



OTTERS

in

Sundarban Tiger Reserve

Status Report

2023



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FOREWORD



The state of West Bengal with its rivers, floodplains and deltaic mangroves, is an important stronghold of Otters in all of the range countries in South and South-East Asia. Justifiably, the Otters (Beng. Bhodor/ Udbiral) occupy a place of pride in West Bengal. They are important bioindicators for the health of many marshlands and wetlands in India as they act as the top predator in the landscape. These otters have evolved as a wetland specialist species and have some unique characteristics that allow them to survive in such conditions. The IUCN lists the Otters as a globally threatened (endangered, critically endangered and vulnerable) and Indian Wildlife (Protection) Act, 1972 lists these Scheduled-I mammals, both signifying the urgency to take up conservation of the species in India. In this scenario, it becomes very important to protect the existing intact habitats so as to revive the population and to create awareness. Otters are one of the most important mammalian species found in this Ramsar Site. Population studies of a species is the first step in conservation of the species as it provides the baseline for management interventions. In this regard, the Otter Status Report of Sundarban Tiger Reserve 2023 is the first such effort in the Government of West Bengal to estimate the population distribution and activity pattern of the otters in Sundarban Tiger Reserve. This report has yielded valuable data on the current population and the distribution patterns of the species. This report also provides valuable insights to undertake location specific interventions that will help us to sustain and increase the population in the reserve. I appreciate the team of Sundarban Tiger Reserve for their efforts in bringing out the report.

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ACKNOWLEDGEMENT



First and foremost, I must say that I am overwhelmed and at the same time humbled by the magnificent variation of aquatic and terrestrial flora and fauna of Sundarbans. I would like to express my deep sense of gratitude towards mother nature, at this point of time. I would also like to express my sincere gratitude to S. Jones Justin, IFS, Deputy Field Director, Sundarban Tiger Reserve (STR), for his leadership, coordination and review of the works which enabled the successful completion of this report. I offer my heartiest appreciation to Shri Debojyoty Ghosh, Research Assistant of STR for his dedicated efforts in the compilation, analysis and preparation of the report for the first time from the Sundarbans. My sincere thanks also goes to Assistant Field Directors Shri Soumen Mondal WBFS and Shri Debdarshan Roy WBFS for the overall field coordination with the field officers and staff during the camera trap exercise. Otters constitute a fundamental part of wetland conservation since they indicate the health and sustainability of the wetland ecosystem. This is vital for understanding their population dynamics, and to plan species-oriented conservation strategies to strengthen more research and conservation efforts for these globally threatened species. The completion of this report would not have been possible without the support of the range officers of Sajnekhali Wildlife Sanctuary Range, Basirhat Range, National Park East Range, National Park West Range, and Research Range, who were vital in the implementation of camera trap exercises in the field, as per the established protocols. Finally, any attempt at any level can't be satisfactorily completed without the support of the field staff. I express my sincere thanks to the staff of STR, who have put in immense efforts at the ground level in the collection of data, without which this report would not have been possible.

Shri Ajoy Kumar Das, IFS
CCF & Field Director
Sundarban Tiger Reserve

SUMMARY



The Sundarbans is a unique mangrove ecotone landscape and Sundarban Tiger Reserve (STR) forms the majority of the protected areas (2585 sq. KM) of the Sundarbans in India, with a good number of tigers, co-habiting with other fauna. The present work is based on the data from camera trap exercise of tiger estimation between December 2021 to January 2023 which is held only during the winter. It is important to note that, not a single picture of Smooth-Coated Otters or Eurasian Otters were observed through camera trapping in the study area within the study period, which implies that they were not captured in any of the camera traps and there is a need for further intensive study to ensure the status of Smooth Coated otters in Sundarbans. But the Direct eye sightings have been reported in the recent past during patrolling and as in the reference Status of otters in Sundarban Tiger Reserve, West Bengal(Manjrekar, 2014). Out of the total 573 trap

camera points, 45 points depict the presence of Asian Small clawed otters which include 84 trapped photographs with an estimated total of 211 individuals (probably overlapping individuals) with varying group size. Mean group size for the species was recorded 2.51 (S.E. = 0.145). The sighting frequency and numbers are the highest in the Core areas of STR. This research is basically focused on the spatial distribution and activity pattern of the vulnerable Asian Small- Clawed Otters (*Aonyx cinereus* Illiger, 1815) in the territory of STR (2584.89 sq KM). Frequency based GIS map is constructed for better understanding of the zone of detection and spatial distribution. Activities of the otters were high at dawn, morning and at dusk while the sun set, recorded from the camera trap data. This is the first such intensive research work on the globally vulnerable Asian Small-Clawed otters from the West Bengal Forest Department.

