

Building evidence for conservation globally

Journal of Threatened Taxa



Open Access

10.11609/jott.2025.17.11.27787-28010

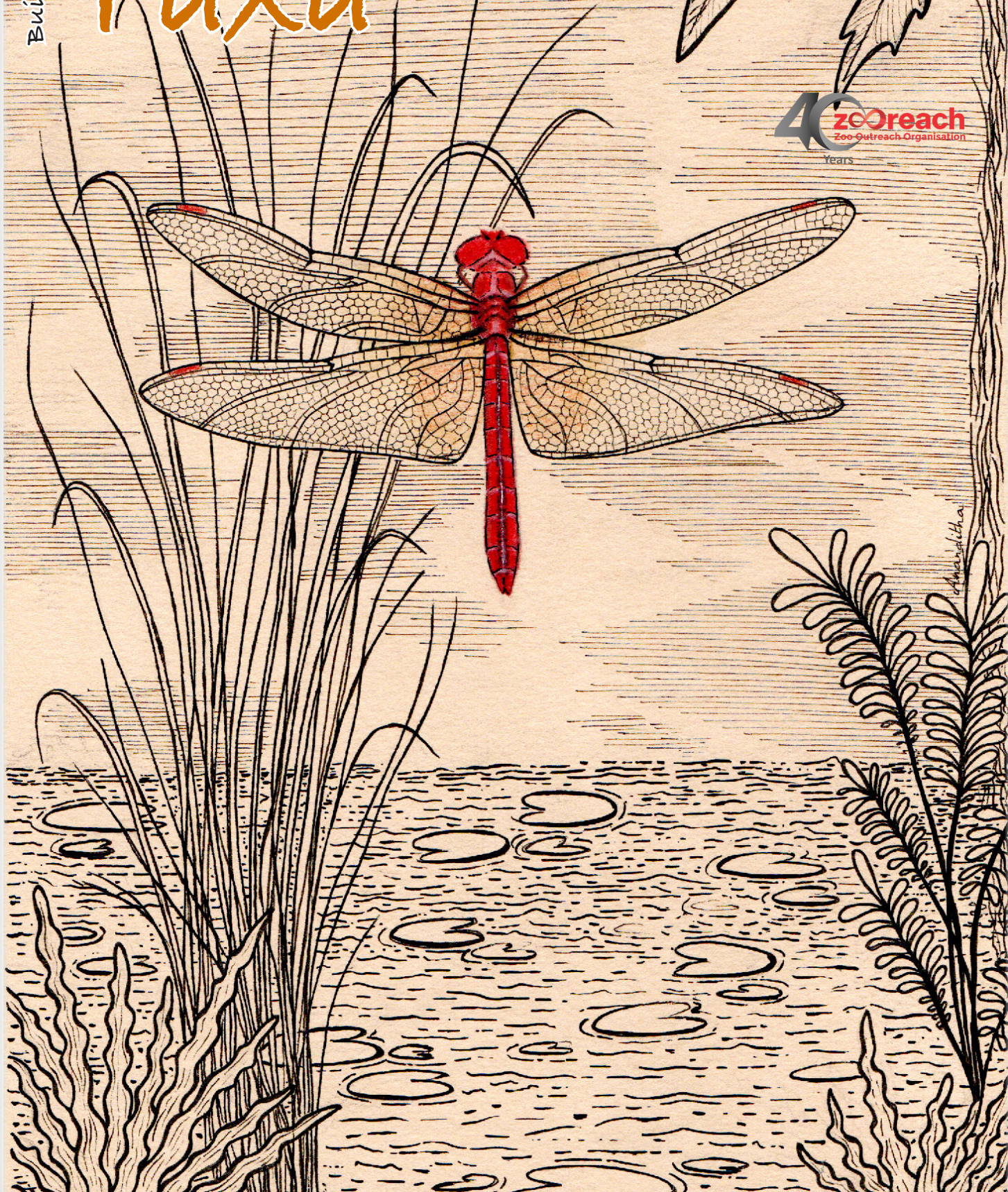
www.threatenedtaxa.org

26 November 2025 (Online & Print)

17(11): 27787-28010

ISSN 0974-7907 (Online)

ISSN 0974-7893 (Print)





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

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

Host
Zoo Outreach Organization
www.zooreach.org

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

EDITORS

Founder & Chief Editor

Dr. Sanjay Molur

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

Assistant Editor

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

Managing Editor

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

Associate Editors

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

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

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

Board of Editors

Dr. Russel Mittermeier

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

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

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

Stephen D. Nash

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

Dr. Fred Pluthero

Toronto, Canada

Dr. Priya Davidar

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

Dr. John Fellowes

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

Prof. Dr. Mirco Solé

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

Dr. Rajeev Raghavan

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

English Editors

Mrs. Mira Bhojwani, Pune, India

Dr. Fred Pluthero, Toronto, Canada

Copy Editors

Ms. Usha Madgunaki, Zooreach, Coimbatore, India

Ms. Trisa Bhattacharjee, Zooreach, Coimbatore, India

Ms. Paloma Noronha, Daman & Diu, India

Web Development

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

Typesetting

Mrs. Radhika, Zooreach, Coimbatore, India

Mrs. Geetha, Zooreach, Coimbatore, India

Fundraising/Communications

Mrs. Payal B. Molur, Coimbatore, India

Subject Editors 2021–2023

Fungi

Dr. B. Shivaraju, Bengaluru, Karnataka, India

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

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

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

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

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

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

Plants

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

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

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

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

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

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

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

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

Dr. Merlin Franco, Curtin University, Malaysia

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

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

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

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

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

Dr. Vijayasankar Raman, University of Mississippi, USA

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

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

Dr. Aparna Watve, Pune, Maharashtra, India

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Invertebrates

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

Dr. D.B. Bastawade, Maharashtra, India

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

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

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

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

Dr. Brian Fisher, California Academy of Sciences, USA

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

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

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

For Focus, Scope, Aims, and Policies, visit https://threatenedtaxa.org/index.php/JoTT/aims_scope

