

Building evidence for conservation globally

Journal of Threatened Taxa



10.11609/jott.2022.14.6.21127-21330

www.threatenedtaxa.org

26 June 2022 (Online & Print)

14 (6): 21127–21330

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 2019–2021

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. 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. 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

Cover: *Euphaea pseudodispar* shot at Kalindi River, Thirunelly, Wayanad district, Kerala. © Muneer P.K.



Population and distribution of Wattled Crane *Bugeranus carunculatus*, Gmelin, 1989 at lake Tana area, Ethiopia

Shimelis Aynalem Zelelew¹ & George William Archibald²

¹ Bahir Dar University, College of Agriculture and Environmental Sciences, School of Fisheries and Wildlife, Department of Wildlife and Ecotourism Management, Bahir Dar, Ethiopia.

² International Crane Foundation, E11376 Shady Lane Rd, Baraboo, WI 53913, United States.

¹ shimelisay@yahoo.co.in (corresponding author), ² george@savingcranes.org

Abstract: The Wattled Crane is listed as Vulnerable on the IUCN Red List, and isolated population occurs in Ethiopia. This study was conducted in Chimba wetlands, Lake Tana area from October–2013 to December–2014. The objectives were to understand the distribution and population status of the Wattled crane and assess the vegetation characteristics and threats of the ecological units. The population size and density of cranes in the study area was determined from weekly counts carried out in equal-sized sampling units. The total survey area was divided into square grids, and each of them was 1.23 square km wide/size. A total of 10 grid squares, which have an area of 12.32 square km were considered for density analysis. Although the total area of the study was 208.2 km², unsuitable habitats, such as forest or farmlands were excluded. Counts of cranes were made at known sites. The density was calculated as the average number of cranes counted per unit area. A total of 32 cranes were recorded. The density of cranes in the study area is 2.6 per km². Cranes were located in Addis Amba, Dehena Mesenta, Latamba, and Legdia local administrative areas. The number recorded in each area varied, the largest (17) was recorded in Latamba Kebele and the fewest (2) in Legdia. The dominant vegetation type of Chimba wetlands is emergent macrophyte. However, the papyrus bed represents about 10% of the wetland. Species of vegetation other than papyrus bed is represented by a 20 quadrat study. A total of 26 macrophyte species belonging to 10 families were recorded. Intensive cultivation, draining of the wetland, habitat degradation, overgrazing of the wetland, overharvesting of papyrus, invasive species, and over-flooding are the major threats of wetlands.

Keywords: Blue Nile, conservation, density, ecological units, egg, habitat destruction, macrophytes, nesting site, threats, wetlands.

Editor: Anonymity requested.

Date of publication: 26 June 2022 (online & print)

Citation: Zelelew, S.A. & G.W. Archibald (2022). Population and distribution of Wattled Crane *Bugeranus carunculatus*, Gmelin, 1989 at lake Tana area, Ethiopia. *Journal of Threatened Taxa* 14(6): 21170–21178. <https://doi.org/10.11609/jott.5589.14.6.21170-21178>

Copyright: © Zelelew & Archibald 2022. 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: The project was funded by International Crane Foundation (ICF), E11376 Shady Lane Rd, Baraboo, WI 53913, United States of America.

Competing interests: The authors declare no competing interests.

Author details: SHIMELIS AYNALAM ZELELEW (PhD), Associate Professor in ecological systematic zoology at Bahir Dar University, College of Agriculture and Environmental Sciences, Department of Wildlife and Ecotourism Management, Bahir Dar, Ethiopia. GEORGE ARCHIBALD (PhD), senior expert and co-founder of the International Crane Foundation, E11376 Shady Lane Rd, Baraboo, WI 53913, United States of America.

Author contributions: The authors have conducted the project and collected data in the field at various times. Both authors have participated in organizing and analyzing the data. The second author participated in shaping and commenting the manuscript while the first author wrote the draft paper.

Acknowledgements: This study was supported by the International Crane Foundation. We would like to thank Karen Becker from ICF for English editing.



INTRODUCTION

Cranes (family Gruidae) are among the world's most threatened birds. Of the six species occurring in Africa, Wattled Cranes are listed as 'Vulnerable' on the IUCN Red List. Isolated populations occur in Ethiopia and South Africa, which are not considered different subspecies (Beilfuss et al. 2007; BirdLife International 2020). Wattled Cranes range across 11 countries from Ethiopia to South Africa, the majority occurring in the extensive flood plain systems of southern Africa's large river delta (especially the Kafue, Okavango, and Zambezi). They are also found in smaller wetlands throughout their range.

The status and distribution of the Wattled Crane is of particular conservation concern because of the species' life history traits (e.g., delayed sexual maturity and low reproductive output) and specialized habitat requirements (Johnsgard 1983). Wattled Cranes are the most wetland-dependent of all Africa's cranes (Meine & Archibald 1996). When hydrological conditions are not satisfactory at a particular location due to drought, flooding, or inappropriate water management, most Wattled Cranes fail to initiate nesting (Douthwaite 1974; Konrad 1981). The availability of the Wattled Crane's main food source, underground tubers of spike rushes (*Eleocharis* spp.), water lilies (*Nymphaea* spp.) and various sedge species (especially *Cyperus* spp.), is also negatively affected by disruption in the regular annual cycle of flooding and drying (Beilfuss 2000).

Three populations of the Wattled Crane are recognized. The core population occurs in southern central Africa on the primary floodplains and dambos of the upper Congo, Zambezi, and Okavango river basins. More isolated populations occur in Ethiopia and South Africa, with the Ethiopian population likely to be a distinct subspecies (Jones 2003). However, this isolated population presently is not considered as a separate subspecies (Beilfuss et al. 2007).

