

Journal of Threatened Taxa

Building evidence for conservation globally

10.11609/jott.2021.13.13.19887-20142

www.threatenedtaxa.org

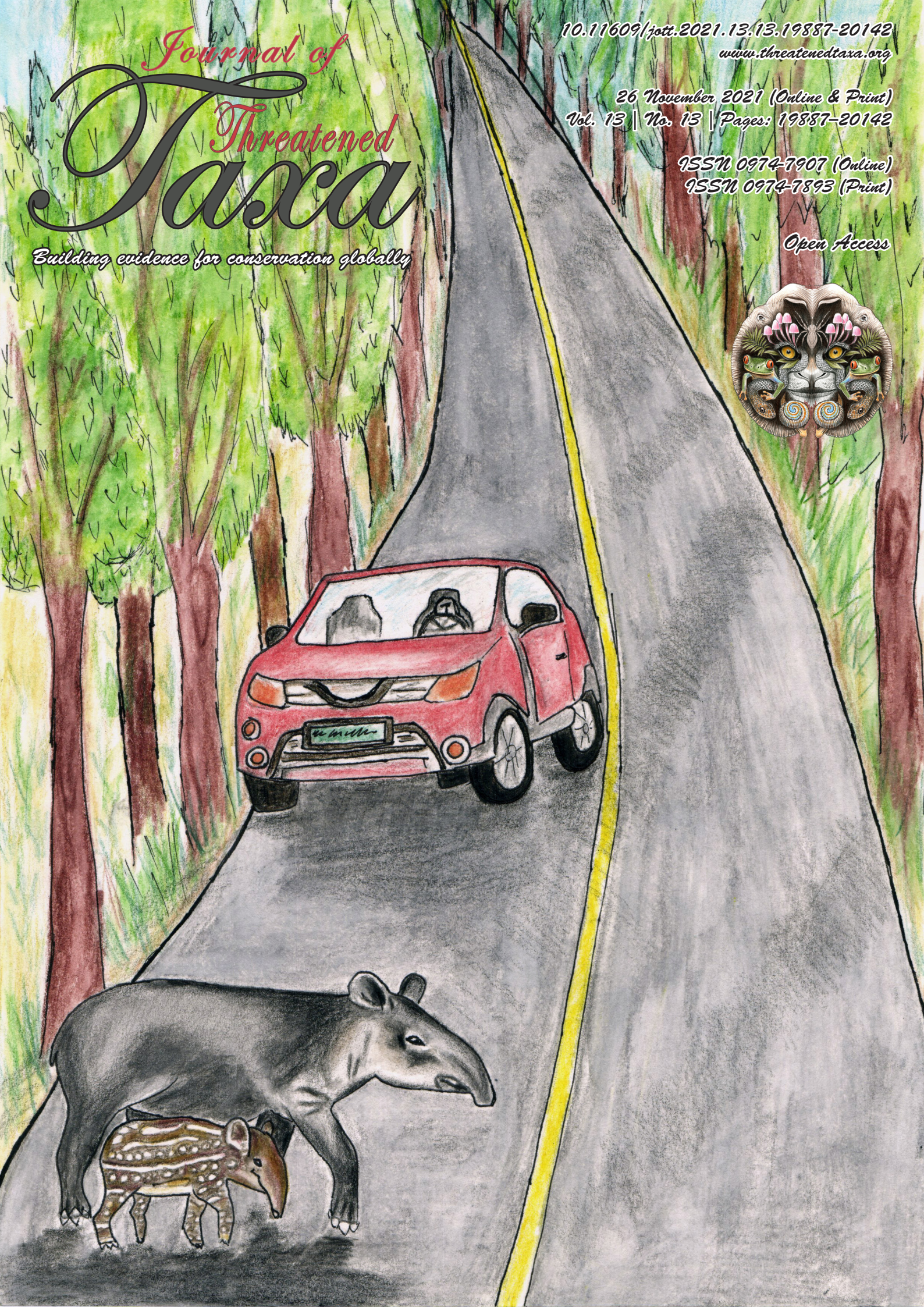
26 November 2021 (Online & Print)

Vol. 13 | No. 13 | Pages: 19887-20142

ISSN 0974-7907 (Online)

ISSN 0974-7893 (Print)

Open Access





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

No. 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road, Saravanampatti,
Coimbatore, Tamil Nadu 641035, 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),
12 Thiruvannamalai Nagar, Saravanampatti, Coimbatore, Tamil Nadu 641035, India