For Article Submission Guidelines, visit <https://threatenedtaxa.org/index.php/JoTT/about/submissions>

For Policies against Scientific Misconduct, visit https://threatenedtaxa.org/index.php/JoTT/policies_various

continued on the back inside cover

Cover: A male Scarlet Skimmer perching on vegetation by the banks of a waterbody. Ink and watercolour illustration by Ananditha Pascal.



INTRODUCTION

The Indian Flapshell Turtle *Lissemys punctata* (Bonnaterre, 1789) is a freshwater turtle found in tropical South Asian countries such as India, Sri Lanka, Bangladesh, Nepal, Myanmar, and Pakistan. The femoral flaps that stretch from the shell to envelop the limbs are its distinctive features. A flapshell turtle can grow up to 370 mm long and survive for roughly 20 years (Das 1995, 2011). While adults have oval shells, young ones have round shells. They live in freshwater bodies like shallow lentic waters of lakes, rivers, streams, ponds, and marshes as well as artificial storage tanks, and canals dug for irrigation. They prefer sandy or muddy water bottoms because they may easily burrow into them. Monitoring health of the body and the habitat of *L. punctata*, a vulnerable freshwater turtle species, is crucial for effective in situ conservation efforts (Rashid & Swingland 1997; Das 2011). The morphometrical characteristics of *L. punctata* and water quality of the lake they inhabit are intricately linked with the turtles' health and survival, being directly influenced by the physicochemical properties and pollution levels of their aquatic environment (Baruah et al. 2016).

The physicochemical parameters of lake inhabited by *L. punctata*, including pH, dissolved oxygen, temperature, and nutrient levels can help to assess the suitability of the habitat for its long-term survival (Bhupathy & Vijayan 1989; Dutta et al. 2022). Morphometric measurements, such as carapace length, width, and height, as well as limb & head dimensions, can provide insights into the species' growth, development, and adaptations to their environment (Hossain et al. 2013). Integrating the findings from morphometrical analysis and water quality assessment can contribute to a comprehensive understanding of the species' ecology and the pressures it faces in its natural environment (Moll & Moll 2004). A lack of comprehensive conservation work will cause many species of turtles and tortoises to go extinct in the next few decades (Turtle Conservation Fund 2003). The current study aims to do a thorough morphometric examination of *L. punctata* (Image 1), encompassing measures of body weight, plastron length, carapace width, and carapace length, so that the health of *L. punctata* and its environment may be tracked with the use of this data to develop management plans and targeted conservation initiatives (Rhodin et al. 2018).

METHODS

Visits were made to upper Kuttanad Taluk and Karthikapally of Alappuzha District (Image 2). In the study



Image 1. Indian Flapshell Turtle *Lissemys punctata*. © Sajan Sunny.

areas, based on their habitats, both the species of turtles *M. trijuga* (called Karayaama or land turtle/tortoise) and *L. punctata* (called Vella aama or water turtle/tortoise) were observed respectively. Data about the flapshell turtles was compiled using the questionnaire survey approach. Random inquiries were posed to the villagers who lived close to the wetlands. A total of 15 *L. punctata* turtles, (female = 10, male = 4 and one juvenile) were measured and weighed in the least invasive way possible. In adults, sexes were distinguished by differences in length of limbs, tail, and configurations (Das 1995). Morphological parameters were measured using flexible meter tape and ruler scale nearest to 0.1 cm, and weight was loaded on electronic weighing balance nearest to 0.1 g. The data of the present study was undertaken with 20 associations comprising of each turtle morphometrics. Based on mean values of males and females, the percentage of 14 morphometric characteristics were calculated (Table 1). The statistical analysis was done using statistiXL 2.0 for Microsoft Excel 2016. Regression test was used to analyze data pertaining to the different morphometric measurements of *L. punctata* and deduce the importance of the correlation coefficient at the two-tailed level.

RESULTS

Questionnaire & Field Surveys

A total of 150 people, representing a range of ages (14–80), participated in the survey. Ninety percent of respondents were interested in providing information about turtles, whereas 10% showed little interest in gathering data about them. The fishing community in the Alappuzha District is well known, and they were crucial in aiding in the turtle capture utilizing different kinds of nets.

