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43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore, Tamil Nadu 641035, IndiaPh: +91 9385339863 | www.threatenedtaxa.org

Email: sanjay@threatenedtaxa.org

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continued on the back inside cover

Cover: Mugger Crocodile basking on the banks of Savitri River at Mahad in Maharashtra, India. © Utkarsha M. Chavan.



Camera trapping records confirm the presence of the elusive Spotted Linsang *Prionodon pardicolor* (Mammalia: Carnivora: Prionodontidae) in Murlen National Park (Mizoram, India)

Amit Kumar Bal¹  & Anthony J. Giordano² 

^{1,2}The Society for the Preservation of Endangered Carnivores and their International Ecological Study (SPECIES), PO Box 7403, Ventura, CA 93006, USA.

¹Amity Institute of Forestry and Wildlife, Amity University, Noida, Uttar Pradesh 201313, India.

¹amitamu096@gmail.com (corresponding author), ²species1@hotmail.com

Abstract: The Spotted Linsang is an elusive and infrequently recorded small carnivore believed to be distributed widely throughout southern-southeastern Asia. Here, we present the first confirmation of this species from Murlen National Park, Mizoram, a protected area with tracts of subtropical evergreen forest less than 30 km from the western Myanmar border. These records are also the first to confirm the occurrence of the species in the southern portion of northeastern India. Although we could distinguish several individuals despite low camera-trap sampling effort, this population may be threatened by opportunistic and intentional hunting using projectiles and snares meant to kill small game for wildmeat.

Keywords: Conservation, distribution, new record, northeastern India, small carnivore, snares.

The Spotted Linsang *Prionodon pardicolor* is a small, nocturnal carnivore native to southeastern Asia and parts of eastern southern Asia (Jennings et al. 2015; Duckworth et al. 2016). Based on what little is known of this elusive species, linsangs are solitary and partially arboreal; however, very little is known about their behaviour (Lim 1973; Kuznetsov & Baranauskas 1993; Gaubert 2009). Previously classified as part of

the Viverridae, linsangs are now classified in their own family, the Prionodontidae, which is considered a sister taxonomic group to the Felidae (Barycka 2007).

Spotted linsangs inhabit dense moist tropical forests, particularly lowland dipterocarp forests and some grasslands, throughout southeastern Asia (Sunquist 1982). Although information are lacking on their distribution ranges, they are known to occur in eastern Nepal, northeastern India, Bhutan, northern & central Myanmar, northern & central Thailand, Lao PDR, Cambodia, most of Vietnam, and central to southern China (Van Rompaey 1995; Zhang et al. 1997; Walston 2001; Holden & Neang 2009; Choudhury 2014). In India, the species has been recorded in the states of Assam (Choudhury 2004; Borah 2010), Mizoram (Mizo-Envir 2008; no details given), Manipur (Ramakantha 1994; Envir 2005), Nagaland (Choudhury 2002, 2013), Sikkim (Ganguli-Lachungpa 1989; Schreiber et al. 1989), Arunachal Pradesh (Singh et al. 1996; Choudhury 1999; Kumar 1999; Datta et al. 2008), Meghalaya (Khatonier &

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Lyngdoh 2021). Despite its rarity in northeastern India (Choudhury 1999) and the infrequency with which it is generally detected range-wide, the spotted linsang is listed as 'Least Concern' on the IUCN Red List of Threatened Species (Duckworth et al. 2016). However, it is considered a CITES Appendix I species and a Schedule I species by the Indian Wildlife (Protection) Act (1972).

Recently, there have been no direct efforts to research Spotted Linsangs in northeastern India, as only some opportunistic records exist. This report is part of a larger study to assess the diversity of and threats to small carnivores, with particular reference to felids and their relatives, in eastern Mizoram, a biodiversity hotspot of the Indo-Burma region.