The total population of the species was 13,000–15,000 in 1974–1994. However, it declined to 8,000 in 2004, with the highest population residing in Zambia (4,500). The population and distribution of Wattled Cranes in Ethiopia is poorly known. A survey report in 2004 estimated less than 200 birds (Beilfuss et al. 2007). However, a recent survey in 2017 suggested that a total of 366 were recorded because additional survey sites were added (Zezelew et al. 2020).

The three species of cranes found in Ethiopia; Wattled Crane, Eurasian Crane and the Black Crowned Crane occur in different sites of the Lake area (Francis & Aynalem 2007; Aynalem et al. 2011). Wetlands of

Chimba, Yiganda, Gorgora and the Fogera wetland plain are the major locations for the cranes. Past records show that the Wattled Cranes occurred over a large range and different habitats in Ethiopia (Urban & Walkinshaw 1967). However, recent studies showed that they are distributed in the central, southern, and northwestern parts of the country (Zezelew et al. 2020). Chimba wetlands are the breeding grounds of the Wattled Crane (Aynalem et al. 2011). Although these sites are known for breeding and foraging, total population estimate of the species is still not known. Therefore, baseline information on the distribution, population of the species, the vegetation characteristics of the wetlands, and threats to the species can provide a starting point for future monitoring, conservation planning, and developing management intervention. Therefore, the objectives of this study were to determine the distribution, population estimate, and assess the vegetation characteristics of the wetlands, and the threats of ecological unit conservation targets.

MATERIALS AND METHODS

Study area

The study was conducted in the lake Tana area of Ethiopia. The southwestern part of the lake, particularly the wetlands situated along the Gilgel Abay River, was the main focus of the study (Figure 1). Lake Tana is the largest lake in Ethiopia, ca. 68 km wide and ca. 73 km long, and is the source of the Blue Nile. About 83 wetland bird species have been recorded here and their total population around Lake Tana is likely to exceed 100,000 individuals seasonally (Francis & Aynalem 2007).

Chimba wetlands are situated along the Gilgel Abay River. It is bounded by 13 local administrative Kebeles (small districts that have at least 2,000 households), whereas the wetland itself covers four Kebeles: Latamba, Legdia, Addis Amba, Dehena, and Mesenta. Seasonal flooding occurs during the rainy season, June–September. Conventional farming is practiced in the area. Chimba wetlands harbor an enormous number of resident and migratory bird populations. It is home to the largest Black Crowned Crane population of Ethiopia next to the Gambela wetland flood plains (Zezelew et al. 2020). It is also the only place where extensive papyrus beds remain in the Lake Tana area.

The study area is situated within the temperate, cool sub-humid highland agro-ecological zone (Sime & Solomon 2017). The elevation of Chimba wetland area varies from 1,790–1,812 m. The mean annual rainfall at