Deputy Chief Editor

Dr. Neelesh Dahanukar

Noida, Uttar Pradesh, India

Managing Editor

Mr. B. Ravichandran, WILD/ZOO, Coimbatore, 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 641035, India

Dr. B.A. Daniel, ZOO/WILD, Coimbatore, Tamil Nadu 641035, India

Editorial Board

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, Mavinahalla PO, Nilgiris, Tamil Nadu 643223, India

Dr. Martin Fisher

Senior Associate Professor, Battcock Centre for Experimental Astrophysics, Cavendish
Laboratory, JJ Thomson Avenue, Cambridge CB3 0HE, UK

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

Mr. P. Ilangoan, Chennai, India

Web Development

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

Typesetting

Mr. Arul Jagadish, ZOO, Coimbatore, India

Mrs. Radhika, ZOO, Coimbatore, India

Mrs. Geetha, ZOO, Coimbatore India

Fundraising/Communications

Mrs. Payal B. Molur, Coimbatore, India

Subject Editors 2018–2020

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

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, Kadoorie Farm and Botanic Garden Corporation, Hong Kong S.A.R., China

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

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

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

Caption: Lowland Tapir *Tapirus terrestris* (Medium—watercolours on watercolour paper) © Aakanksha Komanduri.



New records of mass seeding *Cephalostachyum latifolium* Munro (Poaceae) along the mid-elevation broadleaved forest of Sarpang district, Bhutan

Jigme Tenzin¹ , Sangay Nidup² & Dago Dorji³

¹ Research and Information Unit, Divisional Forest Office, Sarpang, Department of Forests and Park Services, Ministry of Agriculture & Forests, 31002, Bhutan.

^{2,3} Gelephu Forest Range Office, Divisional Forest Office, Sarpang, Department of Forests and Park Services, Ministry of Agriculture & Forests, 31101, Bhutan.

¹ jigmetenzin16@gmail.com (corresponding author), ² sanzellsom@gmail.com, ³ ddorjee@moaf.gov.bt

Bamboo are plietesial plants which can typically grow as even-aged cohort for some time and in their final year of life, flower gregariously, set seed, and then die (Wright et al. 2014). According to Vorontsova et al. (2016), there are over 1,642 species of bamboo that belongs to about 88 genera of woody bamboos in the world. Out of that, Bhutan has recorded 15 genera and 31 species of bamboo (Noltie 2000), currently 32 species after the new record of *Bambusa pallida* by Dorjee et al. (2020). Among them, 17 species belonging to nine genera are found within the broadleaved forest of Sarpang district (Tenzin 2015). In fact, bamboo species flower once in their life and die after mass seeding (Wright et al. 2014). Flowering can be categorized into three major groups: annual, sporadic or irregular and gregarious flowering (Brandis 1899). This event appears in a cyclic pattern within the interval of 10 to 120 years (Ramanayake 2006) or 20 to 120 years (Thapliyal et al. 2015) depending on the species and genera.

According to Namgyel (2017), first oral account of

sub-tropical bamboo flowered in Bhutan was recorded around 1963 in Kerabari, Woma & Sama villages in Kalikhola under Dagana district by Mr. Chenkyab Dorji (Forest Ranger at that time), former Minister of Planning Commission in Bhutan. Later, Samtse district has recorded mass seeding of *Dendrocalamus sikkimensis* in 1985 to 1986 and *Melocanna baccifera* in 2007 (Wright et al. 2014). While, temperate bamboo species such as *Sinarundinaria falcata*, *Thamnocalamus falconeri*, and *Thamnocalamus spathiflora* were also seeded around 2001 & 2002 and 2004 & 2005 in western part of the Bhutan (Wright et al. 2014). In sub-alpine region, similar mass seeding has been reported for *Borinda grossa* at Sakteng under Trashigang district in 2005; *Thamnocalamus spathiflorus* along Pelela-Yotongla passes in 2008 and *Yushania microphylla* at Lawala under Wangdue districts in 2011 (Wangda et al. 2011; Namgyel 2017). Likewise, mast seeding of *Melecanna beccifera* were also been reported in the lowland forest of Bajali in Indo-Burma hotspot region in 2008 (Sarma et al. 2010)

Editor: K. Haridasan, Palakkad District, Kerala, India.

