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Cover photo by Ayan Mondal.



Phrynus whitei (Gervais, 1842) from the type locality Burdwan is actually *Charinus bengalensis* (Gravely, 1911)



Charinus bengalensis sighted in Ramnabagan WS, Burdwan, West Bengal, India (© Ayan Mondal).

Amblypygi ('ambly' means 'blunt' and 'pygi' means 'rump'-denoting the absence of a tail) comprises one of the least diverse groups of Arachnida. According to the catalogues of Amblypygi (Harvey 2003, 2013), there are six species classified under two families which are present in India. The family Charinidae (Quintero 1986) comprises three species, *Charinus bengalensis* (Gravely, 1911), *Sarax cochinensis* (Gravely, 1915) and *Sarax sarawakensis* (Thorell, 1888) and two subspecies of *S. cochinensis* (Gravely, 1915), i.e., *S. cochinensis bispinosus* (Nair, 1934), and *S. cochinensis cochinensis* (Gravely, 1915). The family Phrynichidae (Simon, 1892) includes *Phrynichus andhraensis* (Bastawade et al., 2005), *Phrynichus nigrimanus* (C.L. Koch, 1847) and *Phrynichus phipsoni* (Pocock, 1894). *Phrynus whitei* (Gervais, 1842) is not listed as an Indian species in the catalogue (Harvey 2003, 2013) though its type locality was mentioned as Burdwan, India originally.

Rigorous opportunistic surveys were carried out in Burdwan (23.2324°N &





Burdwan town in Purba Bardhaman, West Bengal, India.

87.8615°E), to study the lesser known arachnid diversity. We found some Amblypygi specimens from Ramnabagan Wildlife Sanctuary, Burdwan on 23rd January 2018. During the eight surveys conducted over a period of two years, we were able to find only one morphospecies.

Phrynus whitei was described from material

collected by Maj. Gen. Thomas Hardwicke (Hardwicke 1756, 1835) with locality label mentioned as Burdwan. However, its present distribution is in Texas, California (Pocock 1894, 1902), Nicaragua (Kraepelin 1895, 1899), Mexico, Honduras, El Salvador, Costa Rica and Guatemala (Quintero 1981), restricted to the New World. Pocock mentioned that only one specimen was available in the British Museum of Natural History (BMNH) from which P. whitei was described. He also stated the collection locality of the holotype was erroneously labelled "Burdwan, India". To verify this, we examined our specimen and compared it with the descriptions of P. whitei provided by various authors (Gervais 1842; Pocock 1894, 1902; Kraepelin 1895, 1899; Quintero 1981). After careful examination we found that our specimen did not bear characters of the genus Phrynus, i.e., 3rd dorsal spine shorter than 2nd and 4th (Harvey 2002) but that of the genus Charinus, characterized by the dorsal spine length arranged in descending order from 1st to the last (Weygoldt 2000). The only Charinus species found in West Bengal, India is C. bengalensis (Gravely 1911). Our specimen matched impeccably with the descriptions by Gravely (1911) and other



subsequent literature (Gravely 1915; Quintero 1986). We therefore conclude that the type specimen of *P. whitei* as previously mentioned by Pocock is "erroneously ticketed". All the specimens collected from Burdwan, West Bengal are in fact, *Charinus bengalensis*.

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Mammal Tales

New range extension by Asian Elephant Elephas maximus L. - a case study of Oddanchatram Forest Range in Dindigul Forest Division, Tamil Nadu, southern India

Introduction

At present, the population estimate of wild Asian Elephants distributed in 13 countries across southern and southeastern Asia is 45,671-49,028 (Sukumar 2018). The Indian sub-continent harbours 50% of the world's Asian Elephant population, which is estimated to be 27,312. Most of these are currently distributed over an area of about 110,000km² within four regions in India; Tamil Nadu alone has a population of about 2,761 elephants (Synchronized Elephant Population Estimation Report 2017). We witnessed the presence of elephants in the foot hills of Oddanchatram Forest Range, which falls under the Palani Northern Slope Reserved Forests of Dindigul Forest Division, Tamil Nadu, southern India after 200 years

Studies on mapping the distribution of elephants, their habitats and estimating elephant population in the project Elephant Range No. 9, consisting of Anamalais-Nalliyampathi and Palani hills between January 2005 and June 2006, reported elephant distribution in Palani Range of Dindigul Forest Division (Baskaran 2013), which is further west of Oddanchatram Forest Range. Although the foothills of Oddanchatram have a natural forest suitable for elephants, the area was not reported for elephant until 2006 as per the studies cited above. Thus, it indicates that elephants' movement into Oddanchatram Forest Range is likely be after 2006 from Anaimalai Tiger Reserve and Chinnar Wildlife Sanctuary. The elephants crossed Palani-Kodaikanal road which act as a natural barrier for elephants where the important areas are Thekkanthottam, Annanagar, and Varathamanadhi reservoir are located. Hence, the present study is focused on Oddanchatram Forest Range, which is about 35km long foot-hill stretch.

In recent years, range extension or dispersal of elephants into new areas where elephant movements were not reported for the past 2-3 centuries are becoming more common in southern India. For example (i) Hosur and Bannerghatta dispersing into Andhra Pradesh and (ii) elephants from north Canara dispersing into Maharashtra and Goa. Similarly, elephant population in the eastern central Indian range especially from south Odisha, extending their ranges into northern Andhra Pradesh and elephants of old Bihar, i.e. Dhalma Wildlife Sanctuary extending their range up to southern Bengal region. Although, the present event in Dindigul

Forest Division is not a dispersal, which is an indication of much higher severity in their natural habitats. Range extension is also an indication of either resource lack in their traditional natural habitat or growing elephant population. In either case, management must take into account the presence of elephants in newer areas and ways and means to manage them effectively without much conflict with people. In this context, the present study throws more light on the new issues of range extension by elephants in Oddanchatram Forest Range.