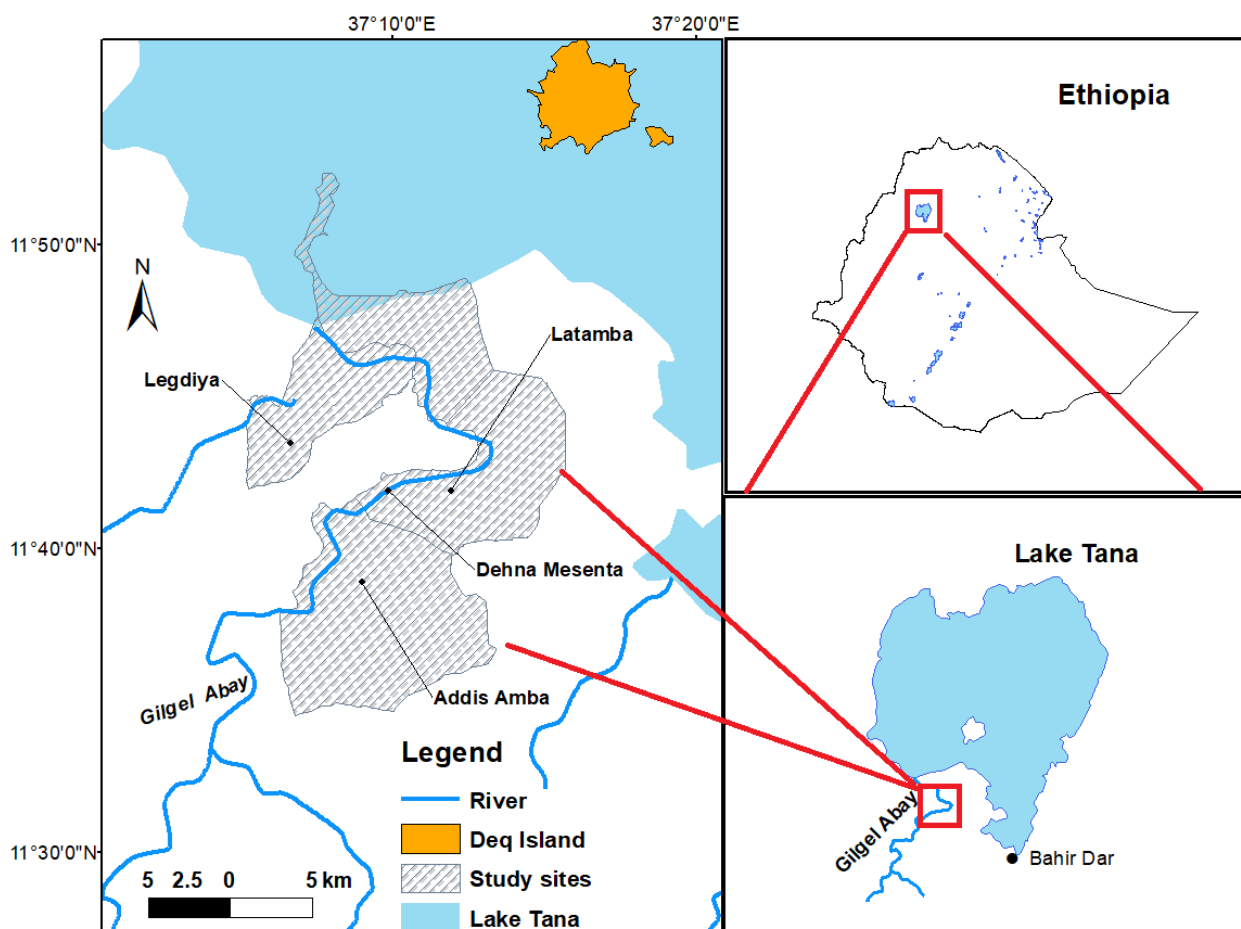


Figure 1. Study area, Chimba wetlands, and southwestern parts of Lake Tana.

Bahir Dar station is 1,439 mm. The rainfall in the area has a unimodal peak extending from May–October followed by the dry season from November–April. Ninety five percent of the annual rainfall occurs during the wet season (May–October).

The geographical coordinates where Wattled Crane occurs was recorded and mapped using ArcGIS 9.3 Software to show where the species are concentrating. Single species count method was employed. The typical feature of the habitat was determined (Bibby et al. 1992; Sutherland 1996; Lloyd et al. 1998).

Distribution and population

The population size and density of cranes in Lake Tana area was assessed from 10 October 2013 to 30 December 2014. The study area was divided into 1.23 km squares based on the size of the wetland and transferred to a GIS map during field work. Weekly counts of cranes were made in 10 grid squares selected systemically where cranes reside (Krebs 1978).

Search for cranes started from 0800 h up to 1800 h

since the survey area was spread out and inaccessible. Ground surveys were done by walking and a car was used to reach the study areas.

Breeding pairs (territorial pairs) and non-breeding ones (in this case family groups) were searched for by a person walking along the edge of the wetland and stopping frequently to scan using binoculars and spotting scope for birds. When nests were encountered the distance from the observer and the approximate coordinates of the nests were recorded by indicating the position relative to the grid map. Additional information such as crane roosting site, foraging places, nesting sites and any local movement of cranes from the local people was recorded while surveying the birds.

The population size and density of cranes in the study area was determined from weekly counts carried out in equal-sized sampling units as described by Joly (1969). These sampling units using x and y coordinates a 'go to' function in the GPS was practiced in the field to find the exact place. A total sampled area of 12.32 km² where cranes occur was considered. However, the total area of

the study was 208.2 km². Areas that were covered by unsuitable habitat, such as forest or farm land, were excluded. Counts of cranes were made at known sites.

The population density (R , birds/square km), was estimated using the following equation,

$$R = \sum y / \sum z$$

where, y is the number of birds in a quadrat and z is the area of the quadrat. The population size (Y) for each survey period was calculated from the average number of birds counted in each quadrat.

Vegetation

Macrophytes were collected at each sampling site using one by one meter quadrat sampling method. A total of 20 quadrats were collected. The quadrats were laid along a diagonal line with an interval of 50 m. Papyrus were excluded for sampling since the vegetation cover is distinct and known (10% cover). The collected unknown specimens were identified to the species or genus level at the Addis Ababa University Herbarium. The proportion of macrophyte cover per sampled area was estimated.

Materials

Observations were carried out with the aid of Nikon 12 x 25 © binoculars and 20–60x Swarovski Telescope. GPS eTrex® model 2004 was used to apply ‘Go to’ function, which was used to find the specified selected quadrat, and also to limit the transect length. Grid map was used during the actual field work. Sony ‘16’ optical lens digital camera and Leica professional camera were utilized to take pictures of the habitat components, features, and the macrophytes.

Threats

Threat types for each ecological unit were listed out during field observation. Then each threat type was evaluated based on their “severity” and “scope”, and their conservation priority was also evaluated by “ranking” them as very high, high, medium and low. The ecological units’ such as wetlands, indigenous trees, macrophytes, shrubs and some wild animals’ were the conservation targets in the area. Their conservation status of these ecological units were evaluated based on the threat types that are listed out already. And hence to indicate the degree of threat severity, a “severity” index was assigned for each threat. A very high level was given for the total eliminated ecological unit in the area, high for seriously degraded, and medium for moderately degraded and low for slightly impaired ecological components. Whereas, for the “scope”, which shows

the extent of damage of the area, spatially: very high evaluation was given for 75% prevalence of the threat, high for 50–75 % widespread threats, medium for the threats that are localized in limited spots, and low for very localized spread. Based on this evaluation, a threat matrix table was developed to provide priority of management action to conserve which ecological unit.

RESULTS

Distribution and population

A total of 30 adults and two juvenile Wattled Cranes were recorded in the sampled area (Image 1). The density of Wattled Cranes in the study area is 2.6/ km².

Cranes were observed in four Kebele’s areas (Legdia, Latamba, Dehena Mesenta, and Addis Amba). The number of Wattled Cranes recorded in each Kebele was: Addis Amba, five; Legdia, two; Dehena Mesenta, eight; and Latamba, 17. All places are nesting sites for the species. However, Latamba Kebele was a very important site for Wattled Crane nesting sites because the nesting area is larger than the others.