ABOUT OTTERS

Otters are one of the top meso-carnivores of the riverine, estuarine and marine ecosystems. This species is found predominantly in the estuarine marshy tracts of Sundarbans, the land of mangrove-tigers. Otters are one of the important species in wetland ecology in addition to other mammals like Fishing cat which has almost overlapping habitat ranges. As per the food pyramid of the ecosystem, the otter feeds majorly on the diverse group of fishes and thereby maintains a natural fish stock in the creeks and

rivulets of the marshy Sundarbans.

The otters are declared under Critically Endangered, Endangered and Vulnerable (VU) category globally by the IUCN, mainly due to the loss of habitats and anthropogenic disturbances throughout its range countries. In this case it is important to protect the existing intact habitats so as to revive the species numbers and to create awareness to reduce the destruction of the habitats.



RATIONALE OF THE STUDY ON OTTERS OF SUNDARBAN TIGER RESERVE

The Sundarbans is a World Heritage Site, part of the Man and Biosphere Reserve Program of UNESCO and a Designated Ramsar Site of international importance since 2019. With its diurnal tidal influx and abundance of fishes, crabs and other aquatic species, the Sundarbans ensures a viable habitat for two different species of otters namely Smooth coated Otters (*Lutrogale*

perspicillata) and Asian Small Clawed otters (*Aonyx cinereus*) both declared as Vulnerable (VU) by IUCN in good numbers.

Apart from the tigers in mangrove, the semi-aquatic micro habitat of the Sundarban Tiger Reserve sustains a good numbers of other important fauna which belong to threatened category (e.g. Endangered, Critically Endangered and Vulnerable) viz. Fishing cats, Northern River Terrapins and Otters etc. The focus is now shifted towards the protection and conservation of these associate species along with the Overall conservation of the umbrella species, the Royal Bengal Tigers. This report is based on the important exercise in knowing about the presence, population distribution and vulnerability of habitats for otters in Sundarbans.



LITERATURE SURVEY

Otters are tertiary consumers and important bio-indicator of the wetland ecosystem (Erlinge, 1972). Previously the presence of Asian Small-clawed Otter and Smooth-coated Otter had been reported from the Indian Sundarbans and Bangladesh part also (Feeroz et al., 2011a, b; Mallick, 2011). Apart from the scientific view, otters had a socio-cultural perspective as per Indian mythology, in some of the south Indian temples Otters are depicted below the stone sculpture of Goddess Parvati as well as in Buddhist narratives (van der Geer, 2008).

The otters coexist with the other small cats like- Fishing cat, Leopard cat and Jungle cat with variable niche but same food habit pronged the investigators to study on the activity pattern of the

species in the wild pristine forest of the Sundarbans. The significance of otters is in the maintenance of the ecological balance of the mudflat ecosystem, as it is one of the prime piscivores of the ecotone. An attempt can be made to know about the diet of otters from fecal samples but due to the harsh terrain it is hard and risky and daily inundation removed the evidence in the entire delta. No systematic data on the population and the habitat survey of the otters were recorded in the past (Hussain, 1999; Manjrekar and Prabu, 2014). Due to anthropogenic causes like oil spill, pollution by mechanized boats, fishing related disturbances the otter population is declining from the Sundarbans (Chowdhury and Akber, 2015).





A basic deed related to the status of otters in the Sajnekhali and National Park West range under Sundarban Tiger Reserve (STR) by boat transect method was done previously (Manjrekar and

Prabu, 2014). Hence, the need of the hour is to have a holistic idea about the distribution of the Otters along with their activity pattern in the wild from the Sundarban Tiger Reserve.



