

Building evidence for conservation globally

Journal of Threatened TAXA

10.11609/jott.2025.17.3.26571-26762

www.threatenedtaxa.org

26 March 2025 (Online & Print)

17(3): 26571-26762

ISSN 0974-7907 (Online)

ISSN 0974-7893 (Print)



Open Access





Publisher

Wildlife Information Liaison Development Societywww.wild.zooreach.org

Host

Zoo Outreach Organizationwww.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 Madgunki**, 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, Kuvenpu University, Shimoga, Karnataka, India**Dr. K.R. Sridhar**, Mangalore University, Mangalagangotri, Mangalore, Karnataka, India**Dr. Gunjan Biswas**, Vidyasagar University, Midnapore, West Bengal, India**Dr. Kiran Ramchandra Ranadive**, Annaheb 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. Ferdinand 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, Anantapur, 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 Ranjan Housing Society, Pune, Maharashtra, India**Prof. A.J. Solomon Raju**, Andhra University, Visakhapatnam, India**Dr. Manda Datar**, Agharkar Research Institute, Pune, Maharashtra, India**Dr. M.K. Janarthanam**, Goa University, Goa, India**Dr. K. Karthigeyan**, Botanical Survey of India, India**Dr. Errol Vela**, University of Montpellier, Montpellier, France**Dr. P. Lakshminarasiham**, 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. Siru**, 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. Warrier**, 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**, Ilandudno, North Wales, LL30 1UP**Dr. Hemant V. Ghate**, Modern College, Pune, India**Dr. M. Monwar Hossain**, Jahangirnagar University, Dhaka, BangladeshFor Focus, Scope, Aims, and Policies, visit https://threatenedtaxa.org/index.php/JoTT/aims_scopeFor 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: A bag worm with its beautiful heap of junk. Acrylics on 300 GSM paper by Dupati Poojitha based on a picture by Sanjay Molur.



Assessment of nest and nesting activities of White-bellied Heron *Ardea insignis* Hume, 1878 (Aves: Ardeidae) in the broad-leaved forests of northeastern India

Himadri Sekhar Mondal¹  & Gopinathan Maheswaran² 

^{1,2} Zoological Survey of India, M-Block, New Alipore, Kolkata, West Bengal 700053, India.

¹ Bombay Natural History Society, Hornbill House, Shahid Bhagat Singh Road, Mumbai, Maharashtra 400001, India.

¹ himadri1510@gmail.com (corresponding author), ² gmaheswaran@yahoo.com

Abstract: The discovery of White-bellied Heron *Ardea insignis* nesting in India in 2014 was a significant record since it was the second nesting report in India after one reported in Bhutan 'dooars (= Terai)' below Darjeeling. White-bellied Herons are known to build their nests in the riverine forests between 300 m and 1,500 m. The majority of the nesting records are from Chir Pine *Pinus roxburghii* forests of Bhutan. This article highlights heron's nest site selection and nesting activities in the broadleaved forests in Arunachal Pradesh, India. During the study period (2013–2017) in Namdapha Tiger Reserve, two active nests of this species were recorded one in 2014 and another in 2015. Though both the nests failed without producing any offspring, the findings, shed crucial information, especially on how the herons select their nesting sites and nest trees and the risks involved in the process. These findings will help implement conservation actions especially while safeguarding the known nesting sites in India.

Keywords: Arunachal Pradesh, behavioural ecology, Critically Endangered, eastern Indian Almond, Hollock, Namdapha, nest material trips, nesting tree.

Bengali: ভাৰতবৰ্ষ, ২০১৪ সাল, সাদা-পেটের বক তথ্য *Ardea insignis*-এর বাসা বীৰ্ধাৰ ঘটনাটি ছিল একটি উল্লেখযোগ্য আবিষ্কাৰ, কাৰণ এই ঘটনাটি, দার্জিলিংয়ের সীচে ভুটানের 'ডুয়ার্স (তোৱাই)-এর পৰে, ভাৰতে শিল্পীয় বাসা বীৰ্ধাৰ ঘটনা বিবৃত হয়েছিল। সমৃদ্ধপূর্ণ থকে ৩০০-১,৫০০ মিটাৰ উপরে নদী-চীৰাবলী বন, সাদা-পেটের বক, বাসা তৈৰি কৰে বাল জানা যায়। ভুটানের চিৰ-পাইন বা *Pinus roxburghii* বন থকে এই পাখিটির বেশিৰভাগ বাসা বীৰ্ধাৰ বিবৰণ পাওয়া গৱেষণা। এই নিৰৱৰ্কৃতি ভাৰতবৰ্ষৰ অত্যৰ্গতি অৱগাচল প্রদৰ্শনৰ বিস্তৃত-পাতাযুক্ত বনে (broad-leaved forest), এই বকদেৱ বাসা নিৰ্বাচন এবং তাদেৱ বাসা বীৰ্ধাৰ ঘটনাবলী উল্লেখ কৰা। নামদাফা বাসা বীৰ্ধাৰ প্রকল্পে (Namdapha Tiger Reserve) গবেষণাৰ সময় (২০১০-২০১৭), এই প্ৰজাতিৰ পাখিটিৰ, দুটি সক্ৰিয় বাসা পাওয়া পিছলিল, একটি ২০১৪ সাল এবং আৱেকটি ২০১৫ সাল। যদিও উভয় বাসাটি খুব সন্তুষ্ট কৰান সক্ষম না কৰে বার্ষ হয়েছিল, তুমুৰ তৎকালীন অনুসন্ধানগুলি, শুক্রহৃদপূৰ্ণ অংশ প্ৰকাশ কৰে, বিশেষ কৰে এই প্ৰজাতিৰ বক কীভাৱে তাদেৱ বাসা বীৰ্ধাৰ স্থান এবং বাসা বীৰ্ধাৰ গাছ নিৰ্বাচন কৰে এবং প্ৰক্ৰিয়াটিৰ সাথে কী ধৰণৰ সম্পৰ্কিত। এই আবিষ্কাৰগুলি, এই বিবৰণ প্ৰজাতিৰ বকেৰ গ্ৰহণকৰণক কাৰ্যকৰ কৰাতে, বিশেষজ্ঞ কৰে এই প্ৰজাতিৰ বক বাসা বীৰ্ধাৰ হামলালৈক সুৰক্ষিত কৰাৰ ক্ষেত্ৰে, উল্লেখযোগ্য ভূমিকা পালন কৰাবে।