The trend of range extension by elephants in Oddanchatram Forest Range is a greater relevance to the management of Asian Elephant population not only for this area, but also adjoining landscape areas like Annamalai Tiger Reserve. Therefore, a new range extension by elephants into Oddanchatram Forest Range could be viewed as a unique case to derive management implications for elephant conservation in this region.

Objectives

 To monitor elephants in newly extended range of Oddanchatram Forest Range.
 To understand the age-sex of elephants.
 To estimate number of elephants in new extended range of Oddanchatram Forest Range.

Materials and Methods

a) Foot survey was carried out all along the foothills and crop fields to monitor the elephants and their movements using scan sampling method as described by Altmann (1973). The following indirect signs were used for identifying elephants' movements (a) occurrence of dung piles of elephants (b) feeding sign and other indirect evidences such as rubbing sign and mud bath locations of elephants (Sivaganesan et al. 2000).

b) The foot hill habitats between Palani-Kodaikanal road and Parapalar reservoir was intensively surveyed to document elephant movement, number of individuals and its age and sex (Choudhury 1980) to identify different individuals of elephants using their natural identifications like back shapes, tail types according to length and brush (hair) and especially males, tusk types according to their plane, thickness, parallelness, and angle to the ground. Arivazhagan & Sukumar (2005) has described the physical features such as ear cuttings, external growth on the body for individual elephant identification. All elephant sighted locations were geotagged with the help of e-trex global positioning system (GPS).

c) Weekly two days were spent in one location which has covered a total of 23 locations falling between Palani-Kodaikanal road and Parapalar reservoir to estimate the number of elephants and their age and sex.

Result

Monitoring elephant population in newly extended foothills in Oddanchatram forests The present study revealed that the elephants mostly used two different paths for their movement either through the foot hill forests or crop fields. These two trails are crucial to this pocketed herd of elephants in Oddanchatram Forest Range of Dindigul Forest Division. It was pointed out by the local people that the elephants initially moved up to Annanagar till 2005 in Palani range, later they moved into Ponnimalaikaradu which is located about 1km north of Varathamanadhi Reservoir and goes up to Parapalar Reservoir of Oddanchatram Forest Range.

a. Movement of elephants in foothills:

(from Thekkanthottam to Pudukottai via Anna Nagar, Varathapattinam and Sattaparai). Very often, this route was utilized by elephant herds to cross the check post of Palani-Kodaikanal road in Thekkanthottam to reach Pudukottai. From Pudukottai the herds climb up and reach the Parapalar Reservoir. It has been observed that the herds stay for a week at Parapalar Reservoir and raid the crop fields in the villages of Bethelpuram, Pulikuthikadu, Mettupatti, and Thattakuzhikadu. These herds were not seen to climb beyond Pachalur, instead, they moved up to Siruvattukadu, where the altitude is between 750m and 1000m.

b. Movement trail through crop fields:

(Thekkanthottam to Periya Ayyampalli pond, Vannanthurai, Gurukarai pond, Sattaparai and Karnansalai in Kombapatti RF). The Elephants also moved via Josiyar kulam, Periya Ayyampalli-Kodaikanal road near Punganodai predominantly through crop fields. The final destination of the elephants was the Ponnimali north and south until they reached the Sattaparai and Pudukottai further climbed to Parapalar



Elephant movement pattern from Anamalai Tiger Reserve to Thekkanthottam and Parapalar Reservoir.

	Name of the villages	Number of days elephants sighted	Number of days family herd sighted	Number of days solitary elephant sighted
1	Kittappansalai	26	26	
2	Pudukottai	14	10	4
3	Karnansalai	13	11	2
4	Varathapattinam	12	11	1
5	Annanagar	11	10	1
6	Chattaparai	7	6	1
7	Puliamarathu shed	7	7	
8	Siruvattukombai	5	2	3
9	Palar	4	3	1
10	Parapalar reservoir	4	4	
11	Ponnimalai	4	2	2
12	Varathamanadhi dam	3	1	2
13	Kombapatti	2	2	
14	Thekkanthottam	2	2	
15	Bethelpuram	1	1	
16	Gandhinagar	1	1	
17	Kanakkampatti railway cross	1	1	
18	Karadikuttu	1	1	
19	Madathusalai	1	1	
20	Ponnimalai east	1	1	
21	Puliampatti	1	1	
22	Pulikuthikadu	1	1	
23	Vengalaparai	1	1	

Table 1. Family herds and solitary elephants sighted during the study period (n=123 days).

Reservoir site and ended at Bethelpuram-Siruvattukadu agricultural field.

Age-sex composition of elephants:

A total of 23 incidents elephants were sighted during our 123-day field work between February and July, 2016. For around 26 days, elephant herds were seen more near Kittappansalai Village followed by Pudukottai (n=14 days), Karnansalai (n=13 days) and Varathapattinam (n=12 days) villages. On most occasions solitary bulls were recorded in Pudukottai (n=4), followed by Siruvattukombai (n=3) Karnansalai, Ponnimalai, and Varthamanadhi dam and on one occasion, a solitary male was recorded in Varathapattinam, Annanagar, Chattaparai, and Palar villages (Table 1).