METHODS

○ General Introduction to Camera trap exercise in Sundarban :

Camera trap exercise is one of the important practices in management of any tiger reserve as it gives the base point of the population of a certain species and the trends thereof. In a four year interval, the apex monitoring body NTCA (National Tiger Conservation Authority) organizes a massive exercise to estimate the population of tigers throughout India. Apart from the tiger census, herbivore, carnivore sign survey and Khal survey were also taken up for the better understanding of predator-prey relationship. Thereby a healthy balance of the ecosystem can be maintained in nature.

○ Planning and execution of the exercise :

The Camera Trap Exercise was carried out in two phases for tiger estimation using 2 KM² standard gridlines under the guidance of National Tiger Conservation Authority (NTCA). First set of Data is from 2021-22 and the second set is from 2022-23, both in the winter season (December - January). Winter is the only season favourable for the exercise due to the low levels of inundation and favourable weather conditions.

○ Data Collection :

Jurisdiction of the STR is divided into 4

territorial ranges, namely, National Park East (NPE), National Park West (NPW), Basirhat (BHT) and Sajnekhali Wildlife Sanctuary Range (SWLS). The NPE, NPW and SWLS form the Core area and the BHT forms the Buffer area of the tiger reserve. 2 sq. KM grid maps of the entire landscape were prepared and camera trapping exercise was carried out accordingly. In the year 2021-22, 573 locations were tracked with camera trapping and in the very next year 2022-23, 569 trap cameras were installed in the entire STR. The trap cameras were installed according to the tide time frame in different ranges. The cameras were installed face-to face thereby both sides of the species can be captured. Hence, each grid has two trap cameras and the whole area (2584.89 KM²) was covered under Camera Traps.

Camera trap is generally a capture-recapture methodology. For Otters, the Research range and the senior officials have carried out an overall population distribution of the species. By this process prompt actions can be taken and the management plans can be implemented further. By ocular observation, the otters are easily identified by their morphometric size, coat colour, vibrissae, claw size and shape etc. From the analysis of the images and videos from the Trap Cameras, occurrences of Otters were recorded with GPS coordinates; thereby with the available data the frequency based GIS map was prepared. Basic statistical works were performed using IBM SPSS software.



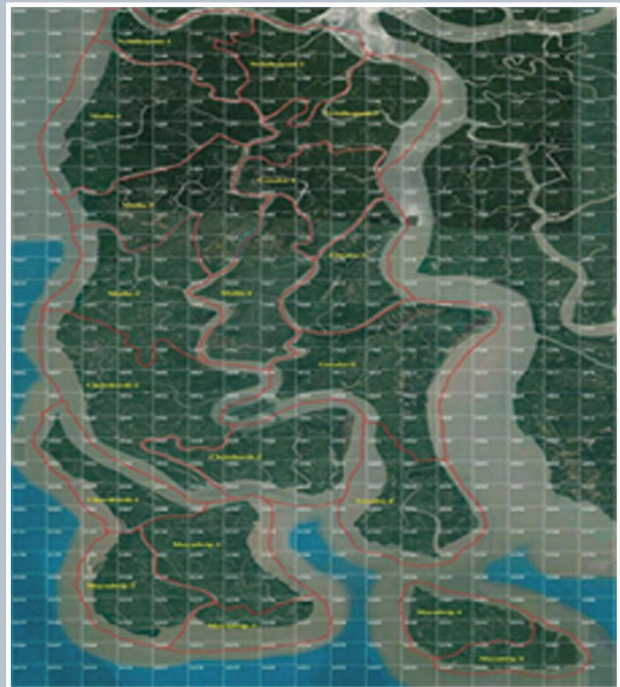
(A) National Park East Range



(B) Basirhat Range



(C) Sajnekhali Range



(D) National Park West Range

2 sq. Km. Grid Maps

RESULTS AND DISCUSSION



From the survey it is quite obvious that Asian Small-Clawed otters are the dominating species of otters in STR in comparison to Smooth Coated otters. From the 84 trap camera photographs the investigators found 211 individuals from 45 different locations throughout STR and thereby the occurrence GIS map was constructed (Fig 1) based on the frequency of the sightings. The detection frequency was set as the attribute of heat map generation in QGIS. NPW has 41 detection, followed by NPE (30) > BHT (9) > SWLS (4) (Fig 3) under STR.