Editor: H. Byju, Coimbatore, Tamil Nadu, India.

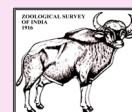
Date of publication: 26 March 2025 (online & print)

Citation: Mondal, H.S. & G. Maheswaran (2025). Assessment of nest and nesting activities of White-bellied Heron *Ardea insignis* Hume, 1878 (Aves: Ardeidae) in the broad-leaved forests of northeastern India. *Journal of Threatened Taxa* 17(3): 26690–26696. <https://doi.org/10.11609/jott.9476.17.3.26690-26696>

Copyright: © Mondal & Maheswaran 2025. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use, reproduction, and distribution of this article in any medium by providing adequate credit to the author(s) and the source of publication.

Funding: This study was funded by the Science and Engineering Research Board (SERB) of the Department of Science & Technology, Government of India with the reference to file number SR/SO/AS-62/2012.

Competing interests: The authors declare no competing interests.



Author details: HIMADRI SEKHAR MONDAL completed his PhD on the behavioural studies of Critically Endangered White-bellied Heron *Ardea insignis* from the Pondicherry University in 2019. He has joined BNHS as scientist on 2018 and has worked on different projects since then. He is currently working on the birds and wetlands of the Sikkim Himalaya. GOPINATHAN MAHESWARAN is presently working as senior scientist in Zoological Survey of India's HQ office at Kolkata mostly on the foraging behavior of long-legged wading birds. He is currently involved in another DST-sponsored project on White-bellied Heron in Namdapha Tiger Reserve of Arunachal Pradesh.

Author contributions: HSM involved in data collection, analyses, conceptualization and writing of this article. GM helped in writing of this article and also, involved in its correction and accrued the fund for this study.

Acknowledgements: We thank the director, Zoological Survey of India, Kolkata, for encouragement and support throughout the study and the Science and Engineering Research Board (SERB) of the Department of Science & Technology, Government of India, for financial support of the study of White-bellied Heron in Namdapha Tiger Reserve through grant SR/SO/AS-62/2012 offered to the second author. We also thank the Department of Forests and Wildlife, Government of Arunachal Pradesh, for giving us permission to stay and study within the reserve for a large part of the year. Finally, we thank our four field assistants; without whose help this study could not have been possible in such a difficult terrain.

INTRODUCTION

The White-bellied Heron (WBH hereafter) is the only heron classified as 'Critically Endangered' by the IUCN Red List of Threatened Species (Maheswaran et al. 2021a; BirdLife International 2024). It is a resident in Bhutan, northeastern India and Myanmar with merely about 60 reported individuals (Price & Goodman 2015 Maheswaran et al. 2021b). In India, it is mainly reported from Namdapha Tiger Reserve (Mondal & Maheswaran 2022), Kamlang National Park and reserve forests in Walong area of Anjaw District, Arunachal Pradesh (Reddy et al. 2021).

In Bhutan, the first nest of WBH was reported in 2003 (Acharja 2019; Khandu et al. 2020); with 27 active nests identified by 2017 (Khandu et al. 2020). In India, Hume & Oates (1890) reported the first nest of *Ardea insignis* as a platform of sticks placed on the top of a large tree in an inaccessible swampland southern of Darjeeling, in the Bhutan dooars (= terai). No photographic evidence was available as it only mentioned that a large stick nest was placed high upon a large tree in a swampy and inaccessible area. The breeding period mentioned was during July–August. the present study documents two nests of WBH from the Namdapha Tiger Reserve. This article will be the first of its kind that will assess the nesting of this rare heron species in India and aid in further research and future conservation action and management plans.

MATERIALS AND METHODS

During the study period (2013–2017), in Namdapha Tiger Reserve (27.392–27.661 °N & 96.251–96.976 °E) (NTR hereafter) (Image 1), all the activities of WBHs were monitored and recorded along with their nest building activities. The studies focused on understanding how nest site/s were selected and followed by the nest building activities.