A herd comprising of eight to nine individuals was sighted in more occasions near Kittappansalai (n=20 occasions). The same number of individuals were also been recorded near Pudukottai (n=8 occasions) and Karnansalai (n=7 occasions). It was quite interesting to note that 15 to 18 elephants were also sighted in two

	Name of the village	Number of days solitary elephant sighted	Number of days family herds sighted
1	Kittappansalai		26
2	Pudukottai	4	10
3	Karnansalai	2	11
4	Varathapattinam	1	11
5	Annanagar	1	10
6	Chattaparai	1	6
7	Puliamarathu shed		7
8	Siruvattukombai	3	2
9	Palar	1	3
10	Parapalar		4
11	Ponnimalai	2	2
12	Varathaman nadhi dam	2	1
13	Kombapatti		2
14	Thekkanthottam		2
15	Bethelpuram		1
16	Gandhinagar		1
17	Kanakkampatti rail cross		1
18	Karadikuttu		1
19	Madathusalai		1
20	Ponnimalai east		1
21	Puliampatti		1
22	Pulilikuthikadu		1
23	Vengalaparai		1

Table 2. Number of occasions elephant family herds and solitary bulls recorded in different locations.

locations near Kittappansalai and Parapalar reservoirs. Solitary elephants were sighted on four occasions at Pudukottai and on three occasions at Siruvattukombai areas (Table 2).

Estimation of elephant population in the new range

The eighteen individuals were seen in different numbers on 12 occasions during our study period. All the repeated elephant sightings were carefully reviewed to remove the duplications according to the individual physical features of elephants. In total, the elephants sighted in the area consisted of seven adult females, one sub-adult female, four adult males, two sub-adult males, and four juvenile/calves. Overall, the sex ratio between male and female irrespective of age class was 1: 1.3. It was found that an adult male and one group comprising nine individuals were regularly seen in this area.

Discussion

The present study has found a new range extension of elephants for more than 35km into new areas between Thekkanthottam and Parapalar reservoir is a clear sign that



Elephant population and its age and sex in newly extended Oddanchatram Forest Range.

the elephant herds were trying to find new habitats though the elephants have not been sighted here until 2005. The possible reason could be either due to availability of water spread areas in the eastern portion of Palar-Puranthalar reservoir or proximity of agriculture fields with coconut, mango, and silk cotton. In addition, the elephant herds follow the foot hill forests to reach various hamlets such as Annanagar, Gandhinagar, Varathamanadhi's '0' point, north of Pappampali, and southern part of Ponnimalai, Varathapattinam, Sattaparai, Kombapatti, Karnansalai, Dasaripatti to raid crops and goes to Pudukottai-Theetukkal paarai to enter into Parapalar Reservoir to drink water.

The elephant herds settled down in the foothill tract and sustain with crop fields with a strategy of securing themselves in dense fruit garden closer to the foothill forests. The other option could be to find out new routes to go back into its traditional range to avoid various anthropogenic pressures. Ramakrishnan (2007) stated that elephants get bounced back due to blockage of corridor. Over a few decades, there has been shrinkage of potential habitats due to various land use changes which forms the major causes for the loss of crucial habitats to Asian Elephant populations (Daniel 1980). The present study has thrown light on the land use changes that has influenced the need to study on various new range extension by these elephants.

This study has brought out various aspects that the elephant's accessible areas have been occupied by the local people in the foothills of Oddanchatram. The occupancy by elephants between Varathapattinam and Pudukottai especially in crop fields showed the significance of attractive food crops for elephants in this tract. Cultivation of elephants' preferable food crops such as guava, mango, paddy,

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jackfruit and plantain could trigger the elephants to withstand venturing into new areas. The left over forest patches at the foothill areas are now under serious threat with extensive encroachments. In some areas, elephants are forced to move through human dominated landscapes mainly for water (Sukumar, 1989a). Many studies also suggest that the elephants use microhabitats especially during dry season when deciduous forests become unpalatable (Sukumar 1989b; Sivaganesan 1991; Rameshkumar & Sathyanarayana 1994; Baskaran 1998). The fact that the adjoining areas of Anamalai Tiger Reserve which is dominated by deciduous forests would become unpalatable to elephants in dry season could have triggered the elephants to use these areas for a shorter duration. But from an ecological point

of view, this short period dispersal is inevitable to elephants as its own habitat became unpalatable.

The present study has revealed that the elephants' movement from Thekkanthottam to Parapalar reservoir during the dry spell could also be in search of natural resources like water, food, shade and other ecological requirements that are sparsely distributed in the study area during the onset of north east monsoon. Ishwaran (1981) found that during dry conditions, swampy areas provide grass for elephants. Similarly, in Wilpattu National Park, Sri Lanka, the movement of elephants to large grassy villus during wet season was influenced by the availability of food and dry season movement was influenced by the permanent water source (Eisenberg &



A panoramic view of water spread areas of Paalar-Puranthalar Reservoir at Thekkanthottam where elephants used to cross from Palani-Koddaikanal road towards Oddanchatram foothills and further go up to Parapalar Reservoir.

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Lockhart 1972).

