Magazine of Zoo Outreach Organisation
www.zoosprint.org

ISSN 0971-6378 (Print); 0973-2543 (Online)
Vol. XXXIX, No. 11, November 2024

ZOO'S PRINT

Communicating science for conservation

ZOO'S PRINT

Communicating science for conservation

Vol. XXXIX, No. 11, November 2024 ISSN 0971-6378 (Print); 0973-2543 (Online)

Contents

Cover photo: Stem fungi in Coorg. ©Sanjay Molur.

A UNESCO World Heritage Site: The alluring montane forests and grasslands of the Western Ghats of peninsular India

As a budding wildlife researcher, I often get a chance to visit several locations like the open grasslands of Rajasthan, mixed moist deciduous forests of Maharashtra or the dense mixed-wet forests of northern Bengal. During my internship with Indian Institute of Science Education and Research (IISER), Tirupati, I got an opportunity to visit the Eravikulam National Park as part of a project to examine the spread of woody invasive species across the Sky Island landscape and its relationship with the bird community. Famous for its endemic Nilgiri Tahr, this national park is located along the Western Ghats in the Idukki and Ernakulam districts of Kerala, India. It acts as a distinct biogeographic zone of India and a biodiversity hotspot. During the data collection I got a chance to visit some breathtaking and remote locations in the park.

The landscape that was a mosaic of forest and open grasslands attracted me the most. You could walk miles after miles along the open, windy grasslands only to suddenly experience a complete transformation of your surroundings into a dark, gloomy, moist forest patch. This landscape is often referred to as the shola-grassland ecosystem. The shola landscape contradicts the 'one climate-one biome' view of a single climax community of a given climate (Joshi et al. 2020).

Landscape and biodiversity of the region

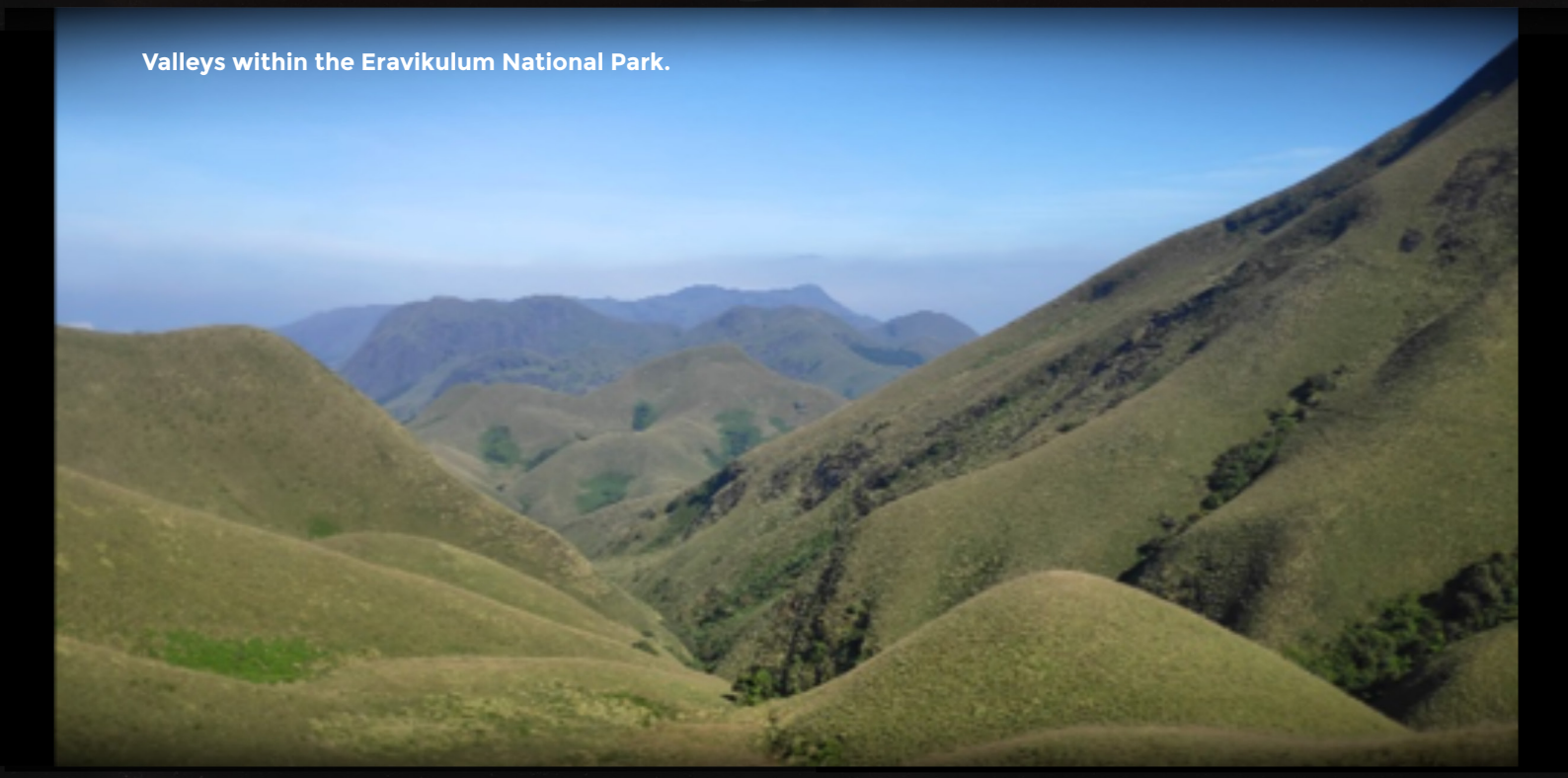
The grasslands were mostly open spaces with different varieties of grass species. It is definitely the only place where one can now witness the grandeur of the mountains covered by the mass flowering 'Neelakurinji' *Strobilanthes kunthiana*, "the great blue flower of Nilgiri". Based on the characteristic spectral radiance value three grassland communities are identified in the region i) *Dichanthium polyptcum- Eulalia phaeothrix-Chrysopogon zeylanicus*; ii) *Arundinella mesophylla-Andropogon lividus-Ischaemum indicum-Chrysopogon zeylanicus*; and iii) *Arundinella purpurea-Chrysopogon zeylanicus-Eulalia phaeothrix*.

The shola forest had different Strobilanthes sp. of stunted growth. A plethora of bird calls entertained the journey through the forest. Often distinct rattle and hoots of the Indian Scimitar-Babbler *Pomatorhinus horsfieldii* would be heard and the Palani Laughingthrush *Montecincla fairbanki* would be seen chilling amidst the coffee plantations. Many species like the Nilgiri Pipit *Anthus nilghiriensis,* Black-and-orange Flycatcher *Ficedula nigrorufa*, Nilgiri Flycatcher *Eumyias albicaudatus* or the magnificent Black Eagle *Ictinaetus malaiensis* would pay a visit.

On the last day of work a cacophony of birds caught my attention and after staying on guard at the place, I got a glimpse of three Nilgiri Sholakili *Sholicola major*. I was eager to see this bird and it seemed like it gave me a final adieu before my departure.

A species of fungi *Microporus xanthopus*.

Leopard scat found by a walking track.



Valleys within the Eravikulum National Park.

A *Nyctemera adversata* caterpillar.

Nilgiri Tahr in its natural habitat.

This landscape is mysterious and one of the most diverse in its existence. 29 Species of mammals, 140 species of birds, 100 varieties of butterflies, 20 species of amphibians are found here. The Nilgiri Tahr, Gaur, Sloth Bear, Nilgiri Langur, Tiger, Leopard, Giant Squirrel and Wild Dog are common (Menon 1997). Civet Cats and Jungle Cats live in the Sholas. Atlas Moth, the largest of its kind in the world is seen in this park (Menon 1997).

Cause of existence and maintenance of the shola-grassland ecosystem

The existence of the shola-grassland system has baffled ecologists for decades. Most mosaics occur under climate where most biome distribution models predict the occurrence of forest, not grasslands (Joshi et al. 2020).

Then what caused and maintained this unique landscape? Several theories explain their evolution and adaptation over the long period of time:

• One considers the grasslands and forests to be edaphic climaxes caused by differences in soil moisture (Thomas & Palmer 2007).

• While some say distinct climatic and physiographic factors enable the mosaic's persistence. A dynamic equilibrium maintained by the existence of alternate stable states influenced by environmental parameters including frost, fire, grazing, soil nutrients, soil depth, wind, and illegal harvesting (Bunyan et al. 2012).