Date of publication: 26 November 2021 (online & print)

Citation: Tenzin, J., S. Nidup & D. Dorji (2021). New records of mass seeding *Cephalostachyum latifolium* Munro (Poaceae) along the mid-elevation broadleaved forest of Sarpang district, Bhutan. *Journal of Threatened Taxa* 13(13): 20136–20139. <https://doi.org/10.11609/jott.6728.13.13.20136-20139>

Copyright: © Tenzin et al. 2021. 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: None.

Competing interests: The authors declare no competing interests.

Acknowledgements: The authors would like to acknowledge Mr. Phub Dhendup, chief forestry officer, Divisional Forest Office, Sarpang under Department of Forests and Park Services (DoFPS), Ministry of Agriculture & Forests (MoAF) for approving this field expedition (i.e., Tiger monitoring using camera traps in 2018). Meanwhile, Mr. Tshering Dorji, forestry officer, Mr. Sangay Dorji, SFR-I, Mr. Kezang Dhendup, SFR-I and Mr. Tandin Wangchuk, FR-II are also indebted for accompanying as a survey team. Simultaneously, WWF Bhutan Office is also acknowledged for funding this camera trap survey under Zero Poaching Project (2016–2018) and reviewers for refinement of the paper.

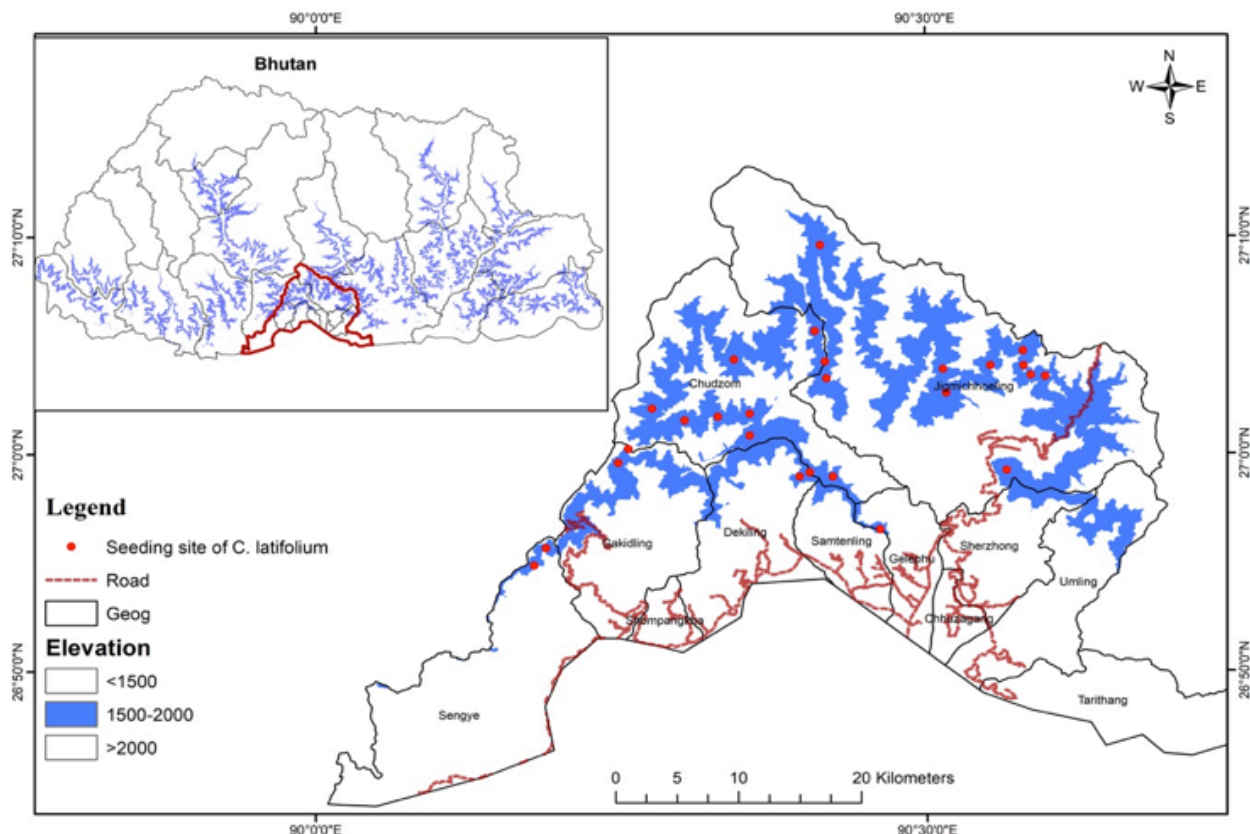


Figure 1. Mass seeding of *Cephalostachyum latifolium* under Sarpang District, Bhutan.