Elephants being a wide-ranging species require large areas to forage. Once the habitat is fragmented or reduced in size, elephants become isolated and hemmed in small patches of forests surrounded by vast area of agriculture crops and human habitations. For instance, Annamalai Tiger Reserve and Chinnar Wildlife Sanctuary already have various biological pressures such as fragmentation and conversion of large areas into tea gardens. This scenario has forced elephants to extend their range into new areas or resettle into the neighboring habitat to avoid man-made pressures. Graham et al. (2009) indicated that elephants' movement and use of habitats are based on a risk-minimization strategy with concomitant diurnal differences in habitat use. Elephants could potentially range outside protected areas, survive in reasonable numbers in humandominated landscapes and get benefit from forest agriculture matrices, despite pressures associated with anthropogenic landscapes (Calabrese et al. 2017; Leimgruber et al. 2003; Madhusudan 2003); however, the space used by elephants is influenced by distribution of resources, vegetation types, changes in land use and presence of human disturbance within their distributional range (Hoare 1995).

Conclusion and recommendations

 Two-hundred years before, elephants were seen in these areas (evidence from British records), which means these areas were part of the annual seasonal home range of elephants in those days. Due to some reasons, the elephants were not using their traditional range for about 200 years. Since 2006, the herd comprising 18 individuals dispersed into their traditional part of home range and staying back round the year till now (evidenced from n=7 human casualty; n=2 elephant electrocution). Therefore, the present study conclude that this can be kind of a geographical distribution range extension by elephants. To establish this in a more scientific manner, at least one or two years of study is warranted.

2) Based on the questionnaire survey, the present study found that from 2006 to 2011, the elephants were extended up to Siruvattukadu and Bechelpuram of Oddanchatram Forest Range. After 2011, they further extended up to Kannivadi Forest Range of Dindigul Forest Division. Last two years, the elephant herd moved up to Betlagundu Forest Range (two forest field staff were injured by one of these tuskers while they were involved in driving back these individuals into their traditional range during 2019) of the Dinndigul Forest Division. This clearly indicates that the elephant herd is extending its range into parts of their ancient home range.

3) A long-term study is urgently needed to thoroughly study the elephant movement pattern in these areas enabling to bring out a strong scientific strategy to manage human-elephant interaction issues.

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Acknowledgments: We sincerely thank the district forest officer of the Dindigul Forest Division for providing the necessary permission to carry out this short-term study. This work would not have been possible without the support of all forest range officers, foresters, forest guards, forest watchers, and anti-poaching watchers of the Dindigul Forest Division, especially Oddanchatram, Kannivadi, and Betlagundu forest ranges; we profusely thank them all. We are sincerely thankful to our mentor Dr. N. Sivaganesan for introducing both of us to elephant studies.

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Co-exist or Collapse? Defining the "new normal" existence

The human race has been thriving so successfully (or so we think!) for not so long enough; just as long as a few hundred thousand years. This is apparently a very small time period compared to the much longer period of evolution, and life on Earth. The idea of co-existence is being acknowledged by humans only very recently; since we have exponential growth rate and unfortunately, no natural or more powerful predators as yet. The concept of human-animal interaction has been around since a very long time, but they fail to grab our attention every time, unless it results in severe human fatality.

Once in a while, 'Avni' and 'Sundari' make the headlines, but are the real issues being discussed? Are we confronting the fact that human population boom has drastically reduced the land available for animals? Large mammals like tiger and elephant prefer to travel long distances and cross human-made boundaries. Spilling numbers, 2,361 humans and 510 elephants were killed in human-animal negative interactions in last five years; over 80 elephants killed every year of which an average of 50 killed by electrocution. Incidents of human-wildlife interactions like the recent elephant killing in Kerala evoked a wave of protest from all across the country. Though human-elephant interaction is one of the most intense

conservation challenges in Asia, the underlying issue is more complicated than we can fathom.

The trend of culling wildlife has been taken up by state governments across India. Animals considered vermin are now being killed irrespective of the consequences they have on a stable ecosystem. The Indian government has already listed the Nilgai (Blue bull- Asia's largest antelope), Wild Boar and Rhesus Macaque as vermin in the state of Bihar, and Rhesus Macagues as vermin in Himachal Pradesh. The list does not end here, as way back in 2016, the state of Uttarakhand already obtained the permission to kill Wild Boars, West Bengal was seeking permission to kill wild Elephants, Maharashtra and Gujarat were awaiting permission to kill Nilgais, and Goa studying a proposal to make Peafowl a vermin. India has started a mutiny between wildlife and its citizens!

Communities that live close to forests tend to suffer the greatest damage to both livestock and humans, but are the lawmaking bodies aware of the struggle they go through? Let's talk about the issue more explicitly now.

Elephants prefer to raid farms and fields since they need less energy for foraging and farmed food are often 'tastier' than

Mammal Tales

those in the wild. Elephants are "nomadic feeders" and tend to travel long distances for food and water, and thus cross human inhabited areas quite a lot. The damage and loss as a result of this interaction are never returned to the farmers. The insurance or remunerations given by the government to the affected parties are meagre compared to the damage. This in turn pressurizes the farmers to build electric fences and snares for animals. Unfortunately, elephants fall prey for these often. The recent elephant killing in Kerala was much publicized news in the national and international media. A bait kept for Wild Boars was mistakenly consumed by the elephant which eventually led to its horrifying death. People responsible for the event were booked, but will the attitude of the communities who continue to live in villages close to the forest change?

Hunting takes a large toll on the elephant population in India. But a significant decline in elephant population is attributed to the habitat degradation and human encroachment including the deaths due to road and rail accidents. Another reason can be the inability of females to find suitable mates. Among Asian Elephants, males have tusks, making them more vulnerable to poaching.

