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43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Registered Office: 3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Ph: +91 9385339863 | www.threatenedtaxa.org
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Cover: Pseudo-flying animals and wind-dependent seed & spore dispersers – made with digital painting in Krita. © Melito Prinson Pinto

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COMMUNICATION

On the occurrence of Eurasian Otter *Lutra lutra* (Carnivora: Mustelidae) in Neeru stream of Chenab catchment, Jammu & Kashmir, India

Dinesh Singh [1], Anil Thakar [2] & Neeraj Sharma [3]

[1–3] Institute of Mountain Environment, Bhaderwah Campus, University of Jammu, Union territory of Jammu & Kashmir 182222, India.
[1] itzmed12@gmail.com, [2] anilenv0@gmail.com, [3] nirazsharma@gmail.com (corresponding author)

Abstract: This communication reports the first photographic record of Eurasian Otter *Lutra lutra* in a hill stream in Jammu & Kashmir, putting an end to doubts over its presence in the upper Chenab catchment. Three individuals were photographed during a limited camera trap survey conducted in Neeru stream, a left bank tributary of river Chenab during mid-October 2020. We argue that rapid human population influx, infrastructure expansion, and pollution have altered the hydro morphology of Neeru stream, affecting the otter population. This observation calls for more intensive otter surveys in the nearby smaller basins of Neeru, Kalnai, & Sewa and other large tributaries of Chenab River, combining occupancy surveys with camera traps for improved conservation and management of the species in the region.

Keywords: Camera trap, dense escape cover, flagship species, hill stream, holts and dens, semi-aquatic mammal, retaliatory killings, shore vegetation.

خلاصہ: یہ مواصلات جموں وکشمیر میں ایک پہاڑی ندی میں یوریشین اوٹر (لوٹرا لوٹر ا) کے پہلے فوٹو گرافیک ریکارڈ کی اطلاع دیتاہے، جس سے بالائی کھتہ چناب میں اس کی موجودگی پر شکوک وشبہات کا خاتمہ ہوتاہے۔اکتوبر 2020 کے وسط میں نیرو ندی میں منعقد کی گئی ایک محدودہ کیمرہ ٹریپ سروے کے دوران اوٹرکے تین افراد کی تصویر لی گئی ۔ ہم یہ دلیل دیتے ہیں کہ تیزی سے انسانی آبادی کی آمد ،انفراسٹریکچر کی توسیع اور آلودگی نے نیرو ندی کی آبی شکل وصورت کو تبدیل کردیا ہے، جس سے اوٹر کی آبادی متاثر ہورہی ہے۔ اس مشاہدے میں نیرو، کلنائی، سیوا اور دریائے چناب کی دیگر بڑی معاون ندیوں میں زیادہ گہرے اوٹر سروے کا مطالبہ کیا گیا ہے اور اس کے علاوہ اوٹرپرجاتی کے بہتر تحفظ اور انتظام کے لیے کیمرہ ٹریپس کے ساتھ ساتھ ا کوپنسی سروے کو بھی ترجیح دی جائے ۔

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Author details: Dr. Dinesh Singh is a lecturer in the Faculty of Life Sciences, Institute of Mountain Environment (IME), Bhaderwah Campus, University of Jammu. He received a doctorate for his work on 'Ecological attributes and vegetation responses to environmental variables in upper Bhaderwah Valley, J&K' in 2019. Aside from his interest in alpine vegetation and flora, he has contributed to the exploration of other animal groups in the region, including mammals, birds, odonata, and butterflies. Mr. Anil Thakar is a junior research fellow in NMHS sponsored project on 'Himalayan alpine biodiversity characterization and information system network'. Dr. Neeraj Sharma is an assistant professor in the Faculty of Life Sciences in IME, Bhaderwah Campus where he is actively involved in research on high altitude biodiversity, wildlife ecology, riparian ecology, avian ecology, and hill stream dynamics, as well as scientific outreach and extension on different facets of mountain environment. Besides investigating the externally aided projects on biodiversity monitoring and assessment in the region, he is actively engaged in guiding Ph.D students and research interns.

Author contributions: Dinesh Singh conducted the field surveys, camera trapping, data analysis and drafted the manuscript; Anil Thakar helped in camera trapping, data collection, analysis, and writing the manuscript; Neeraj Sharma conceptualized, designed, and executed the surveys, assisted first author in writing and editing the manuscript, and communicated with the journal.