Lam Gebya, Basha Dangela at Latamba Kebele, and Addis Amba area are nesting sites that are far apart from each other. During the study period, two nests were identified. The nesting sites were located where disturbance from people were less. The average water depth where the nests are built was about 60 cm. The nesting materials were mainly sedge plants cut from the surrounding area. However, no chick was observed. But, for the first time, one egg that weighed 213.7 g was measured during October 2014.

Vegetation characteristics

The dominant vegetation type of Chimba wetlands are the emergent macrophytes and papyrus bed. A total of 26 macrophytes belonging to 10 families were recorded (Table 1). However, the major macrophytes were: *Cyperus rotundus*, *C. papyrus*, *Echinochloa colona*, *E. stagnina*, *Hygrophila schulli*, *Ipomoea aquatic*, *Leersia hexandra*, *Ludwigia stolonifera*, *Nymphaea nouchali*, *Oryza longistamina*, *Perscaria senegalensis*, *Potamogeton thunbergii*, and *Sacciolepis africana*.

The papyrus bed represents about 10% of the wetland area and is located around ‘Achifi Gott’ and ‘Lamm Gebya’ in Latamba Kebele and Dhana Mesenta area. The proportion of macrophytes other than papyrus was estimated in the sample quadrat (Figure 2).



Image 1. Sampled area Wattled Cranes in Chimba wetland. © Shimelis Aynalem Zeleelew, 2014.

Table 1. List of macrophytes in Chimba wetlands (Local status), Lake Tana area, 2014.

Family	Species	Growth habit	Status	Remark
Acanthaceae	<i>Dyschoriste radicans</i> Nees	Herb	LC	Weed
	<i>Dyschoriste</i> sp.	Herb	LC	Weed
	<i>Hygrophila schulli</i> (Hamilt.) MR. & S.M. Almeida	Herb	LC	Weed
Ceratophyllaceae	<i>Ceratophyllum demersum</i>	Submerged		
Convolvulaceae	<i>Ipomoea aquatic</i> Forssk.	Emergent	LC	Aquatic floater
Cyperaceae	<i>Cyperus papyrus</i> L.	Aquatic	LC	Emergent
	<i>Cyperus longus</i> L.		LC	Emergent
	<i>Cyperus macrostachyos</i>	Sedge	LC	Emergent
	<i>Cyperus dives</i>		LC	Emergent
	<i>Cyperus rotundus</i>			
Menyanthaceae	<i>Nymphoides indica</i> (L.) O.Kunze	Water herb		Float leaves
	<i>Nymphaea lotus</i>	Water herb		Float leaves
	<i>Nymphaea nouchali</i> var. <i>caerulea</i>	Water herb		Float leaves
Onagraceae	<i>Ludwigia stolonifera</i> (Guilt L. & Perl') Raven	Creeper		Aquatic
	<i>Ludwigia</i> sp.			
Poaceae	<i>Hyperrhenia rufa</i> Staps	Grass	LC	Terrestrial
	<i>Andropogon gayanus</i> Kunth.	Grass		Terrestrial
	<i>Snowdenia polystachya</i> Pilg	Grass		
	<i>Echinochloa colona</i> (L.) Link	Aqu.Grass		Aquatic
	<i>Echinochloa stagnina</i> (Retz.) P. Beauv.	Aqu.Grass		Aquatic
	<i>Leersia hexandra</i> SW.	Aquatic		
	<i>Sacciolepis africana</i> CE. Hubb. & Snowden			
	<i>Oryza longistaminata</i> A. Chev. & Roehr.	Aquatic		
	<i>Eleusine africana</i>	Semi aquatic		Edge part of wetland
	<i>Phragmites australis</i> . (Cav.) Trin. ex Steud.	Aquatic		
Polygonaceae	<i>Persicaria senegalensis</i> (Meisn.) Sojak	Aquatic	LC	Creeper
Potamogetonaceae	<i>Potamogeton thunbergii</i> Cham. & Schlecht.	Submerging		
Typhaceae	<i>Typha latifolia</i>	Aquatic		

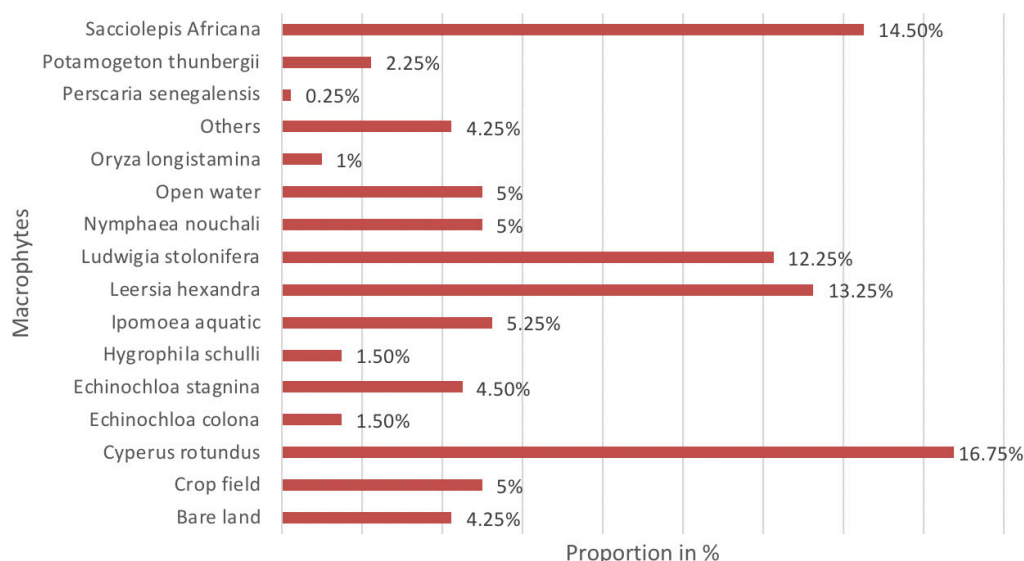


Figure 2. Relative proportion of macrophytes, except papyrus in Chimba wetlands, 2014



Image 2. Pumping water for *Khat C. edulis* cultivation at Chimba wetland Lam Gebya area. © Shimelis Aynalem Zezelew, 2013.