Habitat degradation and fragmentation adds more pressure to this situation. Undisturbed elephant corridors provide safe movement of these gentle giants to move across the fragmented habitats in different parts of the country. Currently, India has around 101 wildlife corridors, of which many are closely monitored by NGOs. But the question of "Are we doing enough?" still lingers. The idea of "co-existence" needs to be reframed, more animal corridors need to be built, more awareness to be done among the communities that face these challenges, more financial security be given to life and livestock of forest-dwelling communities, and finally adapt and adopt to the "new normal" lifestyle where our wild counterparts are given more chances to live and not intrude into their land which has now become ours too!

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Corrigenda

Chintan Sheth, M. Firoz Ahmed, Sayan Banerjee, Neelesh Dahanukar, Shashank Dalvi, Aparajita Datta, Anirban Datta Roy, Khyanjeet Gogoi, Monsoonjyoti Gogoi, Shantanu Joshi, Arjun Kamdar, Jagdish Krishnaswamy, Manish Kumar, Rohan K. Menzies, Sanjay Molur, Shomita Mukherjee, Rohit Naniwadekar, Sahil Nijhawan, Rajeev Raghavan, Megha Rao, Jayanta Kumar Roy, Narayan Sharma, Anindya Sinha, Umesh Srinivasan, Krishnapriya Tamma, Chihi Umbrey, Nandini Velho, Ashwin Viswanathan & Rameshori Yumnam (2020). 'The devil is in the detail': Peer-review of the Wildlife Conservation Plan by the Wildlife Institute of India for the Etalin Hydropower Project, Dibang Valley. *Zoo's Print* 35(5): 1–78; http://www.zoosprint.zooreach.org/index.php/zp/article/view/5686/5103

'The devil is in the detail': Peer-review of the Wildlife Conservation Plan by the Wildlife Institute of India for the Etalin Hydropower Project, Dibang Valley.

Page 1, second column second sentence:

The review has found that the study was conducted in under five five months from February to June 2018 and cannot be considered as a 'multiple seasonal replicate' study as it does not represent three seasons in Arunachal Pradesh.

Read as:

The review has found that the study was conducted in under five months from February to June 2018 and cannot be considered as a 'multiple seasonal replicate' study as it does not represent three seasons in Arunachal Pradesh.

Page 3, 2nd column, second from last sentence:

Crucially, nowhere does the Report mention whether the areas that will see the impacts of power evacuation infrastructure were integrated into the Zol.

Read as:

Crucially, nowhere does the Report mention whether the areas that will see the impacts of power extraction infrastructure were integrated into the Zol.

Page 7, second column, last sentence under 'SECTION 1: REVIEW OF ZONE OF INFLUENCE AND ANALYTICAL FRAMEWORK':

This approach is lacks scientific rationale.

Read as:

This approach is not based on any of the published scientifically-recognized methods used to score the impact on biodiversity due to HEPs.

Page 9, second column, last sentence of 'SECTION 3: REVIEW OF FLORA':

Dihang Dibang Biosphere Reserve.

Read as: Dihang-Dibang Biosphere Reserve.

Page 12, second column, fourth sentence under the sub-heading 'Additional errors in entomofauna sections':

Additionally, some of the subspecies mentioned in the butterfly checklist are not distributed in the Dibang Valley (e.g., subspecies like *Parantica melaneus plataniston*, *Celastrina argiolus kollari*, *Dodona ouida phlegra*, etc.).

Read as:

Additionally, some of the subspecies mentioned in the butterfly checklist are not distributed in Dibang Valley (e.g., subspecies like *Parantica melaneus plataniston*, *Celastrina argiolus kollari*, *Dodona ouida phlegra*, etc.).

Page 16, first column, second sentence in 'SECTION 6: REVIEW OF AVIFAUNA':

Five-hundred-and-sixty-three species have been reported from Dibang Valley (eBird 2020, see Appendix IV for a checklist of birds of Dibang River basin following the taxonomy outlined in the Clements Checklist (Clements et al. 2019)) making the two districts of the Dibang Valley (Dibang Valley and Lower Dibang Valley) among the richest in the country (Figure 1).

Read as:

Five-hundred-and-fifty-five species have been reported from Dibang Valley (eBird 2020, see Appendix IV for a checklist of birds of Dibang River basin following the taxonomy outlined in the Clements Checklist (Clements et al. 2019)) making the two districts of the Dibang Valley (Dibang Valley and Lower Dibang Valley) among the richest in the country (Figure 1).

Page 19, first sentence in 'SECTION 7: REVIEW OF MAMMALIAN BIODIVERSITY':

Dihang Dibang Biosphere Reserve

Read as: Dihang-Dibang Biosphere Reserve.

Page 20, second paragraph, second sentence:

Gonghsan Muntjac

Read as: Gongshan Muntjac.

Page 22, first bullet point, last sentence:

Meaningful comparisons in abundance across species cannot be made without accounting for interspecies variation detection (Sollmann et al. 2013).

Read as:

Meaningful comparisons in abundance across species cannot be made without accounting for interspecies variation in detection (Sollmann et al. 2013).

Page 23, second column, fifth sentence:

In addition, studies on tigers in Eastern Himalayan mountain ecosystems have recorded large home ranges varying between 70 to 675 km² depending gender and habitat type (Tempa 2017).

Read as:

In addition, studies on tigers in Eastern Himalayan mountain ecosystems have recorded large home ranges varying between 70 and 675 km² depending on gender and habitat type (Tempa 2017).

