ଇତ୍ୟାଦି ମଧ୍ୟମରେ ବିଭିନ୍ନ ପୁରୁଷ ପୂଜକ ବର୍ଗା ରଖାଯାଇଥିଲା । ଏହି ଅବସରରେ କେଶମ୍ବ ନଗର କୁଡର ଶାନ୍ତପୁ ପ୍ରଧାନକ ନେତୃତ୍ଵରେ ନୀଳରକ୍ତ କଙ୍କଡ଼ା ଆକୃତିରେ ଏକ ଗଣେଶ ପ୍ରତିମୂର୍ତ୍ତି ମଣ୍ଡପରେ ପ୍ରଦର୍ଶିତ କରାଯାଇଥିଲା ।

ପୂଜା ପରଦିନ ସନ୍ଧ୍ୟାରେ ବାଲେଶ୍ଵରର ହର୍ଷବୁ ଗ୍ରାହ ଫୋରମ ଆବାହକ ଡ. ସିଦ୍ଧାର୍ଥ ପତି, ପ୍ରଜ୍ଞା ବିଶ୍ଵାଳ ପ୍ରଧାନକ ଡ. ଗୋବିନ୍ଦ ଚନ୍ଦ୍ର ବିଶ୍ଵାଳ, ବାଲେଶ୍ଵରୀ ବନା କେନ୍ଦ୍ରର ଶିଳ୍ପୀ କେଶୁ ଦାସ, ପୁସ୍ତକ ବିକାଶର ନିର୍ଦ୍ଦେଶକ ଗୋବିନ୍ଦ କନ୍ଦୁର ଦଳାଇ, ହର୍ଷବୁ ଗ୍ରାହ ଫୋରମର ମୁଖ୍ୟ ସୁଧାକର ସେଠା, ପୁସ୍ତକ ବିକାଶର ପୂର୍ବ ବିଚାରକ ରାଜେ ଯୋଗଦେଇ ବିଭିନ୍ନ ମଣ୍ଡପ ପରିଦର୍ଶନ କରିଥିଲେ । ଏଥିରେ ରାମପୁରୀର କେଶମ୍ବ ନଗର କୁଡ ପ୍ରଥମ, ତାଳବୋରାରେ ରାଜିଙ୍ଗ ଝରା କୁଡ ଦ୍ଵିତୀୟ ପୁରୁଷର ଚିତିଥିଲେ । ଅନ୍ୟମାନଙ୍କ ମଧ୍ୟରେ ପ୍ରବୀର କୁମାର ବାମିନା, ପ୍ରଣବି ମହାପାତ୍ର, ବେଗଳିଷ ସିଂହ, ସଞ୍ଜୟ କୁମାର ପଣ୍ଡା, ରାଜେନ୍ଦ୍ର ଚିନ୍ତି, ଚିତ୍ତରାଜା ପାତ୍ର, ସୌମ୍ୟରଞ୍ଜନ ପାଳ, ଗଗନ ସେଠା, ରମାୟତ ଅନୁା ଶାନ୍ତ, ଅଜିତ ବାଲେଶ୍ଵରୀ, ମଧୁସୂଦନ ମିଶ୍ର, ପ୍ରଭାକର ସାହୁ, ରାଜକରଣ ଦାସ ପ୍ରମୁଖ କର୍ମକର୍ତ୍ତା ସହଯୋଗ କରିଥିଲେ ।



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NORTHERN ODISHA PLUS

supplement to the readers of the times of india

sunday August 25, 2019

Balasoore coast is a home to the horseshoe crabs, a living fossil that were crawling on the planet for 450 million years before dinosaurs. But they are now faced with a suite of threats and are rapidly disappearing. According to the International Union for Conservation of Nature, all four extant species of horseshoe crabs are imperilled, because of overfishing for use as food and bait, production of biomedical products derived from their blood and loss of habitat or alteration due to shoreline development. They are commercially harvested, particularly in the United States, by biomedical and cosmetic companies for their coveted blue blood.

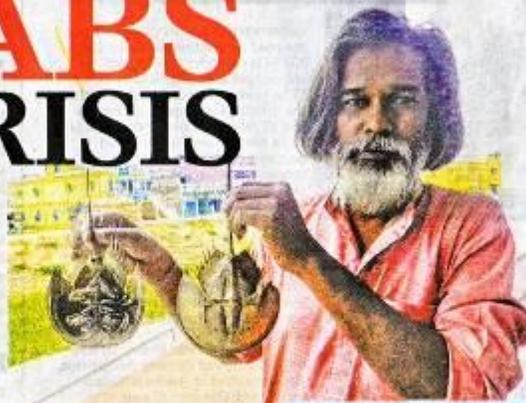
Deeply concerned about the pathetic condition of these species, Silpi Kesudas, renowned artist and activist, along with Dr Bisnu Prasad Dash, professor, Fakir Mohan University, Prof Gobinda Chandra Biswal and Dr Siddharth Pati, researchers and marine biologists, and Sudhakar Sethi, co-founder of Horse Shoe Crab Foundation has taken bold steps with a touch of cultural revival strategies to protect this once thriving species.

CULTURAL EXPRESSIONS
In order to promote sensitivities among the people in the coastal

CRABS IN CRISIS

THE LIVING FOSSIL THAT SURVIVED FOR 450 MILLION YEARS IS NOW FACING A THREAT OF EXTINCTION IN INDIA

communities, Dr Bisnu Prasad Dash along with the local villagers have been organising Rakshas Bandhan for the third year in a row. "Balasoore is one of the important cultural capitals of Odisha. Only scientific research and publication of papers will not make a big impact. Local community based cultural expres-



SILPI KESUDAS WITH HORSESHOE CRAB

sions around the importance of conservation of horseshoe crab can make a huge difference. We have been creating gift items and household decors using the mould of horseshoe crabs for making it the symbol of bio heritage of the region," said Dash.

THE DEATH TRAP

Every full moon and new moon, numerous horseshoe crabs emerge from the depths of the sea along the Balasoore coast in places such as Sartha, Dubulagadi, Bahabalpar, Balaramgadi, Khandia and Chandipur. However, these places being the major marine centres, the entanglement of individual crabs in nets along the shore due to fishing activities is a frequent hazard.

According to Dash, Balasoore is the most prominent and important ecosystem for Horseshoe crabs because of the soft sandy beaches and the uniqueness of the sea coast. "Unless we understand the biology of the rare species and the required ecosystem, the sincere conservation

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Conservation can truly happen when the first responders in the coastal communities are sensitised on its importance and when the government implements the wildlife laws effectively

when the first responders in the coastal communities are sensitised on its importance and when the government implements the wildlife laws effectively," felt Dr Siddharth Pati.

ENCULTURATION DRIVE

Several number of likeminded conservationists and social workers have come together to start 'Horse-shoe Crab Foundation', which has taken up aggressive campaigns such as blood donation camps, organise literary meet, painting competition among school children and putting up installations and paintings in various parts of the city and tourism spots like Chandipur for the mass sensitisation. Not only that, several government and non-government agencies and countries like Malaysia, Thailand and Saudi Arabia are helping Odisha conserve the species owing to their medicinal value in pharmaceutical, clinical and food industries.

> **Gobinda Dalai**
Share your views at
Aaheli.Ghose@timesgroup.com



SCIENCE EXHIBITION ON HORSESHOE CRABS



PAINTINGS DONE BY SCHOOL CHILDREN

efforts will be far from reality," added Dash, who has done thorough research on the horseshoe crabs and has been advocating for its conservation.