and neighboring northeastern India and Bangladesh in 2010 (Belmain et al. 2010; Wright et al. 2014). Till date, *Melecantha bambusoides* was the first bamboo species been recorded to be flowered in Mizoram under North east state, India in 1815 (Thapliyal et al. 2015). Perhaps this could be the first starting milestone ever tracked by the scientific literature till date within the range countries. Meanwhile, recent record of gregarious and mass seeding of *Cephalostachyum latifolium* bamboo species from the mid-elevation broadleaved forest of Sarpang district in Bhutan has added another new records to bamboo science in the February of 2017 (Image 1).

C. latifolium is locally known as 'Jhi' (Dzongkha), 'Pishima' (Kengkha), and 'Ghopi bans' (Nepali) that belongs to *Cephalostachyum* genera (Image 1). Globally, it is distributed across Bangladesh, China, India, Myanmar, and Nepal including Bhutan. However, Bhutan till date has recorded only two *Cephalostachyum* species (*C. latifolium* & *C. capitatum*) (Noltie 2000). *C. latifolium* is distributed along Phuntsholing and Gelephu under Chukha and Sarpang within the elevation range of 1,500 to 2,000 m (Noltie 2000). Taxonomically, Noltie (2000)

reported that it is a broadleaved bamboo, which can grow up to 15 m height with the diameter of 5 cm. Culm sheaths has 50 cm with ridges, edges membranous, and raised shoulders. While, leaf sheath shoulder are raised, oral setae long, long ligules with glabrous and blade broad ranging 7 x 35 cm. Inflorescence are compounded with unilateral and becoming sub-globular with orange cylindrical shape spikelet.

In Bhutan, gregarious flowering of *C. latifolium* has been recorded from Dorokha in Samtse towards the extreme west, Gedu regions in Chukha and Narphung in Samdrup Jongkhar district including Sarpang (Sangay Dorjee, Samdrup Jongkhar Forest Division, DoFPS, pers. comm.) within the mid-elevation of 1,500–2,000 m (Figure 1). While, in case of Sarpang district, gregarious flowering and seeding were recorded from the different areas under five gewogs (sub-district administration): Darachu and Pathiwara in Gakidling; Dawnidhap and ridges of Sherubling under Chudzom; Ranibagan top in Dekiling; Labarbotry top in Sengye; and Ashiney, Samkhara top, Ghopidara and Lampokhari in Jigmecholing gewog (Figure 1). Dorjee (2019) has also recorded gregarious and mass seeding of same bamboo



Image 1. A—Clump of *Cephalostachyum latifolium* species | B—Flowers | C—Seeds. © Jigme Tenzin.

species in 2017 from undulated patches of Lemtsorong and Shekpashing at 26.950°N & 91.546°E extending towards 26.952°N & 91.958°E in Narphung under Samdrup Jongkhar Forest Division (eastern Bhutan). This suggested that the entire *C. latifolium* species which were grown within these elevation ranges (1,500–2,000 m) might have flowered and seeded across Bhutan. With this bamboo species, Bhutan has recorded a total of eight bamboo species have flowered till date (until 2020), while, 35 bamboo species have been reported to be flowered till 2015 in India ever since the early 19th century (Thapliyal et al. 2015).

According to Wang et al. (2016), gregarious and mast seeding explodes rodent population and induces food scarcity. Exactly in these gregarious years, Bhutan Broadcasting Services (BBS) and Kuensel both reported the ravages of maize by rodents in Largyab gewog in Dagana & Patsaling in Tsirang district (16 October 2018 in BBS) and paddy in Chudzom and Gongduegang in Jigmecholing gewog under Sarpang district in Bhutan (10 November 2018 in Kuensel). Similar ecological havoc (famine and food security issues) has been widely reported aftermath of gregarious flowering in northeastern states of India in 1929 and 1959, particularly in Mizoram, India (Goraya et al. 2003; Namgyel 2017). Nonetheless, gregarious and mass seeding of bamboo plants means that local people lose their raw materials for building, fencing, and other economic uses (Wangda et al. 2011). Further, studies also report that mass seeding leads to the explosion of numerous bird species and rodents in cases of India (Wright et al. 2014), while wild pigs, rats, squirrel, and bears in case of Bhutan (Namgyel 2017)

