

Building evidence for conservation globally

Journal of Threatened Taxa

40
Years
zooreach
Zoo Outreach Organisation



Open Access

10.11609/jott.2025.17.12.28011-28150

www.threatenedtaxa.org

26 December 2025 (Online & Print)

17(12): 28011-28150

ISSN 0974-7907 (Online)

ISSN 0974-7893 (Print)





ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

Publisher
Wildlife Information Liaison Development Society
www.wild.zooreach.org

Host
Zoo Outreach Organization
www.zooreach.org

Srivari Illam, No. 61, Karthik Nagar, 10th Street, Saravanampatti, Coimbatore, Tamil Nadu 641035, India
Registered Office: 3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Ph: +91 9385339863 | www.threatenedtaxa.org
Email: sanjay@threatenedtaxa.org

EDITORS

Founder & Chief Editor

Dr. Sanjay Molur

Wildlife Information Liaison Development (WILD) Society & Zoo Outreach Organization (ZOO),
Coimbatore, Tamil Nadu 641006, India

Assistant Editor

Dr. Chaithra Shree J., WILD/ZOO, Coimbatore, Tamil Nadu 641006, India

Managing Editor

Mr. B. Ravichandran, WILD/ZOO, Coimbatore, Tamil Nadu 641006, India

Associate Editors

Dr. Mandar Paingankar, Government Science College Gadchiroli, Maharashtra 442605, India

Dr. Ulrike Streicher, Wildlife Veterinarian, Eugene, Oregon, USA

Ms. Priyanka Iyer, ZOO/WILD, Coimbatore, Tamil Nadu 641006, India

Board of Editors

Dr. Russel Mittermeier

Executive Vice Chair, Conservation International, Arlington, Virginia 22202, USA

Prof. Mewa Singh Ph.D., FASc, FNA, FNAsc, FNAPsy

Ramanna Fellow and Life-Long Distinguished Professor, Biopsychology Laboratory, and
Institute of Excellence, University of Mysore, Mysuru, Karnataka 570006, India; Honorary
Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore; and Adjunct
Professor, National Institute of Advanced Studies, Bangalore

Stephen D. Nash

Scientific Illustrator, Conservation International, Dept. of Anatomical Sciences, Health Sciences
Center, T-8, Room 045, Stony Brook University, Stony Brook, NY 11794-8081, USA

Dr. Fred Pluthero

Toronto, Canada

Dr. Priya Davidar

Sigur Nature Trust, Chadapatti, Mavinhalla PO, Nilgiris, Tamil Nadu 643223, India

Dr. John Fellowes

Honorary Assistant Professor, The Kadoorie Institute, 8/F, T.T. Tsui Building, The University of
Hong Kong, Pokfulam Road, Hong Kong

Prof. Dr. Mirco Solé

Universidade Estadual de Santa Cruz, Departamento de Ciências Biológicas, Vice-coordenador
do Programa de Pós-Graduação em Zoologia, Rodovia Ilhéus/Itabuna, Km 16 (45662-000)
Salobrinho, Ilhéus - Bahia - Brasil

Dr. Rajeev Raghavan

Professor of Taxonomy, Kerala University of Fisheries & Ocean Studies, Kochi, Kerala, India

English Editors

Mrs. Mira Bhojwani, Pune, India

Dr. Fred Pluthero, Toronto, Canada

Copy Editors

Ms. Usha Madgunaki, Zooreach, Coimbatore, India

Ms. Trisa Bhattacharjee, Zooreach, Coimbatore, India

Ms. Paloma Noronha, Daman & Diu, India

Web Development

Mrs. Latha G. Ravikumar, ZOO/WILD, Coimbatore, India

Typesetting

Mrs. Radhika, Zooreach, Coimbatore, India

Mrs. Geetha, Zooreach, Coimbatore India

Fundraising/Communications

Mrs. Payal B. Molur, Coimbatore, India

Subject Editors 2021–2023

Fungi

Dr. B. Shivaraju, Bengaluru, Karnataka, India

Dr. R.K. Verma, Tropical Forest Research Institute, Jabalpur, India

Dr. Vatsavaya S. Raju, Kakatiya University, Warangal, Andhra Pradesh, India

Dr. M. Krishnappa, Jnana Sahyadri, Kuvempu University, Shimoga, Karnataka, India

Dr. K.R. Sridhar, Mangalore University, Mangalagangothri, Mangalore, Karnataka, India

Dr. Gunjan Biswas, Vidyasagar University, Midnapore, West Bengal, India

Dr. Kiran Ramchandra Ranadive, Annasaheb Magar Mahavidyalaya, Maharashtra, India

Plants

Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India

Dr. N.P. Balakrishnan, Ret. Joint Director, BSI, Coimbatore, India

Dr. Shonil Bhagwat, Open University and University of Oxford, UK

Prof. D.J. Bhat, Retd. Professor, Goa University, Goa, India

Dr. Ferdinando Boero, Università del Salento, Lecce, Italy

Dr. Dale R. Calder, Royal Ontario Museum, Toronto, Ontario, Canada

Dr. Cleofas Cervancia, Univ. of Philippines Los Baños College Laguna, Philippines

Dr. F.B. Vincent Florens, University of Mauritius, Mauritius

Dr. Merlin Franco, Curtin University, Malaysia

Dr. V. Irudayaraj, St. Xavier's College, Palayamkottai, Tamil Nadu, India

Dr. B.S. Kholia, Botanical Survey of India, Gangtok, Sikkim, India

Dr. Pankaj Kumar, Department of Plant and Soil Science, Texas Tech University, Lubbock, Texas, USA.

Dr. V. Sampath Kumar, Botanical Survey of India, Howrah, West Bengal, India

Dr. A.J. Solomon Raju, Andhra University, Visakhapatnam, India

Dr. Vijayasankar Raman, University of Mississippi, USA

Dr. B. Ravi Prasad Rao, Sri Krishnadevaraya University, Anantpur, India

Dr. K. Ravikumar, FRLHT, Bengaluru, Karnataka, India

Dr. Aparna Watve, Pune, Maharashtra, India

Dr. Qiang Liu, Xishuangbanna Tropical Botanical Garden, Yunnan, China

Dr. Noor Azhar Mohamed Shazili, Universiti Malaysia Terengganu, Kuala Terengganu, Malaysia

Dr. M.K. Vasudeva Rao, Shiv Ranjani Housing Society, Pune, Maharashtra, India

Prof. A.J. Solomon Raju, Andhra University, Visakhapatnam, India

Dr. Mandar Datar, Agharkar Research Institute, Pune, Maharashtra, India

Dr. M.K. Janarthanam, Goa University, Goa, India

Dr. K. Karthikeyan, Botanical Survey of India, India

Dr. Errol Vela, University of Montpellier, Montpellier, France

Dr. P. Lakshminarasimhan, Botanical Survey of India, Howrah, India

Dr. Larry R. Noblick, Montgomery Botanical Center, Miami, USA

Dr. K. Haridasan, Pallavur, Palakkad District, Kerala, India

Dr. Analinda Manila-Fajard, University of the Philippines Los Banos, Laguna, Philippines