"Conservation can truly happen

ନୀଳଗିରି ଜଙ୍ଗଲ ସୁରକ୍ଷା ବାର୍ତ୍ତା ନେଇ ପୂଜା ମଣ୍ଡପରେ ପ୍ରତିଯୋଗିତା

ବାଲେଶ୍ୱର, (ସଂଘ୍ୟ) : ବିଭିନ୍ନ ନୀଳଗିରି ଜଙ୍ଗଲ ସୁରକ୍ଷା ପାଇଁ ଏବେ ସମସ୍ତ ପରିବେଶବିତ୍ରମାନେ ଚର୍ଚ୍ଚିତ ରହିଥିବା ବେଳେ ବାଲେଶ୍ୱରର ବିଭିନ୍ନ ପରିବେଶବିତ୍ର ଏହି ନିପୁଣତା ଆଇଡିଆ କଂପାନୀ ଆରମ୍ଭ ଆନ୍ଦୋଳନରେ ଯୋଗଦେଇଛନ୍ତି । ନୀଳଗିରି ଜଙ୍ଗଲର ଉପକରଣ ସମ୍ପର୍କରେ ଜନସଚେତନତା ସୃଷ୍ଟି କରିବା ପାଇଁ ସରକାରୀ ସ୍ତରରେ କୌଣସି ପଦକ୍ଷେପ ଗ୍ରହଣ କରାଯାଇନଥିବା ବେଳେ ବାଲେଶ୍ୱରରେ ବେତେକ ଅନୁଷ୍ଠାନ ନିଜ ଉଦ୍ୟମରେ ଏହି ଜଙ୍ଗଲର ସୁରକ୍ଷା ପାଇଁ ଦର୍ଶନାତ୍ମକ ବିଭିନ୍ନ କାର୍ଯ୍ୟକ୍ରମମାନେ ଆୟୋଜନ କରିଆସୁଥିବା ଦେଖିବାକୁ ମିଳୁଥିଲା । ଏବେ ଗଣେଶପୂଜା ଅବସରରେ ବିଭିନ୍ନ ପୂଜାମଣ୍ଡପରେ ନୀଳଗିରି ଜଙ୍ଗଲ ସୁରକ୍ଷା ବାର୍ତ୍ତାରେ ଆୟୋଜିତ ଅଭିନବ ପ୍ରତିଯୋଗିତା ଦର୍ଶକମାନଙ୍କ ମନକୁ ବେଶ୍ ଛୁଇଁଥିବା ଦେଖାଯାଏ । ଚଳିତ ଦର୍ଶ ଦର୍ଶସ୍ତ୍ର ନାଚ ପୋରନ୍ ଚରଣକୁ ପ୍ରଥମ ଥର ପାଇଁ ନୀଳଗିରି ଜଙ୍ଗଲ ସୁରକ୍ଷା ବାର୍ତ୍ତା ଆଧାରିତ ବାଲେଶ୍ୱରର ଗଣେଶ ପୂଜା ମଣ୍ଡପ ମାନଙ୍କ ଏକ ଅଭିନବ ପ୍ରତିଯୋଗିତା କରାଯାଇଥିଲା । ଏହି ପ୍ରତିଯୋଗିତାରେ ନୋଣ୍ଡା ନଗର ରୁଦ୍ର, ଓଡ଼ି ରୋଡର ଆଦିତ୍ୟ ଚନ୍ଦ୍ର ସ୍ୱାମୀ, ମାଣିକ୍ଷ୍ୟର ଧୂମ୍ରଧାମ୍



ରୁଦ୍ର, ଡାକ୍ତରାଘର ବି ରଘୁନାଥ ରୁଦ୍ର, ରାଜିବ୍ ଶାମ ରୁଦ୍ର, ଦାହାଦରପୁର ଆଚାର୍ଯ୍ୟ ମହାବିଦ୍ୟାଳୟ ଓ ସାର୍ଯ୍ୟାୟ ବ୍ରତମୋହନ ମହାବିଦ୍ୟାଳୟ ପ୍ରମୁଖ ମୋଡ଼ ଓଡ଼ି ମଣ୍ଡପ ଅଂଶ ଗ୍ରହଣ କରିଥିଲେ । ନୀଳଗିରି ଜଙ୍ଗଲ ସୁରକ୍ଷା ପାଇଁ ବେତେକ ଅନୁଷ୍ଠାନ ବେତେକ ଦ୍ୟାନ୍ତର ମାରି ଥିବାବେଳେ ବ୍ରତମୋହନ ମହାବିଦ୍ୟାଳୟର ରାଜିବ୍ ଆଧ୍ୟାପକ ଶତ୍ରୁଘ୍ନାଥ ପାଲକ ନେତୃତ୍ୱରେ ସମସ୍ତ ସହକର୍ମୀ ଓ ଛାତ୍ରଛାତ୍ରୀଙ୍କୁ ନେଇ ସଚେତନତା କର୍ମଶାଳା ଆୟୋଜନ କରିଥିଲେ । ବି ରଘୁନାଥ ରୁଦ୍ର ଚରଣକୁ ଅଶୋକ କୁମାର ପ୍ରଧାନଙ୍କ ନେତୃତ୍ୱରେ ରୁଦ୍ର ଯୁବକ ତଥା ଗ୍ରାମବାସୀଙ୍କ ମଧ୍ୟରେ ସଚେତନତା ସୃଷ୍ଟି କରିଥିଲେ । ରାଜିବ୍

ଶାମ ରୁଦ୍ର ଚରଣକୁ ଯୁବ ସଂଘର ସରୋଜ କୁମାର ପରିଚାଳିତ ଚଳାକାଳରେ ଚଳନ ଆଚାର୍ଯ୍ୟ ଛାତ୍ର କର୍ମିତା ଓ ସୁରକ୍ଷା କମିଟି ପ୍ରଦର୍ଶିତ ଦ୍ୟାନ୍ତର ସମସ୍ତ ଜନସାଧାରଣକୁ ସଚେତନ କରିବାରେ ସହାୟକ ହୋଇଥିଲା । ସେହିପରି ନୋଣ୍ଡା ନଗର ରୁଦ୍ର ଶାନ୍ତ ପ୍ରଧାନ ନେତୃତ୍ୱରେ ନୀଳଗିରି ଜଙ୍ଗଲ ଆଦୃତିରେ ଏକ ଗଣେଶ ପ୍ରତିମୂର୍ତ୍ତି ମଣ୍ଡପରେ ପ୍ରଦର୍ଶିତ କରି ଗଣେଶ ଭଜନ ମନରେ ନୀଳଗିରି ଜଙ୍ଗଲ ପ୍ରତି ଏକ ଆଦେଶ ସୃଷ୍ଟି କରିପାରି ଥିଲେ । ପୂଜା ପରିଚାଳନାରେ ବାଲେଶ୍ୱରର ହର୍ଷସ୍ତ୍ର ନାଚ ପୋରନ୍ ଯଥା ଏସୋସିଏସ ପର ବାଲେଶ୍ୱର ନୀଳଗିରି ଜଙ୍ଗଲର ମୁଖ୍ୟ ଚ. ସିଦ୍ଧାର୍ଥ ପତି, ବିଲେଶ୍ୱର