Behavioural observation

Studies on nest-building activities of WBH were conducted over two years (06–18 March 2014 and from 24 February 2015 to 10 May 2015). Nesting activities were observed for a total of 39 days—eight days in 2014 and 31 days in 2015. The longest continuous stretch of observation was from 24 February to 4 April 2015. During this period, observations were made for 25 days with intervals of 1–2 days in between. The continuous scan sampling method (Martin & Bateson 2007) was used to

record various nest-building activities of WBH from 0530 h to 1730 h. Various behavioural activities of WBH were observed during this period: courtship (making calls for its mate and greet their mates when they come back to the nest), nest-material trips (when one of the pair flew to bring nest material to the nest), foraging (catching fish at the river). Observations were made from a distance of 300 m with a pair of 8 x 40 binoculars (Nikon) and a spotting scope (Nikon) and photographed with Nikon D70S SLR camera and Sigma 500 mm telephoto lens. Hideouts constructed at a distance of 100 to 150 m from the nest tree to observe behavioural activities without disturbing the nesting. Locating the active nest of WBH is merely a chance and can be found by following the adult bird from their foraging sites to the roosting area, especially during breeding season. As soon as WBH was spotted at its nest, or seen building the nest, the observation on the individual/pair started and continued till the heron(s) disappeared from the sight or flew away towards the Noa-Dehing River for foraging or nest material collection. As WBHs do not have any distinctive sexual dimorphism, identifying individual birds remained difficult.

Evaluation of the nesting sites and nests

The tree species used for nesting by WBH was identified using Chowdhery et al. (1996). The height of the nesting tree and the height at which the herons built their nests were measured using conventional methods of measuring a smaller tree nearby, using rope and then extrapolating that with the nest tree to arrive at the actual height. The diameter of the fallen nest was measured with the help of a measuring tape. Coordinates and elevations of the respective locations were recorded using Garmin GPS. Using Google Earth, the aerial distance were measured between the nesting tree and the regular foraging sites and human tracks and villages.

Data analysis

Nesting: Time spent by WBH in nesting was calculated for each day. The entire observation period of a day was divided into three categories:

- (i) Morning: 0530–0930 h.
- (ii) Mid-day: 0930–1330 h.
- (iii) Evening: 1330–1730 h.

The percentage time spent by the pair in nest-building activities was calculated for different times of the day.

Hours spent on nesting on a specific category of time of the day X 100

—————
Total hours spent on nesting

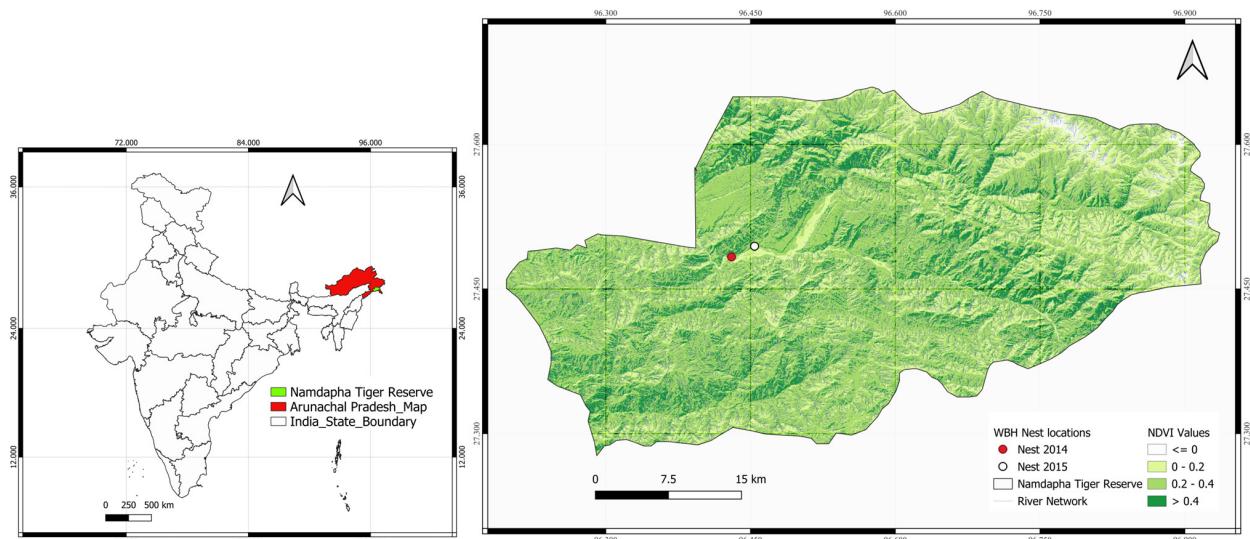


Image 1. Map of Namdapha Tiger Reserve indicating nests of White-bellied Heron.

Mean \pm SD of each of these categories were calculated to understand during which time of the day the species preferred to construct their nest.

Nest material trips

'Nest material trips' are the trips (flights) made by the adult nesting birds from their nesting tree to the nearby trees or land and return to their nest with sticks in their bills (Maheswaran & Rahmani 2005). These sticks or 'nest materials' are collected by the WBH, waiting in the nest. Whenever the herons returned to the nest with nest materials in their bills the time taken to make such trips was also recorded. At a time, WBHs were seen collecting only one piece of nest material. Percentage (%) of nest material trips and percentage (%) and Mean \pm SD value of time spent on such trips were calculated for each category during different times of the day and also for the years 2014 and 2015, separately.