Dr. P.A. Sinu, Central University of Kerala, Kasaragod, Kerala, India

Dr. Afroz Alam, Banasthali Vidyapith (accredited A grade by NAAC), Rajasthan, India

Dr. K.P. Rajesh, Zamorin's Guruvayurappan College, GA College PO, Kozhikode, Kerala, India

Dr. David E. Boufford, Harvard University Herbaria, Cambridge, MA 02138-2020, USA

Dr. Ritesh Kumar Choudhary, Agharkar Research Institute, Pune, Maharashtra, India

Dr. A.G. Pandurangan, Thiruvananthapuram, Kerala, India

Dr. Navendu Page, Wildlife Institute of India, Chandrabani, Dehradun, Uttarakhand, India

Dr. Kannan C.S. Warriar, Institute of Forest Genetics and Tree Breeding, Tamil Nadu, India

Invertebrates

Dr. R.K. Avasthi, Rohtak University, Haryana, India

Dr. D.B. Bastawade, Maharashtra, India

Dr. Partha Pratim Bhattacharjee, Tripura University, Suryamaninagar, India

Dr. Kailash Chandra, Zoological Survey of India, Jabalpur, Madhya Pradesh, India

Dr. Ansie Dippenaar-Schoeman, University of Pretoria, Queenswood, South Africa

Dr. Rory Dow, National Museum of Natural History Naturalis, The Netherlands

Dr. Brian Fisher, California Academy of Sciences, USA

Dr. Richard Gallon, Llandudno, North Wales, LL30 1UP

Dr. Hemant V. Ghate, Modern College, Pune, India

Dr. M. Monwar Hossain, Jahangirnagar University, Dhaka, Bangladesh

For Focus, Scope, Aims, and Policies, visit https://threatenedtaxa.org/index.php/JoTT/aims_scope
For Article Submission Guidelines, visit <https://threatenedtaxa.org/index.php/JoTT/about/submissions>
For Policies against Scientific Misconduct, visit https://threatenedtaxa.org/index.php/JoTT/policies_various

continued on the back inside cover

Cover: Freshly emerged Footman Moth *Nepita conferta* from the cocoon on a brightly painted wall in the Nilgiris. Digital art on Procreate. © Aakanksha Komanduri.



INTRODUCTION

India is home to three otter species: the Smooth-coated Otter *Lutrogale perspicillata*, the Asian Small-clawed Otter *Aonyx cinerea*, and the Eurasian Otter *Lutra lutra*. Since most freshwater sites lie outside protected areas or Ramsar-listed wetland sites, otter populations face threats from land use changes. According to the Amendments in the Wild Life (Protection) Act, 2022, these otters are listed as Schedule species, prohibiting hunting, trapping, trade, or killing. Populations continue to decline due to unsustainable development, large-scale wetland conversion, deteriorating water quality, and poaching (Duplaix & Savage 2018).

In the tropics, protected areas occupy less than 10% of the total area, and a substantial amount of biodiversity exists outside protected areas (Schmitt et al. 2009). In landscapes lacking protected areas, human-modified landscapes often provide critical habitats and refuges for biodiversity (Chazdon et al. 2009). As protected areas continue to shrink and human-modified landscapes continue to expand, conservation and research attention must be focused on these heterogeneous landscapes, especially river basins. Conservation of charismatic species like otters in such a heterogeneous landscape is critical, as they occupy some of the best habitats available for them. The habitats are essential for otters, providing space for spraint deposition, grooming, and creation of holts (dens), which play a vital role in their social interactions and in marking territories.

Our main objective is to improve the understanding of Smooth-coated Otters in the Kalinje Mangrove of Raigad District, and along the Savitri River between Raigad and Ratnagiri districts of Maharashtra.

METHODS

Study Area

Kalinje (18.039° N, 73.029° E) is a small village situated between Harihareshwar and Shrivardhan, known for its stunning mangroves and diverse wildlife. Most people residing here are either fishermen, drivers, or employees. In recent years, mangrove tourism has become popular as more and more people are recognizing the values of this unique ecosystem. The Mangrove Foundation of the Maharashtra Forest Department has undertaken a community-based conservation initiative, called Kalinje Ecotourism, for the upliftment of local communities.

Savitri River (18.048° N, 73.165° E) is one of five rivers originating from Mahabaleshwar in Maharashtra.

It flows through Bankot Village en route to the Arabian Sea, and forms a natural boundary between Ratnagiri and Raigad districts. Most villagers residing on the banks of the Savitri are involved in fishing and agriculture.

Baseline data on the distribution of otters in Raigad, Maharashtra.

Sign surveys: For the study of the distribution of otters and their habitat preference, the sign survey method was used. Sign surveys are generally done by looking for indirect evidence of the species such as scat/spraints (Image 11), latrines, pugmarks (Image 8), leftover food, and dens/burrows/holts (Images 9 & 10). Our study area was divided into multiple transects of 1,000 x 50 m (Prakash et al. 2012; Atul et al. 2014; Patil & Yardi 2022). To ensure spatial independence, transects were laid at intervals of 500 m. The study area was thoroughly surveyed for “otter sites” (signs/evidence of otter presence) and “non-otter sites” (signs/evidence of otter absence), recording:

- Date and time of the survey.
- GPS location.
- The presence & absence of otter signs.
- Anthropogenic activities or any other disturbances.
- Den locations: The active dens were noted as “active plots” and inactive dens were marked as “inactive plots” (Images 9 & 10).

Spatial habitat data: GIS software was used to map down vegetation cover, otter distribution, and denning sites along the river stretch. As vegetation cover plays a major role in the selection of denning sites, it served as an aid in the evaluation of potential wildlife habitats. Observed anthropogenic activities along the river stretch were also mapped to understand the impact on the distribution pattern of otters.

Analysis: To estimate the percentage of area occupied by otters, we used Principal Component Analysis (PCA) coupled with logistic regression. These scores were considered as percentages of the Occurrence of Otters.