କଲେଜ, ଅମରୀର ବ୍ୟଲୋଚି ବିଭାଗର ପ୍ରଧ୍ୟାପକ ଡ. ଗୋବିନ୍ଦ ଚନ୍ଦ୍ର ବିଶ୍ୱାଳ, ବାଲେଶ୍ୱରୀ ଜବା କେନ୍ଦ୍ରର ଶିଳ୍ପୀ ଦେଶୁ ଦାସ, ଯୁବ ବିକାଶ ନିର୍ଦ୍ଦେଶକ ଗୋବିନ୍ଦ ବରୁଣ ଦତ୍ତ, ହର୍ଷସ୍ତ୍ର ନାଚ ପୋରଣେର ମୁଖ୍ୟ ସୁଧାକର ସେଠୀ, ଯୁବ କବି ରଞ୍ଜିତ୍ ପୃଷ୍ଟି ବୁଦ୍ଧି ବୁଦ୍ଧି ସମସ୍ତ ମଣ୍ଡପ ପ୍ରଦର୍ଶନ କରି ଭାଗପୁରାର ଦୋଣ୍ଡା ନଗର ରୁଦ୍ର ପ୍ରଥମ, ଡାକ୍ତରାଘର ରାଜିବ୍ ଶାମ ରୁଦ୍ରକୁ ଦ୍ୱିତୀୟ ଭାବରେ ମନୋନୀତ କରିଥିଲେ । ଶେଷରେ ଉକ୍ତ ମଣ୍ଡପକୁ ଯାଇ ରୁଦ୍ର ସମସ୍ତ କର୍ମକର୍ତ୍ତାଙ୍କ ଉପସ୍ଥାପନରେ ପୁରସ୍କାର ସ୍ୱରୂପ ପ୍ରମାଣ ପତ୍ର ଓ ଅର୍ଥରାଶି ବାବଦରେ ୨୦୦/- ଓ ୫୦୦/- ଟଙ୍କାର ଚେକ୍ ପ୍ରଦାନ କରାଯାଇଥିଲା । ଦ୍ୟୟ ବହୁକ ପୂଜା

ମଣ୍ଡପମାନଙ୍କରେ ଯଦି ଦଶ ପ୍ରତିଶତ ଖର୍ଚ୍ଚ କରାଯାଇ ଏହିଭଳି ସାମାଜିକ ସଚେତନତା ମୁକ୍ତ କାର୍ଯ୍ୟକ୍ରମମାନ କମିଟି ସବୁ ଗ୍ରହଣ କରନ୍ତୁ ବୋଲି ସବୁ ଦର୍ଶକ ମତ ଦ୍ୟୟ କରିଥିଲେ । ଏହି ଅବସରରେ ପ୍ରଥମ ଥର ପାଇଁ ନୀଳଗିରି ଜଙ୍ଗଲ ଆଧାରିତ ଗଣେଶ ମଣ୍ଡପ ପ୍ରତିଯୋଗିତାକୁ ବିଭିନ୍ନ ମଣ୍ଡପରେ ସ୍ୱାଗତ କରାଯାଇଥିବା ବେଳେ ପ୍ରଥମ ରୁମାର କର୍ମକା, ପୁଣର୍ବ ମହାପାତ୍ର, ଦେବାଶିଷ୍ଟ ସିଂହ, ସଖ୍ୟ କୁମାର ପଣ୍ଡା, ରାଜେନ୍ଦ୍ର ସିଂହ, ଦୁସ୍ତାଭାଣୀ ପାତ୍ର, ସୌମ୍ୟଚନ୍ଦ୍ର ପାତ୍ର, ସରନ ସେଠୀ, ଜନସଚେତନ ଶାନ୍ତ, ଅଭିମ ବାଲେଶ୍ୱରୀ, ମଧୁସୂଦନ ମିଶ୍ର, ପ୍ରଭାକର ସାହୁ, ମାନସ୍ ମାଣିକି, ରଞ୍ଜନେଶ ଦାସ ପ୍ରମୁଖ କର୍ମକର୍ମମାନେ ସହଯୋଗ କରିଥିଲେ ।

ପ୍ରତିଯୋଗିତା ପ୍ରତିଯୋଗିତା ପ୍ରତିଯୋଗିତା ପ୍ରତିଯୋଗିତା

ପ୍ରତିଯୋଗିତା ପ୍ରତିଯୋଗିତା ପ୍ରତିଯୋଗିତା



A day for horseshoe crabs in international calendar

Global conference deliberates on the endangered species and the next course of action for its conservation

POST NEWS NETWORK

Balasure, June 25: Expressing concern over the protection of endangered marine species like horseshoe crabs, a global conference has decided to mark June 20 of every year as International Day for Horseshoe Crab.

The international meet, held in China from June 15 to 20, was organized by the International Union for Conservation of Nature (IUCAN).

Six experts from Balasure attended the conference. On return, they said that people living in coastal areas in Balasure and other districts will be sensitized about protection of this red-listed species. Experts at the meet had proposed to include a chapter on horseshoe crabs in textbooks.

Prof Bishnu Prasad Das (Head of Biotechnology at FM University)



Delegates from Odisha who had taken part in the international conference.

had put forth a thesis on the marine creature while Gobinda Chandra Biswal (Director of Association for Biodiversity Conservation and Research) and Siddharth Patil (Asst.

Prof. Anity College, Bhubaneswar) drew applause for their display of poster on the crabs. Artist Kesu Das (chief of NOCI Cultural Academy) put up a sand animation

on the crabs and drew attention of the researchers.

Anthropology lecturers at FM University Sosmita Das, Dr Basudev Tripathy, Sheikh Sajan and

Bhubaneswari Bal were among those who attended the meet.

Over 140 organisations, experts, researchers, artists, teachers and students associated with work and research on the horseshoe crab from 20 countries including the USA, China, Japan, Vietnam, Hong Kong, Thailand, Denmark and Malaysia deliberated on the endangered species and the next course of action for its protection and conservation.

Of four species of horseshoe crabs found in Asia and the USA, two are in India. River mouth areas and some coastal areas of Balasure are the only places in the country where horseshoe crabs come to lay eggs during tides. Many have been carrying out research on the marine species for the last four decades at Chandipur and Balaramgadi.

Link to media coverage

- <https://www.telegraphindia.com/states/odisha/drive-to-clean-beaches-220662>
- <https://www.dailypioneer.com/state-editions/bhubaneswar/bswar-beach-cleaned-to-save-marine-species.html>
- <https://www.dailypioneer.com/state-editions/bhubaneswar/raksha-bandhan-celebrated-in-bwar.html>
- <http://www.orissapost.com/wildlife-warrior/>
- <https://scroll.in/article/926796/horseshoe-crab-the-living-fossil-that-survived-for-450-million-years-is-facing-a-threat-in-india>
- <https://india.mongabay.com/2019/06/indian-research-network-on-horseshoe-crab-takes-wing-as-the-living-fossil-battles-threats/>
- <http://www.newindianexpress.com/states/odisha/2019/aug/30/fishing-takes-a-toll-on-horseshoe-crabs-along-odisha-coast-researchers-worried-2026485.html>
- <https://m.dailyhunt.in/news/india/english/odishatv-epaper-odishatv/blue+blood+crab+in+danger+of+being+wiped+out+from+balasure+shores-newsid-96310687>
- <https://localwire.me/experts-call-for-conservation-of-horseshoe-crabs/>



Plate-32: CLP member interact with community leader at Mahisali



Plate-33: Community health check up blood donation camp for horseshoe crab conservation



Plate-34: Kesu Das with ABC volunteers at khandia during beach survey



Plate-35: Horseshoe crab expert Dr. Anil Chatterji and Prof Bisnu Prasad Dash interact with project member at field