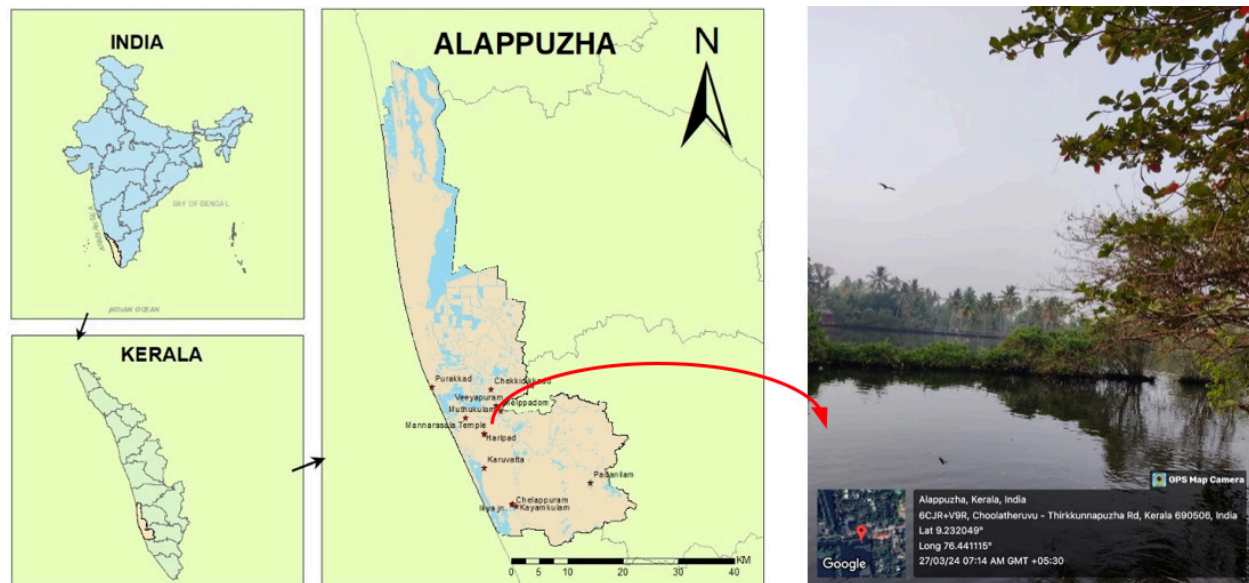


Image 2. Map depicting the study area.

According to the results of the survey, Mannarasala has higher *M. trijuga* population while Karthikapally has higher *L. punctata* population. The local people are unaware of the species' endangered status. *Melanochelys trijuga* was observed to be intensively utilized for medicinal and commercial purposes whereas *L. punctata* are hunted and traded for meat consumption. A good number of turtles (*M. trijuga*) are protected with the belief of sanctity in the temple pond of Mannarasala, Ambalappuzha of Alappuzha district. The illegal collection of turtle eggs for consumption and traditional medicine was observed to pose a threat to the survival of turtles, as it can significantly reduce reproductive success and contribute to a population decline. In some locations of Karthikapally, turtles were seen to be hunted for food and for traditional medicines.

Morphometrics

The shell height of males varied from 11.0–13.5 cm (mean 11.8 ± 1.1 cm) and that of females varied from 13.0–17.0 cm (mean 14.8 ± 1.4 cm). The mean length of males and females were 17.8 cm and 22.0 cm, respectively. It was observed that the mean length of females were 1.2 times greater than the males. The weight of male turtles varied 0.42–0.78 kg with a mean value of 0.56 ± 0.16 kg and that of females varied from 0.7 kg to 1.53 kg with a mean value of 1.08 ± 0.31 kg. The mean weight of females were approximately two times greater than the males (Table 1). From the regression analysis, it was evident that all the correlation coefficients had positive values (Table 2), and when the size or length increases, the associated covariate,

i.e., weight also increases.

The correlation coefficient between straight carapace length (SCL) & curved carapace length (CCL) was 0.961. The F-value from ANOVA was 155.4 indicating that CCL increases with increase in SCL. The correlation coefficient between SCL & straight carapace width (SCW) was 0.96. The F-value of 150.98 showed that SCW increases with increase in SCL. The correlation coefficient between SCL & straight plastron length (SPL) was 0.938. The F-value of 95.63 showed that when SCL increases SPL also increases. The correlation coefficient between SCL & straight plastron width (SPW) was 0.951. The F-value from ANOVA of 124.201 showed that SCL increases with increase in SPW. The correlation coefficient was found significant in all the above cases. The correlation coefficient between CCL & curved carapace width (CCW) was 0.952. The F-value from ANOVA was 124.590. So, it showed CCW increases as CCL increases. The correlation coefficient was significant. Similarly, all the parameters are correlated and are significant because $p < 0.01$. The shell height of male *L. punctata* was 24.29% whereas that of females was 75.71%. The carapace lengths (SCL and CCL) of males and females were 24.8% and 75.20%, respectively. Carapace width (SCW and CCW) of the males was 25% and females was 75%, plastron length (SPL and CPL) of males was 23.5% and females was 76.5%. Plastron width (SPW and CPW) of males was 25.06% and females 74.94% and the body weight of males was 17.30% and females 82.7%. It was found that all the regression equations related to the morphometric analysis are correlated and their values are significant (Tables 2, 3, & 4).

Table 1. Measurements of adult male and female Flapshell Turtle *Lissemys punctata*.