RESULTS

Nesting sites: Two nests of WBH, one each in 2014 and 2015, were located in different tree species (Table 1) that were 2.69 km apart. Each year, one pair of WBH was spotted building the nest. It could not be confirmed whether the same pair of WBH constructed both nests. Certain features were common for both nesting sites.

Forest type: The forest type of this area is categorized as the northern tropical evergreen forest or Assam Valley tropical wet evergreen forest. Champion & Seth (1968) mentioned three types of forests in NTR: (a)—northern

tropical evergreen forest or Assam Valley tropical wet evergreen forest (dominated by *Dipterocarpus*) | (b)—northern Indian tropical moist deciduous forest (dominated by *Terminalia*) | and (c)—miscellaneous forest (no single species dominance). In both years, WBHs were seen building their nests only in the nearby riverine or fringes of the forests but not much in the interiors.

Forest edge: The trees chosen to build the nest were at the forest edge, between the open riverbed and the interior dense forest. Distance of the nesting tree from their regular foraging site was 663 m and 201 m in 2014 and 2015, respectively.

North-sided forest: WBHs were seen almost regularly foraging in the Noa-Dehing River that flows in an east-west direction at the 27-mi area of NTR. Both nests were recorded at the north-sided forest of this area. Also, the north-sided forest is less anthropogenically disturbed than the south-sided forest.

Nest Azimuth: In both years WBHs were seen building their nest facing east that ensured better reception of sunlight throughout the nesting period.

Human trails: The nearest human track was on the other side of the Noa-Dehing River (near south sided forest), more than 800 m away from the nest. The nearest human settlement was far more interior in the forest (at least 1.5 km away from the nesting site) (Table 1).

Nesting tree height: WBH selected 22–33 m trees to build their nests although there were many tall trees in the vicinity.

Position of the nest in the tree: WBH did not

construct nests at the top of the nesting tree but the nests were built at the middle, more specifically on the outer branches (Images 2, 3, & 4).

Nesting activities

In 2014 and 2015, in NTR, the courtship of WBH was observed starting from January onwards. In 2014, WBH already started building their nest by the time we noticed them on their nest for the first time (Image 2). On 24 February 2015, it was assumed that the WBH pair was seen to assess the trees to select the nesting tree as they were flying from one tree to the next and eventually settled for one, where they removed a few branches and leaves with their bill to create some vacant space to build their nest. From 26 February 2015 onwards, the pair started nest material trips that lasted up to 21 March 2015. The number of nest material trips gradually decreased towards the later phase of the nest-building period. During this time, WBHs were also seen spending a considerable amount of time on the nest without any nest material trips (Image 3). From 25 March 2015 onwards, at least one of the adult herons was seen in the nest throughout the observation period, indicating that the female had laid the egg(s). No drastic step like moving very close to the nest in the presence of the birds or climbing up the nesting tree were undertaken to observe the activities of adults and to look for eggs and chicks at any point in time ensuring zero disturbance in their habitation and activities.

Nesting activities of WBH were observed for a total of 93.74 h (17.67 h in 2014 and 76.07 h in 2015) in 34 days (8 days in 2014 and 31 days in 2015). During this period, WBHs were recorded completing 175 nest material trips (total duration – 17.8 h).

During the nesting period (mainly at the beginning), WBHs were spotted less frequently at their foraging site/s during morning hours as they were engaged in nest-building activities (Table 2 & 3). The majority (90.85%) of the nest material trips were also conducted in the morning (Table 3). These trips generally started from 0630 hr and were at their peak at 0700–0800 h. Each trip was 0.02 to 0.3 h long. The mean length of each nest material trip was 0.10 ± 0.06 (Mean \pm SD) hr. On four occasions, the herons were seen returning to the nest without any nesting material ($n = 1$ in 2014 and $n = 3$ in 2015). Generally, the pair were seen to cease their nest-building activities around 0830 h and both of them flew (generally one after another) to their foraging site/s.

Fate of the identified Nests

2014: The breeding success of the 2014 nesting

Table 1. Details of the nesting trees of White-bellied Herons identified in Namdapha Tiger Reserve.

Particulars	First nesting tree (2014)	Second nesting tree (2015)
Common name	East Indian Almond <i>Terminalia myriocarpa</i> (Van Heurck & Müll. Arg.)	Hollong <i>Dipterocarpus macrocarpus</i> (Vesque)
Local name	Hollock	Hollong
Altitude	426 m	410 m
Height of the nesting tree	22–27 m	28–33 m
Height of the nest from the ground	18 m	25 m
Distance from nearest regular foraging site	663 m	201 m
Distance from human settlement or road	1.55 km (nearest village) 0.86 km (from the nearest regular dirt track used by villagers)	1.90 km (nearest village) 1.36 km (from the nearest regular dirt track used by villagers)

Table 2. Time spent by White-bellied Heron while nesting during different times of the day in Namdapha Tiger Reserve.