Page 25, under sub-section 'Dibang Valley has many undiscovered species', fifth sentence:

These include species within the following genera: *Amolops*, *Bufo*, *Cyrtodactylus*, *Ingerana*, *Kurixalus*, *Microhyla*, *Nasutixalus*, *Oreolalax*, *Philautus*, *Theloderma*, and *Xenophrys*.

Read as:

These include species within the following genera: *Amolops*, *Bufo*, *Ingerana*, *Kurixalus*, *Microhyla*, *Nasutixalus*, *Oreolalax*, *Philautus*, *Theloderma*, and *Xenophrys*.

Page 31, second column, second paragraph, fourth sentence:

By not accounting for a large influx of labourers and their impacts on the landscape, the wildlife habitat, and on the cultural identity, health and wellbeing of the local people, the Report consistently undermines the impact of this project on multiple fronts.

Read as:

By not accounting for a large influx of labourers and their impacts on the landscape, the wildlife habitat, and on the cultural identity, health and well-being of the local people, the Report consistently undermines the impact of this project on multiple fronts.

Pages 58 to 65:

The following bird species are unlikely to be found in the Dibang River basin and have been erroneously included in Appendix IV.

Page no.	SI no.	Family	Common name	Scientific name	SolB concern status	IUCN Red list	WLPA schedule
58	214	Campephagidae (Cuckooshrikes)	Rosy Minivet	Pericrocotus roseus	NA	LC	Schedule-IV
59	243	Corvidae (Crows, Jays, and Magpies)	Red-billed Blue- Magpie	Urocissa erythroryncha	Low	LC	Schedule-IV
59	256	Paridae (Tits, Chickadees, and Titmice)	Rufous-vented Tit	Periparus rubidiventris	Low	LC	Schedule-IV
59	257	Paridae (Tits, Chickadees, and Titmice)	Gray-crested Tit	Lophophanes dichrous	Low	LC	Schedule-IV
60	264	Cisticolidae (Cisticolas and Allies)	Dark-necked Tailorbird	Orthotomus atrogularis	NA	LC	Schedule-IV
64	375	Pellorneidae (Ground Babblers and Allies)	Rusty-capped Fulvetta	Schoeniparus dubius [!]	NA	LC	Schedule-IV
64	383	Leiothrichidae (Laughingthrushes and Allies)	Brown-cheeked Fulvetta	Alcippe poioicephala	Moderate	LC	Schedule-IV
65	400	Leiothrichidae (Laughingthrushes and Allies)	Gray Sibia	Heterophasia gracilis [*]	Moderate	LC	Schedule-IV

The evolving role of Indian zoos as "Centers for Education" with special reference to National Zoological Park, New Delhi

Introduction

One of the valuable resources for environmental education today in the developing countries includes zoological parks, sanctuaries, nature centers, museums, and related organizations. These institutions play a significant role in developing an understanding of our relationship with nature and the need for its conservation. Zoological parks attract large population of the society; in India, millions of people visit zoos annually which are slowly evolving from menageries to conservation and educational centers with time. With the changing scenario, the Government of India realized the need for making conservation as one of the main objectives of zoos. Accordingly, policies formulated by Central Zoo Authority also made emphasis on the educational role played by the zoos in creating awareness about wildlife and its conservation as the zoos are visited by a large number of visitors. Since then, the Indian zoos have been evolving themselves to serve as a potential tool for educating people about conservation of nature.



A signage on animal welfare concept developed by Sally Walker.

In recent times some Indian zoos have emphasized on zoo education and interpretation and have provided facilities to educate including students from schools & colleges and researchers. These facilities include the education center, interpretation center, library, informative signages, guided tours, virtual tours, research activities, souvenir shops, eco day celebrations, etc.

Apart from these the zoo objectives and mission/vision statements are guides around which all the zoo's educational activities are revolved. Besides, the National Zoo Policy 1998 states that "to inspire amongst the zoo visitors empathy for wild animals, an understanding and awareness about the need for conservation of natural resources and for maintaining the ecological balance". The National Zoo Policy 1998 further states that "each zoo should have a well-drawn-up plan for educating the visitors as well as others in the community". Accordingly, the zoos in India have formulated various awareness plans and have been using various means for educating their visitors about the importance of wildlife, zoo animals, captive breeding, etc.

The report gives a brief overview of the various means used by the Indian zoos with emphasis on the National Zoological Park, New Delhi, India for spreading awareness about wildlife and its conservation among zoo visitors.

The National Zoological Park, New Delhi, popularly known as Delhi Zoo is home to a variety of species of plants and animals. It was established in the year 1958 as a model zoo for the country and is visited by a large



Clay modeling by students during celebration of eco days.

number of visitors every year. Presently, it does not only help in the conservation of endangered species but also in pursuing various breeding programmes, welfare programmes, rehabilitation initiatives as well as creating environmental awareness amongst zoo visitors.

Following are some of the different means used by the National Zoological Park which may help in creating awareness among the different folks of the society:

A. Mission statement: A mission statement is considered as the written declaration of the purpose of an institution and it also designed in such a way so as to provide guidance for institutional planning, administration, and communication. Indian zoos have different mission statements depending upon the operation of the zoo, type of visitors, facilities, etc. Vision/ Mission statement of Indian zoos shows that the zoos are involving themselves more in the area of zoo education, awareness and conservation as mandatory under the Recognition of Zoo Rules, 2009, i.e., "Every Zoo shall endeavor to educate the visitors and the people at large about the significance of wildlife conservation for the general well-being of the people and keeping the life support system of nature intact and efforts shall be made to make people aware about the role played by the zoos in this regard and the ways and means through which general public can participate and contribute for the same ".