Ecological unit conservation targets threats

The ecological unit conservation targets were identified as: wetlands, riverine habitat, indigenous trees (like fig trees, *Sezigum gunensie*, *Millettia ferruginea*, *Mimousops kummel*), macrophytes (like some of them *Cyprus papyrus*), fishes, some primate species (Grivet Monkey and Common Baboons), mammals (Water Buck), birds (like cranes, water birds, passerine birds), and amphibians and reptiles (Table 2). The threats that are potentially of harm to these ecological units are listed out (Table 2).

As observed in the study area, water is drained for *Khat Catha edulis* cultivation (Image 2). Expansion of this activity has affected the wetland ecosystem as the wetland dries fast before the next rain. The presence of a large cattle population has also degraded the nesting sites of cranes. Bare land is created around the wetland (Image 3). The flood also results in sediment

accumulation. This has affected Wattled Crane feeding and nesting sites. Some wetland vegetation is being rooted out due to intensive cultivation.

Seasonal flooding during the wet season and water shortage during the dry season and self-removal of wet biomass were observed. Overgrazing, wetland draining, habitat fragmentation, and farming have affected the natural ecological process, which have impacts on breeding and feeding sites of cranes. This creates competition for habitat, reduction of breeding grounds leading to decrease in the viable population, and ecosystem destruction. Encroachment of agriculture on wetlands and overgrazing have affected the papyrus bed that is important for breeding and feeding sites of birds, reptiles, amphibians, and fishes as well. Since the area is a communal land, there is no proper management activity.

Table 2. Ecological unit conservation targets, threat. and ecological levels.

	Ecological unit conservation targets	Threats	Severity	Scope	Ranking	Ecological level
1	Wetlands and Gilgel Abay riverine habitat	Habitat degradation	High	V. High	V. High	Ecosystem
		Draining of wetland	Medium	Low	Low	Ecosystem
		Over grazing	Medium	V. high	V. high	Ecosystem
		Cultivation and encroachment	Medium	High	High	Ecosystem
		Vegetation removal	High	Medium	high	Ecosystem
		Flooding	High	High	High	Ecosystem
		Invasive species	Medium	High	Medium	Ecosystem
2	Indigenous trees macrophyte and shrubs	Deforestation	High	V. High	V. High	Community
		Overgrazing	High	V. High	V. High	Community
		Agriculture encroachment	High	V. High	V. High	Community
		Sedimentation	High	Medium	High	Community
		Invasive species	Medium	Medium	Medium	Community
3	Fig trees, <i>Sezigum gunensie</i> , <i>Millettia ferruginea</i> , <i>Mimousops kummel</i> , <i>Cyprus papyrus</i>	Deforestation	V. High	V. High	V. High	Species
		Charcoal making	Medium	Medium	Medium	Species
		Construction	Medium	Low	Low	Species
		Lumber production	Medium	Low	Low	Species
		Burning (intentional)	Low	Low	Low	Species
4	Fish	Overfishing	Medium	Low	Low	Species
		Habitat loss	High	Low	Medium	Species
		Water Channelization	Medium	Low	Low	Species
		Wetland degradation	High	Medium	Medium	Species
5	Primate species Grivet Monkey and Common Baboons; Water Buck	Habitat degradation	V. High	V. High	V. High	Species
		Killing (to remove them)	Low	Low	Low	Species
		Grazing competition	Low	Low	Medium	Species
6	Birds (cranes, water birds, passerine birds)	Wetland degradation	High	V. High	V. High	Species
		Vegetation removal	High	High	V. High	Species
		Overgrazing	High	V. High	V. High	Species
		Breeding and feeding site loss	High	High	V. High	Species
7	Amphibians and reptiles	Wetland degradation	V. High	High	High	Species
		Killing (to remove them)	High	High	High	Species
		Food shortage	V. High	V. High	V. High	Species
		Breeding and feeding sites loss	V. High	V. High	V. High	Species
		Decreased water flow	Medium	Medium	High	Species



Image 3. Siltation after flooding in Chimba wetland adjacent to Gilgel Abay River. © Shimelis Aynalem Zeleelew, 2013.

DISCUSSION

The occurrence of 32 individuals of Wattled Cranes showed that the population has increased compared to 27 recorded in 2009 (Aynalem et al. 2011). It could be even more since inaccessibility and the limited position available to view the majority area of the breeding wetlands could underestimate the number of breeding nests recorded and also the number of juveniles. In addition to this factor, delayed sexual maturity and low reproductive output and specialized habitat requirements could account for low number of population (Johnsgard 1983). Particularly, when hydrological conditions are not satisfactory at a particular location due to drought, flooding, or inappropriate water management, most Wattled Cranes fail to initiate nesting (Douthwaite 1974; Konrad 1981). The lack of availability of the Wattled Crane's main food source, underground tubers of spike rushes (*Eleocharis* spp.), water lilies (*Nymphaea* spp.), and various sedge species (especially *Cyperus* spp.), also affects the annual cycle of flooding and drying (Beilfuss 2000).