Encounter rate method: Based on the survey/transect length, which was Savitri River as well as Kalinje Mangrove. The transect length was kept the same throughout the site and duration (Manjrekar & Prabu 2014).

$$\text{Encounter Rate} = \frac{\text{No. of sightings}}{\text{Total km covered}}$$

The analysis was carried out separately for both Savitri and Kalinje. We also analysed seasonal encounter rates

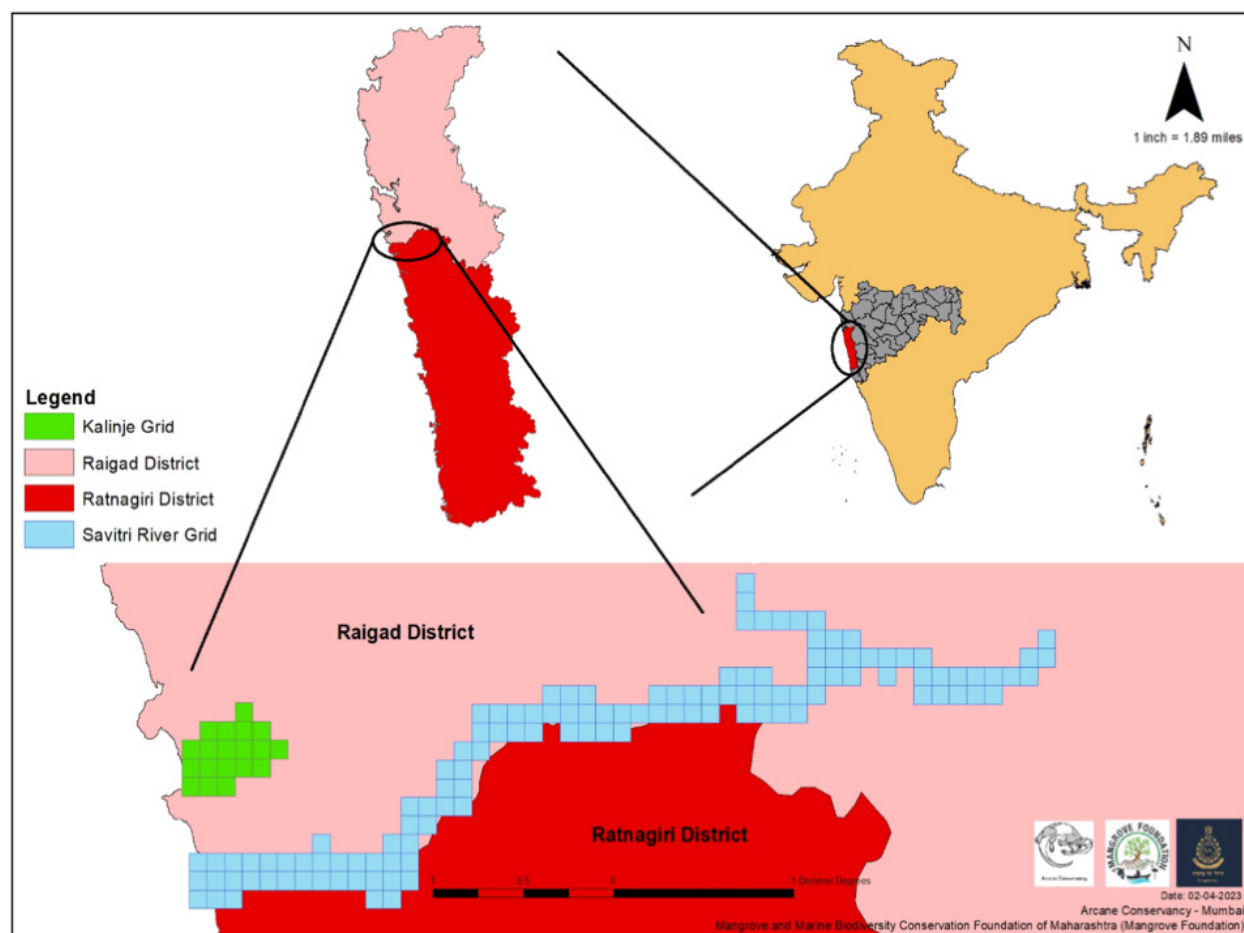


Image 1. Map showing the Savitri River (field site) situated between Raigad and Ratnagiri districts.

by considering pre-monsoon and post-monsoon surveys.

RESULTS

Savitri River

To achieve the study's objectives, a 1 x 1 km grid was deployed along the entire Savitri River, starting from Mahad to Velas, using Google Earth and ArcGIS software. A total of 124 grids were created along the Savitri River (Image 2).

Of these, 103 transect surveys were conducted, covering the river from Bankot to Mahad on the right bank and from Mahad to Bagmandala on the left bank. Certain sites, such as Umroli and Nigdi, remained inaccessible owing to presence of crocodiles (Image 3). Out of the 124 grids, 92 were surveyed, with 34 grids showing positive otter presence.

From the 103 surveys conducted along the Savitri River, 37 surveys yielded positive otter signs (Image 7),

indicating that 36% of the area was occupied by otters. The sign surveys were influenced by tidal variations (high and low tides), which affected the detection probability of signs. In total, 67 otter signs were observed during the surveys, including denning areas (holts) and defecation areas, primarily on mangrove island patches.

Kalinje Mangrove

A total of 19 grids were created in the Kalinje Mangrove (Image 4). Each grid had a survey transect with fixed replicates. These surveys assessed the presence or absence of otters, recorded habitat parameters, and noted any threats to the habitat. Additionally, camera trapping was conducted at selected sites based on the presence of direct and indirect otter signs. A total of 296 hours were spent on camera trapping across the Kalinje and Savitri areas (Images 5 & 6).

In the Kalinje Mangrove, 19 grids were surveyed, and 39 transects were conducted. Priority was given to active otter sites to maximize sightings. Surveys were