Parameters	Males (n = 4)		Females (n = 10)	
	Range	Mean ± SD	Range	Mean ± SD
Straight Carapace Length SCL (cm)	14.5–17	16.25 ± 1.32	17.5–23	19.7 ± 2.05
Curved Carapace Length CCL (cm)	16.5–19	17.87 ± 1.31	19–26	22 ± 2.8
Straight Carapace Width SCW (cm)	11.5–15	13.25 ± 1.55	14–18.7	15.68 ± 1.5
Curved Carapace Width CCW (cm)	15.2–18.5	16.55 ± 1.51	17.5–22.5	19.85 ± 1.82
Straight Plastron Length SPL (cm)	13.5–16	14.5 ± 1.08	15.5–22.3	18.88 ± 2.22
Curved Plastron Length CPL (cm)	14.7–17	15.67 ± 0.96	17–23	19.9 ± 2.25
Straight Plastron Width SPW (cm)	12–13.5	12.62 ± 0.75	12.5–17.5	15.1 ± 1.79
Curved Plastron Width CPW (cm)	12.5–14	13.37 ± 0.75	13.5–19	16.05 ± 1.97
Head Length HL (cm)	8–15	12.37 ± 2.13	16–18	15.9 ± 1.1
Head Width HW (cm)	2–3.5	2.75 ± 0.64	2.3–4.5	3.63 ± 0.66
Head Circumference H.CIR (cm)	8–10	9.25 ± 0.95	8–14	11.5 ± 2.01
Body Circumference (cm)	29–31.5	29.5 ± 1.68	30.5–39.5	35.4 ± 3.53
Shell Height (cm)	11–13.5	11.87 ± 1.1	13–17	14.8 ± 1.47
Body Weight (kg)	0.42–0.78	0.56 ± 0.16	0.7–1.53	1.08 ± 0.31

Table 2. Relationship based on carapace data.

Parameters	Correlation coefficient	F	Regression (y = bx + a)
SCL – CCL	0.961*	155.4*	CCL = SCL*1.04 + 1.51
SCL – SCW	0.96*	150.98*	SCW = SCL* 0.774 + 0.46
SCL – SPL	0.938*	95.63*	SPL = SCL*0.886 + 1.535
SCL – SPW	0.951*	124.201*	SPW = SCL*0.673 + 1.811
CCL – CCW	0.952*	124.59*	CCW = CCL*0.797 + 2.209
CCL – CPL	0.954*	131.774*	CPL = CCL*0.87 + 0.540
CCL – CPW	0.957*	140.279*	CPW = CCL* 0.683 + 1.003
SCL – HL	0.76*	17.797*	HL = SCL*0.508 + 5.42
CCL – HL	0.709*	13.13*	HL = CCL*0.439 + 5.711

* denotes significance [$p < 0.01$]**Table 3. Relationship based on head data.**

Parameters	Correlation Coefficient	F	Regression Equation (y = bx + a)
HL – HW	0.553*	5.726*	HW = HL*0.174 + 0.779
HL – HC	0.729*	14.772*	HC = HL*0.66 + 0.987

* denotes significance [$p < 0.01$]**Table 4. Relationship based on body data.**

Parameters	Correlation Coefficient	F	Regression Equation (y = bx + a)
BH – BW	0.882*	41.851*	Log weight = Log height*2.648 – 0.086
BH – Circumference	0.94*	98.291*	Cicumference = BH*2.128 + 3.885

* denotes significance [$p < 0.01$]

Habitat Assessment

The average values of physicochemical parameters in Muthukulam Lake of Karthikapally area (Alappuzha district) are listed in Table 5. The water quality test yielded a pH value of 7.35. It demonstrated the lake's rather alkaline composition. This alkalinity may be caused by the local population's usage of detergents. These bodies of water might potentially become eutrophic. There would be a possibility of eutrophication in these water bodies. The dissolved oxygen (DO) was found to be 4.7 mg/L, showing anticipated microbial activities. Hardness of the water proclaimed the extremely high levels of calcium and magnesium in the lake. High levels of chloride (>

5,000 mg/L), fluoride (1.39 mg/L), and sulphate (348.67 mg/L) was detected in the water during the present study indicating high levels of freshwater pollution. The high values on electrical conductivity showed maximum ionic concentration of the lake. Low values of iron were detected (0.39 mg/L) and nitrate (4.75 mg/L) showed a moderate value. The high amount of total dissolved solids (TDS) (> 10,000 mg/L) indicated the concentration of dissolved ions in water. The presence of harmful organisms was demonstrated by the massive amounts of *Escherichia coli* and total coliforms in lake water.

Table 5. Water quality parameters of the studied lakes (Muthukulam, Karthikapally).

Chemical Parameters				
	Characteristics	Unit	Maximum acceptable limits (Freshwater)	Result
1	Turbidity	NTU	70	6.5
2	pH at 25°C		6.0 – 9.0	7.35
3	Total dissolved solids	mg/L	1000	>10000
4	Total Hardness	mg/L	200 – 600	>5000
5	Calcium	mg/L	75	561
6	Magnesium	mg/L	150	923
7	Chloride	mg/L	250	>5000
8	Electrical conductivity	micro mhos/cm	2000	39160
9	Sulphate	mg/L	250	348.67
10	Fluoride	mg/L	1.5	1.39
11	Iron	mg/L	1	0.39
12	Nitrate	mg/L	10	4.75
13	Dissolved Oxygen	mg/L	4.5 – 10.3	4.7
Biological Parameters				
14	Total coliforms		Shall not be detected/100 ml	Present
15	E. Coli/100 ml		Shall not be detected/100 ml	Present

DISCUSSION

The present preliminary study provides the first step in understanding the morphometric characteristics and habitat conditions of the Indian flap-shelled turtle, *L. punctata*, in the Muthukulam (Alappuzha) Kerala, India. The results of the present study showed maximum CCL and CW by the males and females of *L. punctata*, was in accordance with published findings (Yadava & Prasad 1982; Bhupathy & Vijayan 1991). The length of head, forelimbs, hindlimbs, and body circumference of males and females revealed in the present investigation agreed with literature (Auffenberg 1981; Agarwal 1987; Shrestha 1997). The juvenile turtle noted by us, had dark striped pattern which tend to reduce with growth (Smith 1931; Das 1995).