MATERIALS AND METHODS

Our study site occurred in the part of Murlen National Park (MNP) (23.53–23.7°N & 92.21–92.45°E), which is located in the Champhai district of Mizoram and is part of the Indo-Burman Biodiversity Hotspot (Myers et al. 2000). This protected area covers 100 km² and the recorded peak elevation is 1,929 m within the park. (highest point is recorded inside the park by gps) (Amit Kumar Bal's pers. obs.). The predominant forest types occurring in the park are tropical and subtropical mixed evergreen forests, which are distributed across undulating hills and mountainous terrain (Sharma et al. 2017). Several ongoing human activities such as logging, encroachment of livestock inside the park, widespread Jhum cultivation, and illegal hunting using firearms, snares, and other projectiles has severely threatened the wildlife diversity of MNP. (Amit Kumar Bal's pers. obs. between November 2019 – May 2022).

Our sampling occurred as part of an exploratory survey between November 2019 and May 2022. We initially overlaid a grid cell network of 1 × 1 km² over the area of MNP and deployed ten Cuddeback (WI, USA) C1 type digital camera-traps (20.0 megapixel) enabled with a white flash. Camera-traps were enabled to take three photos in rapid succession every time the motion sensor was triggered. Each camera-trap was installed for 40 days with a trap night of 400 days. Camera trap stations were spaced 1 km apart from nearby traps (average trap distance = 910 m). Camera-trap sensitivity was set low (minimum value), and units were placed between 1.8–4.5 m away from an animal trail, depending on the angle of intersection, so that each camera had sufficient time to detect an animal (i.e., specifically small carnivores), and take full-frame pictures. Individuals of certain carnivores, including spotted linsangs, were identified from their unique pelage markings/patterns in

photographs.

Records

We obtained six images of spotted linsangs from six camera-trap stations over 400 trap nights in and around MNP (Image 1). The first individual was captured on 20 February 2020 (23.6586°N, 93.3004°E) at an elevation of 1,563 m, and the last was photographed on 26 March 2022 (23.6354°N, 93.2907°E) at an elevation of 1,800 m. We used right flanks only to identify a minimum of four different individuals (Image 2) in these six photographs; the other photos of left flanks may or may not have represented additional individuals. These are the first ever confirmed photographic records of this species from Mizoram, validating a previously suspected range extension further south into northeastern India and the Myanmar border (Figure 1). The characteristics of all records are mentioned in the table below (Table 1).

On 28 January 2022, we also discovered the carcass of a Spotted Linsang (Image 3) in the house of a local hunter in the village Murlen. After some discussion with locals to determine the reason for this individual's death, we identified that it was shot and killed by a handheld catapult or slingshot (Image 4), a local weapon that is often used by children in the area to kill birds for food and to sell locally. The hunter initially thought the species was a leopard cat when he first saw it. Despite being a lifelong resident of the region, he told us he had never seen this species before, noting that the bones, claws, and teeth of leopard cats were somewhat valuable for sale locally. He also told us that, as far as he knew, other local hunters had never encountered spotted linsangs before, and thus they don't consume its meat. The specimen was a female, and it measured at 69 cm from snout to tail, of which the tail was 35 cm in length (Image 3).

CONSERVATION IMPLICATIONS

Possibly due to their arboreal, nocturnal nature and ambush predatory tactics (Van Rompaey 1995; Lyngdoh et al. 2011), there are only a handful of camera-trap records of spotted linsangs across their range. Despite their 'Least Concern' status, this may be cause for concern, as habitat loss and degradation, hunting and trade all remain important threats to the species (Schreiber et al. 1989; Lau et al. 2010; Bhupathy et al. 2013). Although the risk of linsangs being killed by hunters or poachers may be lower relative to other more terrestrial, diurnal, and gregarious mammals (Duckworth et al. 2016), the observation we report here still suggests they are vulnerable to local opportunistic hunters (Amit



Figure 1. Range extension of spotted linsang further south into northeastern India added on IUCN global distribution map of Spotted Linsang.