The most frequent sighted places are mentioned here:

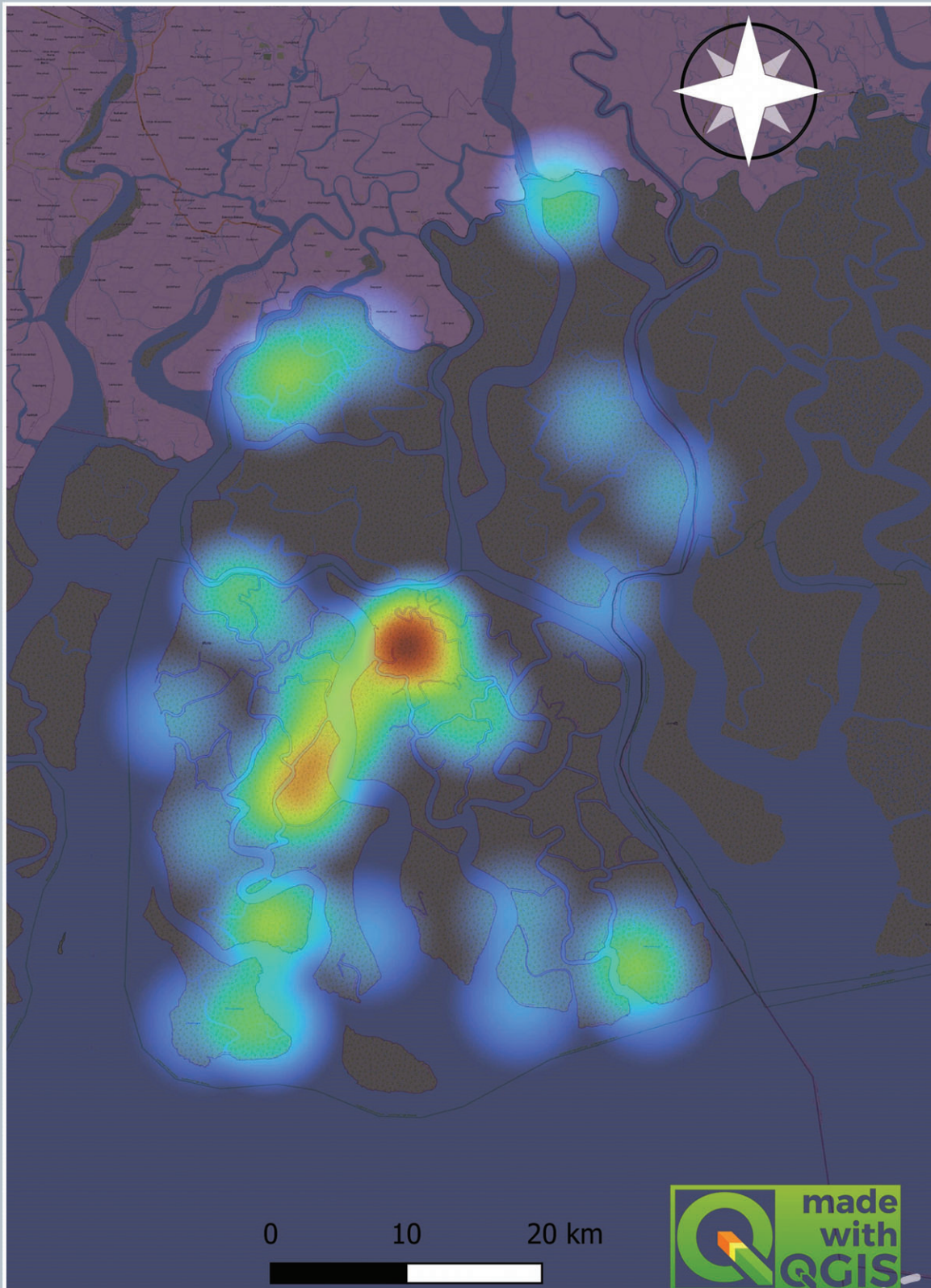
CORE AREA - Netidhopani 1; Netidhopani 3; Gosaba 1; Gosaba 2; Choto Hardi 3, Mayadweep 1 and 3 compartments under NPW range and Chamta 3,4,5,6,8, Chandkhali 2, Bagmara 4,5,6 and 8 and eastern part of Gona 3 compartment under NPE range. In the BUFFER AREA - Jhila 1; Arbesi 2, 5; Western portion of Arbesi 1 near Jhingekhali beat; Khatuajhuri 1, 2 and 3; Harinbhang 3 compartment under BHT range, Pirkhali 1,2,3,4 and upper regions of Pirkhali 5 and Pirkhali 7 under SWLS range are also important. Few sightings were there in the rest of the areas of the buffer region.