• Forest spread over the grasslands during the warmer wetter phases and contract during dry cooler times (Das et al. 2015). A study by Joshi et al. (2020) found that frosts and freezing night-time temperatures that occur during the winter kill native tree seedlings in grasslands, and thereby maintain this tropical montane forest-grassland mosaic system.

• Topography also influences the vegetation patterns. Higher elevations support large grassland stretches (Ramesh et al. 1997). Other parameters such as the position of the slope, elevation along with the number of winds, and solar radiation faced by a region also determine vegetation types (Das et al. 2015).

• Grasslands are also thought to be formed due to anthropogenic fires caused by humans to clear forests in the past (Das et al. 2015).

• Palaeohistological studies suggest the existence of the grasslands and forest mosaic long before human settlements were established in those regions (Das et al. 2015).

More spatial-temporal data on the disturbance is required to understand the occurrence of the vegetation patterns especially at lower elevations (Das et al. 2015).

Threats and conservation

This ecosystem has been under several threats since the age of time. One such threat is the plantation of exotic species and tea/coffee plantations, these are leading to a loss of the native shola species (Joshi et al. 2018). Non-native species of plants such as Black Wattle *Acacia mearnsii* are better at tolerating frost and cold temperatures, hence surpasses the native species and invades into the savanna (Joshi et al. 2020). Climatic changes can disrupt the shola-grassland equilibrium. The pattern of the mosaics varies greatly across the entire region, hence conservation plans should be crafted with different management guidelines. A better understanding of the interactions between the topographic and bioclimatic conditions will provide insights into

Stream inside the Shola forest.

Neelakurinji seen in the national park.

The Shola forest-grassland mosaic landscape.

A fern of the family Cyatheaceae in the Shola forest.

A flower of the family 'Asteraceae'.

the mechanisms that maintain forest-grassland mosaics and help in their conservation in the face of increasing anthropogenic activities. With the presence of endemic flora and fauna such as the White-bellied Sholakili *Sholakili albiventris*, Nilgiri Tahr and a high rate of species diversity associated with the island-like conditions of mountaintops make these mosaics a priority in conservation. Awareness through workshops should be spread among local communities and biodiversity assessment through citizen science can help conserve this landscape and its diversity. The fate of this bewildering landscape hence depends on further research and appropriate management.

References

Bunyan, M., S. Bardhan & S. Jose (2012). The shola (tropical montane forest)-grassland ecosystem mosaic of Peninsular India: A Review. *American Journal of Plant Sciences* 03(11): 1632–1639.

Das, A., H. Nagendra, M. Anand & M. Bunyan (2015). Topographic and bioclimatic determinants of the occurrence of forest and grassland in tropical montane forest-grassland mosaics of the Western Ghats, India. *PLoS ONE* 10(6): e0130566.

Joshi, A.A., M. Sankaran & J. Ratnam (2018). 'Foresting' the grassland: Historical management legacies in forest-grassland mosaics in southern India, and lessons for the conservation of tropical grassy biomes. *Biological Conservation* 224: 144–152.

Joshi, A.A., J. Ratnam & M. Sankaran (2020). Frost maintains forests and grasslands as alternate states in a montane tropical forest–grassland mosaic; but alien tree invasion and warming can disrupt this balance. *Journal of Ecology* 108(1): 122–132.

Menon, A.R.R. (1997). Vegetation mapping and analysis of Eravikulam National Park, Using remote sensing techniques. KFRI Research Report 130. Kerala Forest Research Institute, Peechi, 20 pp.

Ramesh, B.R., S. Menon & K.S. Bawa (1997). A vegetation based approach to biodiversity gap analysis in the Agastyamalai Region, Western Ghats, India. *Ambio* 26(8): 529–536.

Thomas, S.M. & M.W. Palmer (2007). The montane grasslands of the Western Ghats, India: Community ecology and conservation. *Community Ecology* 8(1): 67-73.

Ritika Chatterjee
Migratory Bird Monitoring Trust, Kanyakumari, Tamil Nadu 629702, India.
Email: chatterjeeritika1997@gmail.com

Shola grasslands. ©Ritika Chatterjee.

When catfish met birds: a Perumbakkam lake's tale

About six months ago, my friends and I were birdwatching at Perumbakkam Lake, one of the popular locations in Chennai. During our visit, we noticed this intriguing event – an uncanny encounter between catfish and a Spot-billed Pelican. It was a nice winter morning, an unexpected shower helped cope with the weather. We drove down to the Perumbakkam lake, enroute T-Nagar and Old Mahabalipuram Road. The road looked quite occupied, from the cyclists pedaling their way along the corner to the bikers carefully manoeuvring their way in between buses and cars. It wasn't busy, but it wasn't too quiet.

We reached the spot at around 7 am. A mustering of Painted Storks busily foraging the waterfront, immediately caught our eyes. It's heavy yellow beak with down-turned tip, the dark orange head, and light pink elongated slender legs are impossible to miss. Meanwhile, there was a flock of Northern Pintails with its heads dipped inside the water. It has this peculiar habit of foraging by dipping its head in the shallow water for food, according to the National Audubon Society. There emerged another interesting couple from within this flock, who seemed to be in a hurry. From the distance, they appeared like Pintails, but a closer inspection through our binoculars revealed their distinctively larger, flatter beak, which is a sign of yet another beautiful migrant – Northern Shoveler. We were unable to catch the green head of the male, as the birds were positioned against the sun. The two of them were in some sort of rush as they swam their way back into the flock and were gone.

And we saw a couple of Bronze-winged Jacana foraging close to the swamp near the road. Blue-tailed Bee-eaters playing hunt and rest like a flash, a flurry of motion and fleeting response. Meanwhile, Spot-bellied Pelicans were scattered all around the

Lake and a Pond Heron was perched on the water lily, patiently awaiting its prey, all the while hearing an annoyed Red-wattled Lapwing. The poor thing was distressed by a stray dog, and of course, us (talkative strangers). It went on like this did-u-do-it---did-did-did-u-do-it. In response we could only say, "Sorry dude, we did it and we will stop now."

We moved from there and walked past the speed bump and abandoned tollbooth. The metro wall stood between us on the road and the lake. As we walked past the bump, looking for a gap in between the temporary wall, questions about the fate of this precious wetland ecosystem swirled in my mind. Could this development disturb the birds? Would they be forced to seek a new home? I left it up to the time and moved on, it wasn't easy though. A bulldozer parked in the corner and a huge opening in the temporary wall piqued our curiosity. Slipping through, we positioned ourselves to gain an unobstructed view of the lake. A lone pelican was paddling its way effortlessly to the other side.

However, it looked disturbed as it picked up the pace and turned back with its opened beak to shush someone. We screened the surface behind the pelican to see a school of catfish. It looked menacing in numbers and kept following the bird. We immediately got engrossed by this event and followed them closely for a while.

On the water's surface, we first noticed a pelican swimming in front of this school of catfish. Although we were unsure, it appeared that the fish were chasing the pelican. Pelican accelerated and frequently flashed them in an attempt to frighten the fish, but it was in vain.

After a while, we noticed a flock of pelicans moving toward and joining the lone bird. Because there were so many catfish, we assumed they would feast. But what we observed from the outside was truly astounding. The catfish and pelican were both snacking on some smaller fish. The pelicans were divided and dispersed all over as the catfish group grew in size within a short period of time.

However, things didn't stop there. When there was a second visitor, the scene took an unexpected turn. A Painted Stork, with its striking white plumage and long, slender bill, added a new dimension to the encounter. As this new fella joined the pelicans, the situation became even more intense.

The catfish, however, proved to be a formidable adversary. With their numbers growing and their size of the school increasing, they remained a challenging opponent for the birds. The stork, along with the pelicans, tried their best to round up the catfish near a dense bush, hoping to limit their movement and make it easier to catch them. Despite their efforts, the catfish proved to be agile and elusive. They swiftly navigated through the water, skilfully avoiding the birds' attempt to catch them. The catfish split into two or three smaller groups, making it even more challenging for the birds to control the situation. Interestingly, it seemed as if the pelicans and storks had a well-thought-out strategy, positioned behind each of these smaller catfish groups. They persisted in their pursuit.