Observation	Times of the day (h)		
	Morning	Mid-day	Evening
2014	16.37	0.72	0.58
2015	45.08	16.40	14.58
Total	61.45	17.12	15.17
Percentage (%) Mean \pm SD	77.96 \pm 36.71	14.07 \pm 29.86	9.51 \pm 23.52

Table 3. Nest material trips by White-bellied Heron during different times of the day in Namdapha Tiger Reserve.

Times of the day	Number of nest material trips		Duration of nest material trips		
	n	%	hr		%
			Total	Mean \pm SD	
2014	54	30.86	6.48	0.12 \pm 0.06	36.42
2015	121	69.14	11.32	0.09 \pm 0.06	63.58
Morning	159	90.85	16.87	0.11 \pm 0.06	94.75
Mid-day	13	7.43	0.77	0.06 \pm 0.03	4.31
Evening	3	1.72	0.17	0.06 \pm 0.04	0.94
Total	175	100	1068	6.10 \pm 3.68	100

pair was not known because that study could not be continued from mid-March 2014 onwards due to excessive rainfall and heavy floods in the study area. The nest that WBH built in 2014, could be seen on the same tree but found abandoned in 2015 (Image 4).



© Gopinathan Maheswaran

Image 2. Nest-building activities of White-bellied Herons *Ardea insignis* at 27 mi in 2014 (Mondal & Maheswaran 2014).



© Himadri Sekhar Mondal

Image 3. Active nest of White-bellied Heron at 27 mi in 2015.



© Himadri Sekhar Mondal

Image 4. Abandoned first nest (nest built in 2014) of White-bellied Heron at 27 mi in 2015.



© Himadri Sekhar Mondal

Image 5. A part of the broken eggshell near the fallen nest of White-bellied Heron at 27 mi in 2015.



© Innaonong Singpho

Image 6. Fallen nest of White-bellied Heron at 27 mi in 2015.

2015: On 13 May 2015, it was found that the WBH nest amidst the boulders (almost dried stream) (Image 6). The maximum diameter of that nest was 141.8 cm. The fallen nest consists of only dry branches or twigs of 50–110 cm in length (average length 83.46 ± 15.60

cm; $n = 24$). One large portion of the broken eggshell (3.6 cm length) was also found at the same site (Image 5), 28.2 m away from the fallen nest. It was presumed that it was of WBH as we could not see any other nest nearby. The outer colour of the recovered eggshell was

light blue with a white inner surface. No traces of yolk were present in the egg shells. As permission to collect samples were not granted, the egg shells and the twigs were left in place after being photographed. The reason why the nest had fallen remains unclear.

During the remaining study period (till January 2017) in the study area, we neither came across any other nests nor any juveniles of WBH in NTR.

DISCUSSION

Larger herons are generally known as colonial breeders (Kushlan & Hancock 2005; Stier et al. 2017; Byju et al. 2024) but WBH is a solitary breeder. In Bhutan, WBH were mainly known to nest in the Chir Pine *Pinus roxburghii* trees (Acharja 2019; RSPN 2024). The study discovered that WBHs also prefer broadleaved forests. In 2018, a similar record also from Bhutan (Nesting trees *Michelia champaca* and *Pterospermum acerifolium*; Khandu et al. 2020). In 2021, two WBHs with their active nest were spotted in Walong (1,123 m), Anjaw District, Arunachal Pradesh (Reddy et al. 2021), a habitat dominated by Chir Pine forests.

Nesting site selection is extremely essential for the continual survival and reproduction of the nesting bird species (Dyrcz et al. 1981; Nguyen et al. 2003). Forest fires at the Chir Pine forest nesting sites are quite frequent in Bhutan and Walong. Whereas, the nesting sites in the broad-leaved forest are less likely to suffer from forest fire (Khandu et al. 2020).

In NTR, WBHs selected 22–33 m trees to build their nests at the height of 18–25 m (Table 1), similar to the height of the nests (18.3±7.4 m) in the trees in Bhutan (Acharja 2019).

For the majority of the cases in Bhutan, WBH nests were at the top of the nesting tree (Acharja 2019). In NTR, WBH constructs their nests in the middle, more specifically on the outer branches. Such a position ensures easy entry and exit for a large bird-like WBH (wingspans approximately 2 m in flight), better visibility of their feeding sites and potential threats or disturbances nearby (Mondal & Maheswaran 2014).

The nearest human track and human settlement were on the other side of the Noa-Dehing River (near south-sided forest) (Table 1). Hence these nesting sites receive less anthropogenic disturbances. This is very important for a shy species like WBH (RSPN 2012; Acharja 2019) whose minimum tolerance distance to human presence was roughly estimated to be 150 m in Bhutan (Acharja 2019). In NTR, the herons are more shy

and the tolerance distance to any human presence was around 200–300 m. WBH have been found to remain in their nests until any disturbance or threat from closer distance particularly during their initial phase of nesting.

From the information available on the WBH nesting sites in NTR, Bhutan (Acharja 2019) and Walong (Reddy et al. 2021), the following possible inferences can be drawn.

- i) They nest at the riverine forest edges that are also close to their feeding grounds. Furthermore, the vast open river gave herons a clear view of any approaching threat.
- ii) They prefer to nest in the north-sided forest maybe because it is less disturbed and they can build east-facing nests that can potentially aid in the incubation process by providing heat from direct exposure to the sun.
- iii) They tend to abandon their older nests though this aspect needs to be studied further.