After the photograph analysis (Fig 2), the grouping variable was fixed with 'area' for statistical analysis. Group 1 denotes core area which was then divided into two parts: NPE and NPW range, Group 2 denotes buffer area which was then divided into two parts: BHT and SWLS range (included as buffer).

Two sample K-S test was run in the statistical software to detect if the field dataset is in normal distribution or not. The result of the KS test (* P = 0.19 > 0.05) depicts that the data is non-normally distributed (Table 1). After that, Mann-Whitney U test was performed, assuming (H₀): No statistically significant level of difference exists between the core and the buffer area for Small-Clawed Otters in STR.

Based on the area as the grouping variable, the result shows that the P < 0.05, hence the null hypothesis was rejected (Table 2).

Now, it can be stated that, due to the area demarcation NPW possess the highest number of otters and it is also the biggest range of STR. And, due to human interference in the buffer zone (BHT and SWLS range) shy animals like otters are not captured in high numbers.



High  Low

Fig 1: Spatial distribution of Asian Small- Clawed Otters from STR.

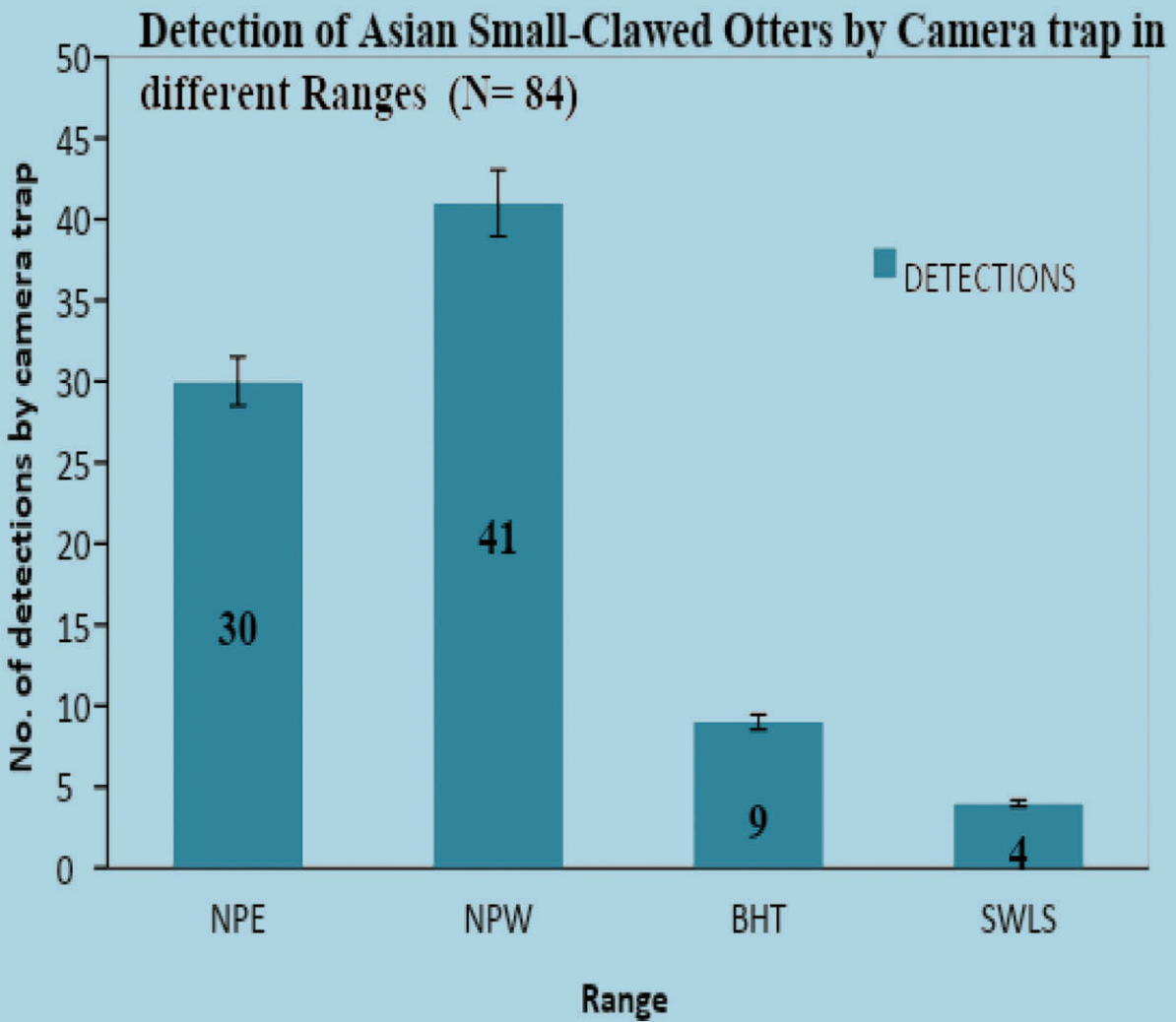


Fig 2: Number of photographs of otters from different ranges.

Test Statistics ^a		
		Detection
Most Extreme Differences	Absolute	0.327
	Positive	0.327
	Negative	-0.028
Kolmogorov-Smirnov Z		1.085
Asymp. Sig. (2-tailed)		0.19
a. Grouping Variable: Area		

Table 1: K-S test statistics.

Test Statistics a	
	Nos.
Mann-Whitney U	275
Wilcoxon W	2831
Z	-2.377
Asymp. Sig. (2-tailed)	0.017
a. Grouping Variable: Area	

Table 2: Mann-Whitney test for two sample means.



REGRESSION ANALYSIS

Regression analysis is a reliable method of identifying which variables have impact on a topic of interest (here, human interference over the animal

detection).The regression analysis ($R^2= 0.74$) depicts that the, human interference has a role in the abundance of otters in STR (Table 4, Fig 3).

Regression Analysis	
Multiple R	0.865393499
R Square	0.748905908
Adjusted R Square	0.623358862
Standard Error	0.501092897
Observations	4

Table 4: Regression Analysis between human interference with abundance of Asian Small Clawed Otters in STR.