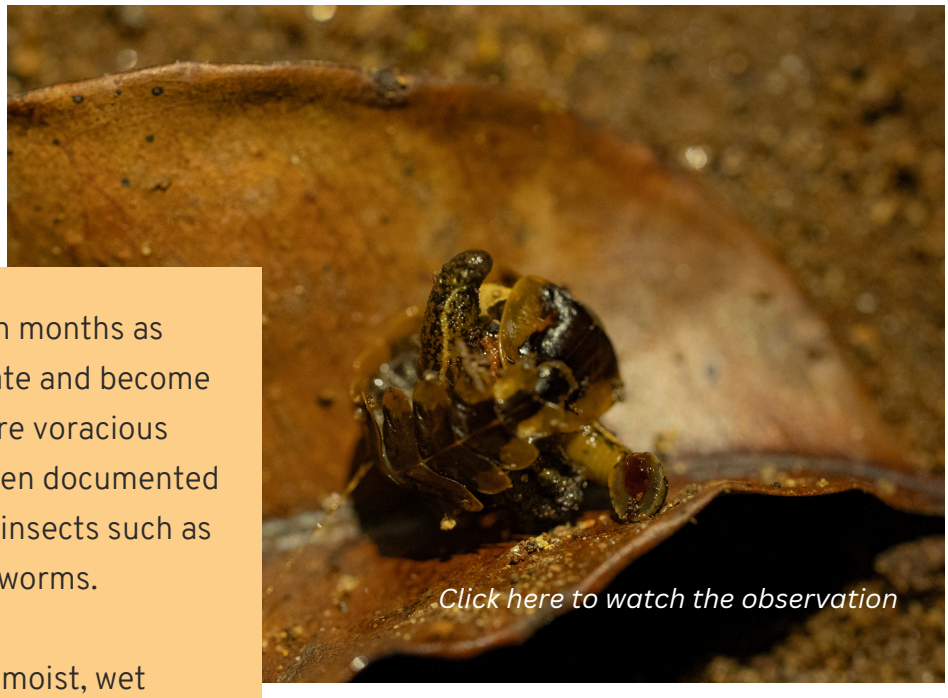
After some time, one of the smaller groups of catfish found themselves cornered against the bank of the lake, near a patch of water hyacinth. Seizing the opportunity, the painted stork and the pelicans swiftly closed in on the trapped fish.

With their sharp beaks and expert hunting skills, the stork and the pelicans feasted on the catfish that were finally within their reach. It was a moment of triumph for the birds, as they managed to secure a meal despite the formidable resistance put up by the catfish. As the Painted Stork and the pelicans enjoyed their hard-earned feast, the other catfish groups dispersed, retreating to safer areas of the lake. The encounter between the catfish and the birds had come to an end, leaving behind an intriguing spectacle of nature's power dynamics.

Witnessing this extraordinary event has been a memorable experience for me since then. This event has the perfect highlight of the intricate interplay between different species in their struggle for survival. It serves as a reminder of the diverse and fascinating behaviours that can be observed in the natural world.

Gowthama Rajavelu, No 38/1, KK Illam, Gangaiamman Koil street, Choolaimedu, Chennai 600094.
Email: gowthy87@gmail.com

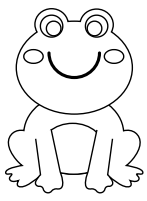
ECOLOGICAL OBSERVATION



FIREFLY LARVA PREDATION: UNEXPECTED PREY AND INSIGHTS FROM THE FIELD

Fireflies grow up to ten months as larva before they pupate and become adults. Firefly larvae are voracious predators and have been documented to feed on soft bodied insects such as snails, slugs and earthworms.

In January 2023, on a moist, wet evening, we ventured into a shola forest in the Anamalai Tiger Reserve, looking for firefly larvae. In pitch black conditions, under a thick forest canopy, we saw a firefly larva, on the ground, glowing in a rich, lime green colour. I turned my yellowish - orange light on, focusing it away from the larva. The larva was coiled up, feeding on a leech. It was swallowing it slowly. The larvae inject their prey with paralysing neurotoxins. Then, they secrete digestive enzymes that liquefy the prey before consumption. The larva consumed the leech in thirty minutes and crawled away under leaf cover. This was an exhilarating hunt in the forest at the macro level. This is the first record of a firefly larva feeding on a leech.



Recorded by Sriram Murali and Chandrasekar Rathnam of Wild and Dark Earth, an NGO that conserves nocturnal habitats in India. Email: wildanddarkorg@gmail.com.

First record of albinistic Plain Prinia observed near Sathyamangalam in Erode district Tamil Nadu, India.

The Plain Prinia *Prinia inornata* is a monogamous bird that comes under the family Cisticolidae and order Passeriformes. It is a resident breeder from India and Pakistan to southern China and southeastern Asia, typically found in wet lowland grassland, open woodland, scrub, and sometimes gardens.

Albinistic Plain Prinia observed in Sathyamangalam. © Kishore M.

Albinism is characterized by the lack of colour pigment, birds are often pure white, and in some cases, they might have yellow and dark patches on feathers and tail. Abnormally coloured birds have reduced chances of survival and mating success compared to normal coloured birds (Forrest & Naveen 2000; Guay et al. 2012).

On 16 January 2022 during the field trip, we observed a Plain Prinia in a farmland near Sathyamangalam (11.5235 N, 77.2451 E, 239 m). A small passerine bird was spotted with a white morph in the whole body, feathers and tail in the group. It is not common, and we closely observed the bird and found that it was an albinistic Plain Prinia. It was a chick that was fed by its parents. The Plain Prinia usually has a black bill, grey-brown upperparts, and whitish underparts (Grimmett et al. 2011). However, in this observation, the bird is fully white and has yellowish beak.

Based on the literature a partially leucistic Plain Prinia was observed at Thane district, Maharashtra (Kasambe & Kasambe 2020). Here we describe the first record of albinistic Plain Prinia from Tamil Nadu, India. Further research is needed for the abnormal plumage occurrence, which likely to affect their survival and breeding.

Normal Plain Prinia and albinistic Plain Prinia. © Kishore M.

References

Forrest, S.C. & R. Naveen (2000). Prevalence of leucism in pygocelid penguins of the Antarctic Peninsula. *Waterbirds* 23(2): 283–285.

Grimmett, R., C. Inskipp & T. Inskipp (2011). *Birds of the Indian subcontinent*. Oxford University Press, New Delhi, 528 pp.

Guay, P.J., D.A. Potvin & R.W. Robinson (2012). Aberrations in plumage coloration in birds. *Australian Field Ornithology* 29(1): 23–30.

Kasambe, R & V. Kasambe (2020). A partially leucistic Plain Prinia from Thane District, Maharashtra. *Newsletter for Birdwatchers* 60(6): 69.

M. Kishore[1] & T. Siva[2]

[1] Department of Zoology and Wildlife Biology, Government Arts College, Udhagamandalam, Tamil Nadu 643001, India.

[2] 73, Manthakarai Street, Thirukoilure, Kallakurichi District, Tamil Nadu 605757, India.

Emails: [1]kishoreak1999@gmail.com (corresponding author), [2]sivanaturewild@gmail.com.

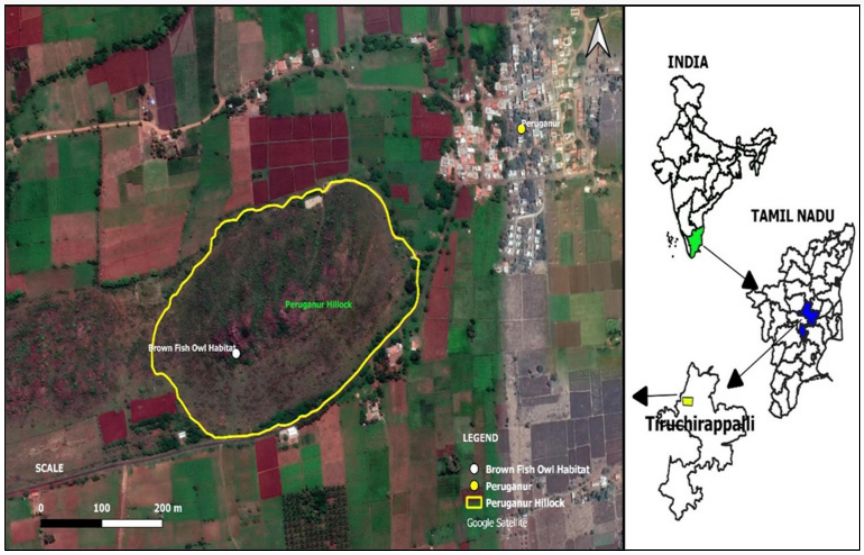
Citation: Kishore, M. & T. Siva (2024). First record of albinistic Plain Prinia observed near Sathyamangalam in Erode district Tamil Nadu, India. Bird-o-soar #249, In: *Zoo's Print* 39(11): 09–10.