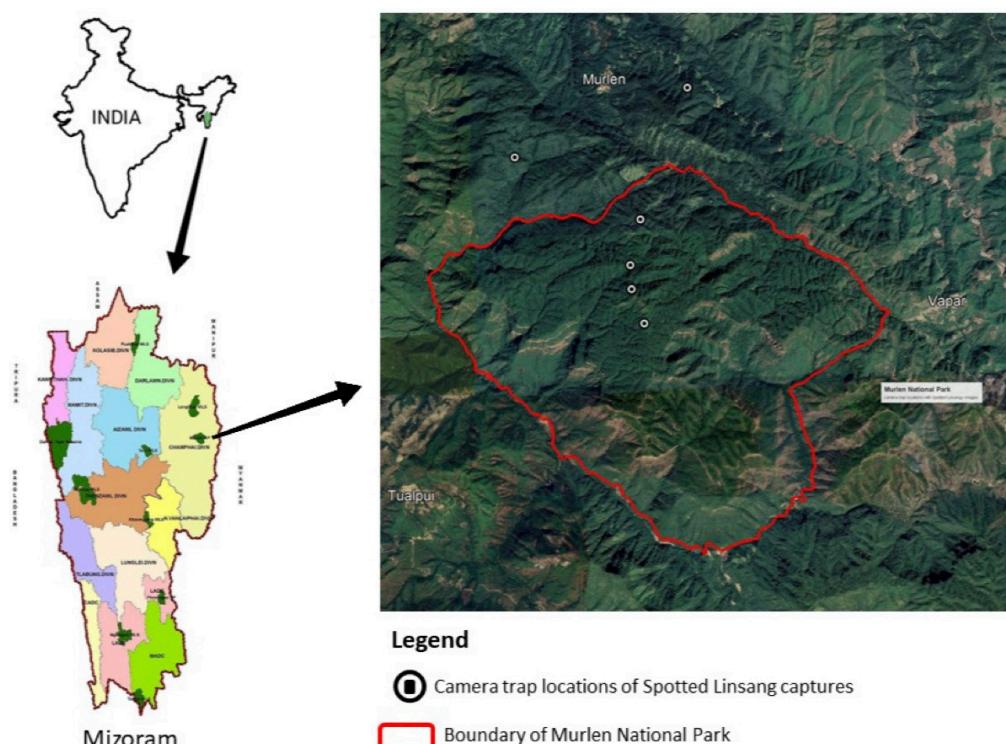


Image 1. Murlen National Park showing camera trap locations of Spotted linsang captures.



Image 2. Four individuals of Spotted Linsang photographed in Murlen national Park, Mizoram.

Table 1. The characteristics of all Spotted Linsang records.

Record No	Individual No (by right flank)	Habitat type	Elevation (in meters)	Time of day	Date
1	01	Bamboo mixed evergreen forest	1563	19:11:00	20.ii.2020
2	02	Bamboo mixed evergreen forest	1745	19:16:00	22.ii.2020
3	(Left Flank)	Bamboo mixed evergreen forest	1458	19:50:00	05.iii.2020
4	(Left Flank)	Bamboo mixed evergreen forest	1763	18:38:00	02.i.2021
5	03	Bamboo mixed evergreen forest	1748	02:28:00	12.v.2021
6	04	Bamboo mixed evergreen forest	1800	03:58:00	26.iii.2022

Kumar Bal's pers. obs. November 2019 to May 2022). In the Lower Subansiri district of western Arunachal Pradesh, indiscriminate noose-traps (i.e., snares) kill spotted linsangs (Lyngdoh et al. 2011), and Datta et al. (2008) suggested they are also killed for ornamental purposes (i.e., their skins & pelts for display) and in retribution for killing poultry. These threats suggest that diverse threats from opportunistic hunting still persist in some parts of the linsang range. To better understand the ecology and potential threats of this little-known

species, we urge additional range-wide surveys and local studies specifically targeting linsangs and their behaviour highlighting its proper global conservation context.