Both in India and Bhutan, nesting of WBH usually begins from late February to early March onwards. Herons generally build their nest during morning hours (Kushlan & Hancock 2005). The weather during morning hours seems less stressful to birds and morning fog in this area can soften the tree branches and make it easier for the WBH to break. Most likely it took almost a month for the pair to prepare their nest for laying eggs. After laying the eggs, they spent more time hatching or protecting the eggs/ chicks from danger.

The diameter of the fallen nest is similar to the nest diameter (1.5 m) of the large heron species, as suggested by Kushlan & Hancock (2005). In Bhutan, the diameter of the WBH nests was measured at around 87–120 cm (Acharja 2019). The larger diameter of the nest in NTR, can be attributed to the loosening of twigs when the nest fell from 25 m height.

Like Great Blue Heron, the broken egg shells found beneath the nesting tree might indicate the possible result of hatching (Cottrille & Cottrille 1958). No live or dead chicks were found near the spot in NTR. Acharja (2019) postulated that WBH nesting in the broad-leaved forest can result in breeding failure particularly because of predation. In Punatsangchhu, Bhutan, numerous droppings of small frugivorous mammals and monkeys were found near the unsuccessful nesting sites (Acharja 2019). No such droppings were found at the fallen nest site in NTR.

Though the observations on these two nests were anecdotal, their discovery in the riverine habitat of the broad-leaved forest indicates the importance of conserving this habitat not only to ensure future

conservation of the breeding pairs within NTR but also ensure long-term survival of the species in NTR (Mondal & Maheswaran 2022), particularly when this area is infamous for illegal logging, hunting (Datta et al. 2008) and fishing (Maheswaran 2007).

REFERENCES

Acharja, I.P. (2019). Evaluation of nest habitat, site preferences and architecture of the Critically Endangered White-bellied Heron *Ardea insignis* in Bhutan. *Bird Conservation International* 30(4): 1–19.

BirdLife International (2024). Species factsheet: *Ardea insignis*. Downloaded from <https://datazone.birdlife.org/species/factsheet/white-bellied-heron-ardea-insignis> on 08/06/2024 .

Byju, H., H. Maitreyi, N. Raveendran & R. Vijayan (2024). Avifaunal diversity assessment and conservation significance of Therthangal Bird Sanctuary, Ramanathapuram, Tamil Nadu: insights about breeding waterbirds. *Journal of Threatened Taxa* 16(9): 25802–25815. <https://doi.org/10.11609/jott.8999.16.9.25802-25815>

Champion, H.G. & S.K. Seth (1968). *A Revised Survey of Forest Types of India*. Government of India Press, New Delhi, 404 pp.

Chowdhery, H.J., G.S. Giri, G.D. Pal, A. Pramanik & S.K. Das (1996). Materials for the Flora of the Arunachal Pradesh, pp. 1–623. In: Hazra, P.K., D.M. Verma & G.S. Giri (eds.). *Flora of India – Volume 1 (Series 2)*. Botanical Survey of India, Kolkata, 724 pp.

Cottrille, W.P. & B.D. Cottrille (1958). *Great Blue Heron: Behavior at the Nest*. Museum of Zoology, University of Michigan, No. 102, 15 pp.

Datta, A., M.O. Anand & R. Naniwadekar (2008). Empty forests: large carnivore and prey abundance in Namdapha National Park, northeastern India. *Biological Conservation* 141: 1429–1435.

Dyrcz, A., J. Witkowski & J. Okulewicz (1981). Nesting of 'timid' waders in the vicinity of 'bold' ones as an antipredator adaptation. *Ibis* 123: 542–545.

Hume, A.O. & E. W. Oates (1890). *Nests and Eggs of Indian Birds. Volume III, 2nd Edition*. R.H. Porter, London, 374 pp.

Khandu, P., G.A. Gale, R. Pradhan, I.P. Acharja & S. Bumrungsri (2020). First record of successful breeding of the Critically Endangered White-bellied Heron *Ardea insignis* in broadleaved trees. *The Journal of Animal & Plant Sciences* 30(2): 502–507.

Kushlan, J.A. & J.A. Hancock (2005). *The Herons*. Oxford University Press, Oxford, United Kingdom, 454pp.

Maheswaran, G. (2007). Records of White-bellied Heron *Ardea insignis* in Namdapha Tiger Reserve, Arunachal Pradesh, India. *BirdingASIA* 7: 48–49.

Maheswaran, G. & A.R. Rahmani (2005). Breeding behaviour of the Black-necked Stork *Ephippiorhynchus asiaticus* during non-breeding season in Dudhwa National Park, India. *Journal of the Bombay Natural History Society* 102(3): 305–312.

Maheswaran, G., I.P. Acharja, L.K. Sharma, H.S. Mondal, T. Mukherjee, I. Alam & A. Majumder (2021a). Save the White-bellied Heron from extinction. *Science* 373(6561): 1317. <https://doi.org/10.1126/science.abl9682>

Maheswaran, G., L.S. Sharma, H.S. Mondal & T. Mukherjee (2021b). White-bellied Heron a species on the verge of extinction: ensemble model reveals loss of habitats and resultant prolonged isolation driving the species to extinction. *Ecological Informatics* 64: 101383. <https://doi.org/10.1016/j.ecoinf.2021.101383>

Martin, P. & P. Bateson (2007). *Measuring Behaviour: An Introductory guide, 3rd Edition*. Cambridge University Press, UK, 186 pp.