Diet composition of Brown Fish-Owl in Tiruchirappalli District, Tamil Nadu, India

In India, 36 species of owls are recorded (Praveen et al. 2021) and among them, 15 species are from Tamil Nadu (Ali & Ripley 1983; Grimmett et al. 2011; Jayson & Sivaram 2009). The local name of the Brown Fish-Owl is *Booman Anthai* (Tamil) (Ali & Ripley 1983). The Brown Fish- Owl *Ketupa zeylonensis* is a resident owl and occurs in the Indian Subcontinent. It is mostly seen in lowlands, streamside, lakeside woods, thickets, villages, groves, and open forests. This owl is semi-diurnal, roosting in large trees during the daytime and leaving well before sunset. Nests are built in hollows or depressions in trees, rock ledges or steep stream banks, normally near water. The clutch size is typically two. Published information on Brown Fish-Owl on various aspects by researchers in India is limited to a few geographical regions, viz., feeding on Little Cormorant in Rajasthan (Thakur & Kray 2015), notes on the breeding of Brown Fish-Owl from Jambughoda

Brown Fish Owl roosting on a tree. © T. Siva.

Habitat of Brown Fish-Owl at Peruganur hillock. © T. Siva.



Brown Fish Owl location map.

Broken and scattered non-rodent pellet observed and collected from underneath of roosting site of a Brown Fish-Owl. © T. Siva.

Wildlife Sanctuary, Gujarat (Vyas et al. 2013), observation on the breeding from Kerala (Bindu & Balakrishnan 2015). To date, there is no published information about the diet aspects on this owl from Tamil Nadu. The present study was conducted to document the prey intake of Brown Fish-Owl from hillock (small hill) habitats of Musiri Taluk, Tiruchirappalli District, Tamil Nadu.

The present study was conducted in the Peruganur Village of Musiri Taluk in Tiruchirappalli District, Tamil Nadu, India. The Brown Fish-Owl was observed from the Peruganur hillock. The total area of the Peruganur hillock is 9.57 ha. In this study area, one pair of Brown Fish-Owls were studied. During the survey, GPS locations of the identified nest/roost sites were recorded with the help of Garmin etrex 20 GPS device (11.1166 N, 78.4154 E).

Owl pellets are in general accumulations of the undigested portions of prey that are regurgitated and ejected through the mouth in compact units. Owl pellet analysis serves as a non-destructive means of diet determination. The regurgitated pellets were collected from a pair of Brown Fish- Owls in Peruganur hillock every week from October 2020 to February 2021. They were collected separately during each visit and placed them in plastic bags. The pellets were kept at 70°C in a hot air oven for 24 hours to kill the associated invertebrates (Siva et al. 2019). The diet composition of the Brown Fish-Owl was studied by the analysis of materials found in the pellets. The regurgitated pellets were placed in the 8% (by weight) sodium hydroxide

Table: Prey composition of Brown Fish-Owl.

	Month and year	October 2020	November 2020	December 2020	January 2021	February 2021	Total	Percentage
	Prey species / Total number of pellets collected	**22**	**16**	**22**	**19**	**29**	**108**	
Invertebrates								
1	Rhinoceros Beetle *Oryctes rhinoceros*	6	6	2	3	5	22	14.47
2	Wind or Sun Spider *Galeodus indicus*	0	0	0	1	0	1	0.66
3	Crab sp.	1	0	3	2	1	7	4.61
Vertebrates								
4	Amphibians	20	15	21	14	23	93	61.18
5	Reptiles	4	2	0	1	3	10	6.58
6	Lesser Bandicoot Rat *Bandicota bengalensis*	0	1	2	1	3	7	4.61
7	Indian Soft-furred Rat *Millardia meltada*	2	0	0	2	0	4	2.63
8	Little Indian Field Mouse *Mus booduga*	0	0	0	1	0	1	0.66
9	Indian Gerbil *Tatera indica*	0	0	0	0	1	1	0.66
10	Unidentified Rodents	1	1	0	1	3	6	3.95
Total		**34**	**25**	**28**	**26**	**39**	**152**	**100**

(NaOH) solution, individually, in separate washing cups as suggested by Siva et al. (2019). The 8% NaOH solution was then carefully decanted by using a filter and the osteous/ chitinous remains were collected, oven-dried at 60°C, labelled, bagged and preserved for prey species identification.

The skull, cranial bones and dentary bones were used to identify the small mammalian prey. Among the pellet contents, the lower jaws were selected as keys for the identification of prey species as they occurred in most of the pellets and differed morphologically among rodent species (Neelanarayanan et al. 1998; Talmale & Pradhan 2009). One pair of the mandible of a rodent species was recorded as one prey.

The other prey items were identified based on the osteous and chitinous arthropod remains (Taylor 1994). In the absence of mandibles, other bones like skulls, limb bones, pectoral and pelvic girdles were useful, especially for identifying and quantifying the mammalian, reptilian and amphibian prey (Neelanarayanan et al. 1998; Talmale & Pradhan 2009). The Rhinoceros Beetles were identified by using their chitin remains in the analysed pellets. A hand lens or low power binocular microscope was employed to identify arthropod exoskeletons (Marti 1987).

A total of 108 pellets were collected during October 2020 to February 2021. The number of pellets collected varied every month. The

intactness of the pellets is perhaps due to the hair present in the rodent prey. It was observed in the present study, if these owls consume non-rodent prey, the fallen pellets are often found broken and scattered under the nest/ roosting sites.

The analysis of 108 pellets resulted in 152 prey items. The percentage of prey composition was to the tune of 14.47% for Rhinocerus Beetles *Oryctes rhinoceros*, 0.66% for Sun Spider *Galeodes indicus*, 4.61% for crab species. The vertebrate prey species was to the tune of 61.18% for amphibians, 6.58% for reptiles, 4.61% Lesser Bandicoot Rat *Bandicota bengalensis*, 2.63% for Indian Soft-furred Rat *Millardia meltada*, 0.66% for Little Indian Field Mouse *Mus booduga*, 0.66% for Indian Gerbil *Tatera indica* and 3.95% for unidentified rodent species. Further, it is apparent from the results that in terms of the frequency and proportion that amphibians dominated in the owl's diet followed by Rhinoceros Beetle O. rhinoceros and reptiles. In the present study, no fish prey were found in the diet of this bird as there were no water in the water bodies during the study period.

Analysis of regurgitated pellets revealed presence of small mammals such as rodent prey included *Bandicota bengalensis*, *Millardia meltada*, *Mus booduga*, and *Tatera indica*. All these four species of rodents were already reported by Neelanarayanan et al. (1996) and Neelanarayanan (1997). Another prey item Rhinoceros Beetle is a major pest of coconut palm trees. This study indicates that the Brown Fish-Owls are natural predators of amphibians, rodents and insects. The results of the present investigation are following the findings of Rasmussen & Anderton (2012) wherein they reported that the diet of this owl is composed of mainly fish, frogs, freshwater crabs and occasionally rodents, reptiles and birds. Further, according to Holt et al. (2016) this owl hunts from perches overlooking the water from where it swoops down and seizes prey from the water.

Conclusion

Based on the findings of the present study, the Brown Fish-Owl can be viewed as an important predator of amphibians, rhinoceros beetles, reptiles, and rodents.

References

Ali, S. & S.D. Ripley (1983). *Handbook of the birds of India and Pakistan together with those of Bangladesh, Nepal, Bhutan and Sri Lanka*. Compact ed. Oxford University Press, Delhi, 737 pp.

Bindu, T.N. & P. Balakrishnan (2015). Observation on the breeding of the Brown Fish-owl *Ketupa zeylonensis* in Kerala, Southern India. *Journal of the Bombay Natural History Society* 112(2): 97–98.

Grimmett, R., C. Inskipp & T. Inskipp (2011). *Birds of Indian Subcontinent*. Princeton University Press, India, 528 pp.

Holt, D.W., R. Berkley, C. Deppe, P. Enriquez Rocha, J.L. Petersen, J.L. Rangel Salazar, K.P. Segars, K.L. Wood & G.M. Kirwan (2016). Brown Fish-owl (*Ketupa zeylonensis*). In: del Hoyo, J,, A. Elliott, J. Sargatal, D.A. Christie & E. de Juana (eds.). *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.

Jayson, E.A. & M. ram (2009). Ecology and behaviour of forest owls in the Western Ghats and developing a habitat model for their conservation. KFRI Research Report No. 343.

Marti, C.D. (1987). Raptor food habit studies, pp. 67–79. In: Pendleton, B G., B.A. Millsap, K. W. Kline & D.A. Bird (eds.). *Raptor Management Techniques Manual*. Institute

for Wildlife Research, National Wildlife Federation, Washington D.C., USA, 462 pp.