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INTRODUCTION

Otters, the semi-aquatic mammals of the family Mustelidae with seven genera and 13 species are found in every continent except Australia and Antarctica. Eurasian Otter *Lutra lutra,* a European and Asian member of the Otter subfamily *Lutrinae* is an elusive, solitary species with the largest range of any palearctic mammal covering parts of three continents: Europe, Asia, and Africa (Corbet 1996). Seven subspecies of Eurasian Otter (Bhattacharya et al. 2019) include *L.l. nair* (Cuvier, 1823) found in southern India, Sri Lanka, Nepal, Bhutan, & Myanmar; *L.l. kutab* (Schinz, 1844) in northern India—Kashmir; *L.l. aurobrunneus* (Hodgson, 1839) in Garhwal Himalaya & higher altitudes in Nepal; *L.l. monticolus* (Hodgson, 1839) in Himachal Pradesh, Sikkim, & Assam; *L.l. barang* (Cuvier, 1823) in southeastern Asia (Thailand, Indonesia, & Malaysia); *L.l. chinensis* (Gray, 1837) in southern China & Taiwan, and *L. l. lutra* (Linnaeus, 1758) in Europe & northern Africa. In India, it occurs in the north (Ladakh, Jammu & Kashmir, Himachal Pradesh, Uttarakhand), northeast (largely in Himalayan foothills), central (Madhya Pradesh), east (Odisha), and southern India covering parts of Kerala, Tamil Nadu, Karnataka, & Andhra Pradesh (Hussain 1993; Prater 1998). The species has been recorded from the northern mountains of Pakistan, Punatshanghchu basin of Bhutan (Yoxon & Yoxon 2019), and Nepal (Basnet et al. 2019; Shrestha et al. 2021).

Eurasian Otter is regarded as a flagship species and indicator of high-quality aquatic habitats (Macdonald & Mason 1994; Cianfrani et al. 2011) that obtains all its food from aquatic systems (Clavero et al. 2003; Krawczyk et al. 2016). They inhabit a wide variety of aquatic habitats, including highland and lowland lakes, rivers, marshes, streams, swamp forests, and coastal areas (Mason & Macdonald 1986). They occupy cold Himalayan streams and rivers, much like their temperate cousins across Europe and Asia (Prakash 2022), reaching 3,660 m in the Himalaya during summers (Prater 1971). Most of the animal activity is restricted to a narrow land-water interface (Kruuk et al. 1994), as they prefer swiftly flowing upper river sections (Kruuk 1995) which coincides with the upward migration of the carp and other fish spawning.

The species is classified as 'Near Threatened' (Loy et al. 2022) on the IUCN Red List and is listed in Appendix I of CITES (CITES 2023). The species became extinct in Japan in 1979 (Roos et al. 2015; Waku et al. 2016) and its populations in Europe and developing Asian countries have drastically declined in recent years (Balestrieri et al. 2016; Jha et al. 2020). The species is still hunted for their pelt, food, sport, and persecuted as a pest in many Asian countries, particularly China, India, and Nepal (Gomez et al. 2016). Along with habitat loss and pollution, climate change is a major cause of their declining population (Gomez et al. 2016; Gupta et al. 2020). After a catastrophic drop, otters are making a comeback across Europe (Loy et al. 2009, 2010; Romanowski et al. 2013), and other regions possibly as a result of legal protection and the ban on Polychlorinated biphenyls (Loy et al. 2015).

The Indian Otter population is severely fragmented across its distribution range, with isolated populations primarily confined to protected areas (Hussain 1999; Nawab 2007, 2009; Nawab & Gautam 2008) and high-altitude riverine ecosystems in the Indian Himalayan region (Pal et al. 2021). It has so far been reported from Nayamjang Chu River, Arunachal Pradesh (Bhattacharya et al. 2019), forests of Madhya Pradesh including Balaghat forest circle (Jena et al. 2016) and Satpura Tiger Reserve (Joshi et al. 2016), Periyar Tiger Reserve in Kerala & Kalakkad Mundanthurai Tiger Reserve, Tamil Nadu (Raha & Hussain 2016), Bhagirathi basin, Uttarakhand (Pal et al. 2021), and Sundargarh forest division, Odisha (Palei et al. 2022). The species was reported to occur in the Jammu & Kashmir divisions of the Union Territory of Jammu & Kashmir (Ahmad et al. 2020). Jamwal et al. (2016) and Shawl et al. (2008) confirmed its presence in Indus and its tributaries in Ladakh. Following the credible accounts of its historical presence in Neeru stream, researchers from the Institute of Mountain Environment, Bhaderwah conducted extensive investigations that included questionnaire surveys, direct surveys, and camera trapping including a joint sign survey in collaboration with Wild Otters Research Private Limited during July 2019. The current communication describes the first photographic record of this elusive semi-aquatic animal in Neeru stream.