Plate-36: Interaction with different leader at different coastal villages

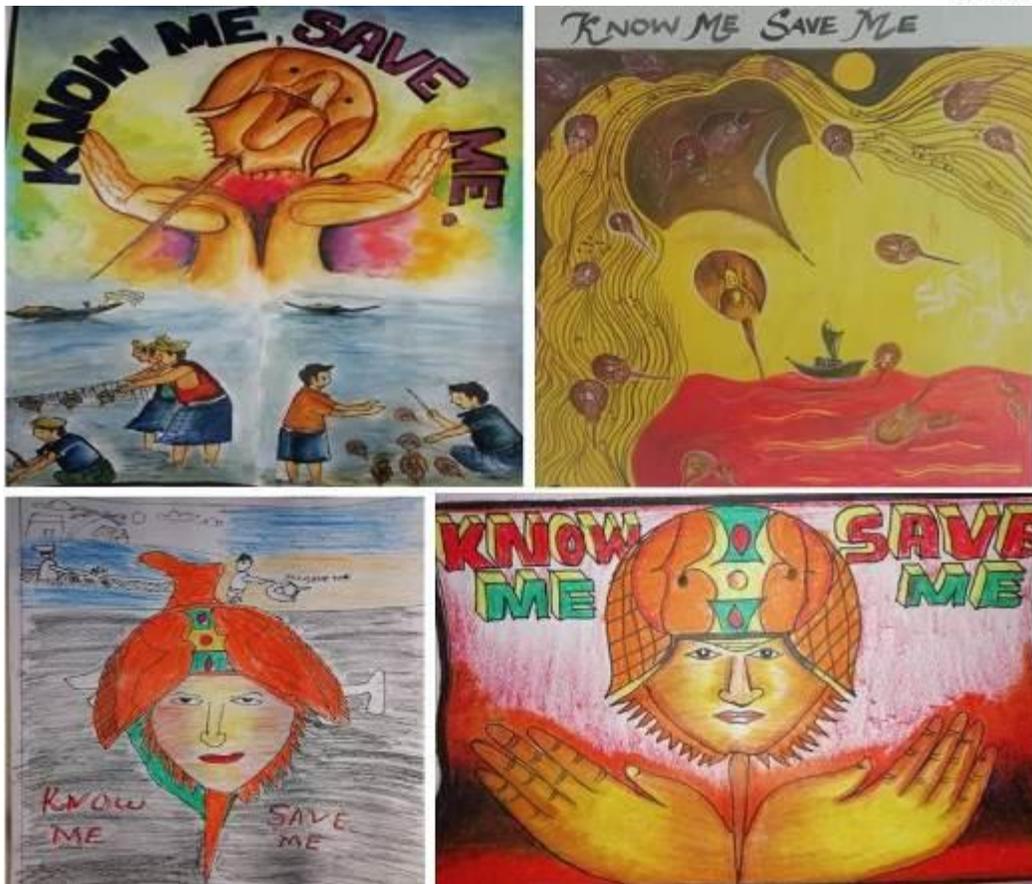


Plate-37: Best art collection by student



Plate-38: A banner for horseshoe crab conservation ceremony



Plate-39: A Banner for 3rd Rakshya Bandhan Utsav 2019



Plate-40: Sand animation by Horseshoe crab heroes during Baroni holy bath for community awareness



Plate-41: Our advisory member holds a horseshoe crab carapace during community participation event



Plate-42: Mr. Biswaraj Panda, Divisional Forest Officer delivered a talk on the importance of horseshoe crab in an awareness program on horseshoe crab conservation



Plate-43: Dr. Pati demonstrating fishers to rescue capture horseshoe crab



Plate-44: Wall paint by CLP horseshoe crab hero at different coastal village



Plate-45: Dr. Pati invited as a resource person in a awareness programme by Forest department at Talsari



Plate-46: Stakeholder's participation on the World wildlife Day celebration-2019



Plate-47: Poster installed at Durga Mandao by team member Kesu Das

Appendix I: Leaflet distributed in different cultural and religion ceremony

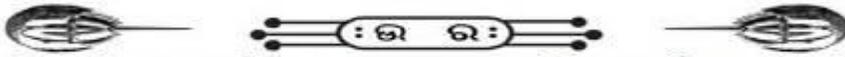


ନୀଳରତ୍ନ କଙ୍କଡ଼ା ସମ୍ବନ୍ଧୀୟ ସାଧାରଣ ଜ୍ଞାନ

ଆଗାମି ଦିନରେ ଛାତ୍ରଛାତ୍ରୀମାନଙ୍କ ମଧ୍ୟରେ ମଣ୍ଡଳ ଓ ଜିଲ୍ଲାସ୍ତରୀୟ ନୀଳରତ୍ନ କଙ୍କଡ଼ା ସମ୍ବନ୍ଧୀୟ ପ୍ରତିଯୋଗିତା ଆୟୋଜନ କରାଯିବ ।



୧. ଅଶ୍ୱତ୍ୱରାକୃତି ବା ନୀଳରତ୍ନ କଙ୍କଡ଼ା କେଉଁ ଶ୍ରେଣୀର ପ୍ରାଣୀ ?
୨. ଏମାନଙ୍କୁ ଇଂରାଜୀରେ କ'ଣ କୁହାଯାଏ ?
୩. ଏହି କଙ୍କଡ଼ା କେତେ ବର୍ଷ ପୂର୍ବରୁ ପୃଥିବୀରେ ଦୃଷ୍ଟି ହୋଇଥିଲା ?
୪. ଆମ ରାଜ୍ୟରେ ହିମୋଗ୍ଲୋବିନ ଥିବାବେଳେ ନୀଳରତ୍ନ କଙ୍କଡ଼ାର ରକ୍ତରେ କ'ଣ ଥାଏ ?
୫. ପୃଥିବୀରେ କେତେ ପ୍ରଜାତିର ଓ କେଉଁଠି କେଉଁଠି ନୀଳରତ୍ନ କଙ୍କଡ଼ା ଦେଖାଯାଆନ୍ତି ?
୬. ଭାରତରେ କେତେ ପ୍ରଜାତିର ଓ କେଉଁଠି ଏମାନେ ଦେଖାଯାଆନ୍ତି ?
୭. ଏମାନେ କେତେବେଳେ ନଦୀ ମୁହାଣର ବାଲୁକା ଶଯ୍ୟାରେ ଦେଖାଯାଆନ୍ତି ?
୮. ଏମାନେ କ'ଣ ପାଇଁ ନଦୀ ମୁହାଣକୁ ଆସନ୍ତି ?
୯. ଏମାନେ କ'ଣ ପାଇଁ ବିଶ୍ୱବିଖ୍ୟାତ ?
୧୦. ଏମାନଙ୍କ ସଂଖ୍ୟା ଲୋପ ପାଇବାର କାରଣ କ'ଣ ?
୧୧. ଏହାର ଗବେଷଣାକେନ୍ଦ୍ର ବାଲେଶ୍ୱରରେ କେଉଁଠାରେ ଅଛି ?
୧୨. ଏହାର ସଂରକ୍ଷଣ ଓ ପୁରୁଷା ପାଇଁ ବାଲେଶ୍ୱରରେ କେଉଁ କେଉଁ ଅନୁଷ୍ଠାନ କାର୍ଯ୍ୟରତ ?
୧୩. ଏହାକୁ ସ୍ଥାନୀୟ ଲୋକ କେଉଁ ନାମରେ ଡାକନ୍ତି ?
୧୪. କେଉଁମାନେ ନୀଳରତ୍ନ କଙ୍କଡ଼ା ଗବେଷଣାରେ କାର୍ଯ୍ୟରତ ?
୧୫. ଏହାର ପୁରୁଷାର ପ୍ରଭର ପ୍ରସାର ପାଇଁ ବାଲେଶ୍ୱରରେ କିଏ ପ୍ରମୁଖ ଭୂମିକା ଗ୍ରହଣ କରିଛନ୍ତି ?