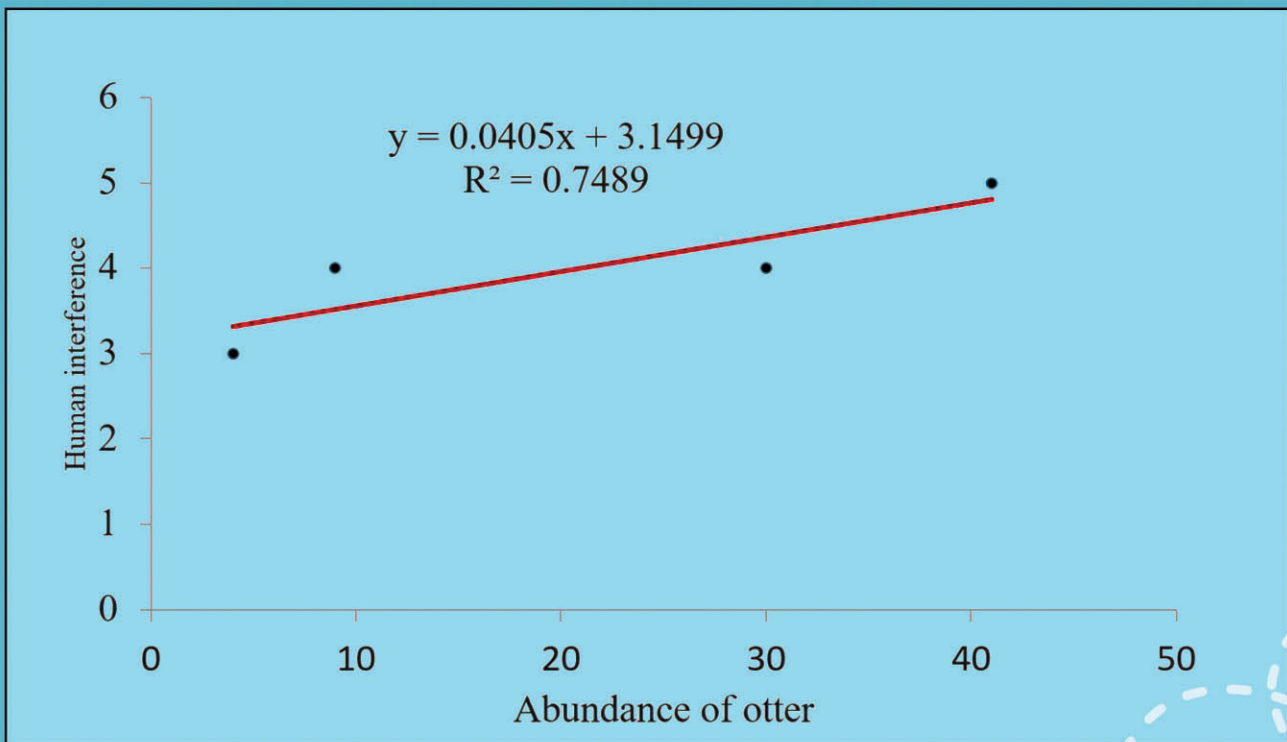


Fig 3: Regression model on human interference with abundance of otters in STR.

ACTIVITY PATTERN ANALYSIS



In general the activity of Asian small clawed otters starts at 3 AM. Between 6AM to 7 AM the otters are highly active. Between 8 AM to 10 AM a certain amount of activity is observed followed by a cooling period. And again from 2 PM to 4 PM they are highly active. Correlating with the tide timings indirectly indicate that the intensity of the sunlight

along with the tide timings are the two major factors influencing the activity of the otters.

This is the very first attempt to construct the activity pattern (Fig 4) of the wild Asian Small-Clawed Otters from the mangrove- ecotone of Sundarban landscape.