MATERIAL AND METHODS

Study area

The study area is characterized by typical mountainous terrain comprised of high mountains, wide valleys, cliffs and gorges, and vast alpine meadows. The region is drained by Neeru stream, a 30-km long linear hydro-morphological unit (Image 1) that originates in Kailash Lake (3,900 m) and drains into the Chenab River at Pul-Doda (848 m). The perennial stream contributed by 13 major tributaries flows through a number of

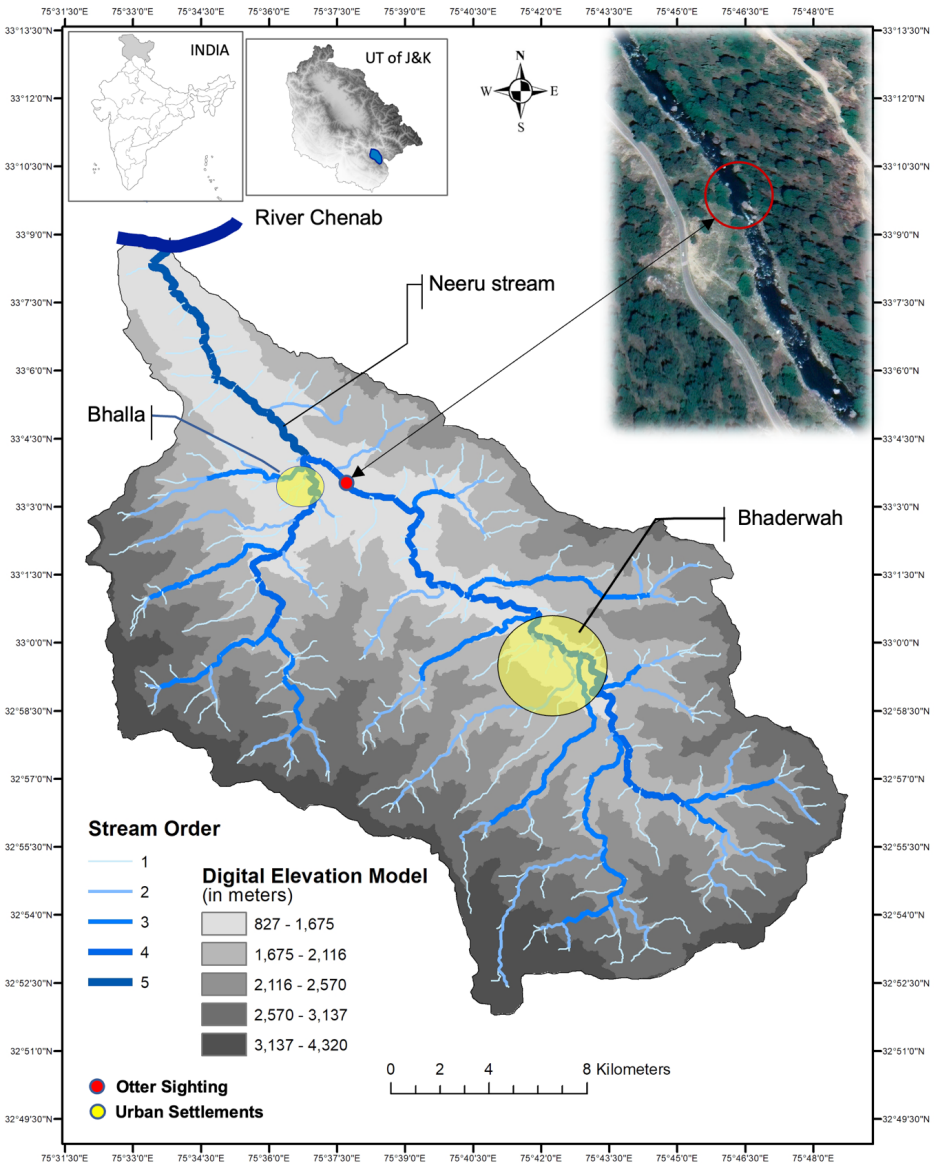

Image 1. Digital elevation map of the Neeru watershed showing the location of the Otter sighting (reference Google Earth image inset), drainage pattern, and major townships

small villages, semi-urban, and urbanised areas, with Bhaderwah being the largest settlement (Image 1). The region is distinguished by its usual cold climate, with short summers and long dry winters. The temperature varies with seasons and elevation and reaches sub-zero during the winters. Precipitation is largely determined by topography, ranging from 1,750 mm at lower and intermediate altitudes (<1,500 m) to 800 mm over 2,000 m. The vegetation varies from sub-temperate scrub at lower elevations to pure conifers and broad leaved-conifer mixed at the mid, and spruce-fir and kharsu oak at higher elevations marking the tree line.