The present study found that the female turtles were twice as large in carapace length, carapace width, plastron length, plastron width, and body weight compared to males, consistent with literature (Moll 1984; Bhupathy & Choudhury 1995). The higher body size and weight of females are likely adaptations to accommodate the energy requirements for egg production and brooding, which is an essential reproductive strategy in turtles (Gibbons 1990; Janzen & Paukstis 1991). Our preliminary regression analysis yielded a positive correlation of shell dimensions, which agrees with the literature (Ling & Palaniappan 2011; Hossain et al. 2013; Talukdar et al. 2021). These significant

associations indicate that the growth and development of different body parts in *L. punctata* are closely linked, and the measurement of one parameter can be used to reliably predict the value of another (Kuchling & Kuchling 1999; Zuffi et al. 1999). The data represented here has a rather higher number of variables than turtle sample size, which may generate chances for overfitting issue ($p > N$). The randomness of chances might produce pseudo correlations. Future attempts of improving the current preliminary study must aim to overcome these caveats, as postulated here.

The unsuitable water quality values revealed by us in the Muthukulam (Kayamkulam) lake, with high levels of dissolved solids, hardness, chloride, fluoride, sulfate, *E. coli*, and total coliforms, mirror previous studies on freshwater bodies in Kerala (Das & Jain 2017; Kumar et al. 2015). The alkaline pH, low dissolved oxygen, and high electrical conductivity of the lake water indicate eutrophication, which is a common issue in many water bodies due to human activities, like the detergents use and agricultural runoff (Sharpley et al. 1994; Carpenter et al. 1998; Smith 1998). The high levels of nitrates in the lake water also suggest the presence of organic pollutants, which can have detrimental effects on the aquatic flora and fauna, including the *L. punctata* population (Camargo et al. 2005; Camargo & Alonso 2006). The implications of the poor water quality in the *L. punctata* habitat are significant, as turtles are known to be sensitive to environmental changes and pollution (Davenport & Wrench 1990; van Dijk et al. 2014; Benn et al. 2021). Krishnakumar et al. (2009) studied the distribution, habitat preferences, and conservation status of *L. punctata* in Kerala and reported that the species is widely distributed across the state, but its populations are threatened by habitat degradation, pollution, and illegal harvesting.

In a global context, the challenges faced by freshwater turtles, including *L. punctata*, are not limited to India and its neighboring regions. A review by Buhlmann et al. (2009) on the conservation status of freshwater turtles worldwide revealed that more than 50% of these species are threatened with extinction, primarily due to habitat loss, pollution, and overexploitation. To secure the long-term survival of these endangered species, the authors emphasized the necessity of all-encompassing conservation initiatives that include habitat restoration, pollution prevention, and sustainable resource management. To sum up, this work offers important new information about the morphometric traits and environmental circumstances of the Flap-shelled Turtle of southern Kerala. Future studies and conservation plans targeting *L. punctata* and other freshwater turtle species in the area can be built upon the data and analysis provided here.