୧. ସାମୁଦ୍ରିକ ସଙ୍କୀର୍ଣ୍ଣ, ୨. ଔର୍ବସୁ ଭାବ, ୩. ୩୫୦ ମିଲିୟନ ବର୍ଷ, ୪. ହିମୋସିୟାନିନ୍, ୫. ୪ ପ୍ରଜାତି, ଆମେରିକାରେ ଗୋଟିଏ ଓ ଏସିଆରେ ୩ ପ୍ରଜାତି, ୬. ୨ ପ୍ରଜାତି ଓ ବଙ୍ଗୋପସାଗରର ଉପକୂଳରେ ଥିବା ନଦୀମୁହାଣରେ (ବିଶେଷ କରି ବାଲେଶ୍ୱରରେ), ୭. ପୂର୍ବୀମା ଓ ଅମାବସ୍ୟାରେ ସୁରୁକ୍ତ ଆର ସମୟରେ, ୮. ଅଷ୍ଟା ଦେବା ପାଇଁ, ୯. ଏଡ୍‌ସ୍ ଓ କ୍ୟାନସର ରୋଗ ପାଇଁ ଶିଷ୍ୟ ପ୍ରସ୍ତୁତ କରାଯାଏ, ୧୦. ନଦୀ ମୁହାଣମାନଙ୍କରେ ଅଧିକ ମାଛଧରା ପାଇଁ ଗଛଟି ଓ ଜନ ସଚେତନତା ଅଭାବ ପାଇଁ, ୧୧. 'ଜାରମୋହନ ବିଶ୍ୱବିଦ୍ୟାଳୟର ଜୀବବିଜ୍ଞାନ ବିଭାଗ, ୧୨. ଏସୋସିଏସ୍ ଫର ବାୟୋଡାଇଭରସିଟି କଞ୍ଚାଭୈସନ, ରାମକୃଷ୍ଣ କଳାକେନ୍ଦ୍ର, ଜଉକଣ୍ଠେଇ ବାହାଘର ଉତ୍ସବ କମିଟି ଦି ନିଷ୍ଠା ହୋପ୍, ୧୩. ରାମଲକ୍ଷଣ କଙ୍କଡ଼ା, ରାମଲିଖନ କଙ୍କଡ଼ା, କଙ୍କର, କଳ୍ପ, ଚେଳି ଇତ୍ୟାଦି ୧୪. ଡ଼ ଅନିଲ ଉଡ଼ାଜି, ପ୍ରଫେସର ଡ଼. ବିଷ୍ଣୁପ୍ରସାଦ ଦାସ, ଡ଼. ଜୟତ ଜୁମାର ମିଶ୍ର, ପ୍ରାଧ୍ୟାପକ ଗୋବିନ୍ଦ ଚନ୍ଦ୍ର ବିଶ୍ୱାଳ, ସିଦ୍ଧାର୍ଥ ପତି, ସନାତନ ଟ୍ରଷ୍ଟ ପ୍ରମୁଖ, ୧୫. ଶିଳା କେଶ୍ରଦାସ ।

Appendix II: Questionnaire

Questionnaire Survey		HSC- Horseshoe Crab
SNo.	Questions	Justification
1	Would you answer a few questions for our research? (To be asked after the introduction) If no, can you please give reason?	It is important to know the reason behind non-respondents (may prove to be important for strategizing future studies)
2	Can we voice record the interview, it will make the interview proceed faster? Would you be interested in being a part of a documentary/movie?	To make interview process faster; To make short documentary to be submitted to grant organization
4	What is your name?	To check if these factors have any correlation with perception/information
5	What is your age?	
6	What is your educational background?	
7	Is fishing your primary occupation? Do you have any other sources of income (for e.g., laborer; post-processing etc.)?	
8	Which type of fishing are you involved in? For how long you been have involved in this type of fishing?	
9	Can you point which among the pictures is "lakshman-patha"; Is it known by any other name locally?	To check if the interviewee is aware of HSC
10	Where have you seen HSC?	which areas do HSC occupy along the beach
	Do you have any photographic proof? (If yes, can you show it to us?)	will act as strong proof of dog predating on HSC
11	Are there any stories associated with HSC/ why is it called "lakshaman patha"? (to be asked with 2e)	To obtain info on cultural significance
13	When is the best time of the year to see "lakshaman-patha"? (probe reproduction of HSC)	To know when HSC reproduce; also, cultural significance of HSC; significance of HSC in tourism industry
14	Has the population of HSC in your lifetime: Increased; Decreased; Remained same	Perception about the population of HSC
15	Does it get caught in nets?	To know more about HSC-fishermen interaction (if present)
16	Does HSC affect your fishing operation (e.g.- damage to nets)? (If yes, how?)	
17	What is the economic importance of HSC? (Is HSC sold over here?)	To probe if trade (incl. local) of HSC is prevalent
18	What are the factors affecting HSC according to you? (Ask details of the factors stated)	To know in detail what factors acc to fishermen affect HSC. Ratings of factors to know their perception of impact
19	Has the catch (from standing and cast nets) over your lifetime: Increased; Decreased; Remained Same; Fluctuated	Preliminary; does catch trends and trends of HSC have any correlation?



Appendix III: Poem and literature for horseshoe crab conservation

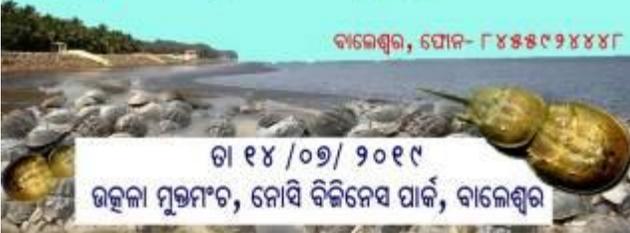
କେବଳ ନୀଳରକ୍ତକଙ୍କଡ଼ା ପାଇଁ

ଆଦିମ ଆଲିଙ୍ଗନ

ପ୍ରସାର କୁମାର କମିଳା

ରକ୍ତରେ ସମ୍ପର୍କ ଆଏ
ନା ହୃଦୟର ଅକନ୍ଦିରେ,
ଖୋଜୁ ଖୋଜୁ ପାଇଥିଲି
ବାସ୍ତବର କଳକଳ ବେଳାକୁଇଁରେ
ବିସ୍ମିତ୍ତ ବାଲୁକା ଧାରେ ଧାରେ ।
ଆଦିମ ଆଲିଙ୍ଗନରେ ଛନ୍ଦା
ଅଳ୍ପ କଙ୍କଡ଼ାଟି ତା ସାଥୀ ସାଥେ
ନେଖି ନୀଳରକ୍ତ କହିତା ।
ଆମେ ଯେ ମାନବ କଙ୍କଡ଼ା
କାଣି ଧରୁ ଆମ ଲୋକଟିକୁ
ରକ୍ତର ଗୁଣ୍ଡର ଗାଳିତାରେ ।
ଏଇ ବିଛି ବିନ ହେଲା
ନିଖୋଳ ଯୁଗର ଦମ୍ପତି ଯୋଡ଼ି
ରକ୍ତରକା ବାଲୁକା ବେଳାକୁଇଁରୁ ।
ଫେରାଦ ନେଇ ଆସିଛି ମୁଁ
ଫେରାଇ ଦିଅ ମୋ ନୀଳରକ୍ତ
କରିବାକୁ ଆଦିମ ଆଲିଙ୍ଗନ ଯୁଗ ଯୁଗକୁ ।

ବାଲେଶ୍ୱର, ଫୋନ- ୮୪୫୫୯୨୪୪୮



ତା ୧୪/୦୭/୨୦୧୯

ଉତ୍କଳା ମୁଖମଂଚ, ନୋସି ବିଜିନେସ ପାର୍କ, ବାଲେଶ୍ୱର

କେବଳ ନୀଳରକ୍ତକଙ୍କଡ଼ା ପାଇଁ

ନୀଳରକ୍ତର ଧନକ

ରାଜେନ୍ଦ୍ର ରାଉ

ଦେଖି ଯା ରେ ମଣିଷ ଭାଇ
ଦେବେ ଭବିଷ୍ଟ ନଷ୍ଟ,
ଆମ ବର୍ତ୍ତଣ ରୁ ଦୂରେ
ପୁଞ୍ଜାରେ ପାଇବୁ କଷ୍ଟ ।
ଓହା ରାଜନେ ଖୋଜିଲେ
ଆମ ରକ୍ତ ଏକ ନୀଳ,
ଅଜ୍ଞାନ ହେଲୁ କି ରୁଚି
କାଣି ନାହିଁ ସେ ରକ୍ତର ଦଳ ।
ଭିକ୍ଷାନ କହୁଛି ସେ ରକ୍ତେ ଅଛି
ରୋଗ ନୀଳର ଶକ୍ତି,
କାହିଁ ଦେବେ ଅସାଧ୍ୟ ରୋଗକୁ
ସହଜେ ମିଳଇ ମୁକ୍ତି ।
୪୮୦ କୋଟି ବରଷ ଧରି
କାଟି ରହିଛି ଆମ କାଟି,
ପ୍ରାକୃତିକ ବିପର୍ଯ୍ୟୟ, ଜଳବାୟୁ
ପରିବର୍ତନ
ସହିଲୁ ଦେବେ ବିପତ୍ତି ।
ମଣିଷ ପରି କରୁନା ଆମେ
ପୁଣ୍ୟ ପରହିୟା ପ୍ରାତି,
ନିପଦେ ଦେବେ ଘାତ ନ ଛାଡ଼ୁ
ଆମେ କଙ୍କଡ଼ା ଦମ୍ପତି ।