Mondal, H.S. & G. Maheswaran (2014). First nesting record of White-bellied Heron *Ardea insignis* in Namdapha Tiger Reserve, Arunachal Pradesh, India. *BirdingASIA* 21: 13–17.

Mondal, H.S. & G. Maheswaran (2022). Foraging ecology of White-bellied Heron *Ardea insignis* in the fast-flowing rivers of Namdapha Tiger Reserve, Arunachal Pradesh, India. *Waterbirds* 44(4): 389–396.

Nguyen, L.P., E. Nol & K.F. Abraham (2003). Nest success and habitat selection of the Semipalmated Plover on Akimiski Island, Nunavut. *The Wilson Bulletin* 115(3): 285–291.

Price, M.R.S. & G.L. Goodman (2015). White-bellied Heron *Ardea insignis*: conservation strategy. IUCN species survival commission White-bellied Heron working group, part of the IUCN SSC Heron Specialist Group, 100 pp.

Reddy, S.K., G. Maheswaran, G.V. Gopi, A. Majumder, I. Alam, H.S. Mondal, B.B. Bhat, D. Yongam, T. Yamcha, S. Patgiri & U.K. Sahoo (2021). Nesting of the White-bellied Heron *Ardea insignis* in Anjaw District, Arunachal Pradesh, India. *Indian Birds* 17(4): 115–118.

RSPN (2012). Research on White-bellied Heron. *Rangzhin* 5(1): 3.

RSPN (2024). White-bellied Heron annual population survey 2024. Royal Society for Protection of Nature, Thimphu, Bhutan, 28 pp.

Stier, A., A. Ricardou, S. Uriot, N.D. Pracontal & J.A. Kushlan (2017). Breeding season home range and migration of the Agami Heron *Agamia agami*. *Waterbirds* 40: 289–296.

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. Karen 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 Al Kuwait Real Estate. Co. K.S.C., Kuwait
Dr. Himender Bharti, Punjabi University, Punjab, India
Mr. Purnendu Roy, London, UK
Dr. 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. Lional 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. Karen 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. Priyadarshan 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. Priyadarshan 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 KV, 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. Raja Vyas, Vadodara, Gujarat, India
Dr. Pritpal S. Soorae, Environment Agency, Abu Dhabi, UAE.
Prof. Dr. Wayne J. Fuller, Near East University, Mersin, Turkey
Prof. Chandrashekher U. Rironker, 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

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

Birds

Dr. Hem Sagar Baral, Charles Sturt University, NSW Australia
Mr. H. Biju, 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 Jayopal, SACON, 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 Sundev, Professor of Ornithology, Ulaanbaatar, Mongolia
Prof. Reuven Yosef, International Birding & Research Centre, Eilat, Israel
Dr. Taej Mundkur, Wetlands International, Wageningen, The Netherlands
Dr. Carol Inskip, Bishop Auckland Co., Durham, UK
Dr. Tim Inskip, 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, SACON, 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, SACON, 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, The American College, Madurai, 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, 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

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 Helleni 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. Bharat Baviskar, Wild-CER, Nagpur, Maharashtra 440013, India

Reviewers 2021–2023

Due to paucity 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

Articles

***Dasymaschalon leilamericanum* (Annonaceae), a new species with evidence of non-monophyly from Mount Lantoy Key Biodiversity Area, Philippines**

– Raamah Rosales, Edgardo Lillo, Archiebald Baltazar Malaki, Steve Michael Alcazar, Bernardo Redoblado, John Lou Diaz, Inocencio Buot Jr., Richard Parilla & Jessica Rey, Pp. 26571–26586

Association analysis of *Castanopsis tungurut* and the neighboring vegetation community in Cibodas Biosphere Reserve, Indonesia

– Dian Ridwan Nurdiana & Inocencio E. Buot, Jr., Pp. 26587–26598

Riparian flora of Haveri District, Karnataka, India

– Ningaraj S. Makanur & K. Kotresha, Pp. 26599–26615

Conservation strategies for *Vatica lanceifolia* (Roxb.) Blume: habitat distribution modelling and reintroduction in northeastern India

– Puranjoy Mipun, Amritee Bora, Piyush Kumar Mishra, Baby Doley & Rinku Moni Kalita, Pp. 26616–26626

Patterns and economic impact of livestock predation by large carnivores in protected areas of southern Kashmir, India

– Lubna Rashid & Bilal A. Bhat, Pp. 26627–26635

People perception on use patterns and conservation of Chinese Pangolin

in and around Yangouopkpi Lokchao Wildlife Sanctuary, Manipur, India

– Yengkham Roamer Zest, Awadhesh Kumar, Om Prakash Tripathi, Rakesh Basnett & Dipika Parbo, Pp. 26636–26647

Communications

Population status, threats, and conservation of *Trachycarpus takil*: an endemic and threatened plant species in western Himalaya, India