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Image 3. Carcass of Spotted Linsang and during the measurement of the specimen. © Amit Kumar Bal.



Image 4. Catapult slingshot which is used to kill the Spotted Linsang. © Amit Kumar Bal.

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Dr. John T.D. Caleb, Zoological Survey of India, Kolkata, West Bengal, India
Dr. Priyadarsanan Dharma Rajan, Ashoka Trust for Research in Ecology and the Environment (ATREE), Royal Enclave, Bangalore, Karnataka, India

Fishes

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Dr. A. Biju Kumar, University of Kerala, Thiruvananthapuram, Kerala, India
Dr. Akhilesh K.V., ICAR-Central Marine Fisheries Research Institute, Mumbai Research Centre, Mumbai, Maharashtra, India
Dr. J.A. Johnson, Wildlife Institute of India, Dehradun, Uttarakhand, India
Dr. R. Ravinesh, Gujarat Institute of Desert Ecology, Gujarat, India

Amphibians

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Dr. Annemarie Ohler, Muséum national d'Histoire naturelle, Paris, France

Reptiles

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Dr. V. Santharam, Rishi Valley Education Centre, Chittoor Dt., Andhra Pradesh, India
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Dr. Grant Connette, Smithsonian Institution, Royal, VA, USA
Dr. M. Zafar-ul Islam, Prince Saud Al Faisal Wildlife Research Center, Taif, Saudi Arabia

Mammals

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Dr. David Mallon, Zoological Society of London, UK
Dr. Shomita Mukherjee, SACON, Coimbatore, Tamil Nadu, India
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Dr. Brian L. Cypher, California State University-Stanislaus, Bakersfield, CA
Dr. S.S. Talmale, Zoological Survey of India, Pune, Maharashtra, India
Prof. Karan Bahadur Shah, Budhanilkantha Municipality, Kathmandu, Nepal
Dr. Susan Cheyne, Borneo Nature Foundation International, Palangkaraya, Indonesia
Dr. Hemanta Kafley, Wildlife Sciences, Tarleton State University, Texas, USA

Other Disciplines

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Dr. Mandar S. Paingankar, University of Pune, Pune, Maharashtra, India (Molecular)
Dr. Jack Tordoff, Critical Ecosystem Partnership Fund, Arlington, USA (Communities)
Dr. Ulrike Streicher, University of Oregon, Eugene, USA (Veterinary)
Dr. Hari Balasubramanian, EcoAdvisors, Nova Scotia, Canada (Communities)
Dr. Rayanna Helleni Santos Bezerra, Universidade Federal de Sergipe, São Cristóvão, Brazil
Dr. Jamie R. Wood, Landcare Research, Canterbury, New Zealand
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Dr. Rajeshkumar G. Jani, Anand Agricultural University, Anand, Gujarat, India
Dr. O.N. Tiwari, Senior Scientist, ICAR-Indian Agricultural Research Institute (IARI), New Delhi, India
Dr. L.D. Singla, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India
Dr. Rupika S. Rajakaruna, University of Peradeniya, Peradeniya, Sri Lanka
Dr. Bharat Baviskar, Wild-CER, Nagpur, Maharashtra 440013, India

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Tamil Nadu 641035, India
ravi@threatenedtaxa.org

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Communications

New records of pteridophytes in Mount Matutum Protected Landscape, South Central Mindanao, Philippines with notes on its economic value and conservation status

– Christine Dawn Galope-Obemio, Inocencio E. Buot Jr. & Maria Celeste Banaticla-Hilario, Pp. 22039–22057

Some threatened woody plant species recorded from forests over limestone of the Philippines

– Inocencio E. Buot Jr., Marne G. Origenes, Ren Divien R. Obeña, Elaine Loreen C. Villanueva & Marjorie D. delos Angeles, Pp. 22058–22079