Vision/Mission statement of the National Zoological Park, New Delhi

"To generate awareness and compassion in the society towards wildlife and to garner their support for the national conservation efforts".



Students participating in an awareness programme.

B. Education center: The Zoo has an education center/interpretation center where the zoo organizes various lectures/ talks from renowned and experienced persons in the field of wildlife for the visitors including the school students, college students, and researchers. Various slide shows and documentaries focused on the various aspects of nature and animals etc. have also been organized.

C. Animal exhibits: The Zoo has animal exhibits that have been designed as natural as possible according to their behaviour and needs, i.e., to reflect the requirement of the displayed species so that the animal displays their natural behaviour in the zoo. This is as per the National Zoo Policy

1998, which emphasizes that the "Zoo shall display animals in such enclosures only where the animals do not suffer physiological and psychological restraint". Therefore, the animal exhibits were with time modified with natural componentsgrass, trees, bushes, rocks, etc. - as well as enrichment practices carried out for the animals. These types of exhibits give an opportunity to the visitors to see animals in their near natural settings, i.e., in the wild as much as possible. This, in turn, improves the conditions for the animal and helps in enhancing the viewing experience of the visitors along with developing an understanding of the natural behaviour of the animal- natural feeding behaviour, sleeping, pacing, social behaviour, etc.



Different signages at the National Zoo.

D. Signages: Signages including animal boards and signboards also play an important role in disseminating information about the zoo and animals. The Delhi Zoo has displayed various signboards, wayside exhibits both in Hindi and English. The signages provide information about the species displayed- their scientific name, number, lifespan, diet in the wild and zoo, habit and habitat conditions in nature. breeding aspects, fascinating facts, etc. The identification of flora and fauna through attractive information boards in the zoo serves as one of the important methods to educate the public. This can help in sensitizing the visitors about the important aspects of the animals they are seeing in the zoo. Besides, the Zoo displays signboards for guiding the visitors and also about the Do's and Don'ts to be followed while visiting the zoo with emphasis on the welfare of the animals.

E. Celebrating important days/events: As

per the National Zoo Policy 1998, a formal education programme should be pursued in the zoos for strengthening the education message. The Zoo has been celebrating important days for creating awareness and strengthening the education message among the different sections of the zoo visitors. Besides, the zoo also celebrates birthdays of the animals in its collection as a means of spreading the message about the housing and upkeep facilities provided. **F. Use of volunteers:** A large number of volunteers have been serving the National Zoo for many years which helps it in organizing various events, guiding visitors, and also helps in spreading wildlife conservation education amongst the visitors in addition to their various research projects.

G. Research activities: In National Zoological Park, New Delhi students and researchers from several Universities and Colleges are undergoing research activities on various aspects of animals like management, behaviour, healthcare, enrichment, etc.

H. Guided tours: Exposing primary school children to wild animals has been considered as one of the traditional approaches to environmental education which resulted in cognitive gain and improved attitude towards wildlife conservation and management. Thus, many Indian zoos have been organizing guided tours to the school at various levels, college students and teachers, etc. around the zoo for on the spot observations and study of the animals in the zoo.

Non-Governmental Organizations (NGO's), universities, and colleges have also been encouraged by the zoos to set up various awareness programmes in the zoo including competitions, quizzes, lectures/ talks, exhibitions for groups of school

children, clubs and visitors in the zoo. Similarly, the Delhi Zoo on one occasion in collaboration with the National Museum of Natural History organized a Nukkad Natak highlighting Wildlife and Environmental issues performed by artists at Delhi Zoo which gave a message on conservation of Environment and wildlife by great and interesting dramas.

I. Concession for school children: Several Indian zoos, for the purpose of educating and motivating schools/ school children to visit zoos charge them half the price of

the ticket to enter the zoo and learn about animals. A similar practice has been used by the Delhi Zoo for encouraging school group visits more frequently.

J. Zoo education through publications:

Souvenir Shops in the zoos, distribution of attractive brochures on zoo activities, individual notes on important aspects of the zoo, use of stickers and postcards, etc. are different informal modes used by the Indian zoos for enhancing and promoting the zoo's image as an instrument of education. The National Zoo uses posters, brochures, pamphlets, etc. for highlighting the activities of the Zoo and spreading the message of conservation.

K. Other measures: The use of different social media platforms for creating awareness has become one of the best

modes for attracting a large number of people. The Delhi Zoo also uses social media platforms like a Facebook page, Twitter, and YouTube channel which provide information on different aspects of zoo animals like their behaviour, activities, general information, enrichment, etc.

Way forward.....In order to develop zoos as educational institutions, there is still a need for Delhi Zoo to make dedicated efforts and focus more on developing an understanding about the interests of the zoo visitors towards various aspects of the zoo and gain knowledge about the impact of the zoo visit on the children, students and visitors, i.e., the zoo should evaluate their understanding of animals, etc. for better management of the educational and outreach activities at the zoo.

Further, the awareness and education strategies/programmes/outreach activities used by the zoo should also be evaluated from time to time so that the main message of zoos as conservation/education institutions will be achieved. In short an education plan is the need of the hour.

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Report

Celebration of Earth day and World Turtle day through social media



Photographs shared by participants for First Day Challenge.