କାହାକୁ ନେଇ ଗରବ କରିବୁ
ଆମେ ହୋଇଲେ ବିକୋପ,
ବିଲ, ଶାଗୁଣ୍ଡା, ବାନ୍ଧନସର ପରି
ପହୁଥିବୁ ଆମ ଉପ ।
ଆମ ଦେବାଦନୀ କୁଣ୍ଡ ହେ
ଅଜ୍ଞାନୀ ଜଗତ ଜନ,
ଦେବ ଆଉ ଆଉ ନ ସୁଧୁରିଲେ
ହେବୁଟି ରୁ ହଇରାଣ ॥

ରୋଉରାଇ, ବାଲେଶ୍ୱର, ଫୋନ- ୭୮୭୩୫୭୦୯୩୮



ତା ୧୪/୦୭/୨୦୧୯

ଉତ୍କଳା ମୁଖମଂଚ, ନୋସି ବିଜିନେସ ପାର୍କ, ବାଲେଶ୍ୱର

କେବଳ ନୀଳରକ୍ତକଙ୍କଡ଼ା ପାଇଁ

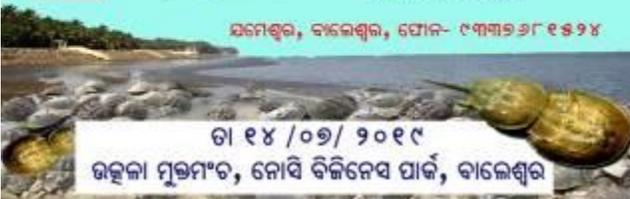
ସ୍ୱପ୍ନ ସ୍ୱପନା ପ୍ରେମେ

ସୁଧାକର ସେନା

ଅଧର ସାଗର ରକ୍ତର ଚିକି
ଆସିବୁ କୋ ସ୍ୱପ୍ନ ସୁପନା,
କେତେ ଯୁଦ୍ଧର ପ୍ରତିଷ୍ଠା ମୋର
ଯାକିଛି ଯେ ଆଜି ପୁରି ।
ଶୁଣିଅଛି ତୋ ଶୁଭ ଲାଭଣେ
ପଢ଼ିଥିଲି କିଛି କବି,
ଅଳ୍ପକ ତଳେ ପର ସିନା ତୋର
ମୋ ପାଇଁ ସପନ ପୁରା ।
ଅଳ୍ପକ ତୋ କାବନ ଚକ୍ରୀ
ବିଚିତ୍ର ତୋର ସେ ରୂପ,
କାହିଁକି କେନାଣି ତତେ ଦେଖି
ଦବନିଛି ମୋର ଭେଦ ।
ପରକୁ ସଜାଇଛି ତୋ ଶୁଭରେ
ପୋଷାକ ପିନ୍ଧିଛି ତୋ ଭକ୍ତି,
ଦୁର୍ଗିଆ ନେଉଁବ ତୋର ମୋର
ଅଳ୍ପକ ଏ ପ୍ରେମ କାହାଣୀ ।
ଏ ପର ସେ ପର ଯାଉ
ଶୁଣାଇଛି ତୋ କଥା,
କିଏ ଆଜି ନୂଆଇଛି ଅନ୍ଧାରେ
କିଏ ପୁଣି ଚୁଙ୍ଗାରିଛି ମଥା ।

ତଥାପି ଅକିଚି ତଥାପି ହାରିବି
ଦେଖିବି ସପନ ସାମର,
ମହତୀନା ଯେବେ ଧରିଲେ ଭାତ
ମନକୁ ବଢ଼ିଲା ଚିନ୍ତନ ।
କଳର କାଣିଲେ ତୋ କୁଣ୍ଡ ଗାରିମା
ଜନ ମୋର ହେବ କୁଣ୍ଡି,
ତୋ କାବନର ଇତିହାସ ଯେବେ
ପିଲାଏ ପଢ଼ିବେ କବି ।
ତୀନ ତାବତା ପାଇ ଯାଉଥିଲି
କାଣିଲି ଦେବେ ରକ୍ତ,
ଦେବେ ଜ୍ଞାନା ବିଜ୍ଞାନା ମେନେ
ପାଇଲି ଗୋବର ଗାଥା ।
କ୍ରୋଡ଼ସାଗର ଉପକୂଳେ
ତୋ ପରି ସୁପନାକ ବାବୁ,
ତୋ ପୁଅ ପୁରୁଷ ଦେଖି ଯୁଦ୍ଧର
ମିତ୍ର ଗାଁ କିଛି ଇତିହାସ ।
ତୋ ଦେବେ ରକତ ନୀଳ ରକ୍ତେ ଉଦା
ତୋ ଦେବେ ରକତ ନୀଳ,
ତଥାପି ତୋ ପ୍ରେମା ଉଦ୍‌ବୁଦ୍ ମୁଁ
ପାଇବିନି କାବୁ କୁଣ୍ଡି ।

ସମେଶ୍ୱର, ବାଲେଶ୍ୱର, ଫୋନ- ୯୩୩୭୬୮୧୫୨୪



ତା ୧୪/୦୭/୨୦୧୯

ଉତ୍କଳା ମୁଖମଂଚ, ନୋସି ବିଜିନେସ ପାର୍କ, ବାଲେଶ୍ୱର

କେବଳ ନୀଳରକ୍ତକଙ୍କଡ଼ା ପାଇଁ

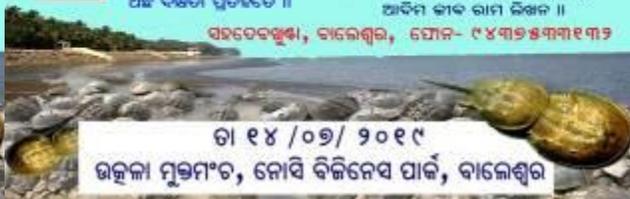
ରାମ ଲିଖନ

ତୃପ୍ତାବାଣୀ ପାତ୍ର

ଆସଇ ତ ଆସଇ ସାହିତ୍ୟ ଆସଇ
ଏକାଠି ଏଠି ଏକି ଦୁଃ ।
ଉତ୍କଳା ମଂଚରେ ହେବ ଆଲୋଚନା
ନୀଳ ପରିଚିନ୍ତଣ ॥
କଙ୍କଡ଼ା ତ କଙ୍କଡ଼ା ନୀଳରକ୍ତ କଙ୍କଡ଼ା
ଆସେ ହୋଇ ଯୋଡ଼ି ଯୋଡ଼ା ।
ନୁହେଁ ମନ ଗଢ଼ା ଦେଖ ସେ କଙ୍କଡ଼ା
ଧନା ରକ୍ତରେ ଗଢ଼ା ॥
କାୟୁ ବ୍ୟସ୍ତରେ ଆସି ହୁଏ ନୀଳ
କାବନ ତା ବିପଦ ସହୁତ ।
ଏହି କଙ୍କଡ଼ାର ବିଜ୍ଞାନସଚିତ
ଅଛି କାବ ସତର ଆଲୋକ ॥
କରିଅଛି ରକ୍ତ କୋଷେ ପୃଷ୍ଠିସାର
ଅଛି କ୍ଷୁଦ୍ର ବ୍ୟାପ୍ତୁରିଆ ।
ନୀଳା ପଦେଖଣାପାରେ କାବନ
ସମ୍ପର୍କେ
ଦିଏ ତଥ୍ୟ ନୂଆ ନୂଆ ॥
ବଦାଉ ପ୍ରେତପଦ ପୃଷ୍ଠିସାର
ରହିଛି ଭରି ତା ଉପରେ ।
କଞ୍ଚନସାର ଏତଥକରି ଭାଇରସ୍
ଅଛି ବକ୍ଷଣ ପୁଚିତରେ ॥