Wattled Cranes are distributed in the extensive wetland areas of Legdia, Latamba, Dehena Mesenta and Addis Amba Kebele. The distribution of cranes and the number of individuals/population is related to the presence of secure habitats, nesting and feeding sites. Several of the Wattled Cranes were located around their nesting sites because most cranes need undisturbed nesting sites, except the Indian Sarus Crane (*Grus antigone*), which is highly tolerant of human activity. Wild cranes generally nest in isolated places where the risk of predation is minimal (Archibald & Meine 1996; Claire et al. 1996; Bento et al. 2007; Sundra 2009); but studies carried out on nest success of Greater Sandhill Cranes at Malheur National Wildlife Refugia, Oregon showed that nest concealment has no relationship with nest success (Ivey 2007). However, in the breeding grounds of Wattled Crane at Lake Tana, nests were built in secure and inaccessible places. This kind of behavior accounted for fewer number of nesting sites at Chimba area though there is more than 208 ha of papyrus bed. Similarly, the breeding and nesting sites have been repeatedly used by the species since the beginning of 2008 at Lake Tana area (Aynalem et al. 2011). This indicates that Wattled Cranes are loyal to their nesting sites. Unless they are disturbed, nesting site consistency has been also reported by Bento et al. (2007) in the Marromeu complex of the Zambezi Delta.

Papyrus swamp is an important habitat supporting a wide diversity of species such as Sitatunga Antelope

Tragelaphus spekei and African Python *Python sebae* (Aynalem & Mengitu 2017); several birds with restricted distribution, including the Papyrus Lesser Swamp Warbler *Acrocephalus glaucirostris* at Chimba wetlands. They provide breeding and feeding ground for numerous species of fish, and also grazing of large herbivores (Aynalem 2017).

The two major threats to wetlands in the area are habitat destruction through agricultural development and over-exploitation (Aynalem 2017). This has affected Wattled Crane feeding and nesting sites. Some wetland vegetation is being rooted out due to intensive cultivation, because private lands are not clearly demarcated from communal ones.

Apart from major biodiversity and ecological ecosystem services, a wide range of regulatory ecosystem services are provided by Papyrus swamps. The services include water, carbon and nitrogen cycles and buffering capacity for sediment and nutrient loads, as well as services of benefit to communities, including biofuel, drinking water, building materials, and flood control (Maltby 1986).

Seasonal flooding during the wet season and water shortages during the dry season and self-removal of wet biomass were observed. Overgrazing, wetland draining, habitat fragmentation, and farming have affected the natural ecological process. These practices have affected the breeding and feeding sites of cranes. This creates habitat competition, reduction of breeding grounds leading to decrease in viable population, and ecosystem destruction. Encroachment of agriculture on wetlands and overgrazing have affected the papyrus bed that is important for breeding and feeding sites of birds, reptiles, amphibians and fishes as well; this phenomenon was described in developing countries (Dugan 1990). Since the area is a communal land, there is no proper management activity.

Threats on the ecological setup of wetlands arose from two major directions. First, from natural processes, which could affect the normal functioning of natural processes derived from natural forces such as seasonal flooding during the wet season and water shortage during the dry season. This phenomenon is linked to the Inter Tropical Convergent Zone (ITCZ) location of the area (Mohamed et al. 2005). The ITCZ is characterized by a low-pressure zone at the meeting point between the dry northeasterly and moist southwesterly winds, and is the major reason for a rainfall season in the area. Bahir Dar annual rainfall records show there are pronounced periods of wetter and drier fluctuations. The early period (1966–1977) was comparatively

wet (average 1,661 mm), but this was followed by a dry period (1978–1987) with an annual average of 1,239 mm. The driest year in the record was 1983, with an annual rainfall of 895 mm. The wettest year was 1973, when the total rainfall was 2,036 mm. The mean and median of the annual series rainfall were 1,439 mm and 1,468 mm, respectively. Seventy percent of the annual rainfall was above 1,300 mm and 80% was above 1,200 mm. Self-removal of wet biomass could also account as a threat. Overgrazing, wetland draining, habitat fragmentation, and farming have also impacted the area. This phenomenon leads to competition, reduction of breeding grounds, and then decrease of viable population. In Chimba area, encroachment of agriculture on wetlands and overgrazing are affecting the papyrus bed.

Wattled Cranes are flagship species requiring extensive wetlands for feeding, breeding and resting. Chimba wetlands are the only areas that support these life processes for this globally threatened species. Since the area is free grazing land, community based sustainable utilization management must be implemented to save this threatened species and other life forms as well.