REFERENCES

- Agarwal A.K. (1987). Observations on the sexual dimorphism in Indian freshwater tortoise *Lissemys punctata punctata*. *Geobios* 14(6): 277–280.
- Auffenberg, W. (1981). Behaviour of *Lissemys punctata* (Reptilia, Testudinata, Trionychidae) in a drying lake in Rajasthan, India. *Journal of the Bombay Natural History Society. Bombay* 78(3): 487–493.
- Baruah, C., P. Devi & D.K. Sharma (2016). Comparative morphometry and biogeography of the freshwater turtles of genus Pangshura (Testudines: Geoemydidae: Pangshura). *International Journal of Pure and Applied Zoology* 4(1): 107–123.
- Benn, D.K., S. Nanlall, A. Jines & A. Eitzinger (2021). Assessing climate change impact on Guyana's crops using integrated crop and spatial modeling approaches. Cali (Colombia): Alliance of Bioversity International and CIAT, 46 pp.
- Bhupathy S. & V.S. Vijayan (1991). The freshwater turtle fauna of Eastern Rajasthan. *Journal of the Bombay Natural History Society* 88: 118–122.
- Bhupathy, S. & B.C. Choudhury (1995). Status, distribution and conservation of the Travancore Tortoise, *Indotestudo forstenii* in Western Ghats. *Journal of the Bombay Natural History Society* 92(1): 16–21.
- Bhupathy, S. & V.S. Vijayan (1989). Predation on the Indian Flapshell Turtle, *Lissemys punctata*. In *Proceedings National Symposium of Animal Behaviour* 27–33 pp.
- Buhlmann, K.A., T.S. Akre, J.B. Iverson, D. Karapatakis, R.A. Mittermeier, R.A. Georges & J.W. Gibbons (2009). A global analysis of tortoise and freshwater turtle distributions with identification of priority conservation areas. *Chelonian Conservation and Biology* 8(2): 116–149. <https://doi.org/10.2744/CCB-0774.1>
- Camargo, J.A. & Á. Alonso (2006). Ecological and toxicological effects of inorganic nitrogen pollution in aquatic ecosystems: a global assessment. *Environment International* 32(6): 831–849. <https://doi.org/10.1016/j.envint.2006.05.002>
- Camargo, J.A., A. Alonso & A. Salamanca (2005). Nitrate toxicity to aquatic animals: a review with new data for freshwater invertebrates. *Chemosphere* 58(9): 1255–1267. <https://doi.org/10.1016/j.chemosphere.2004.10.044>
- Carpenter, S.R., N.F. Caraco, D.L. Correll, R.W. Howarth, A.N. Sharpley & V.H. Smith (1998). Nonpoint pollution of surface waters with phosphorus and nitrogen. *Ecological Applications* 8(3): 559–568. <https://doi.org/10.1890/1051-0761>
- Das, B. & P.C. Jain (2017). Real-time water quality monitoring system using Internet of Things, pp. 78–82. In: *2017 International conference on computer, communications and electronics (Comptelix)*. IEEE. <https://doi.org/10.1109/COMPTELIX.2017.8003942>
- Das, I. (1995). *Turtles and Tortoise of India*. Oxford University Press, Bombay, 176 pp.
- Das, K.C. & A. Gupta (2011). Site records of softshell turtles (Chelonia: Trionychidae) from Barak Valley, Assam, northeastern India. *Journal of Threatened Taxa* 3(4): 1722–1726. <https://doi.org/10.11609/JoTT.o2487.1722-6>
- Davenport, J., J. Wrench, J. McEvoy & V. Camacho-Ibar (1990). Metal and PCB concentrations in the "Harlech" leatherback. *Marine Turtle Newsletter* 48: 1–6.
- Dijk, P.P., J.B. Iverson, A.G. Rhodin, B. Shaffer & R. Bour (2014). Turtles of the World, 7th Edition: Annotated Checklist of Taxonomy, Synonymy, Distribution with Maps, and Conservation Status. *Chelonian Research Monographs* 10: 1–575. <https://doi.org/10.3854/crm.8.checklist.atlas.v9.2021>
- Dutta, N., B.K. Thakur, M. Nurujaman, K. Debnath & D.P. Bal (2022). An assessment of the water quality index (WQI) of drinking water in the Eastern Himalayas of South Sikkim, India. *Groundwater for Sustainable Development* 17: 100735. <https://doi.org/10.1016/j.gsd.2022.100735>
- Gibbons, J.W. & J.E. Lovich (1990). On the slider turtle (*Trachemys scripta*). *Herpetological Monographs* 4: 1–29.
- Hossain, M.L., S.U. Sarker & N.J. Sarker (2013). Morphometry of Indian roofed turtle, *Pangshura tecta* (Gray 1831) in Bangladesh. *Bangladesh Journal of Zoology* 41: 207–215. <https://doi.org/10.3329/bjz.v4i12.23323>
- Janzen, F.J. & G.L. Paukstis (1991). Environmental sex determination in reptiles: ecology, evolution, and experimental design. *The Quarterly review of biology* 66(2): 149–179. <https://doi.org/10.1086/417143>
- Krishnakumar, K., R. Raghavan & B. Pereira (2009). Protected on paper, hunted in wetlands: exploitation and trade of freshwater turtles (*Melanochelys trijuga coronata* and *Lissemys punctata punctata*) in Punnamada, Kerala, India. *Tropical Conservation Science* 2(3): 363–373. <https://doi.org/10.1177/194008290900200306>
- Kuchling, G. & G. Kuchling (1999). Gonadal cycles and gamete production. *The Reproductive Biology of the Chelonia* 31–67. https://doi.org/10.1007/978-3-642-80414-4_3
- Kumar, P., R.K. Kaushal & A.K. Nigam (2015). Assessment and management of Ganga river water quality using multivariate statistical techniques in India. *Asian Journal of Water, Environment and Pollution* 12(4): 61–69. <https://doi.org/10.3233/AJW-150018>
- Ling, O.S. & P.M. Palaniappan (2011). Silent turtle dwellers: barnacles on resident green (*Chelonia mydas*) and hawksbill turtles (*Eretmochelys imbricata*) of Mabul and Sipadan Islands. *Borneo Science* 28: 66–72.
- Moll, D. & E.O. Moll (2004). *The ecology, exploitation and conservation of river turtles*. Oxford University Press, 393 pp.
- Moll, E.O. (1984). Freshwater turtles in India: Their status, conservation and management. *Hamdriyad* 9(3): 9–17.
- Rashid, S.M. & I.R. Swingland (1997). On the ecology of some freshwater turtles in Bangladesh. In *Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles—An International Conference*. New York Turtle and Tortoise Society, New York, NY (pp. 225–242).
- Rhodin, A.G.J., C.B. Stanford, P.P. Van Dijk, C. Eisemberg, L. Luiselli, R.A. Mittermeier, R. Hudson, B.D. Horne, E.V. Goode, G. Kuchling, A. Walde, E.H.W. Baard, K.H. Berry, A. Bertolero, T.E.G. Blanck, R. Bour, K.A. Buhlmann, L.J. Cayot, S. Collett, A. Currylow, I. Das, T. Diagne, J.R. Ennen, G. Forero-Medina, M.G. Frankel, U. Fritz, G. García, J.W. Gibbons, P.M. Gibbons, S. Gong, J. Guntoro, M.D. Hofmeyr, J.B. Iverson, A.R. Kiester, M. Lau, D.P. Lawson, J.E. Lovich, E.O. Moll, V.P. Páez, R. Palomo-Ramos, K. Platt, S.G. Platt, P.C.H. Pritchard, H.R. Quinn, S.C. Rahman, S.T. Randrianjafizanaka, J. Schaffer, W. Selman, H.B. Shaffer, D.S.K. Sharma, H. Shi, S. Singh, R. Spencer, K. Stannard, S. Sutcliffe, S. Thomson R.C. & Vogt (2018). Global conservation status of turtles and tortoises (Order Testudines). *Chelonian Conservation and Biology* 17(2): 135–161. <https://doi.org/10.2744/CCB-1348.1>
- Sharpley, A.N., S.C. Chapra, R. Wedepohl, J.T. Sims, T.C. Daniel & K.R. Reddy (1994). Managing agricultural phosphorus for protection of surface waters: Issues and options. *Journal of environmental quality* 23(3): 437–451. <https://doi.org/10.2134/jeq1994.00472425002300030006x>
- Shrestha, T.K. (1997). Status, Biology, Conservation and Management of Tortoises and Turtles in the Himalayan Foothills of Nepal. *Proc. Conservation, Restoration, and Management of Tortoises and Turtles*, Lunenburg, USA. pp. 278–286.
- Smith, M.A. (1931). The Fauna of British India, including Ceylon and Burma. *Reptilia and Amphibia*. Vol. I. Loricata, Testudines. – Taylor and Francis, London, xxviii + 185 pp.
- Smith, V.H. (1998). Cultural eutrophication of inland, estuarine, and coastal waters, pp. 7–49. In: Pace, M.L. & P.M. Groffman (ed.). *Successes, limitations, and Frontiers in Ecosystem Science*. Springer New York, NY, xviii + 499 pp. https://doi.org/10.1007/978-1-4612-1724-4_2
- Talukdar, A., A. Panda, A. Srivastav, S.A. Hussain, P.K. Malik & P. Nigam (2021). Growth patterns of critically endangered, head-started three-striped roofed turtle, *Batagur dhongoka* (Gray, 1834). *Biologia* 76(12): 3705–3710. <https://doi.org/10.1007/s11756-021-00858-y>
- Turtle Conservation Fund (2003). A Global Action Plan for Conservation of Tortoises and Freshwater Turtles. Strategy and Funding Prospectus 2002–2007. Conservation International and Chelonian Research Foundation, Washington, DC, 30 pp.
- Yadava, M.R. & B. Prasad (1982). Observations on the breeding biology of Indian tropical pond turtle, *Lissemys punctata granosa* (Schoepff). *Indian Journal of Zoology* 23(1): 51–56.
- Zuffi, M.A.L., F. Odetti & P. Meozzi (1999). Body size and clutch size in the European Pond Turtle (*Emys orbicularis*) from central Italy. *Journal of Zoology* 247(2): 139–143. <https://doi.org/10.1111/j.1469-7998.1999.tb00977.x>