Due to the rising cases of corona virus in India, the country went into a nationwide lockdown from 24th March 2020. So the important days such as Earth Day and World Turtle Day were celebrated using the social media. In recent years, India has evidenced significant contribution of social media to various causes. The field of biodiversity conservation is also utilizing it to spread the message through social media. Social media played an immense role in spreading the message of importance of biodiversity as well as its conservation. The aim of organizing online events was to involve people of all age groups in various activities related to Earth Day, 22nd April 2020 and World Turtle day, 23rd May 2020.

Earth Day is an annual event celebrated on April 22 to demonstrate support for environmental protection. First celebrated in 1970, it now celebrates its 50th Anniversary. To celebrate this important day, Indian Biodiversity Conservation Society, in collaboration with Jeev Seva Sansthan, Arohan Foundation and Manav Organization, came up with a series of challenges for the members on Social Media such as Facebook and Whatsapp. The Seven day challenges had following activities.

First Day Challenge: Post a picture showing you planting a tree/gardening. Second Day Challenge: Post a picture of your Cloth bag that you take to the market for shopping.

education

Report



The participants of World Turtle Day.

Third Day Challenge: Post a picture of Plastic item reused by you. Fourth Day Challenge: Have you ever done anything for Mother Earth? Write on your wall or share the picture. This can be being kind and tolerant towards other species, water conservation, reducing pollution, planting trees, saving electricity and there are so many ways to serve Mother Nature. Fifth Day Challenge: Post a picture of your plants in balcony/Garden. Sixth Day Challenge: When you did last spent time in Mother Nature's lap and appreciated it?. Seventh Day Challenge: Post a picture of Earth's Best Friend be it an animal or plant species. The response was immense. People shared the event with their friends and actively participated in the activities. Members who participated in at least 5 out of 7 activities were felicitated with e-certificates. World *Turtle Day* was celebrated by participating in Creative event- My Little Turtle. For this the participants were free to use a variety of household and craft items to make a collection of fun and unique turtle. Some amazing facts about turtles were also

shared with the participants. The elders were requested to involve children in this activity. It is time to realize the importance of different species and conserve them. An appeal was made not to keep them as pets since it is a crime under Wildlife Protection Act, 1972. The people were motivated by these activities. All the participants were felicitated by e-certificates.

Submitted by: Akhilesh Kumar & Sonika Kushwaha, Indian Biodiversity Conservation Society, Jhansi,Uttar Pradesh. Email: ibcsforall@gmail.com

Report

Alpine Musk Deer *Moschus chrysogaster* conservation outreach program in Khaptad National Park, Nepal

The Alpine Musk Deer Moschus chrysogaster has been classified as an 'Endangered' species on the IUCN Red List, listed in Appendix I of CITES, and protected by the Government of Nepal because of its declining population trend. It is endemic to the Himalayan region and is distributed in the altitudinal range of 2,500-4,500 m (Green 1986; Zhixiao & Helin 2002; Lamsal et al. 2018).

The species is facing massive threats from humans such as poaching, habitat loss, and unmanaged livestock grazing. In addition, feral dogs are an emerging threat in most parts of the country (Thapamagar et al. 2018). Developing conservation knowledge to the rural people towards wildlife conservation is a way to conserve such endangered species (Zhixiao & Helin 2002; Bhandari et al. 2019). We conducted the conservation awareness



Alpine Musk Deer (© Tek Gharti Magar).

programme in Khaptad National Park (KNP) of western Nepal. The Park is a prime habitat for musk deer, Himalayan Black Bear Ursus thibetanus, and Wild Dog Cuon alpinus (Thapamagar et al. 2019). Most of the local people in those areas are dependent on agriculture and livestock farming. In such a landscape, the local people are a key factor for nature conservation (Bhandari & Chalise 2016). Conservation outreach programmes for musk deer conservation were done in Chhanna Khaptad rural

municipality of Bajhang **District between October** and November 2018 through group discussions in the villages, poster presentation and distribution of outreach materials such as posters and t-shirts. Around 150 people including school students were directly benefited from this. We made people aware of the ecology and behaviour of the musk deer and its importance in the Himalayan landscape. This programme was so helpful to develop a positive conservation attitude towards the musk deer

Report



The study site location, Khaptad National Park, Nepal.



Participation of local people during Musk Deer conservation outreach program in KNP.

conservation in the KNP and its surrounding areas. Further, the programme motivated others for further conservation work which might be significant in the Alpine Musk Deer conservation in Nepal

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In the first phase of the fundraiser for the **Sally Walker Conservation Fund**, we target three objectives.

(i) **The Sally Walker Lifetime Award for Conservation** — The first award is proposed for 12 October 2020 on Sally's birth anniversary.

(ii) The Sally Walker Training Programme in Conservation Biology and Application — The first workshop to train young biologists and foresters is planned for the third week of March 2020.

(iii) Communicating Science for Conservation through innovative education programs — A series of outreach programs for the rural kids in the districts adjoining the Western Ghats in Tamil Nadu are being planned for in 2020.

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Type — Articles of semi-scientific or technical nature. News, notes, announcements of interest to conservation community and personal opinion pieces.

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Cartoons, puzzles, crossword and stories

Subject matter: Captive breeding, (wild) animal husbandry and management, wildlife management, field notes, conservation biology, population dynamics, population genetics, conservation education and interpretation, wild animal welfare, conservation of flora, natural history and history of zoos. Articles on rare breeds of domestic animals are also considered.

Source: Zoos, breeding facilities, holding facilities, rescue centres, research institutes, wildlife departments, wildlife protected areas, bioparks, conservation centres, botanic gardens, museums, universities, etc. Individuals interested in conservation with information and opinions to share can submit articles ZOOS' PRINT magazine.

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