REFERENCES

- Archibald, G.W. & C. Meine (1996). Ecology, Status, and Conservation, pp. 263–292. In: Ellis, D.H., G.H. Gee & M.C. Mirande (eds.). *Cranes: Their Biology, Husbandry, and Conservation*. Department of the Interior, National Biological Service and Washington, DC, and the International Crane Foundation, Baraboo, Wisconsin, xii+318pp.
- Aynalem, S. (2017). Birds of Lake Tana Sub-Basin, pp. 179–206. In: Stave, K., G. Goshu & S. Aynalem (eds.). *Social and Ecological System Dynamics: Characteristics, Trends, and Integration in the Lake Tana Basin, Ethiopia*. Springer International Publishing, Switzerland, 645 pp.
- Aynalem, S., G. Nowald & W. Schroder (2011). Observation on the biology and ecology of cranes: Wattled Cranes (*Bugeranus carunculatus*), Black Crowned Cranes (*Balearica pavonina*), and Eurasian Cranes (*grus grus*) at Lake Tana, Ethiopia. INDWA. *Journal of African Crane Research and Conservationist* 7: 1–12.
- Beilfuss, R. (2000). Piecing together the story of an African floodplain: water, wetlands, and Wattled Cranes. *ICF Bugle* 26: 1–3.
- Beilfuss, R., T. Dodman & E.K. Urban (2007). The status of cranes in Africa in 2005. *Ostrich* 78: 175–184.
- Bento, C.B., R.D. Beilfuss & P.A.R. Hockey (2007). Distribution, structure and simulation modeling of the Wattled Crane population in the Marromeu Complex of the Zambezi Delta, Mozambique. *Ostrich* 78: 185–193.
- Bibby, C.J., N.B. Collar, M.J. Crosby, M.F. Heath, C. Imboden, T.H. Jonston, A.J. Long, A.J. Satterfield & S.J. Thirgood (1992). *Putting Biodiversity on the Map: Priority Areas for Global Conservation*. Barrington Press, Cambridge, 239 pp.
- Birdlife International (2020). Species factsheet: *Bugeranus carunculatus*. Downloaded from <http://www.birdlife.org> on 31 May 2020.
- Claire, M.M., F.G. George, B. Ann & W. Peter (1996). Egg and semen production, 45–58 pp. In: Ellis DH, Gee GH and Mirande MC (eds.). *Cranes: Their Biology, Husbandry, and Conservation*. Department of the Interior, National Biological Service, Washington, DC, and the International Crane Foundation, Baraboo, Wisconsin, xii+318pp.
- Douthwaite, R.J. (1974). An endangered population of Wattled Cranes. *Biological Conservation* 6: 134–142.
- Dugan, P.J. (ed.) (1990). *Wetland Conservation: A Review of Current Issues and Required Action*. IUCN, Gland, 192pp.
- Francis, I.S. & S. Aynalem (2007). Bird surveys around Bahir Dar-Lake Tana. Important Bird Areas Report, Ethiopia. 93 pp.
- Ivey, G.L. (2007). Factors Influencing Nest Success of Greater Sandhill Cranes at Malheur National Wildlife Refuge, Oregon. M.Sc. Thesis. Oregon State University, Oregon, 48pp.
- Johnsgard, P.A. (1983). *Cranes of the World*. Indiana University Press, Bloomington. 316 pp.
- Joly, G. (1969). Sampling methods for aerial census of wildlife populations. *East African Agricultural and Forestry Journal* 34: 50–55.
- Konrad, P.M. (1981). Status and ecology of Wattled Crane in Africa, pp. 220–237. In: Lewis, J.C. & H. Masatomi (eds.). *Crane Research around the World. Proceedings of the International Crane Symposium at Sapporo, Japan*. International Council for Bird Preservation, Sapporo.
- Krebs, C.J. (1978). *Ecology: experimental analysis of distribution and abundance of animals*. 2nd ed. Harper and Row, New York, 688 pp.
- Lloyd, H., A. Cahill, M. Jones & S. Marsden (1998). Estimating Bird Densities Using Distance Sampling, pp. 35–52. In: Bibby, C., M. Jones & S. Marsden (eds.). *Expedition field techniques, Bird surveys*. Royal Geographical Society with the Institute of British Geography, London, 134pp.
- Maltby, E. (1986). Waterlogged Wealth: Why waste the world's wet places? International Institute for Environment and Development and Earth scan, London, 200 pp.
- Meine, C.D. & G.W. Archibald (1996). The Cranes: Status Survey and Conservation Action Plan. IUCN, Gland, 293 pp.
- Mohamed, Y.A., B.J.J.M. van den Hurk, H.H.G. Savenije & W.G.M. Bastiaanssen (2005). Hydroclimatology of the Nile: results from a regional climate model. *Hydrology and Earth System Science* 9: 263–278. <https://doi.org/10.5194/hess-9-263-2005>
- Sundra, K.S.G. (2009). Are rice paddies suboptimal breeding habitat for Sarus Cranes in Uttar Pradesh, India? *The Condor* 111(4): 611–623.
- Sime E. & B. Solomon (2017). Hydrology of Lake Tana Basin, pp. 117–126. In: Stave, K., G. Goshu & S. Aynalem (eds.). *Social and Ecological System Dynamics: Characteristics, Trends, and Integration in the Lake Tana Basin, Ethiopia*. Springer International Publishing, Switzerland, 645 pp.
- Sutherland, W.J. (1996). *Ecological Census Techniques: A handbook*. Cambridge University Press, London. 336 pp.
- Urban, E.K. & L.H. Walkinshaw (1967). The Wattled Crane in Ethiopia. *Auk* 84: 263–264.
- Zezelew, S.A., N. Günter, A. George, T. Hadis, A. Abebayehu, M. Kerry & G.M. Tariku (2020). Distribution and population estimates of four crane species in Ethiopia: a global crane hotspot facing increasing threats. *Scopus: Journal of East African Ornithology* 40(2): 1–17.

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
 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, 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 2019–2021

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.