– Himani Tiwari, Dhani Arya & K. Chandra Sekar, Pp. 26648–26654

A checklist of fishes of Haiderpur wetland, western Uttar Pradesh, India

– Rahul Rana, Jeyaraj Antony Johnson & Syed Ainul Hussain, Pp. 26655–26668

An avifaunal checklist of the Zanskar Region, Ladakh Himalaya, India

– Abid Hussain, Zakir Hussain & Mumtaz Ali, Pp. 26669–26679

Breeding tern colonies on the sandbars of Adam's Bridge, India: new records and significance

– H. Byju, H. Maitreyi, N. Raveendran, D.A. Marshal & S. Ravichandran, Pp. 26680–26689

Assessment of nest and nesting activities of White-bellied Heron *Ardea insignis* Hume, 1878 (Aves: Ardeidae) in the broad-leaved forests of northeastern India

– Himadri Sekhar Mondal & Gopinathan Maheswaran, Pp. 26690–26696

Preliminary checklist of avifauna from All India Institute of Medical Sciences, Guwahati, Assam, India

– Nitul Ali, Vivek Chetry, Prem Kishan Singha & Maina Boro, Pp. 26697–26703

Implementation strategy and performance analysis of a novel ground vibration-based elephant deterrent system

– Sanjoy Deb, Ramkumar Ravindran & Saravana Kumar Radhakrishnan, Pp. 26704–26714

Short Communications

***Blackwellomyces pseudomilitaris* (Hywel-Jones & Sivichai) Spatafora & Luangsa-ard, 2017 (Sordariomycetes: Hypocreales: Cordycipitaceae): first report from Western Ghats of India**

– Anjali Rajendra Patil, Snehal Sudhir Biranje, Mahesh Yashwant Borde & Yogesh Sadashiv Patil, Pp. 26715–26720

Calvatia craniiformis (Schwein.) Fr. ex De Toni (Agaricomycetes: Lycoperdaceae): a new puffball mushroom record from eastern India
– Asit Mahato, Pritish Mitra, Sabyasachi Chatterjee & Subrata Raha, Pp. 26721–26726

Rediscovery of the gypsy moth *Lymantria kanara* Collenette, 1951 (Insecta: Lepidoptera: Erebidae) from Kerala, India, after 73 years and its taxonomic redescription
– P.K. Adarsh & Abhilash Peter, Pp. 26727–26730

Nest predation by *Vespa tropica* (Linnaeus, 1758): observational insights into polistine wasp defense and hornet feeding behavior
– Shantan Ojha & Vartika Negi, Pp. 26731–26736

The discovery of a male Malay Crestless Fireback *Lophura erythrophthalma* (Raffles, 1822) (Aves: Galliformes: Phasianidae) at Ulu Sat Forest Reserve, Machang, Kelantan, Peninsular Malaysia
– Ainun Hidayah Wahad, Wan Hafizin Idzni Wan Mohammad Hizam, Muhammad Hamirul Shah Ab Razak, Aainaa Amir, Kamarul Hambali, Hazizi Husain, Mohd Saupi Abdullah, Ehwan Ngadi, Mohamad Arif Iskandar Abdul Wahab & Asrulsani Jambari, Pp. 26737–26740

Notes

New distribution record of *Korthalsia rogersii* Becc, a threatened endemic climbing palm of Andaman archipelago

– Paremmal Sarath, Azhar Ali Ashraf, V.B. Sreekumar, Modhumita Ghosh Dasgupta & Suma Arun Dev, Pp. 26741–26743

Clarifying the nomenclature of Roxburgh's pivotal name *Holigarna racemosa* Roxb. (Anacardiaceae)
– Shruti Kasana, Pp. 26744–26746

First confirmed breeding of Brown Noddy *Anous stolidus* in southeastern India: a new record from Adam's Bridge
– H. Byju, H. Maitreyi, N. Raveendran & D.A. Marshal, Pp. 26747–26749

First record of Painted Stork *Mycteria leucocephala* in Indonesia
– Hasri Abdillah, Iwan Febrianto, Cipto Dwi Handono, Fajar Shiddiq, Febryansah Abdillah Harahap & Muhammad Iqbal, Pp. 26750–26752

New sighting and conservation implications of the endemic Sulu Boobook *Ninox reyi* Oustalet, 1880 at Bolobok Rock Shelter, a key archaeological site in the Sulu Archipelago, southern Philippines
– Fauriza J. Saddari, Yennyrriza T. Abduraup, Adzmer A. Juaini, Roger A. Irlis, Khalid D. Adam, Mary Joyce Z. Guinto-Sali & Richard N. Muallil, Pp. 26753–26756

The occurrence of Glossy Ibis *Plegadis falcinellus* Linnaeus, 1766 (Pelecaniformes: Threskiornithidae) in southern Sumatra, Indonesia
– Muhammad Iqbal, Arum Setiawan, Putri Balqis, Exaudi Beatrice Simanullang, Pormansyah, Selamat Robinsa, Winda Indriati & Indra Yustian, Pp. 26757–26760

Book Review

A whisper of silken wings

– Aparna Sureshchandra Kalawate & Pooja Kumar Misal, Pp. 26761–26762

Publisher & Host



Threatened Taxa