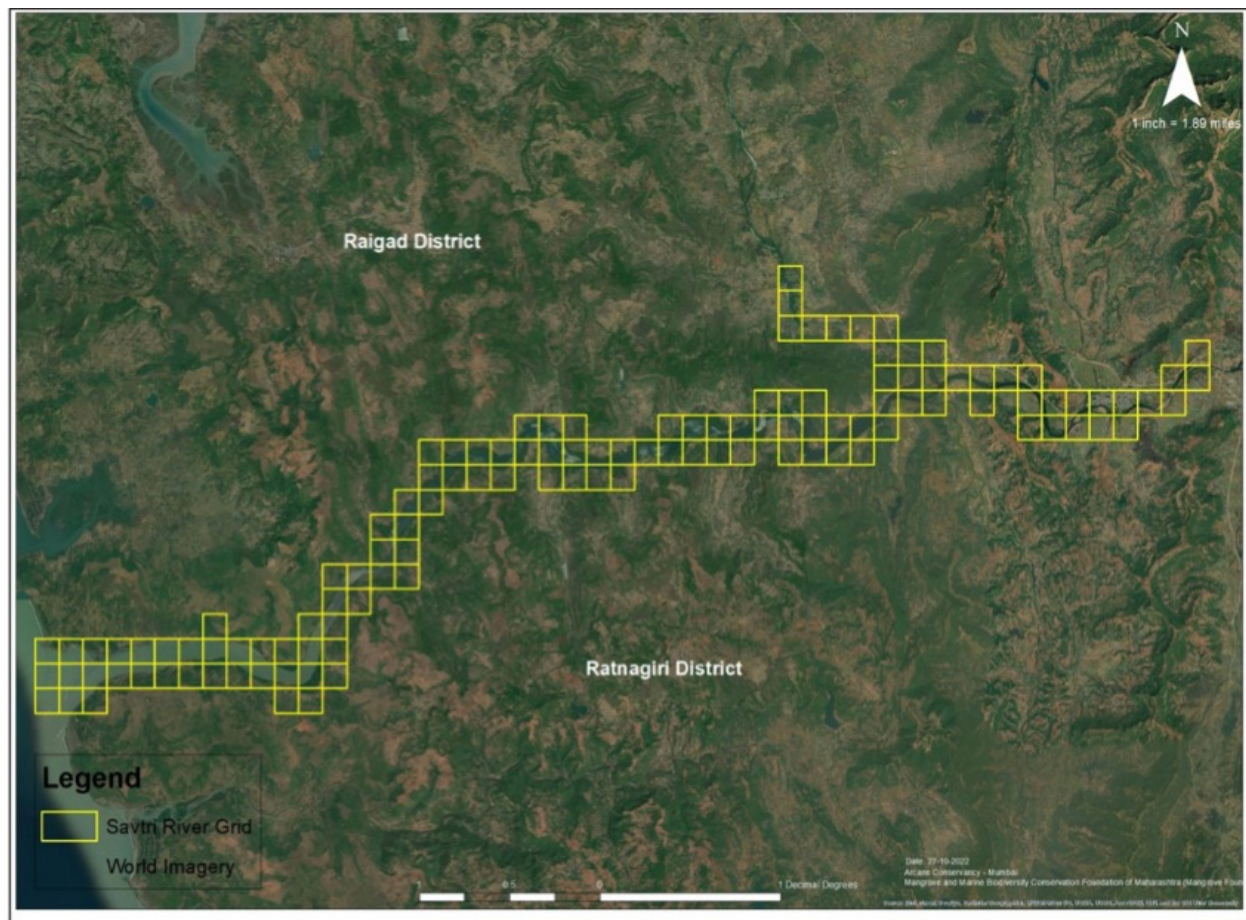


Image 2. Map of survey grid deployed on the Savitri River from Mahad to Velas.



Image 3. Drone shot of a crocodile basking, observed during the otter survey. © Siddharth Pednekar - Arcane Conservancy Trust.

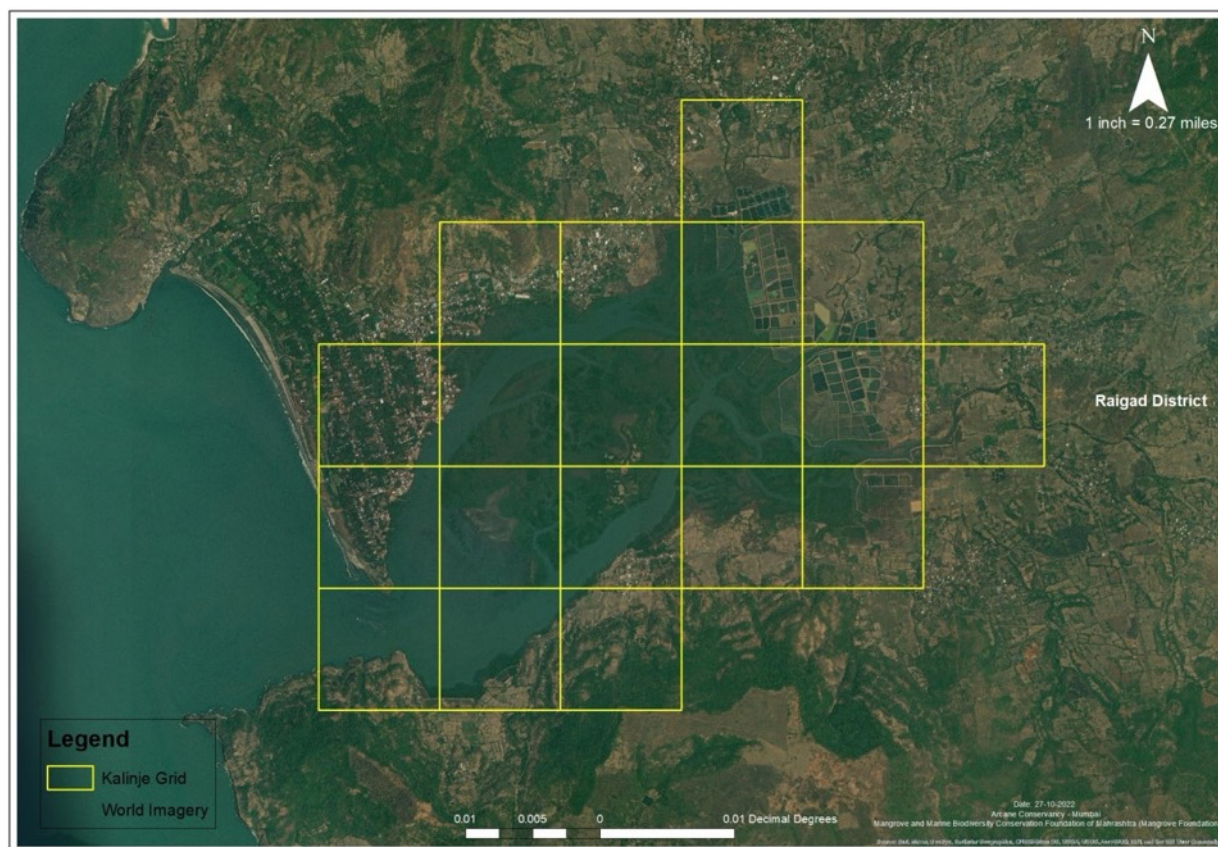


Image 4. Map showing 1 x 1 km survey grid deployed on the Kalinje Mangrove.



Image 5. Camera trap image showing Smooth-coated Otter resting in a mangrove patch in Kalinje. © SArane Conservancy Trust.



Image 6. Camera trap image showing a pair of Smooth-coated Otters near Shipole Village on Savitri River. © Arcane Conservancy Trust.