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

Fishes

Dr. Topiltzin Contreras MacBeath, Universidad Autónoma del estado de Morelos, México
Dr. Heok Hee Ng, National University of Singapore, Science Drive, Singapore
Dr. Rajeev Raghavan, St. Albert's College, Kochi, Kerala, India
Dr. Robert D. Sluka, Chiltern Gateway Project, A Rocha UK, Southall, Middlesex, UK
Dr. E. Vivekanandan, Central Marine Fisheries Research Institute, Chennai, India
Dr. Davor Zanella, University of Zagreb, Zagreb, Croatia
Dr. A. Biju Kumar, University of Kerala, Thiruvananthapuram, Kerala, India
Dr. Akhilesh K.V., ICAR-Central Marine Fisheries Research Institute, Mumbai Research Centre, Mumbai, Maharashtra, India
Dr. J.A. Johnson, Wildlife Institute of India, Dehradun, Uttarakhand, India
Dr. R. Ravinesh, Gujarat Institute of Desert Ecology, Gujarat, India

Amphibians

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

Reptiles

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

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

NAAS rating (India) 5.64

Birds

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

Mammals

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

Other Disciplines

Dr. Aniruddha Belsare, Columbia MO 65203, USA (Veterinary)
Dr. Mandar S. Paingankar, University of Pune, Pune, Maharashtra, India (Molecular)
Dr. Jack Tordoff, Critical Ecosystem Partnership Fund, Arlington, USA (Communities)
Dr. Ulrike Streicher, University of Oregon, Eugene, USA (Veterinary)
Dr. Hari Balasubramanian, EcoAdvisors, Nova Scotia, Canada (Communities)
Dr. Rayanna Hellem Santos Bezerra, Universidade Federal de Sergipe, São Cristóvão, Brazil
Dr. Jamie R. Wood, Landcare Research, Canterbury, New Zealand
Dr. Wendy Collinson-Jonker, Endangered Wildlife Trust, Gauteng, South Africa
Dr. Rajeshkumar G. Jani, Anand Agricultural University, Anand, Gujarat, India
Dr. O.N. Tiwari, Senior Scientist, ICAR-Indian Agricultural Research Institute (IARI), New Delhi, India
Dr. L.D. Singla, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India
Dr. Rupika S. Rajakaruna, University of Peradeniya, Peradeniya, Sri Lanka
Dr. Bahar Baviskar, Wild-CER, Nagpur, Maharashtra 440013, India

Reviewers 2021–2023

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

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

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



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 2025 | Vol. 17 | No. 11 | Pages: 27787–28010

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

DOI: 10.11609/jott.2025.17.11.27787-28010

www.threatenedtaxa.org

Articles

Morpho-taxonomic studies on the genus *Fissidens* Hedw. (Bryophyta: Fissidentaceae) in Senapati District, Manipur, India

– Kholi Kaini & Kazhuhrii Eshuo, Pp. 27787–27796

Ecology and conservation concerns of *Indianthus virgatus* (Marantaceae): an endemic species of the Western Ghats–Sri Lanka Biodiversity Hotspot