Neelanarayanan, P. (1997). Predatory pressure of Barn owl (*Tyto alba stertens* Hartert, 1929) on Rodent Pests - A Field Evaluation. Ph.D. dissertation, Bharathidasan University, Tiruchirappalli.

Neelanarayanan, P., R. Nagarajan & R. Kanakasabai (1996). Burrow morphology of field rodents. *Journal of the Bombay Natural History Society* 93(2): 238–241.

Neelanarayanan, P., R. Nagarajan & R. Kanakasabai (1998). Studying diet of Barn Owl (*Tyto alba stertens*) by pellet analysis, pp.125–131. In: Dhindsa, M.S., P.S. Rao & B.M. Parasharya (eds.). *Proceedings of the First National Symposium on Birds in Agricultural Ecosystem*. Society for Applied Ornithology, India, 196 pp.

Praveen, J., R. Jayapal, T. Inskipp, D. Warakagoda, P.M. Thompson, R.C. Anderson & A. Pittie (2021). Checklist of the birds of the Indian subcontinent (v5.0). Website: http://www.indianbirds.in/indian-subcontinent/. Date of publication: 29 March 2021.

Rasmussen, P.C. & J.C. Anderton (2012). *Birds of South Asia-The Ripley Guide*. Vols. 1 and 2. Second Edition. Lynx Edicions, Barcelona, 1072 pp & 688 pp.

Siva, T., P. Neelanarayanan & V.V. Rao (2019). Food composition of Indian Eagle Owl *Bubo Bengalensis* Franklin (Aves: Strigiformes: Strigidae) from Tiruchirappalli District, Tamil Nadu, India. *Journal of Threatened Taxa* 11(5): 13545–13551.

Talmale, S.S. & M.S. Pradhan (2009). Identification of some small Mammal species through Owl Pellet Analysis. *Records of Zoological Survey of India*, Occasional Paper No. 294: 1–44.

Taylor, I. (1994). *Barn Owls: Predator-prey relationships and conservation*. Cambridge University Press, Cambridge, U.K., 324 pp.

Thakur, S. & C. Kray (2015). Record of Brown Fish Owl *Ketupa zeylonensis* preying on Little Cormorant *Phalacrocorax niger* in Ranthambhore Tiger Reserve, Rajasthan. *Zoo's Print* 30(7): 20.

Vyas, R., K. Upadhayay, M.R. Patel, R.D. Bhatt & P. Patel (2013). Notes on the breeding of the Brown Fish-Owl *Ketupa zeylonensis*. *Indian BIRDS* 8(6): 147–151.

Acknowledgements
We are highly indebted to the management and Principal of Nehru Memorial College (Autonomous) for their help and encouragement. We thank the Tamil Nadu Forest Department for permitting to study the diet composition of Brown Fish-Owls in Tiruchirappalli District.

G. Lakshmanan[1], T. Siva[2], A. Muthusamy[3] & P. Neelanarayanan[4]
[1-4] Research Department of Zoology, Nehru Memorial College, Puthanampatti, Tiruchirappalli District, Tamil Nadu 621007, India.
Emails: [1]gvlakshmanan1708@gmail.com
[2] sivanaturewild@gmail.com (corresponding author),
[3] muthusamy9514@gmail.com, [4]dr.pnn31@gmail.com

Citation: Lakshmanan, G., T. Siva, A. Muthusamy & P. Neelanarayanan (2024). Diet composition of Brown Fish-Owl in Tiruchirappalli District, Tamil Nadu, India. Bird-o-soar #250, In: *Zoo's Print* 39(11): 11–15.

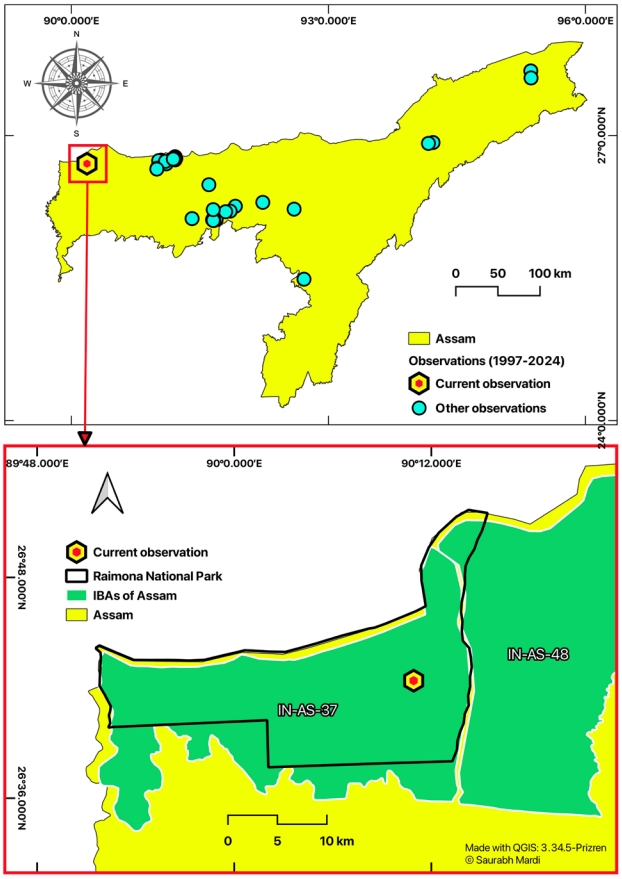
First record of the Short-eared Owl from Raimona National Park, Assam, India

Raimona National Park (Ripu Reserve Forest) is categorized as an Important Bird Area IBA (Rahmani et al. 2016; BirdLife International 2024) and holds a suitable habitat for critically threatened avifauna (Mahanta et al. 2022). Short-eared Owl *Asio flammeus* (Pontoppidan, 1763) is a winter migrant seen from September/October to March/April seen in undulating grasslands with scattered scrub, sparsely scrubbed hillsides, tall grasslands on the margins of *jheels*, and in semi-desert, in the Indian Subcontinent (Ali & Ripley 1987).

Short-eared Owl in RNP. © Bishal Basumatary.

On 30 January 2024, at 1215 h while surveying in Raimona National Park (RNP) on the dry riverbed of the Hel River in Bamba Forest Block (i.e., Athiabari Range), which comprises of patchy grasslands interspersed within the dry riverbed. We inadvertently flushed out a Short-eared Owl (26.706 N, 90.181 E) which had been probably resting. The bird took a 15 m brief flight, skimming close to the ground, and settled on a grass patch. Upon our approach, it took a short low glide, perching on a piece of driftwood. It remained there even after we moved on.

In Assam, they are uncommon (Choudhury 2000) and some observations have been made about this owl elsewhere in Assam (Das 2006; Brahma & Lakhar 2011; eBird 2021) but it was not recorded from Raimona National Park (Mahanta et al. 2022). So this is the first record from Raimona National Park and additional record to Assam.



Observational records of *Asio flammenus* in Assam.

References

Ali, S. & S.D. Ripley (1987). *Compact Handbook of the Birds of India and Pakistan together with those of Bangladesh, Nepal, Bhutan and Sri Lanka. 2nd ed*. Oxford University Press, Delhi, 841 pp.

BirdLife International (2024). Important Bird and Biodiversity Area (IBA) digital boundaries: March 2024 version. BirdLife International, Cambridge, UK. http://datazone.birdlife.org/site/requestgis

Brahma, N. & B.P. Lahkar (2011). Short-eared Owl *Asio flammeus*: a first record for Manas National Park, Assam. *Indian BIRDS* 7(1): 20.

Choudhury, A.U. (2000). *The Birds of Assam*. Gibbon Books & WWF-India: Guwahati, 240 pp.

Das, R.K. (2006). Birds of Dibru-Saikhowa Biosphere Reserve. *Newsletter for Birdwatchers* 46(1): 6–14.

eBird (2021). eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: http://www.ebird.org. Accessed on 06 November 2024.

Mahanta, N., N. Islam, R. Barman, S. Deka, U. Borkataki, T. Chhetri, S. Basumatary & M. Rahman (2022). A Preliminary Checklist of Avian Fauna from Raimona National Park of Assam, India. *Applied Ecology and Environmental Sciences* 10(11): 652–664.