that induced famine and human-wildlife interactions. Therefore, gregarious and mass seeding has immense social, economic, and ecological implications to the communities. Thus, research associated to ecology of gregarious flowered bamboo species, bamboo phenology, and socio-economic implication of gregarious flowering of bamboo species requires in-depth study in context to Bhutan by the research institute (UWICER) under Department of Forests and Park Services (DoFPS) in collaboration with Department of Agriculture (DoA) to manage and mitigate the future ecological havoc related gregarious flowering in Bhutan.

References

- Belmain, S.R., N. Chakma, N.J. Sarker, S.U. Sarker & N.Q. Kamal (2010). The Chittagong story: Studies on the ecology of rat floods and bamboo masting, pp. 49–64. In: Singleton, G.R., S.R. Belmain, P.R. Brown & B. Hardy (eds.). *Rodent Outbreaks: Ecology and Impacts*. International Rice Research Institute, Los Baños, Philippines.
- Brandis, D. (1899). Biological notes on Indian bamboo. *Indian Foresters* 25: 1–25.
- Dorjee, S. (2019). Bamboos of south-eastern, Samdrup Jongkhar, Bhutan. *Nebio* 10(1): 12–16. http://nebio.in/wp-content/uploads/2018/10/NeBio_10_3_Dorjee.pdf
- Dorjee, S., C. Stapleton, U. Chopel, Phurpa, D. Tshering & T. Samdrup (2020). *Bambusa pallida* (Poaceae: Bambusoideae), a new record for Bhutan. *Journal of America Bamboo Society* 30: 1–5.
- Goraya, G.S., V. Jishtu, K.S. Kapoor & M. Pal (2003). Mass flowering of montane bamboos in Himachal Pradesh: Ushering in the new millennium. *Indian Forester* 129(8): 1013–1020.
- Namgyel, P. (2017). Forests for Gross National Happiness: Collection of 16 years' online debate on forestry issues in Bhutan. Kuensel Corporation Limited, Thimphu, 288 pp.
- Noltie, H.J. (2000). *Flora of Bhutan (Volume # 3, part II): Grasses of Bhutan*. Royal Botanical Garden Edinburgh, Edinburgh, UK, 437 pp.
- Ramanayake, S.M.S.D. (2006). Review on flowering in bamboo: an enigma. *Ceylon Journal of Sciences (Biological Sciences)* 35: 95–105.

- Sarma, H., A.M. Sharma, A. Sarma & S. Borah (2010). A case of gregarious flowering in bamboo, dominated lowland forest of Assam, India: phenology, regeneration, impact on rural economy, and conservation. *Journal of Forestry Research* 21: 409–414. <https://doi.org/10.1007/s11676-010-0090-3>
- Thapliyal, M, G. Joshi & F. Behera (2015). Bamboo: Flowering, Seed Germination and Storage, pp. 89–108. In: *Bamboos in India*. Forest Research Institute, Ministry of Environment, Forests & Climate Change, India, 340 pp.
- Tenzin, J. (2015). New bamboo species recorded for Sarpang District - *Neomicrocalamas andropogonifolia*. <http://www.moaf.gov.bt/new-bamboo-species-recorded-for-sarpang-neomicrocalamas-andropogonifolia>. Accessed 10 June 2021.
- Vorontsova, M.S., L.G. Clark, J. Dransfield, R. Govaerts & W.J. Baker (2016). *World Checklist of Bamboos and Rattans*. International Network for Bamboo and Rattan (INBAR), Beijing, China, 467 pp.
- Wang, W, S.B. Franklin, Z. Lu & B.J. Rude (2016). Delayed flowering in bamboo: evidence from *Fargesia qinlingensis* in the Qinling Mountains of China. *Journal of Plant Science* 7: 1–10. <https://doi.org/10.3389/fpls.2016.00151>
- Wangda, P., K. Tenzin, D. Gyaltshen, K. Rabgay, D.K. Ghemiray & T. Norbu (2011). *Thamnocalamus spathiflorus*, a temperate bamboo flowering and regeneration along Yotongla and Pelela pass. *Journal of Renewable Natural Resources of Bhutan* 7(1): 88–97.
- Wright, B.R., B.T. Dorji & P.K. Mukhia (2014). The mast seeding plants in Bhutan. *Journal of Bhutan Ecological Society* 2(1): 9–12.