Field data collection

We conducted a questionnaire survey in the upper Neeru stretch during 2016 and 2017 and found evidence of their historical presence. Following that, we initiated primary surveys for direct and indirect sightings looking for fresh sign (tracks; scats/spraints; evidence of foraging like remains of animal prey, especially, fish scales or bones and cartilages) lodging and dens (Gallant et al. 2008; Crimmins et al. 2009; Lesmeister & Nielsen 2011; Schooley et al. 2012) along the main channel and its major tributaries during 2019–2021. Although we were unable to establish a direct sighting, we were able to locate a few latrines in 2020. Subsequently, we deployed

five infra-red cameras at three probable locations like the mouth of dens, trails leading to dens, and stream banks near the latrine sites. The cameras were placed roughly 100 m apart and were retained in the field for five days from 17 to 21 October 2020.

RESULTS

The questionnaire surveys of 2016–17 indicated that otters inhabited along the whole length of the Neeru stream and all of its tributaries. The animal is locally known as 'Huder' or 'Hud'. According to the majority of respondents, the fish-eating animals resemble mongooses with a somewhat greyer coat and bigger stature. When foraging, most people described the sinuous up and down movement of a swimming otter, that scans its surroundings with just its head above water. To ascertain the presence of the animal, the surveys were conducted in July 2019, October 2020 and August 2021. On 15 October 2020, the team spotted a latrine mound with dark, greasy poop at the mouth of the holt near Bhalla (33.060 °N to 75.626°E, 1,240 m). Five camera traps were deployed at three sites which appeared to us as the probable dens of the otters. While sites 1 and 2 yielded no results, Site-3, the mouth of the den housing the latrine site, captured many photographs of two adults and one sub-adult (Image 2), confirming its presence. On 28 August 2021, while re-exploring the site, the team discovered scratches and marks in a nearby narrow crevice that was presumably used for resting and grooming (Image 3).

The species was identified as a Eurasian Otter *Lutra lutra* based on a dark brown dorsal coat with a pale silvery tinge on the neck, rounded head with stiff white vibrissae around the muzzle, semi-webbed feet with discernible toes, elongated body, and dorsoventrally flattened tail (Hussain 2013; Menon 2014). Most of the images were captured during the early morning. The location of otter sighting is characterised by a small

Image 2. Camera trap images of Eurasian Otter *Lutra lutra*: 1–3—adults | 4—sub-adult.

Image 3. Eurasian Otter signs in a shallow crevice likely used as a resting site: 5—pug | 6—scratch marks.

undisturbed narrow section of the stream with rocky banks, deep caves and crevices and shore vegetation comprising young stands of *Alnus nitida* making up the bulk of the riparian vegetation and *Pinus roxburghii* along the upper dry slopes. The stream is home to *Schizothorax richardsonii* and *Glyptosternum reticulatum,* the former being abundant and most relished fish in the region.

DISCUSSION

A considerable decline in the otter population in the Neeru stream over the past two decades, as indicated in the questionnaire surveys, raises concerns about the changing ecological dynamics of the stream. The sole sighting of the family, however, raised hope of the species existence and survival in the region. Since their presence goes unrecognised due to their secretive, solitary, and nocturnal habits (Pal et al. 2021), our limited survey does not rule out the presence of otter in other sections of the main channel and that of tributaries those are pristine. Though the otters have wide habitat preferences in terms of where they live, swim, hunt, and raise their young (Kruuk 1995; Reid et al. 2013), their preferred habitat is much more specific (Anoop & Hussain 2004). River topography affects the prey availability and consequently the distribution of otters. Otters largely prefer shallow braided river channels with shallow depth, moderate current, patches of muddy and sand substrate on the shoreline, and dense escape cover of vegetation in riparian habitats (Hussain & Choudhury 1997; Anoop & Hussain 2004; Acharya et al. 2010; Romanowski et al. 2013). Neeru being a typical hill stream offer but limited habitat conditions with rocky banks, deep crevices, thin sand shoulders, dense escape cover, and steep slopes. Several studies confirmed that otters avoid polluted water and persist in low-anthropogenic landscapes (Romanowski et al. 2013; Calzada et al. 2022) though in low numbers (Baltrūnaitė et al. 2009). Bhaderwah, a popular tourist destination over the years has experienced extensive urbanisation and infrastructure development, resulting in degraded surface water quality of Neeru stream over its whole course (Kumar et al. 2019, 2022). The stream serves as a sink for urban wastes, notably the plastic trash that penetrates crevices and holts during floods and clogs them. Stream bed mining for construction materials fragments habitats hence threatening their existence. Jenkins & Burrows (1980) and Macdonald & Mason (1983) revealed that poor-quality habitats are occasionally visited by otters. Several incidents of retaliatory killings, poaching, and predation by feral dogs have been reported by the locals during the interactions. Having established its presence, the study urges continued investigations on the species to better understand their distribution, ecology, and threat status as well as to develop appropriate conservation and management plans for its survival in the region.

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