Rahmani, A.R., M.Z. Islam & R.M. Kasambe (2016). *Important Bird and Biodiversity Areas in India: Priority Sites for Conservation (Revised and updated).* Bombay Natural History Society, Indian Bird Conservation Network, Royal Society for the Protection of Birds and BirdLife International (U.K.), 1992 pp

Bishal Basumatary[1], Saurabh Mardi[2], Kankanjyoti Kaushik[3], Paris Basumatary[4], Hilloljyoti Singha[5] & Kushal Choudhury[6]

[1,2,4-6] Department of Zoology, Bodoland University, Kokrajhar (BTR), Assam 783370, India

[3&4] Kachugaon Forest Division, Forest Department of Assam, Assam 783350, India

Email: [1]bishalbasumatary829@gmail.com (corresponding author)

Citation: Basumatary, B., S. Mardi, K. Kaushik, P. Basumatary, H. Singha & K. Choudhury (2024). First record of the Short-eared Owl from Raimona National Park, Assam, India. Bird-o-soar #251, In: *Zoo's Print* 39(11): 16–17.

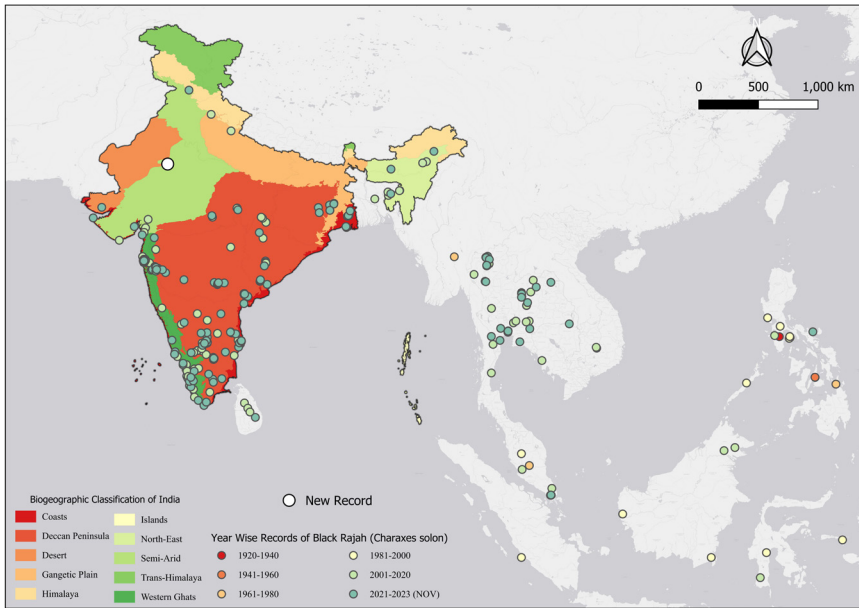
ISSN 2230-7052
Bugs R ALL
#283
21 November 2024
Newsletter of the
Invertebrate Conservation & Information Network of South Asia (ICINSA)

A photographic record of *Charaxes solon* from Aravalli hills of Rajasthan, India

Charaxes solon Fabricius, 1793, belonging to the family Nymphalidae, is a striking butterfly species known for its large size and distinctive black colouration with iridescent yellow markings (Varshney & Smetacek 2015). Historically, its distribution has been documented from Western Ghats, Himalaya (Sheikh & Parey 2019), Gangetic Plains (Mukherjee 2021), semi-arid (Bohra & Purkayastha 2021), Deccan Peninsula (Kuchanwar & Kamble 2021) and northeastern region (Bohra & Purkayastha 2021; Deori & Sonowal 2022). However, during a recent field survey to Aravalli regions of Central Rajasthan, we recorded and confirmed the presence of *C. solon* from this previously unreported region. The common name of this species is Black Rajah.

The recorded observation and morphological examinations

***Charaxes solon* on *Lantana camara*, the characteristic narrow wavy black lines with marginal yellowish-green spots (Kehimkar 2016). © Rounak Choudhary.**



Biogeographic map of India showing distribution and previous records of *Charaxes solon* (iNaturalist 2023) and observation locality.

ISSN 2230-7052
Bugs R All
#283
21 November 2024
Newsletter of the
Invertebrate Conservation & Information Network of South Asia (ICINSA)

based on photographic evidence confirm the identity as *C. solon*, as described in previous literature (Kehimkar 2016; Smetacek 2017) marking the new record of this species in the region. The site of observation (26.531 N, 74.671 E) is an ecotone of arid and semi-arid regions influenced by the Aravalli Hills creating a unique ecosystem that supports a diverse range of flora and fauna (Raj & Sharma 2023). This region experiences a pronounced dry season, with rainfall primarily occurring during the monsoon months. The climate is characterized by hot summers and mild winters, making it a challenging habitat for many species. During our observation studies, *C. solon* was recorded feeding on *Lantana camara*, an invasive plant. The presence of *C. solon* in this region significantly extends its known geographical range. The various social platforms have recorded its sightings from: Assam, Meghalaya, West Bengal, Jammu & Kashmir, Himachal Pradesh, Dadra & Nagar Haveli, Madhya Pradesh, Gujarat, Maharashtra, Goa, and southern Indian states (iNaturalist 2023; ifoundbutterflies 2024).

References

Bohra, S.C. & J. Purkayastha (2021). An insight into the butterfly (Lepidoptera) diversity of an urban landscape: Guwahati, Assam, India. *Journal of Threatened Taxa* 13(2): 17741–17752.
Deori, D. & J. Sonowal (2022). Checklist of butterflies from Kurukani forest village, Sivasagar, Assam, India. *Bulletin of Pure & Applied Sciences-Zoology* 41(1): 40–48.
ifoundbutterflies (2024). Available from https://www.ifoundbutterflies.org/charaxes-solon, Accessed on 3 November 2024.
iNaturalist (2023). Available from https://www.inaturalist.org/taxa/207989-Charaxes-solon, Accessed on11th September 2023.
Kehimkar, I. (2016). *Butterflies of India*. Bombay Natural History Society, Mumbai; 528pp.
Kuchanwar, D. & R. Kamble (2021). Butterfly fauna of Tadoba Andhari Tiger Reserve, Chandrapur district, Central India. *Ethiopian Journal of Environmental Studies & Management* 14(3): 370–379.
Mukherjee, K. (2021). New larval host plants for the Slate flash, Black rajah and Tiny grass blue butterflies (Insecta: Lycaenidae, Nymphalidae) from Bankura, West Bengal, India. *Journal of Animal Diversity* 3(4): 56–63.
Raj, A. & L.K. Sharma (2023). Spatial E-PSR modelling for ecological sensitivity assessment for arid rangeland resilience and management. *Ecological Modelling* 478(4): 110283.
Sheikh, T. & S.H. Parey (2019). New records of butterflies (Lepidoptera: Insecta) from Jammu and Kashmir Himalaya. *Records of the Zoological Survey of India* 119(4): 463–473.
Smetacek, P. (2017). *A Naturalist's Guide to the Butterflies of India*. Prakash Books India Pvt, New Delhi, 176 pp.
Varshney, R.K. & P. Smetacek (2015). *A Synoptic Catalogue of the Butterflies of India*. Butterfly Research Centre, Bhimtal and Indinov Publishing, New Delhi, 261pp .

Rounak Choudhary[1], Subroto Dutta[2], Dipesh Kumar Jangir[3], Vivek Sharma[4] & Praveen Mathur[5]
[1,2,5] Department of Environmental Science (Centre for Excellence), Maharshi Dayanand Saraswati University, Ajmer, Rajasthan 305009, India.
[3&4] Department of Zoology, Maharshi Dayanand Saraswati University, Ajmer, Rajasthan 305009, India.
Email: [1]rounakchoudhary17@gmail.com (corresponding author)

Citation: Choudhary, R., S. Dutta, D.K. Jangir, V. Sharma & P. Mathur (2024). A photographic record of *Charaxes solon* from Aravalli hills of Rajasthan, India. Bugs R All #283, In: *Zoo's Print* 39(11): 18–19.

Bugs R All is a newsletter of the Invertebrate Conservation and Information Network of South Asia (ICINSA)

A photographic record of Nilgiri Marten from Avandur, Kodagu District, India

The Nilgiri Marten *Martes gwatkinsii* is a 'Vulnerable' mustelid endemic to the Western Ghats (Mudappa et al. 2015). It is a semi-arboreal species and the only marten species native to southern India. On 11 February 2023 at 0800 h, a pair of Nilgiri Martens were observed climbing up a Warty Marble Tree *Elaeocarpus tuberculatus* which was ~25 m tall. They appeared to be looking for food and we later noticed an empty bird's nest in the tree which possibly drew the martens there. The pair were photographed at the canopy of the tree. They then descended and proceeded west on the ground towards the denser forest area.

A pair of Nilgiri Martens seen on an *Elaeocarpus tuberculatus* in Avandur, Kodagu District, India. © Romit Shilpe.

Nilgiri Martens perched together before descending the tree. © Romit Shilpe.