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

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



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)

June 2022 | Vol. 14 | No. 6 | Pages: 21127–21330

Date of Publication: 26 June 2022 (Online & Print)

DOI: 10.11609/jott.2022.14.6.21127-21330

www.threatenedtaxa.org

Article

Identification of confiscated pangolin for conservation purposes through molecular approach

– Wirdateti, R. Taufiq P. Nugraha, Yulianto & Gono Semiadi, Pp. 21127–21139

Communications

The trade of Saiga Antelope horn for traditional medicine in Thailand

– Lalita Gomez, Penthai Siriawat & Chris R. Shepherd, Pp. 21140–21148

The occurrence of Indochinese Serow *Capricornis sumatraensis* in Virachey National Park, northeastern Cambodia

– Gregory McCann, Keith Pawlowski & Thon Soukhon, Pp. 21149–21154

Attitudes and perceptions of people about the Capped Langur *Trachypithecus pileatus* (Mammalia: Primates: Cercopithecidae): a preliminary study in Barail Wildlife Sanctuary, India

– Rofik Ahmed Barbhuiya, Amir Sohail Choudhury, Nazimur Rahman Talukdar & Parthankar Choudhury, Pp. 21155–21160

Feather characteristics of Common Myna *Acridotheres tristis* (Passeriformes: Sturnidae) from India

– Swapna Devi Ray, Goldin Quadros, Prateek Dey, Padmanabhan Pramod & Ram Pratap Singh, Pp. 21161–21169

Population and distribution of Wattled Crane *Bugenerus carunculatus*, Gmelin, 1989 at lake Tana area, Ethiopia

– Shimelis Aynalem Zelelew & George William Archibald, Pp. 21170–21178

Waterbird assemblage along Punatsangchhu River, Punakha and Wangdue Phodrang, Bhutan

– Nima & Ugyen Dorji, Pp. 21179–21189

Freshwater fishes of the Chimmony Wildlife Sanctuary, Western Ghats, India

– P.S. Eldho & M.K. Sajeevan, Pp. 21190–21198

Butterflies of Eravikulam National Park and its environs in the Western Ghats of Kerala, India

– Kalesh Sadasivan, Toms Augustine, Edayillam Kunhikrishnan & Baiju Kochunarayanan, Pp. 21199–21212

The dragonflies and damselflies (Insecta: Odonata) of Shendurney Wildlife Sanctuary, southern Western Ghats, India

– Kalesh Sadasivan, Vinayan P. Nair & K. Abraham Samuel, Pp. 21213–21226

A pioneering study on the spider fauna (Arachnida: Araneae) of Sagar District, Madhya Pradesh, India

– Tanmaya Rani Sethy & Janak Ahi, Pp. 21227–21238

Taxonomy and threat assessment of *Lagotis kunawurens* Rupr (Plantaginaceae), an endemic medicinal plant species of the Himalaya, India

– Aijaz Hassan Ganie, Tariq Ahmad Butt, Anzar Ahmad Khuroo, Nazima Rasool, Rameez Ahmad, Syed Basharat & Zafar A. Reshi, Pp. 21239–21245

The study of algal diversity from fresh water bodies of Chimmony Wildlife Sanctuary, Kerala, India

– Joel Jose & Jobi Xavier, Pp. 21246–21265

Review

A checklist of herpetofauna of Telangana state, India

– Chelmala Srinivasulu & Gandla Chethan Kumar, Pp. 21266–21281

Viewpoint

Comments on “The Dragonflies and Damselflies (Odonata) of Kerala – Status and Distribution”

– A. Vivek Chandran & K. Muhamed Sherif, Pp. 21282–21284

Short Communications

Landings of IUCN Red Listed finfishes at Chetlat Island of Lakshadweep, southeastern Arabian Sea

– Davood Nihal, N.M. Naseem, N. Abhirami & M.P. Prabhakaran, Pp. 21285–21289

First report of the termite *Glyptotermes ceylonicus* (Blattodea: Isoptera: Kalotermitidae) from India: an example of discontinuous distribution

– Edwin Joseph, Chinnu Ipe, Nisha P. Aravind, Sherin Antony & Jobin Mathew, Pp. 21290–21295

Authentic report of the emesine bug *Gardena melinarthrum* Dohrn, 1860 (Hemiptera: Heteroptera: Reduviidae) from India

– Sangamesh R. Hiremath, Santana Saikia & Hemant V. Ghatge, Pp. 21296–21301

Reappearance of stomatopod *Gonodactylus platysoma* (Wood-Mason, 1895) after an era from the intertidal region of Chota Balu, South Andaman, India

– N. Muthu Mohammed Naha, Limaangnen Pongener & G. Padmavati, Pp. 21302–21306

Range extension of earthworm *Drawida impertusa* Stephenson, 1920 (Clitellata: Moniligastridae) in Karnataka, India

– Vivek Hasyagar, S. Prasanth Narayanan & K.S. Sreepada, Pp. 21307–21310

Pelatantheria insectifera (Rchb.f.) Ridl. (Orchidaceae): a new generic record for Eastern Ghats of Andhra Pradesh, India

– V. Ashok Kumar, P. Janaki Rao, J. Prakasa Rao, S.B. Padal & C. Sudhakar Reddy, Pp. 21311–21314

Notes

New breeding site record of Oriental White Ibis *Threskiornis melanocephalus* (Aves: Threskiornithidae) at Thirunavaya wetlands, Kerala, India

– Binu Chullakattil, Pp. 21315–21317

Rediscovery of *Gardena melinarthrum* Dohrn from Sri Lanka

– Tharindu Ranasinghe & Hemant V. Ghatge, Pp. 21318–21320

A report on the occurrence of the cicada *Callogaeana festiva* (Fabricius, 1803) (Insecta: Cicadidae) from Mizoram, India

– Khawhling Marova, Fanai Malsawmdawngliana, Lal Muansanga & Hmar Tlawmte Lalremsanga, Pp. 21321–21323

New distribution records of two species of metallic ground beetles of the genus *Chlaenius* (Coleoptera: Carabidae: Chlaeniini) from the Western Ghats, India

– Duraikannu Vasanthakumar & Erich Kirschenhofer, Pp. 21324–21326

Report of *Euphaea pseudodispar* Sadasivan & Bhakare, 2021 (Insecta: Odonata) from Kerala, India

– P.K. Muneer, M. Madhavan & A. Vivek Chandran, Pp. 21327–21330

Publisher & Host