ଦୁଃସାଧ୍ୟ ରୋଗର ହେବ ଉପସମ
ଏହି ଛୋଟ ରାମ ଲିଖନ ।
ମହତୀନା ଆଉ କନ ସାଧାରଣ
ଠିକ୍ ହେ ଦିଶେଇ ଧ୍ୟାନ ॥
କାଣି କୁଣ୍ଡି ଦେଖି ନ ମିଥ ତା କାବନ
ଅଳ୍ପକ ସେ ପ୍ରୟୋକନ ।
ସଦୃଶ ମୋନର କନ ଛାନ୍ଦା କନ
ଲେଖି ଦେବାଦନୀ ଗାନ ॥
ହୁଅ ସଦେବନ ଆମ ସରକାର
ଖୋଇ ଉଦ୍‌ବେଶଣା ବାଦ ।
ବୈଜ୍ଞାନିକ ସାଥେ କେଶୁ ଭାଇ ଆମ
ପ୍ରଦୀପିତେ ଦିଶେଇ ମାନ ।
କର କର କବି କାଣିବେ ସରିବି
ଆଦିମ କାବ ରାମ ଲିଖନ ॥

ସରଦେବତୃପ୍ତା, ବାଲେଶ୍ୱର, ଫୋନ- ୯୪୩୭୫୩୩୧୩୭



ତା ୧୪/୦୭/୨୦୧୯

ଉତ୍କଳା ମୁଖମଂଚ, ନୋସି ବିଜିନେସ ପାର୍କ, ବାଲେଶ୍ୱର



କେବଳ ନୀଳରକ୍ତକଙ୍କଡ଼ା ପାଇଁ

ପ୍ରୀତି ଯୋଡ଼ିବା ତା ସାଥୀରେ

ପ୍ରକୃତି ମହାପାତ୍ର

ସ୍ଵାସ୍ଥେ ବଦଳିତ ଆଦିର ମଣିଷ
 ସମର୍ପିତ ମାନେ ବୁଝେନା,
 ନିଏ ଆପଣାତ ନିଏ ଅବା ପର
 ସର୍ବିକ ସାତ୍ୟ ସେ ଅତିହୀ ।
 ନୁହ ନୁହ ଧରି ନିଏ ଅନା ଅଛି
 ତା ଫିସାକ ସେ ଉଦ୍ଧେନା,
 କଳା ସଂସ୍କୃତି ଭାଷାର ସହରେ
 ତା ଉଦ୍ଧିନା ସର୍ବିକ ଅନଣା ।
 କାହିଁ କେଉଁ କାହୁଁ ଆସୁଅଛି ଶିଏ
 ଆଦିମ ଅତିଥି କୋଇ,
 ପଢ଼ିଅଛି ତାର ସ୍ଵପ୍ନ ପଦଚିତ୍ର
 ଏବେ ବି ଚିତ୍ତି ନାହିଁ ।
 ଶାବ ସରଳ ନୀଳରକ୍ତ କଙ୍କଡ଼ା ସେ
 ଦାତ ତ ନାହିଁ ତାହାର,
 ପ୍ରକୃତ ବିକଳ କର ପରାକର
 କେତେ ସରିଛି ତେଜ ତାର ।

କାହିଁକି ଶବ ସମ କାହିଁକି ସେ
 ରହି ନୀଳ ବଢ଼ିଆରେ,
 କେଶୁଭାର ପୁଣି ତା ପାଇଁ ଅଧ୍ୟୟନ
 ପ୍ରୀତି ଯୋଡ଼ିବା ତା ସାଥୀରେ ।
 ତା ଦଂଶ ନିଷ୍ଠାର ସଙ୍ଗେ ଉଦ୍ଧାର
 ପାଇଁ କରୁଛନ୍ତି ପ୍ରୟାସ,
 ତାଙ୍କ ହାତରେ ଆମେ ହାତ ନିଶ୍ଚଳ
 ସୁଦୂରବା ନୀଳରକ୍ତ କଙ୍କଡ଼ା ମୁହେଁ କବ ।

ଫକୀର ମୋହନ ନନ୍ଦର, ବାଲେଶ୍ଵର, ଫୋନ- ୭୯୭୮୨୭୧୭୨୮

କେବଳ ନୀଳରକ୍ତକଙ୍କଡ଼ା ପାଇଁ

କାବର କାବ୍ୟସ୍ତ

ଶ୍ରୋମ୍ୟରଞ୍ଜନ ପାଇଁ

କାହିଁ କେଉଁ କାହୁଁ କାବର ଧରିଣ
 ଉଦ୍ଧିଅଛ ନୀଳ ସାଗରେ,
 ନୁହ ବଦନିକି ପାତ ବଦନିକି
 ବଦନିକି କେତେ ଥରେ ।
 ଶିଖଧ୍ୟାୟ ପୁଣି ଅଛି ବୋଲି କେତେ
 କେତେ ଉଦ୍ଧେଷଣା ନୁଏ,
 ତୁମ ସରାନୁ ତୁଣି ପଞ୍ଜା ପାଇ
 କହିଛ କାବର ପାଏ ।
 କ୍ଷତ ଅଙ୍ଗ କାତ ବଢ଼ିବାର କଳା
 ଉଦ୍ଧିଅଛ ତୁମଠାରେ,
 ଉଚ୍ଚ ତୁମ ନବନଦୀ ମୁହାଣରେ
 ତୁଣି ଆମ ନୀଳ ପାଇବାବୋ ।
 ଉଦ୍ଧାରନ ରକତ ନୀଳ ହୋଇଯାଏ
 ଅମୃତାନ କୁପ୍ରୀ ପାଳ,
 ଦେଖି କାବର ସଂପ୍ରଦାନର ତୁମେ
 ତୁମ ସମ ନିଏ କାହିଁ ।

ନଅ ଆଖି ରଖି ଶିବାରକୁ ଗାଣି
 ଦାବେ କର ଖଣ୍ଡ ଖଣ୍ଡ,
 ଶତୁ ବରେ ଦେଖି ଅସା ସମ ଲାଜ
 ଦେଇପାର ମହାବୀର ।
 ବିଶ୍ଵାସର ଶାନ୍ତ ଉଚ୍ଚ ବଢ଼ିବାକୁ
 ଦେଇଛ ନିକରୁ ସମର୍ପି,
 ପ୍ରୟାସ କରୁ ନର ତୁମ ପରିବାର
 ବିଭୀନ ନ ହେଉ ବଦାସି ॥