The location of the sighting (12.3950 N, 75.6560 E; 1,023 m) had a mix of wild vegetation (including established endemic trees such as *Artocarpus lacucha* and *Lagerstroemia microcarpa*, along with *Musa* spp.) with several coffee trees (Robusta and Arabica) below. There is a natural stream that flows ~40 m west of the *Elaeocarpus* tree on which the martens were spotted. That area is a thick wooded forest along with steep hills and no coffee plantations. This forested portion of the land is also relatively less disturbed by humans. Nilgiri

One Nilgiri Marten of the pair seconds before the descent. © Romit Shilpe.

Martens are known to frequent *Elaeocarpus* trees perhaps due to the hollows often found on them (Balakrishnan 2005); however, it could be beneficial to understand these species-habitat associations to help inform conservation. There are high levels of tree felling in the area surrounding this land which could have contributed to the sighting.

Previous sightings of the species from this region in the state of Karnataka range from 15–25 km aerial distance away from Avandur (Sreehari & Nameer 2013; GBIF 2023). Habitat loss and fragmentation have been considered as the main drivers in the limited distribution and sightings of this species (Mudappa et al. 2015). Local hunting could also be a key threat to martens (Mudappa 2013), especially in this region where humans believe that Nilgiri Martens raid bee hives and are considered pests (Kumara & Singh 2007). It is an elusive mammal which is often captured more frequently on camera traps (Shameer et al. 2023); however, the recent increase in human modifications is likely to push various species like the marten into this estate which is safe from development and pesticide use. This record appears to fall within the Brahmagiri habitat cluster which also include a multi-use area with key niche features required by the species (Shameer et al. 2023). According to local residents, Nilgiri Martens (referred to as 'tree dog' in the translated local language) have not been spotted around this location for many years. In the last five years of occupying this coffee estate, this is the first sighting of a Nilgiri Marten.

References

Balakrishnan, P. (2005). Recent sightings and habitat characteristics of the endemic Nilgiri Marten *Martes gwatkinsii* in Western Ghats, India. *Small Carnivore Conservation* 33: 14–16.

GBIF (2023). GBIF Occurrence. https://doi.org/10.15468/dl.sd9d3j. Accessed on 12 March 2023.

Kumara, H.N. & M. Singh (2007). Small carnivores of Karnataka: distribution and sight records. *Journal of the Bombay Natural History Society* 104(2): 155–162.

Mudappa, D. (2013). Herpestids, Viverrids and Mustelids, pp. 471–498. In: Johnsingh, A.J.T. & N. Manjrekar (eds.). *Mammals of South Asia*. Volume 1. Universities Press, Hyderabad, India, 766 pp.

Mudappa, D., D. Jathana & T.R.S. Raman (2015). *Martes gwatkinsii* (errata version published in

2016). The IUCN Red List of Threatened Species 2015: e.T12847A86161239. https://doi.org/10.2305/IUCN.UK.2015-4.RLTS.T12847A45199025.en. Accessed on 02 November 2024.

Shameer, T.T., N.A. Mungi, S.J. Backer, S. Raman, S.R. Reddy, P.S. Easa & R. Sanil (2023). Distribution and conservation status of the endemic Nilgiri Marten (*Martes gwatkinsii*). *Mammalia* 87(4): 360–366.

Sreehari, R. & P.O. Nameer (2013). The first records of Nilgiri Marten *Martes gwatkinsii* from Parambikulam Tiger Reserve, southern Western Ghats, India. *Small Carnivore Conservation* 49: 40–42.

Romit Shilpe[1], Ashwin Leyland[2] & Rohan K. Menzies[3]

[1] Barefoot Experiment, Vruksha Estate, Avandur Village, Bhagamandala Taluk, Madikeri, Karnataka 571201, India.
[2] 2nd Main Road, RBI Layout, JP Nagar 7th Phase, Bangalore, Karnataka 560078, India.
[3] Nature Conservation Foundation, 1311, "Amritha", 12th Main, Vijayanagar 1st Stage, Mysore, Karnataka 570017, India.
Emails: [1]romitshilpe@gmail.com, [2]alleyland@gmail.com, [3]rohanmenzies@ncf-india.org (corresonding author)

Citation: Shilpe, R., A. Leyland & R.K. Menzies (2024). A photographic record of Nilgiri Marten from Avandur, Kodagu District, India. Mammal Tales #53, In: Zoo's Print 39(11): 20–22.

Vulture Conservation Programme at Sathyamangalam Tiger Reserve

Vultures are scavengers that feed on dead animals. Out of nine species of vultures found in India, four species—Red-headed Vulture, White-rumped Vulture, Egyptian Vulture and Long-billed Vulture—are found in Sathyamangalam Tiger Reserve which is one of the largest tiger reserves in Tamil Nadu. Vulture awareness programmes were conducted in different school students covering Sathyamanglam and Gobichettipalayam areas.

A total of 12 schools were covered during the awareness programmes and 956 students of ages 11–17 years participated. The programmes include drawing competition, screening videos, and PPT presentation. In the presentation students were told about the ecological importance of vultures, its habitat, habitat loss, threat to vulture population and main threat due to diclofenac drug. The drug is fatal to vultures. Veterinary use of this drug to treat livestock has caused collapse of vulture populations throughout its habitat. Vultures that fed on carcasses treated with this drug suffered from kidney failure and died.

Through the presentation, the students understood about vultures and their conservation issues here in STR and other parts of country in detail and they raised many questions on vultures at the end; and all their queries were addressed. They promised that they will carry forward this message to the parents, most of them have livestock at home, and ask them not to use diclofenac for treating their cattle.

Acknowledgements
The author thankful to Tamil Nadu Forest Department, Sathymangalam Tiger Reserve and all the schools and teachers who participated in the programme.

Submitted by Jayarman Dharmaraj, Research Biologist, Innovation cum Incubation Centre for Vulture Conservation, Sathyamanglam Tiger Reserve, Sathyamanglam, Erode, Tamil Nadu 638401, India.
Email: dharmaraj590@gmail.com

BNHS and Van Vihar National Park observes International Vulture Awareness Day 2024

International Vulture Awareness Day takes place on the first Saturday of September and was established to highlight the importance of vulture conservation. Vultures are a vital part of the planet's ecosystem and are currently fighting several threats out in the wild, with some species facing extinction. On this day, Van Vihar National Park & Zoo and Bombay Natural History Society, Vulture Conservation Breeding Centre, Bhopal organised some events for vulture conservation.

On 07 September 2024, a workshop was held on vulture conservation. The directors/managers of the cow shelters operated by all the non-governmental voluntary organizations around Bhopal city and under MGNREGA (Chief Minister Gauseva Yojana) participated in the workshop. The objectives of the workshop were highlighted by Avdhesh Meena I.F.S., field director, Van Vihar National Park-Zoo, Bhopal. He emphasized that vultures play a significant role in keeping our ecosystem healthy and clean. Vultures do not hunt live prey but act as natural scavengers feeding on the carcasses of dead animals. He further stressed the impact of the Diclofenac drug effect on vulture decline in India as well as safe alternative drugs such as Meloxicam and Tolfenamic Acid utilization on treating cattle.

Shri Mohammed Khaliq, Bhopal Birds, Bhopal gave a presentation on vultures in Madhya Pradesh, their population and identification keys, and importance of vultures in the ecosystem. Further, he insisted on the importance to create vulture restaurants for boosting the vulture population and monitoring the vulture population as well. Ms. Zainab Zaheer Khan, research biologist, Bombay Natural History Society VCBC- Bhopal gave a talk on the impact of NSAIDs on the Vulture population in India and the overview and highlights of the Vulture Conservation Breeding Centre, Bhopal. In her talk, she explained the impact of NSAIDs on the vulture population such as Diclofenac, Acelofenac, Ketoprofen, and Nimusulide and their ban in veterinary practices. Further, she stressed the importance of the vulture conservation breeding program and the importance of what kind of species are involved in a captive breeding program in Bhopal, husbandry & care centre achievements to the participants. Dr. Ajay Ramteke, deputy director, Veterinary Services, in his talk advised the farmers not to use Diclofenac drug in the treatment of milch animals and to use Meloxicam drug instead. The use of Diclofenac drug is banned by the Government of India for dairy animals. At the end of the workshop, a vulture-based snake and ladder game was played to make all the participants aware.

On the spot quiz programme and vulture conservation snake and ladder game were conducted at the snake park to create awareness among general visitors of the zoo. The public participated enthusiastically and the winners were awarded with gifts. Prizes were distributed to the students who participated in the painting and drawing competitions. The assistant director of Van Vihar Zoo gave the vote of thanks.