– Shreekara Bhat Vishnu, Vivek Pandi, Bhathiya Gopallawa, Rajendiran Gayathri, B. Mahim, Deepthi Yakandawala & Annamalai Muthusamy, Pp. 27797–27805

An updated floral diversity of Tal Chhapar Wildlife Sanctuary, Rajasthan, India

– Sneha Singh & Orus Ilyas, Pp. 27806–27821

An updated checklist of the family Rosaceae in Arunachal Pradesh, India

– Pinaki Adhikary & P.R. Gajurel, Pp. 27822–27841

Restoring biodiversity: case studies from two sacred groves of Kozhikode District, Kerala, India

– K. Kishore Kumar, Pp. 27842–27853

A preliminary investigation on wing morphology, flight patterns, and flight heights of selected odonates

– Ananditha Pascal & Chelmala Srinivasulu, Pp. 27854–27862

Phylogenetic confirmation of generic allocation and specific distinction of Mawphlang Golden-cheeked Frog *Odorrana mawphlangensis* (Pillai & Chanda, 1977) (Amphibia: Anura: Ranidae) and its updated distribution records

– Angshuman Das Tariang, Mathipi Vabeiryureilai, Fanai Malsawmdawngliana & Hmar Tlawmte Lalremsanga, Pp. 27863–27873

Phenotypic and genotypic variability in the Snowtrout *Schizothorax richardsonii* (Cypriniformes: Cyprinidae) wild populations from central Himalayan tributaries of the Ganga River basin

– Yasmeen Kousar, Mahender Singh & Deepak Singh, Pp. 27874–27888

Avian composition and distribution in the bird sanctuary planning zone of Can Gio Mangrove Biosphere Reserve, Ho Chi Minh City, Vietnam

– Huynh Duc Hieu, Huynh Duc Hoan, Bui Nguyen The Kiet, Dang Ngoc Hiep, Nguyen Thi Phuong Linh & Nguyen Dang Hoang Vu, Pp. 27889–27896

Bat echolocation in South Asia

– Aditya Srinivasulu, Chelmala Srinivasulu, Bhargavi Srinivasulu, Deepa Senapathi & Manuela González-Suárez, Pp. 27897–27931

A checklist of the mammals of Jammu & Kashmir, India

– Muzaffar A. Kichloo, Ajaz Ansari, Khurshed Ahmad & Neeraj Sharma, Pp. 27932–27945

Communications

Notes on distribution, identification and typification of the Elongated Sweet Grass *Anthoxanthum hookeri* (Aveneae: Poaceae) with comparative notes on *A. borii*

– Manoj Chandran, Kuntal Saha, Ranjana Negi & Saurabh Guleri, Pp. 27946–27953

Conservation significance of Yelakundli Sacred Grove: a relic population of the endemic dipterocarp *Vateria indica* L.

– G. Ramachandra Rao, Pp. 27954–27959

A preliminary study of fish diversity in Sirum River of East Siang District, Arunachal Pradesh, India

– Obinam Tayeng, Leki Wangchu & Debangshu Narayan Das, Pp. 27960–27969

Preliminary investigation on morphometrics and habitat of the Indian Flapshell Turtle *Lissemys punctata* (Bonnaterre, 1789) (Reptilia: Trionychidae) in rural wetlands of Alappuzha, Kerala, India

– Sajan Sunny, Appiyathu Saraswathy Vijayasree, Nisha Thomas Panikkaveetil & E. Sherly Williams, Pp. 27970–27975

A preliminary assessment of avifaunal diversity in Parwati Arga Bird Sanctuary, Uttar Pradesh, India

– Yashmita-Ulman & Manoj Singh, Pp. 27976–27984

Sightings of the Rusty-spotted Cat *Prionailurus rubiginosus* (I. Geoffroy Saint-Hilaire, 1831) (Mammalia: Carnivora: Felidae) in Saurashtra Peninsula, Gujarat, India

– Raju Vyas, Pranav Vaghshiya & Devendra Chauhan, Pp. 27985–27991

Short Communications

Abundance and distribution of the Critically Endangered Giant Staghorn Fern *Platyserium grande* (A.Cunn. ex Hook.) J.Sm. in Maguindanao del Sur, BARMM, Philippines

– Marylene M. Demapitan, Roxane B. Sombero, Datu Muhaymin C. Abo, Nof A. Balabagan & Cherie Cano-Mangaoang, Pp. 27992–27996

***Bonnaya gracilis* a novel find for the flora of Uttarakhand, India**

– Monal R. Jadhav, Revan Y. Chaudhari & Tanveer A. Khan, Pp. 27997–28000

Notes

Crab eating crab: first record of the Horn-eyed Ghost Crab *Ocypode brevicornis* preying on the Mottled Light-footed Crab *Grapsus albolineatus* in Visakhapatnam, India

– Harish Prakash, M.K. Abhisree & Rohan Kumar, Pp. 28001–28003

First record of Greater Scaup *Aythya marila* in Farakka IBA near West Bengal & Jharkhand border, India

– Subhro Paul, Sudip Ghosh & J. Jiju Jaesper, Pp. 28004–28006

Filling the gap: first regional record of the Little Owl *Athene noctua ludlowi* (Strigiformes: Strigidae) from Uttarakhand, India

– Anuj Joshi, Dhanesh Ponnuru, Vineet K. Dubey & Sambandam Sathyakumar, Pp. 28007–28010

Publisher & Host



Threatened Taxa