ବାଲେଶ୍ଵର, ଫୋନ- ୯୯୩୭୮୮୯୮୩୩

ତା ୧୪/୦୭/୨୦୧୯

ଉତ୍କଳା ମୁକ୍ତମଂଚ, ନୋସି ବିଜିନେସ ପାର୍କ, ବାଲେଶ୍ଵର

ତା ୧୪/୦୭/୨୦୧୯

ଉତ୍କଳା ମୁକ୍ତମଂଚ, ନୋସି ବିଜିନେସ ପାର୍କ, ବାଲେଶ୍ଵର

Appendix IV: Poster for horseshoe crab awareness drive

ମୋତେ ମାରନା ମୋତେ ବଞ୍ଚାଅ

ଲେଖକ : ତପନ ଆଚାର୍ଯ୍ୟ

- ▶ ତୁମର ରକ୍ତ ମାରି ମାତ୍ର ମୋର ରକ୍ତ ଧଳା ଧଳା ସିତ ବାୟୁ ସଂଯୋଗରେ ଆସିଲେ ମୋର ରକ୍ତ ରଙ୍ଗ ଧଳାକୁ ନୀଳ ହୋଇଯାଏ।
- ▶ ଭାରତ ମହାସାଗରକୁ ଆବଲୋକିତ ମହାସାଗରରେ, ପୁଣି ପ୍ରବାହ ମହାସାଗରରେ ଆମ୍ଭର ବାସଗ୍ରାମ। ତୀର, ଆମେରିକା, ମାଲେସିଆ, ଇଣ୍ଡୋନେସିଆରେ ଆମ୍ଭର ବ୍ୟବସ୍ଥା ଅଛି। ତୁମ ଦେଶର ସୁନ୍ଦରତା ଠାରୁ ପାରାଦୀପରେ ଆମ୍ଭେ ଅଧିକ ସଂଖ୍ୟାରେ ଦେଖାଯାଇ।
- ▶ ତେବେ ବାଲେଶ୍ଵରର ମସୂଦ ରପତକ ଆମ୍ଭର ବଢ଼ିଆ ବାସଗୃହି। ଗୁଣିପୁର ବାଟାବଳପୁର, ବଳରାମଗଡ଼ି ପ୍ରତୀକ ନିକଟରେ ଆମ୍ଭେ ବାଟାବଳ ଆଶ୍ରୟ।
- ▶ ଆମ୍ଭ ରକ୍ତରୁ ନିର୍ମିତ ହେଉଛି ଭାର ଟେକ୍ସଟିଲ। ଯାହାକୁ ଆମେରିକାର ବୈଜ୍ଞାନିକ ଲେରି ଆଣ୍ଡ ମେଜ ୧୯୭୪ ମସିହାରେ ଉଦ୍ଧାର କରିଥିଲେ। ଯାହା ଔଷଧର ନିର୍ଦ୍ଧାରଣରେ ସର୍ବୋତ୍ତମ।
- ▶ ଆମ୍ଭ ରକ୍ତରୁ ମଧ୍ୟ ତୁମ ରକ୍ତର ସୁଲ୍ୟର କାର୍ଟି କେତେଗୁଣ ତୁମ ଦେଶ ପ୍ରକାରେ ପ୍ରାୟ ୧୦ ଲକ୍ଷ ଟଙ୍କା ରୁ ବି ଅଧିକ।
- ▶ ତୁମ ଦେଶର ଶିଳାବିନ୍ଦ ବି-୧୨, ତୁମର ମାତୃସିଦ୍ଧ, ବ୍ଲୁଟି, ହରଣା ଚିକିତ୍ସାରେ ମୋ ରକ୍ତ ଅବ୍ୟର୍ଥ ଏବେ ମଧୁମେୟ ରୋଗରେ ଚିକିତ୍ସା ପାଇଁ ମୋ ଉପରେ ଘଟେଣି ଗୁଣିଛି।
- ▶ କୁହତ ଏବେ ? ମୁଁ ତୁମର ଉପକାରୀ ଅଟେ ନା ନାହିଁ ? ତେବେ ମୋତେ କାର୍ଟି ତୁମ କାନ୍ଧରେ ଧରି ନିର୍ଦ୍ଦୟରେ ଅକାରଣରେ ହତ୍ୟା କର ? କାର୍ଟି ମୋର ଏବେ ଉପକାର ତୁମକୁ କଣ ଖୁସି ଦେଉନାହିଁ ?

ମୋତେ ମାରନା ମୋତେ ବଞ୍ଚାଅ ହଁ ... ହଁ... ମୋତେ ବଞ୍ଚାଅ।
 ମୁଁ ନୀଳରକ୍ତ କଙ୍କଡ଼ା କହୁଛି ମୁଁ ରାମ ଲେଖନୀ କହୁଛି
 ... ମୁଁ ଲକ୍ଷ୍ମଣ ପାତିଆ କହୁଛି ...

I AM HORSESHOE CRAB TELLING, PLEASE SAVE US.

କହିଲ କିଏ ମୁହିଁ ?

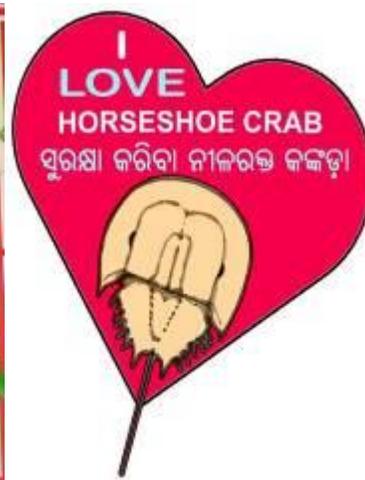
କବି 

ଲେଖନୀ ପରି ଲାଖିତ ମୋର ଦେହଟି ବାପୁ ପରି
 ଦରିଆ ବୁଦ୍ଧ ପ୍ରତୀକ ପାଖେ ପରିଚିତ ମୁଁ ମରୁଛି ।
 ପବନ ଦେହେ ବାଜିଲେ ମୋର ରକ୍ତ ତୁଏ ନୀଳ
 ମୋ ଠାରୁ ଗଢ଼ା ଔଷଧରେ ମଣିଷ ପାଏ ବଳ ।
 ମନ ମରଣେ ମସୂଦ ଘୋଡ଼େ ଭାସେ ମୁଁ ମାଧ୍ୟମରେ
 କାହାର ଶକ୍ତି କରେନି କେବେ ଯେତେ ଯିଏକି ଛଳେ ।
 ବିଦେଶେ ମୋର ଗୁଡ଼ିଦା ଦେଖି କରେ କେ ଚରକାରୀ
 ମଣିଷ ଦେହେ ପରି ମୋର ଲହୁ କରଇ ଉପକାରୀ ।
 ସୁଲ୍ୟ ମୋର କଳିବ କିଏ ଅସୁଲ ମୁଲ ପ୍ରତି
 ଜୀବନ ମୋର ମଣିଷ ଦ୍ଵାରେ ନୀରବେ ଥାଏ ଗୁଡ଼େଁ ।
 ଧାବର କୁଳ ଖଟାଇ ବଳ କାଳରେ ପଡ଼େ ଯେବେ
 ନିର୍ଦ୍ଦୟରେ ମାରଇ ମତେ ନିଃଶ୍ଵାସ ଛାଡ଼େ ତେବେ ।
 ନିରୀହ ପ୍ରତି ମସୂଦ ପାଣୀ ଗୁଡ଼ାରି ମୋର ଶୁଣ
 ମାରନା ଆଉ ଆତ୍ମନାଦକୁ ଶୁଣି ଆମ୍ଭର ଗୁଣ ।
 ଲାଠି ଚୈତନ୍ୟ ଲୁହ ଆହୁନ ଆତ୍ମ ମର୍ଦ୍ଦିକା ମନେ
 ଆମରି ପରି କେ ଉପକାରୀ ଅଛି କୁହତ କଣେ ।
 କହୁଛି ଏବେ ନୀଳ କଥା ପ୍ରତିତ ରାମ ଲେଖନୀ
 ନୀଳରକ୍ତ କଙ୍କଡ଼ା କହେ ଲକ୍ଷ୍ମଣ ରେଖା କିଏ ପୁଣି ?





Appendix VI: Awareness stickers during Rakhya Bandhan Awareness stickers for fishermen





The art shows how CLP helped horseshoe crab conservation

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