Status of mangrove forest in Timaco Mangrove Swamp, Cotabato City, Philippines

– Cherie Cano-Mangaoang, Zandra Caderon Amino & Baingan Brahim Mastur, Pp. 22080–22085

A comparative analysis of the past and present occurrences of some species of *Paphiopedilum* (Orchidaceae) in northeastern India using MaxEnt and GeoCAT

– Debonina Dutta & Aparajita De, Pp. 22086–22097

Foraging activity and breeding system of *Avicennia officinalis* L. (Avicenniaceae) in Kerala, India

– K. Vinaya & C.F. Binoy, Pp. 22098–22104

Diversity patterns and seasonality of hawkmoths (Lepidoptera: Sphingidae) from northern Western Ghats of Maharashtra, India

– Aditi Sunil Shere-Kharwar, Sujata M. Magdum, G.D. Khedkar & Supriya Singh Gupta, Pp. 22105–22117

Population trends of Mugger Crocodile and human-crocodile interactions along the Savitri River at Mahad, Maharashtra, India

– Utkarsha Manish Chavan & Manoj Ramakant Borkar, Pp. 22118–22132

Paresis as a limiting factor in the reproductive efficiency of a nesting colony of *Lepidochelys olivacea* (Eschscholtz, 1829) in La Escobilla beach, Oaxaca, Mexico

– Alejandra Buenrostro-Silva, Jesús García-Grajales, Petra Sánchez-Nava & María de Lourdes Ruíz-Gómez, Pp. 22133–22138

Notes on the nesting and foraging behaviours of the Common Coot *Fulica atra* in the wetlands of Viluppuram District, Tamil Nadu, India

– M. Pandian, Pp. 22139–22147

Population abundance and threats to Black-headed Ibis *Threskiornis melanocephalus* and Red-naped Ibis *Pseudibis papillosa* at study sites in Jhajjar district, Haryana, India

– Anjali & Sarita Rana, Pp. 22148–22155

Crop raiding and livestock predation by wildlife in Kaptad National Park, Nepal

– Ashish Bashyal, Shyam Sharma, Narayan Koirala, Nischal Shrestha, Nischit Aryal, Bhupendra Prasad Yadav & Sandeep Shrestha, Pp. 22156–22163

Review

An annotated checklist of odonates of Amboli-Chaukul-Parpoli region showing new records for the Maharashtra State, India with updated state checklist

– Dattaprasad Sawant, Hemant Ogale & Rakesh Mahadev Deulkar, Pp. 22164–22178

Short Communications

The new addition of Blue Pimpernel of Primulaceae to the state flora of Assam, India

– Sushmita Kalita, Barnali Das & Namita Nath, Pp. 22179–22183

A new species of genus *Neocerura* Matsumura, 1929 (Notodontidae: Lepidoptera) from India

– Amritpal Singh Kaleka & Rishi Kumar, Pp. 22184–22189

Rediscovery of an interesting preying mantis *Deiphobella laticeps* (Mantodea: Rivetinidae) from Maharashtra, India

– Gauri Sathaye, Sachin Ranade & Hemant V. Ghate, Pp. 22190–22194

Camera trapping records confirm the presence of the elusive Spotted Linsang *Prionodon pardicolor* (Mammalia: Carnivora: Prionodontidae) in Murlen National Park (Mizoram, India)

– Amit Kumar Bal & Anthony J. Giordano, Pp. 22195–22200

Notes

First sighting record of the Orange-breasted Green-Pigeon *Treron bicinctus* (Aves: Columbiformes: Columbidae) from Chittaranjan, West Bengal, India

– Shahbaz Ahmed Khan, Nazneen Zehra & Jamal Ahmad Khan, Pp. 22201–22202

Book Reviews

Decoding a group of winged migrants!

– Review by Priyanka Iyer, Pp. 22203–22204

First steps of citizen science programs in India

– Review by Aishwarya S. Kumar & Lakshmi Nair, Pp. 22205–22206

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