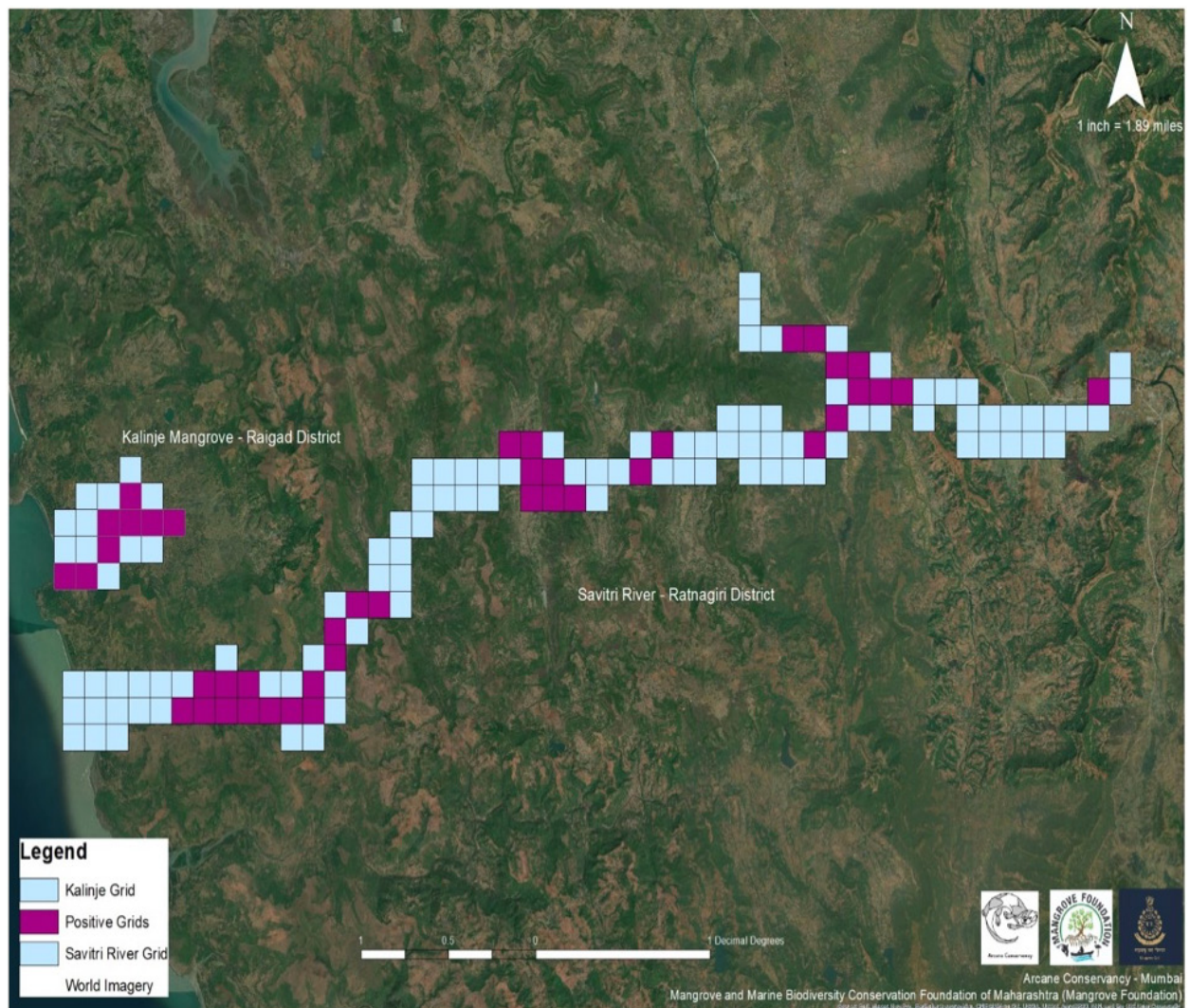


Image 7. Map showing positive field sites/ grids with observed otter signs.

Table 1. Results of principal component analysis with eigenvalues, percentage of variance, and the contribution of habitat variable of Smooth-coated Otters in Savitri River (PC1) and Kalinje Mangrove (PC2).

Variable	PC1 – Savitri River	PC2 – Kalinje Mangrove
Main River	0.740	0.180
Creek	0.690	0.540
Bandh	0.710	0.480
Sandy Bank	0.650	0.320
Farmland	-0.600	-0.620
Rocky Bank	-0.670	-0.220
Elgen Values	4.31	1.54
% Variance	35.92%	12.82%
%Cumulative Variance	35.92%	48.74%



Image 8. Otter pugmark. © Arcane Conservancy Trust.

also carried out at and near fish and prawn farms, where informal interviews with workers confirmed regular otter visits. A total of 12 boat surveys were also conducted. Two FxX IR Camera traps were deployed in areas with a high concentration of otter signs, such as defecation or denning areas.

Of the 19 grids surveyed, 8 showed otter signs in the Kalinje Mangrove (Image 7). From the 39 surveys conducted, five yielded positive otter signs, contributing

Table 2. Table summarizing the key results for both study locations.

Parameters	Savitri River	Kalinje Mangrove
Total length	65.26 km	8.40 km ²
Total number of grids	124	19
Total number of grids surveyed	92	18
Total number of transects carried	103	39
Encounter rate	0.65 signs/km	0.41 signs/km
Detection probability pre-monsoon	0.53 signs/km	0.66 signs/km
Detection probability post-monsoon	0.67 signs/km	0.38 signs/km



Image 9. An inactive otter den (debris fallen, entrance covered with twigs & leaves). © Arcane Conservancy Trust.

to an estimated 12.82% of the area occupied by otters. A total of 16 otter signs were recorded, with six signs observed in mangrove patches and 10 signs on muddy embankments near prawn farms, particularly on the 'bandhs' (Hindi: Mud embankments) of abandoned prawn farms.

Comparative Seasonal Analysis

Between May 2022 and February 2023, 103 surveys were conducted along the Savitri River and 39 transects in the Kalinje Mangrove. The total distance covered was 103 km for the Savitri River and 39 km for the Kalinje Mangrove. The encounter rate for otter signs (pugmarks and spraint) was 0.65 signs/km along the Savitri River and 0.41 signs/km in the Kalinje Mangrove.

Seasonal patterns were analyzed to understand otter



Image 10. Active otter den. © Arcane Conservancy Trust.

detection probability during pre- and post-monsoon seasons (May–June and November–January). Due to the shorter study duration in the pre-monsoon period, achieving the same number of surveys for each season was challenging.

For the pre-monsoon season, three surveys were conducted in the Kalinje Mangrove and 15 in the Savitri River, resulting in detection probabilities of 0.53 signs/km and 0.66 signs/km, respectively. In the post-monsoon season, 88 transects were conducted along the Savitri River and 36 in the Kalinje Mangrove, yielding encounter rates of 0.67 signs/km and 0.38 signs/km, respectively.

CONCLUSIONS

The estimated proportion of the length of Savitri River occupied by Smooth-coated Otters was 36% based on our sign survey. This suggests that otters are relatively widespread across approximately one-third of the surveyed areas, utilizing different sections of the river for foraging, resting, denning, and other activities. In contrast, the Kalinje Mangrove showed a lower occupancy rate of 12.8%, indicating a more limited distribution of otters in this habitat.

Our encounter rates of 0.65 signs/km in the Savitri



Image 11. Otter spraint/ scat (presence of fish scales and small bones). © Arcane Conservancy Trust.

River and 0.41 signs/km in the Kalinje Mangrove reflect the challenges of detecting otter signs in dynamic environments where tides regularly submerge and expose the riverbanks. This fluctuation likely reduces the visibility of otter signs, impacting the detection probability and suggesting that our estimates may be conservative.