Submitted by Arockianathan Samson, Centre Manager, Bombay Natural History Society, Vulture Conservation Breeding Centre, Bhopal, Madhya Pradesh 462007, India.
Email: a.samson@bnhs.org

Workshop on Vulture Conservation (Gaushala representatives).

Vulture conservation based snake & ladder game conducted at Snake Park, Van Vihar National Park & Zoo.

Posters created during the drawing and painting competition.

On the spot quiz programme with visitors at Snake Park, Van Vihar National Park & Zoo.

Group photo with participants on Vulture Conservation workshop 7 September 2024.

Human-Crocodile co-existence: a brief overview


Saltwater crocodile at Bhitarkanika National Park.

Crocodiles have a remarkable evolutionary history and are often referred to as living fossils. They have remained relatively unchanged for over 200 million years, making them one of the oldest reptile lineages on Earth. They are sensitive to changes in water quality, habitat degradation, and pollution. Therefore, their presence or absence from an area serves as an indicator of the health of the ecosystem there.

The Saltwater Crocodile *Crocodylus porosus* is a crocodilian native to saltwater habitats, brackish wetlands, and freshwater rivers. It has been listed as 'Least Concern' on the IUCN Red List since 1996. It was hunted for its skin throughout its range up to the 1970s and is threatened by illegal killing & habitat loss. It is regarded as dangerous to humans.


Community sensitization programme on strategies for mitigation.

The Bhitarkanika mangroves are home to India's many known mangrove species. The mangroves harbour one of India's largest populations of Saltwater Crocodiles, and Gahirmatha beach, which separates the mangroves from the Bay of Bengal, is the world's most important nesting beach for Olive Ridley Sea Turtles. Human crocodile interactions are rampant in Bhitarkanika National Park. The urgency of promoting human-crocodile coexistence is driven by the need to protect human lives, conserve both species, preserve biodiversity, safeguard ecosystems, and address the ethical responsibility of coexisting with wildlife.

Grounds of conflicts in BNP

Habitat Encroachment: As human populations expand, they encroach upon natural habitats, including those of crocodiles. This leads to increased chances of human-crocodile encounters.

Urbanization and Infrastructure Development: Construction of buildings, irrigation projects,

Volunteer surveying locals to understand the conflicts between humans and crocodiles.

and urban development are altering water flow patterns and disturbing crocodile habitats. Crocodiles forcibly move to new areas, bringing them into closer proximity to human settlements.

Loss of Wetlands: Crocodiles inhabit wetlands, rivers, and estuaries. The draining or degradation of these areas for agriculture or other purposes reduces suitable crocodile habitats and can lead to conflicts as crocodiles search for new territories.

Livestock Grazing: Crocodiles are attracted to areas with livestock, such as cattle & goats, leading to conflicts when they prey on domestic animals. This often occurs near water bodies where both crocodiles and livestock graze.

Fishing Activities: Crocodiles are attracted to fishing areas where fish scraps or catches are readily available. This increases the chances of conflicts, especially when humans and crocodiles compete for the same resources.

Climate Change: Changes in climate patterns can affect crocodile habitats and migration patterns. Unpredictable weather conditions force crocodiles to adapt by moving into new areas, potentially bringing them into contact with human populations

Addressing human-crocodile interactions entail several key actions. The initiatives implemented by our team to promote harmony and balance in the delicate ecosystems of Bhitarakanika National Park while safeguarding the livelihoods and safety of local residents such as: school & college outreach programmes; community sensitization; capacity building programme; community perspectives; training of volunteers; community-based volunteer informer, and survey of death case.

To promote coexistence among the people, we took various initiatives which includes formation of a community-based volunteer

Volunteer distributing leaflets to the locals to spread awareness about the behaviour, ecology, and importance of crocodiles in the ecosystem.

School outreach programme on strategies for mitigation and sensitization of the youth about the saltwater crocodile.

informer network to get updates on wildlife related incidents, pre-surveys, community sensitization at Bhitarkanika National Park as well as localities of interaction hotspots, rapport building, victim identification, hotspot identification, school outreach programs, and training of volunteers.

Moreover, the project focused on the protective measures done by the forest department, the survey of casualties due to crocodile attack, outreach to the affected victims, knowledge assessment, opinion towards coexistence, behavioural observation, and safety awareness so that both species can coexist peacefully. The project went on smoothly, and different events were again initiated to ensure to get a positive effect.

Acknowledgements
We would like to express our heartfelt appreciation to the principal chief conservator of forest (Wildlife), Odisha, and DFO, Rajnagar Wildlife Division Kendrapara, for providing the necessary official permissions that made our work possible. Their support has been instrumental in enabling us to conduct our research effectively and responsibly within the designated wildlife areas. Additionally, we are deeply grateful to the Wildlife Trust of India for their invaluable support through the Rapid Action Project grant. This grant has provided us with the essential resources and funding required to carry out our project successfully. Without their generous assistance, our efforts to promote harmony and balance in the delicate ecosystems would not have been as impactful.

Rutika Nath[1], Sambit Patra[2], Satyaranjan Behera[3], Prasanta Kumar Kar[4], Chandrasekhar Bhoi[5] & Biswajeet Panda[6]
[1,2,4&6] Bikash Saathi NGO, Baleshwar, Odisha 756058, India
[2] Department of Zoology, Fakir Mohan Autonomous College, Balasore, Odisha, India.
[3] Odisha Biodiversity Board, Nayapali, Bhuabneswar, Odisha 751012, India.
[5] Department of Botany, MPC Autonomous College, Baripada, Odisha 757001, India.
Email: [1]biswajeetpandanature@gmail.com

ZOO'S PRINT

Communicating science for conservation

ZOO'S PRINT Publication Guidelines

We welcome articles from the conservation community of all SAARC countries, including Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka and other tropical countries if relevant to SAARC countries' problems and potential.

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

Feature articles — articles of a conjectural nature — opinions, theoretical, subjective.

Case reports: case studies or notes, short factual reports and descriptions.

News and announcements — short items of news or announcements of interest to zoo and wildlife community

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.

Manuscript requirements
Articles should be typed into a Word document with no more than 800 words of text and 10 key References (Tables, Images with copyright information, and Videos are encouraged) and emailed to zp@zooreach.org. Include the names of one or two potential reviewers when submitting a publication.

Articles which should contain citations should follow this guideline: a bibliography organized alphabetically and containing all details referred in the following style: surname, initial(s), year, title of the article,name of journal, volume, number, pages.

E**ditorial details**
Articles will be edited without consultation unless previously requested by the authors in writing. Authors should inform editors if the article has been published or submitted elsewhere for publication.

Publication Information

ZOO'S PRINT, ISSN 0973-2543
Published at: Coimbatore

Owner: Zoo Outreach Organisation, 3A2 Varadharajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India.

Editor: Sanjay Molur
Associate Editor: R. Marimuthu
Managing Editors: Latha G. Ravikumar & B. Ravichandran
Editorial Assistant: S. Radhika
Copy Editor: Sapna Ramapriya

Zoo Outreach Organisation Trust Committee and Sr. Staff
Founder Trustee: Late Sally R. Walker
Executive Director Trustee: R.V. Sanjay Molur
Finance Director Trustee: Latha G. Ravikumar
Researcher: R. Marimuthu, Priyanka Iyer, Usha Ravindra, Trisa Bhattacharjee, Tandrali Baruah
Other staff: B. Ravichandran, K. Geetha, S. Radhika

ZOO'S PRINT magazine is informal and newsy as opposed to a scientific publication. ZOO'S PRINT magazine sometimes includes semi-scientific and technical articles which are reviewed only for factual errors, not peer-reviewed.

Address
Zoo Outreach Organisation
3A2 Varadharajulu Nagar, FCI Road, Ganapathy,
Coimbatore, Tamil Nadu 641006, India
Phone: +91 9385339862 & 9385339863
E-mail: zooreach@zooreach.org
Website: www.zoosprint.org, www.zooreach.org

zooreach
Zoo Outreach Organisation

Call for donations

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**

(ii) **The Sally Walker Training Programme in Conservation Biology and Application**

(iii) **Communicating Science for Conservation through innovative education programs**

We solicit your generous contributions to the above activities of your choice. Please log onto our website www.zooreach.org and click on the **SWCF page** for information on how to donate.

You can also click here to go directly to the donation page.

Donations by Indians
Donations by non Indians

In case you wish to know more about the **Sally Walker Conservation Fund,** please contact Dr. Sanjay Molur by email <sanjay@zooreach.org> or by phone +91 9677822997.