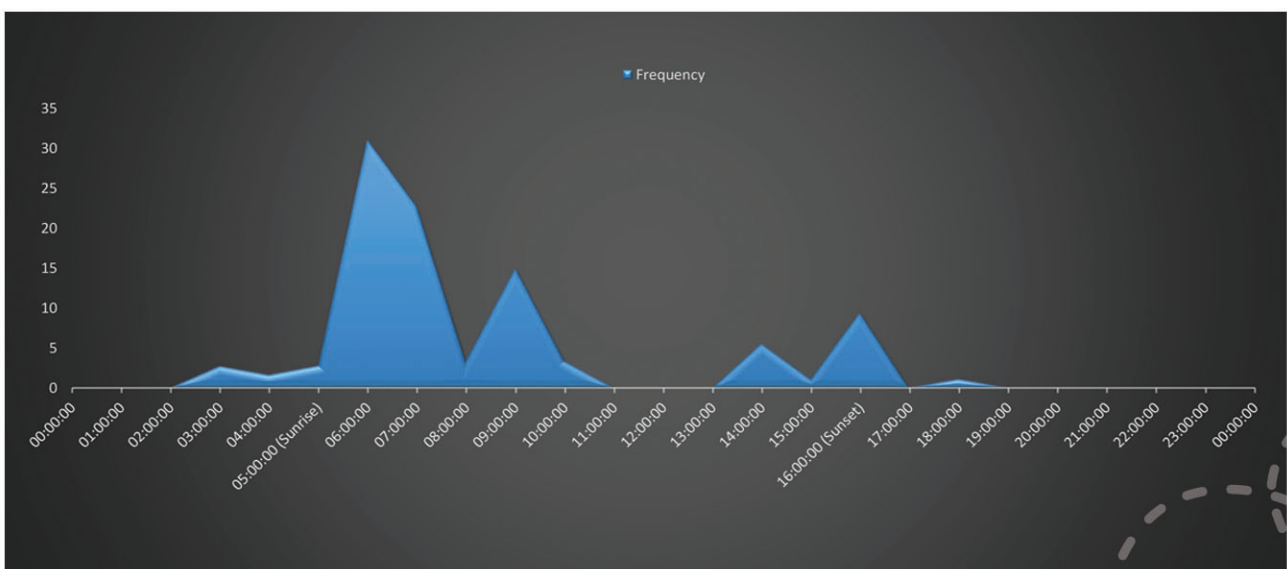


Fig 4: Activity pattern of Asian Small-Clawed Otters in STR.

CONCLUSION

For the first time, the otters have been studied using camera traps in the whole of Indian Sundarbans which has given valuable insights in the distribution, habitat preferences and behavioral aspects of this vulnerable species in Sundarbans. It can be concluded that provided all other parameters remain identical, fishing activity has a negative impact on the occurrence of otters as seen from higher incidence of otter observation in Core areas in comparison to Buffer areas. It is very tough to state any other conclusive remarks due to the inaccessibility of the Sundarban Terrain and the difficulty in collection of further samples from the field for validation. It is recommended that home range study is to be carried out for different species of otters in Sundarbans as it is seen from the above data that Smooth coated

otters have not been recorded in any of the camera traps in the Indian Side and the numbers are declining also in the Bangladesh side. The 2 sq km grid is standardized for the Tigers (*Panthera tigris*), but not for the otters, and hence a detailed protocol needs to be devised for the study of otters using camera traps as a tool.

Various catastrophic events like- tropical cyclones, landslides due to tidal influx, soil erosion etc are enhancing the vulnerability of otters along with Human Disturbances in Sundarban Region. This aspect needs further study and better understanding which will help in devising the requisite management interventions in Sundarbans.



REFERENCES

- Chowdhury, A. H., Akber, M. A. (2015). Study of impacts of oil spill on the Sundarbans mangrove forest of Bangladesh. *Journal of the Asiatic Society of Bangladesh, Science*. 41(1): 75-94.
- Erlinge, S. (1972). Interspecific relations between the otter *Lutra lutra* and mink *Mustela vison* in Sweden. *Oikos* 23:327-335.
- Feeroz, M.M., Aziz, M.A., Thanchanga, P.K. (2011a). Breeding activities of *Lutra perspicillata* in Bangladesh. *IUCN Otter Spec. Group Bull.* 28(A): 38-44.
- Feeroz, M.M., Begum, S., Hasan, M.K. (2011b). Fishing with otters: A traditional conservation practice in Bangladesh. *IUCN Otter Spec. Group Bull.* 28(A): 14-21.
- Gopal, B., Chauhan, M. (2006). Biodiversity and its conservation in the Sundarban mangrove ecosystem. *Aquatic Sciences – Research across boundaries*. 68 (3): 338-354.
- Hussain, S.A. (1999). Status of otter conservation in India. In *ENVIS Bulletin: Wildlife and Protected Areas, Mustelids, Viverrids and Herpestids of India*, Hussain, S. A. (Eds.). Vol. 2, No. 2: pp. 92-97.
- Jhala, Y.V., Qureshi, Q., Gopal, R., Sinha, P.R. (Eds.) (2011). Status of the Tigers, Co-predators and Prey in India, 2010. National Tiger Conservation Authority, Govt. of India, New Delhi and Wildlife Institute of India, Dehradun. TR 2011/003 pp. 302.
- Mallick, J.K. (2011). Status of the mammal fauna in Sundarban Tiger Reserve, West Bengal-India. *Taprobanica*. ISSN 1800-427X. October, 2011. Vol. 03, pp. 52-68.
- Manjrekar, M. P., Prabu, C. L. (2014). Status of otters in the Sundarbans Tiger Reserve, West Bengal, India. *IUCN Otter Spec. Group Bull.* 31(2), 61-64.
- van der Geer, A. (2008). *Lutrogale perspicillata*, the smooth Indian otter. In: *Animals in Stone*, Brill. pp. 328-331.





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