The principal component analysis (PCA) further supports these observations. In Savitri River, PC1 accounted for 35.9% of the variance and revealed that otter presence is positively associated with key riverine features such as main river channels, creeks, bandhs, and sandy banks. These variables were consistently linked to habitat use, underscoring their ecological importance. In contrast, PC2 in the Kalinje Mangrove accounted for 12.8% of the variance, with otters showing a preference for creeks and bandhs, although the overall influence of habitat variables was lower, reflecting limited habitat suitability in this mangrove-dominated system. Additionally, farmland and rocky banks were negatively associated with otter presence across both landscapes, likely due to disturbance and poor suitability for resting and denning. These results suggest that otters prefer relatively undisturbed, structurally diverse aquatic environments, and actively avoid modified banks.

The survey suggests that without such baseline data, there will be a lack of informed decision-making, which might lead to a further decline in the population of the species or its suitable habitat. The presence/absence data will be vital in creating conservation hotspots.

Table 3. GPS locations of otter signs.

	Latitude	Longitude	Type of sign	Species ID
1	17.985	73.081	Defecation area	Smooth-coated Otter
2	17.98586	73.084	Scat/Spraint	Smooth-coated Otter
3	17.985	73.085	Scat/Spraint	Smooth-coated Otter
4	17.985	73.086	Scat/Spraint	Smooth-coated Otter
5	17.984	73.087	Scat/Spraint	Smooth-coated Otter
6	17.984	73.087	Scat/Spraint	Smooth-coated Otter
7	17.981	73.092	Scat/Spraint	Smooth-coated Otter
8	17.981	73.092	Scat/Spraint	Smooth-coated Otter
9	17.981	73.092	Scat/Spraint	Smooth-coated Otter
10	17.981	73.094	Scat/Spraint	Smooth-coated Otter
11	17.98094	73.095	Defecation area	Smooth-coated Otter
12	17.979	73.098	Defecation area	Smooth-coated Otter
13	17.980	73.098	Defecation area	Smooth-coated Otter
14	18.04178	73.038	Defecation area	Smooth-coated Otter
15	18.048	73.046	Defecation area	Smooth-coated Otter

A significant amount of otter distribution lies outside protected areas, emphasizing the need for research projects that can generate information on such species. This information could be useful in future with respect to undertaking sustainable developmental activities and implementing effective conservation measures (Defries et al. 2010).

Advances in technology such as camera traps have proven invaluable in this research. These tools allow for the non-intrusive monitoring of otters, providing insights into their behaviour and activity patterns.

In conclusion, this study highlights the need for ongoing research and the integration of modern technologies in wildlife conservation. Our data suggest that otters have a relatively widespread distribution over approximately one-third of the surveyed area, utilizing different sections of the river for foraging, resting, denning, and other activities.

REFERENCES

- Borker, A., A. Muralidhar, B. Menon & S. Desai (2014). *Conservation of otter habitats through stakeholder participation*. Conservation Leadership Programme. https://www.conservationleadershipprogramme.org/media/2016/11/India_Atul_Otters_Final-Report.pdf
- Chazdon, R.L., C.A. Harvey, O. Komar, D.M. Griffith, B.G. Ferguson, M.



Image 12. A Smooth-coated Otter foraging through the mangroves. © Arcane Conservancy Trust.

- Martínez-Ramos, H. Morales, R. Nigh, L. Soto-Pinto, M.V. Breugel & S.M. Philpott (2009). Beyond reserves: a research agenda for conserving biodiversity in human-modified tropical landscapes. *Biotropica* 41(2): 142–153. <https://doi.org/10.1111/j.1744-7429.2008.00471.x>
- Defries, R., K. Karanth & S. Pareeth (2010). Interactions between protected areas and their surroundings in human-dominated tropical landscape. *Biological Conservation* 143: 2870–2880. <https://doi.org/10.1016/j.biocon.2010.02.010>
- Duplaix, N. & M. Savage (2018). The Global Otter Conservation Strategy. IUCN/SSC Otter Specialist Group, Salem, Oregon, USA
- Manjrekar, M.P. & C.L. Prabu (2014). Status Of Otters In The Sundarbans Tiger Reserve, West Bengal, India. *IUCN/SSC Otter Specialist Group Bulletin* 31(2): 61–64.
- Patil, S. & K. Yardi (2022). Distribution of Smooth-coated Otters *Lutrogale perspicillata* (Mammalia: Carnivora: Mustelidae): in Ratnagiri, Maharashtra, India. *Journal of Threatened Taxa* 14(1): 20511–20516. <https://doi.org/10.11609/jott.7652.14.1.20511-20516>
- Prakash, N., A. Perinchery & R.R. Nayak (2012). Monitoring Otter Populations and Combating Poaching Through Stakeholder Participation in India. Nature Conservation Foundation, 31 pp.
- Schmitt, C.B., N.D. Burgess, L. Coad, A. Belokurov, C. Besançon, L. Boisrobert, A. Campbell, L. Fish, D. Gliddon, K. Humphries, V. Kapos, C. Loucks, I. Lysenko, L. Miles, C. Mills, S. Minnemeyer, T. Pistorius, C. Ravilious, M. Steininger & G. Winkel (2009). Global analysis of the protection status of the world's forests. *Biological Conservation* 142(10): 2122–2130. <https://doi.org/10.1016/j.biocon.2009.04.012>