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
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. 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. Neelesh Dahanukar, IISER, Pune, Maharashtra, India
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

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 Dhabi, UAE.
Prof. Dr. Wayne J. Fuller, Near East University, Mersin, Turkey
Prof. Chandrashekhar 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
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, 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 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. M. Zafar-ul Islam, Prince Saud Al Faisal Wildlife Research Center, Taif, Saudi Arabia

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, 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 2018–2020

Due to pausity of space, the list of reviewers for 2018–2020 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,
No. 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road,
Saravanampatti, Coimbatore, Tamil Nadu 641035, India
ravi@threatenedtaxa.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)

November 2021 | Vol. 13 | No. 13 | Pages: 19887–20142

Date of Publication: 26 November 2021 (Online & Print)

DOI: 10.11609/jott.2021.13.13.19887-20142

www.threatenedtaxa.org

Article

An inventory of geometrid moths (Lepidoptera: Geometroidea: Geometridae) of Kalakad-Mundanthurai Tiger Reserve, India

– Geetha Iyer, Dieter Stüning & Sanjay Sondhi, Pp. 19887–19920

Communications

Roadkills of Lowland Tapir *Tapirus terrestris* (Mammalia: Perissodactyla: Tapiridae) in one of its last refuges in the Atlantic Forest

– Aureo Banhos, Andressa Gatti, Marcelo Renan de Deus Santos, Leonardo Merçon, Ilka Westermeyer, Natália Carneiro Ardente, Luis Francisco Oliveira Pereira Gonzaga, Lucas Mendes Barreto, Lucas Damásio, Tomas Lima Rocha, Vitor Roberto Schettino, Renata Valls, Helena Godoy Bergallo, Marcos Vinicius Freitas Silva, Athelson Stefanon Bittencourt, Danielle de Oliveira Moreira & Ana Carolina Srbek-Araujo, Pp. 19921–19929

Scientific contributions and learning experiences of citizen volunteers with a small cat project in Sanjay Gandhi National Park, Mumbai, India

– Shomita Mukherjee, R. Nandini, P.V. Karunakaran & Nayan Khanolkar, Pp. 19930–19936

Seasonal food preferences and group activity pattern of Blackbuck *Antelope cervicapra* (L., 1758) (Mammalia: Cetartiodactyla: Bovidae) in a semi-arid region of western Haryana, India

– Vikram Delu, Dharambir Singh, Sumit Dookia, Priya & Kiran, Pp. 19937–19947

Studies on the habitats of Grey Francolin *Francolinus pondicerianus* (J.F. Gmelin, 1789) (Galliformes: Phasianidae) in northern districts of Tamil Nadu, India

– M. Pandian, Pp. 19948–19955

Recovery of vulture population in roosting and scavenging areas of Bastar and Bijapur, Chhattisgarh, India

– Sushil Kumar Dutta, Muntaz Khan, P.R.S. Nagi, Santosh Durgam & Surabhi Dutta, Pp. 19956–19963

A geographical assessment of Chariganga and Arpara Beel (wetlands) of Nadia, West Bengal as a habitat of wetland birds

– Mehedi Hasan Mandal, Arindam Roy & Giasuddin Siddique, Pp. 19964–19975

Phenotypic plasticity in *Barilius vagra* (Hamilton, 1822) (Teleostei: Danionidae) from two geographically distinct river basins of Indian Himalaya

– Sumit Kumar, Sharali Sharma & Deepak Singh, Pp. 19976–19984

Taxonomic notes, a new species, and a key to Indian species of the click beetle genus *Cryptalaus* Ôhira, 1967 (Coleoptera: Elateridae: Agrypninae)

– Harshad Parekar & Amol Patwardhan, Pp. 19985–19999

Niche overlap of benthic macrofauna in a tropical estuary: diurnal variation

– Mário Herculano de Oliveira, Lidiane Gomes de Lima, Caroline Stefani da Silva Lima, Jéssica de Oliveira Lima Gomes, Francieli Ferreira Paiva, Graciele de Barros, Carlinda Raily Medeiros & Joseline Molozzi, Pp. 20000–20010

Diversity of aquatic insects and biomonitoring of water quality in the upper Ganga River, a Ramsar site: a preliminary assessment