Mr. Jatishwor Singh Irungbam, Biology Centre CAS, Branišovská, Czech Republic.
Dr. Ian J. Kitching, Natural History Museum, Cromwell Road, UK
Dr. George Mathew, Kerala Forest Research Institute, Peechi, India
Dr. John Noyes, Natural History Museum, London, UK
Dr. Albert G. Orr, Griffith University, Nathan, Australia
Dr. Sameer Padhye, Katholieke Universiteit Leuven, Belgium
Dr. Nancy van der Poorten, Toronto, Canada
Dr. Kareen Schnabel, NIWA, Wellington, New Zealand
Dr. R.M. Sharma, (Retd.) Scientist, Zoological Survey of India, Pune, India
Dr. Manju Siliwal, WILD, Coimbatore, Tamil Nadu, India
Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India
Dr. K.A. Subramanian, Zoological Survey of India, New Alipore, Kolkata, India
Dr. P.M. Sureshan, Zoological Survey of India, Kozhikode, Kerala, India
Dr. R. Varatharajan, Manipur University, Imphal, Manipur, India
Dr. Eduard Vives, Museu de Ciències Naturals de Barcelona, Terrassa, Spain
Dr. James Young, Hong Kong Lepidopterists' Society, Hong Kong
Dr. R. Sundararaj, Institute of Wood Science & Technology, Bengaluru, India
Dr. M. Nithyanandan, Environmental Department, La Ala Al Kuwait Real Estate. Co. K.S.C., Kuwait
Dr. Himender Bharti, Punjabi University, Punjab, India
Mr. Purnendu Roy, London, UK
Mr. Saito Motoki, The Butterfly Society of Japan, Tokyo, Japan
Dr. Sanjay Sondhi, TITLI TRUST, Kalpavriksh, Dehradun, India
Dr. Nguyen Thi Phuong Lien, Vietnam Academy of Science and Technology, Hanoi, Vietnam
Dr. Nitin Kulkarni, Tropical Research Institute, Jabalpur, India
Dr. Robin Wen Jiang Ngiam, National Parks Board, Singapore
Dr. Lionel Monod, Natural History Museum of Geneva, Genève, Switzerland.
Dr. Asheesh Shivam, Nehru Gram Bharti University, Allahabad, India
Dr. Rosana Moreira da Rocha, Universidade Federal do Paraná, Curitiba, Brasil
Dr. Kurt R. Arnold, North Dakota State University, Saxony, Germany
Dr. James M. Carpenter, American Museum of Natural History, New York, USA
Dr. David M. Claborn, Missouri State University, Springfield, USA
Dr. Kareen Schnabel, Marine Biologist, Wellington, New Zealand
Dr. Amazonas Chagas Júnior, Universidade Federal de Mato Grosso, Cuiabá, Brasil
Mr. Monsoon Jyoti Gogoi, Assam University, Silchar, Assam, India
Dr. Heo Chong Chin, Universiti Teknologi MARA (UiTM), Selangor, Malaysia
Dr. R.J. Shiel, University of Adelaide, SA 5005, Australia
Dr. Siddharth Kulkarni, The George Washington University, Washington, USA
Dr. Priyadarsanan Dharma Rajan, ATREE, Bengaluru, India
Dr. Phil Alderslade, CSIRO Marine And Atmospheric Research, Hobart, Australia
Dr. John E.N. Veron, Coral Reef Research, Townsville, Australia
Dr. Daniel Whitmore, State Museum of Natural History Stuttgart, Rosenstein, Germany.
Dr. Yu-Feng Hsu, National Taiwan Normal University, Taipei City, Taiwan
Dr. Keith V. Wolfe, Antioch, California, USA
Dr. Siddharth Kulkarni, The Hormiga Lab, The George Washington University, Washington, D.C., USA
Dr. Tomas Ditrich, Faculty of Education, University of South Bohemia in Ceske Budejovice, Czech Republic
Dr. Mihaly Foldvari, Natural History Museum, University of Oslo, Norway
Dr. V.P. Uniyal, Wildlife Institute of India, Dehradun, Uttarakhand 248001, India
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

Dr. Topiltzin Contreras MacBeath, Universidad Autónoma del estado de Morelos, México
Dr. Heok Hee Ng, National University of Singapore, Science Drive, Singapore
Dr. Rajeev Raghavan, St. Albert's College, Kochi, Kerala, India
Dr. Robert D. Sluka, Chiltern Gateway Project, A Rocha UK, Southall, Middlesex, UK
Dr. E. Vivekanandan, Central Marine Fisheries Research Institute, Chennai, India
Dr. Davor Zanella, University of Zagreb, Zagreb, Croatia
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

Dr. Sushil K. Dutta, Indian Institute of Science, Bengaluru, Karnataka, India
Dr. Annemarie Ohler, Muséum national d'Histoire naturelle, Paris, France

Reptiles

Dr. Gernot Vogel, Heidelberg, Germany
Dr. Raju Vyas, Vadodara, Gujarat, India
Dr. Pritpal S. Soorae, Environment Agency, Abu Dubai, UAE.
Prof. Dr. Wayne J. Fuller, Near East University, Mersin, Turkey
Prof. Chandrashekher U. Rivonker, Goa University, Taleigao Plateau, Goa. India
Dr. S.R. Ganesh, Chennai Snake Park, Chennai, Tamil Nadu, India
Dr. Himansu Sekhar Das, Terrestrial & Marine Biodiversity, Abu Dhabi, UAE

Birds

Dr. Hem Sagar Baral, Charles Sturt University, NSW Australia
Mr. H. Byju, Coimbatore, Tamil Nadu, India
Dr. Chris Bowden, Royal Society for the Protection of Birds, Sandy, UK
Dr. Priya Davidar, Pondicherry University, Kalapet, Puducherry, India
Dr. J.W. Duckworth, IUCN SSC, Bath, UK
Dr. Rajah Jayapal, SAGON, Coimbatore, Tamil Nadu, India
Dr. Rajiv S. Kalsi, M.L.N. College, Yamuna Nagar, Haryana, India
Dr. V. Santharam, Rishi Valley Education Centre, Chittoor Dt., Andhra Pradesh, India
Dr. S. Balachandran, Bombay Natural History Society, Mumbai, India
Mr. J. Praveen, Bengaluru, India
Dr. C. Srinivasulu, Osmania University, Hyderabad, India
Dr. K.S. Gopi Sundar, International Crane Foundation, Baraboo, USA
Dr. Gombobaatar Sunde, Professor of Ornithology, Ulaanbaatar, Mongolia
Prof. Reuven Yosef, International Birding & Research Centre, Eilat, Israel
Dr. Taej Mundkur, Wetlands International, Wageningen, The Netherlands
Dr. Carol Inskipp, Bishop Auckland Co., Durham, UK
Dr. Tim Inskipp, Bishop Auckland Co., Durham, UK
Dr. V. Gokula, National College, Tiruchirappalli, Tamil Nadu, India
Dr. Arkady Lelej, Russian Academy of Sciences, Vladivostok, Russia
Dr. Simon Dowell, Science Director, Chester Zoo, UK
Dr. Mário Gabriel Santiago dos Santos, Universidade de Trás-os-Montes e Alto Douro, Quinta de Prados, Vila Real, Portugal
Dr. Grant Connette, Smithsonian Institution, Royal, VA, USA
Dr. P.A. Azeez, Coimbatore, Tamil Nadu, India

Mammals

Dr. Giovanni Amori, CNR - Institute of Ecosystem Studies, Rome, Italy
Dr. Anwaruddin Chowdhury, Guwahati, India
Dr. David Mallon, Zoological Society of London, UK
Dr. Shomita Mukherjee, SAGON, Coimbatore, Tamil Nadu, India
Dr. Angie Appel, Wild Cat Network, Germany
Dr. P.O. Nameer, Kerala Agricultural University, Thrissur, Kerala, India
Dr. Ian Redmond, UNEP Convention on Migratory Species, Lansdown, UK
Dr. Heidi S. Riddle, Riddle's Elephant and Wildlife Sanctuary, Arkansas, USA
Dr. Karin Schwartz, George Mason University, Fairfax, Virginia.
Dr. Lala A.K. Singh, Bhubaneswar, Orissa, India
Dr. Mewa Singh, Mysore University, Mysore, India
Dr. Paul Racey, University of Exeter, Devon, UK
Dr. Honnavalli N. Kumara, SAGON, Anaikatty P.O., Coimbatore, Tamil Nadu, India
Dr. Nishith Dharaiya, HNG University, Patan, Gujarat, India
Dr. Spartaco Gippoliti, Socio Onorario Società Italiana per la Storia della Fauna "Giuseppe Altobello", Rome, Italy
Dr. Justus Joshua, Green Future Foundation, Tiruchirappalli, Tamil Nadu, India
Dr. H. Raghuram, Sri S. Ramasamy Naidu Memorial College, Virudhunagar, Tamil Nadu, India
Dr. Paul Bates, Harison Institute, Kent, UK
Dr. Jim Sanderson, Small Wild Cat Conservation Foundation, Hartford, USA
Dr. Dan Challender, University of Kent, Canterbury, UK
Dr. David Mallon, Manchester Metropolitan University, Derbyshire, UK
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, Budhanilakantha Municipality, Kathmandu, Nepal
Dr. Susan Cheyne, Borneo Nature Foundation International, Palangkaraja, Indonesia
Dr. Hemanta Kafley, Wildlife Sciences, Tarleton State University, Texas, USA

Other Disciplines

Dr. Aniruddha Belsare, Columbia MO 65203, USA (Veterinary)
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 Hellem Santos Bezerra, Universidade Federal de Sergipe, São Cristóvão, Brazil
Dr. Jamie R. Wood, Landcare Research, Canterbury, New Zealand
Dr. Wendy Collinson-Jonker, Endangered Wildlife Trust, Gauteng, South Africa
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. Bahar Baviskar, Wild-CER, Nagpur, Maharashtra 440013, India

Reviewers 2021–2023

Due to pausity of space, the list of reviewers for 2021–2023 is available online.

The opinions expressed by the authors do not reflect the views of the Journal of Threatened Taxa, Wildlife Information Liaison Development Society, Zoo Outreach Organization, or any of the partners. The journal, the publisher, the host, and the partners are not responsible for the accuracy of the political boundaries shown in the maps by the authors.

Print copies of the Journal are available at cost. Write to:
The Managing Editor, JoTT,
c/o Wildlife Information Liaison Development Society,
3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore,
Tamil Nadu 641006, India
ravi@threatenedtaxa.org & ravi@zooreach.org

Journal of Threatened Taxa is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, National Academy of Agricultural Sciences, NewJour, OCLC WorldCat, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Records.

NAAS rating (India) 5.64



OPEN ACCESS



The Journal of Threatened Taxa (JoTT) is dedicated to building evidence for conservation globally by publishing peer-reviewed articles online every month at a reasonably rapid rate at www.threatenedtaxa.org. All articles published in JoTT are registered under [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) unless otherwise mentioned. JoTT allows unrestricted use, reproduction, and distribution of articles in any medium by providing adequate credit to the author(s) and the source of publication.

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

December 2025 | Vol. 17 | No. 12 | Pages: 28011–28150

Date of Publication: 26 December 2025 (Online & Print)

DOI: 10.11609/jott.2025.17.12.28011-28150

www.threatenedtaxa.org

Articles

Morphometry and feeding notes of an endemic frog *Amolops spinapectoralis* (Amphibia: Ranidae) from Hue City, central Vietnam

– Loi Duc Duong, Giang Van Tran & Nghiep Thi Hoang, Pp. 28011–28025

Ectoparasites of Sumatran Elephants at Tangkahan Elephant Camp, Langkat, North Sumatra

– Kaniwa Berliani, Destiny Simarmata, Wahdi Azmi, Fithria Edhi & Cynthia Gozali, Pp. 28026–28035

Documenting the traditional hunting practices of the Nocte Tribe in Arunachal Pradesh: a case study of cultural legacy for posterity

– Miatcha Tangjang, Ajay Maletha & Kausik Banerjee, Pp. 28036–28047

Floristic composition and plant functional types on the lateritic plateau of Panchgani Tableland, Maharashtra, India

– Sarita Gosavi, Pratiksha Mestry, Swapnil Vyas & Ankur Patwardhan, Pp. 28048–28065

Communications

Distribution of Smooth-coated Otters (Mammalia: Carnivora: Mustelidae: *Lutrogale perspicillata*) in the coastal mangroves of Maharashtra: a case study of Savitri River and Kalinje Mangrove Ecosystem

– Swanand R. Patil & Manas Manjrekar, Pp. 28066–28075

Population dynamics and habitat preference in Painted Stork *Mycteria leucocephala* and Woolly-necked Stork *Ciconia episcopus* in Dighal Wetland, Jhajjar, Haryana, India

– Sony & Sarita Rana, Pp. 28076–28082

A preliminary checklist of avian fauna of the Raha sub-district of Nagaon, Assam, India

– Bhrigumohan Manta, Jonmani Kalita, Afifa Kausar, Barnali Sarma, Lalit Mohan Goswami & Suranjan Debnath, Pp. 28083–28095

Assemblage structure and diversity of ichthyofauna in a low-order stream of the Pamba River in the Western Ghats of southern Kerala, India

– Ruby Thomas & K. Raju Thomas, Pp. 28096–28103

Addition of *Wallophis brachyura* (Günther, 1866) (Colubridae) and *Calliophis melanurus* (Shaw, 1802) (Elapidae) to the reptile fauna of Rajasthan, India

– Vivek Sharma, B.L. Meghwal, Love Kumar Jain & Dharmendra Khandal, Pp. 28104–28110

Checklist of moths (Lepidoptera: Heterocera) of Lumami campus, Nagaland University, India

– Keneisano Yhoshii & Lobeno Mozhui, Pp. 28111–28124

New population report of the ‘Critically Endangered’ Golden Himalayan Spike *Phlomoides superba* (Magnoliopsida: Lamiaceae) from Samba and Udhampur districts of Jammu & Kashmir, India

– Nisha Bhagat, Hina Upadhaya, Rupali Nanda & Rajesh Kumar Manhas, Pp. 28125–28130

Short Communication

A new bird record of Oriental Darter *Anhinga melanogaster* (Suliformes: Anhingidae) in Bhutan: range expansion and plastic entanglement mortality

– Kelzang Dorji, Khandu Subba, Pema Dorji, Kaye L. Gutiérrez & R.J. Gutiérrez, Pp. 28131–28134

Notes

The first distribution record of semelparous plant *Thottukurinji Strobilanthes integrifolia* (Dalzell) Kuntze (family Acanthaceae) for Gujarat, India

– Rasik Sojitra, Snehal Gamit, Kamlesh Gadhvi, Suhas Vyas & Sandip Gamit, Pp. 28135–28139

Cardamine fragariifolia O.E.Schulz (Brassicaceae): a new addition to the flora of Sikkim, India

– Srijana Mangar, Rohit Dutta, Phurba Lhamu Sherpa, Arun Kumar Rai & Arun Chettri, Pp. 28140–28143

Passiflora vesicaria var. *vesicaria* (Passifloraceae) - a new record for the flora of West Bengal, India

– S. Chowdhury, P. Barua & T.K Paul, Pp. 28144–28147

Monocarpic plietesial behaviour in *Lepidagathis* Willd. (Acanthaceae)

– Rutuja R. Kolte, Rahul D. Prabhukhanolkar, Prabha M. Pillai, Sharad S. Kambale, Gunadayalan Gnanasekaran & Malapati K. Janarthanam, Pp. 28148–28150

Publisher & Host



Threatened Taxa