– Kritish De, Arkojyoti Sarkar, Kritika Singh, Virendra Prasad Uniyal, Jeyaraj Antony Johnson & Syed Ainul Hussain, Pp. 20011–20018

Patterns of forest cover loss in the terrestrial Key Biodiversity Areas in the Philippines: critical habitat conservation priorities

– Bernard Peter O. Daipan, Pp. 20019–20032

The woody flora of Shettihalli Wildlife Sanctuary, central Western Ghats of Karnataka, India - A checklist

– Kanda Naveen Babu, Kurian Ayushi, Vincy K. Wilson, Narayanan Ayyappan & Narayanaswamy Parthasarathy, Pp. 20033–20055

Reproductive biology of *Ophiorrhiza caudata* C.E.C. Fisch. (Rubiaceae), an endemic and endangered creeping perennial herb of the Western Ghats, India

– Maria Theresa, Appukuttan Kamalabai Sreekala & Jayalakshmi Mohanlal, Pp. 20056–20065

Short Communications

Successful rescue, medical management, rehabilitation, and translocation of a Red Panda *Ailurus fulgens* (Mammalia: Carnivora: Ailuridae) in Arunachal Pradesh, India

– Jahan Ahmed, Sorang Tadap, Millo Tasser, Koj Rinya, Nekibuddin Ahmed & Sunil Kyarong, Pp. 20066–20071

A rare photographic record of Eurasian Otter *Lutra lutra* with a note on its habitat from the Bhagirathi Basin, western Himalaya, India

– Ranjana Pal, Aashna Sharma, Vineet Kumar Dubey, Tapajit Bhattacharya, Jeyaraj Antony Johnson, Kuppusamy Sivakumar & Sambandam Sathyakumar, Pp. 20072–20077

The first record of Medog Gliding Frog *Rhacophorus translineatus* Wu, 1977 (Anura: Rhacophoridae) from Chhukha District, Bhutan

– Sonam Lhendup & Bal Krishna Koirala, Pp. 20078–20083

First record of a freshwater crab, *Maydelliathelphusa masoniana* (Henderson, 1893) (Decapoda: Brachyura: Gecarcinucidae) from West Bengal, India

– Ram Krishna Das, Pp. 20084–20089

Butterflies of Amrabad Tiger Reserve, Telangana, India

– Deepa Jaiswal, B. Bharath, M. Karuthapandi, Shrikant Jadhav, S. Prabakaran & S. Rehanuma Sulthana, Pp. 20090–20097

An enumeration of the flowering plants of Kyongnosla Alpine Sanctuary in eastern Sikkim, India

– Sudhansu Sekhar Dash, Subhajit Lahiri & Ashiho Asoshii Mao, Pp. 20098–20117

A new record of psychrotrophic *Paecilomyces formosus* (Eurotiales: Ascomycota) from India: morphological and molecular characterization

– Skarma Nonzom & Geeta Sumbali, Pp. 20118–20123

Notes

Study on incidence and pathology of gastrointestinal parasitic infections in Nilgai *Boselaphus tragocamelus* in Hisar, Haryana, India

– Maneesh Sharma, B.L. Jangir, D. Lather, G.A. Chandratre, V. Nehra, K.K. Jakhar & G. Narang, Pp. 20124–20127

An unusual vocalization of Brown Hawk-Owl *Ninox scutulata* (Raffles, 1822) (Aves: Strigiformes: Strigidae) recorded from Kerala, India

– Riju P. Nair & Shine Raj Tholkudiyil, Pp. 20128–20129

New distribution data on the genus *Maripanthus* Maddison, 2020 (Araneae: Salticidae) from southern India

– A. Asima, John T.D. Caleb, Dhruv A. Prajapati & G. Prasad, Pp. 20130–20132

On the IUCN status of *Boesenbergia albolutea* and *B. rubrolutea* (Zingiberaceae) and typification of *B. rubrolutea*

– K. Aishwarya & M. Sabu, Pp. 20133–20135

New records of mass seeding *Cephalostachyum latifolium* Munro (Poaceae) along the mid-elevation broadleaved forest of Sarpang district, Bhutan

– Jigme Tenzin, Sangay Nidup & Dago Dorji, Pp. 20136–20139

Response

If habitat heterogeneity is effective for conservation of butterflies in urban landscapes of Delhi, India? Unethical publication based on data manipulation

– Sanjay Keshari Das & Rita Singh, Pp. 20140–20142

Publisher & Host

