

10.11609/jott.2026.18.2.28262-28454
www.threatenedtaxa.org

26 February 2026 (Online & Print)
18(2): 28262-28454
ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

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

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

Host
Zoo Outreach Organization
www.zooreach.org

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

EDITORS

Founder & Chief Editor
Dr. Sanjay Molur
Wildlife Information Liaison Development (WILD) Society & Zoo Outreach Organization (ZOO), Coimbatore, Tamil Nadu 641006, India

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

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

Associate Editors
Dr. Mandar Paingankar, Government Science College Gadchiroli, Maharashtra 442605, India
Dr. Ulrike Streicher, Wildlife Veterinarian, Eugene, Oregon, USA
Ms. Priyanka Iyer, ZOO/WILD, Coimbatore, Tamil Nadu 641006, India

Board of Editors
Dr. Russel Mittermeier
Executive Vice Chair, Conservation International, Arlington, Virginia 22202, USA

Prof. Mewa Singh Ph.D., FASc, FNA, FNASc, FNAPsy
Ramanna Fellow and Life-Long Distinguished Professor, Biopsychology Laboratory, and Institute of Excellence, University of Mysore, Mysuru, Karnataka 570006, India; Honorary Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore; and Adjunct Professor, National Institute of Advanced Studies, Bangalore

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

Dr. Fred Pluthero
Toronto, Canada

Dr. Priya Davidar
Sigur Nature Trust, Chadapatti, Mavinhalla PO, Nilgiris, Tamil Nadu 643223, India

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

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

Dr. Rajeev Raghavan
Professor of Taxonomy, Kerala University of Fisheries & Ocean Studies, Kochi, Kerala, India

English Editors
Mrs. Mira Bhojwani, Pune, India
Dr. Fred Pluthero, Toronto, Canada

Copy Editors
Ms. Usha Madgunaki, Zooreach, Coimbatore, India
Ms. Trisa Bhattacharjee, Zooreach. Coimbatore, India
Ms. Paloma Noronha, Daman & Diu, India

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

Typesetting
Mrs. Radhika, Zooreach, Coimbatore, India
Mrs. Geetha, Zooreach, Coimbatore India

Fundraising/Communications
Mrs. Payal B. Molur, Coimbatore, India

Subject Editors 2021–2023

Fungi

Dr. B. Shivaraju, Bengaluru, Karnataka, India
Dr. R.K. Verma, Tropical Forest Research Institute, Jabalpur, India
Dr. Vatsavaya S. Raju, Kakatiay University, Warangal, Andhra Pradesh, India
Dr. M. Krishnappa, Jnana Sahyadri, Kuvempu University, Shimoga, Karnataka, India
Dr. K.R. Sridhar, Mangalore University, Mangalagangotri, Mangalore, Karnataka, India
Dr. Gunjan Biswas, Vidyasagar University, Midnapore, West Bengal, India
Dr. Kiran Ramchandra Ranadive, 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 Ontaro 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. Karthigeyan, Botanical Survey of India, India
Dr. Errol Vela, University of Montpellier, Montpellier, France
Dr. P. Lakshminarasimhan, Botanical Survey of India, Howrah, India
Dr. Larry R. Noblick, Montgomery Botanical Center, Miami, USA
Dr. K. Haridasan, Pallavur, Palakkad District, Kerala, India
Dr. Analinda Manila-Fajard, University of the Philippines Los Banos, Laguna, Philippines
Dr. P.A. Sinu, Central University of Kerala, Kasaragod, Kerala, India
Dr. Afroz Alam, Banasthali Vidyapith (accredited A grade by NAAC), Rajasthan, India
Dr. K.P. Rajesh, Zamorin's Guruvayurappan College, GA College PO, Kozhikode, Kerala, India
Dr. David E. Boufford, Harvard University Herbaria, Cambridge, MA 02138-2020, USA
Dr. Ritesh Kumar Choudhary, Agharkar Research Institute, Pune, Maharashtra, India
Dr. A.G. Pandurangan, Thiruvananthapuram, Kerala, India
Dr. Navendu Page, Wildlife Institute of India, Chandrabani, Dehradun, Uttarakhand, India
Dr. Kannan C.S. Warrier, Institute of Forest Genetics and Tree Breeding, Tamil Nadu, India

Invertebrates

Dr. R.K. Avasthi, Rohtak University, Haryana, India
Dr. D.B. Bastawade, Maharashtra, India
Dr. Partha Pratim Bhattacharjee, Tripura University, Suryamaninagar, India
Dr. Kailash Chandra, Zoological Survey of India, Jabalpur, Madhya Pradesh, India
Dr. Ansie Dippenaar-Schoeman, University of Pretoria, Queenswood, South Africa
Dr. Rory Dow, National Museum of natural History Naturalis, The Netherlands
Dr. Brian Fisher, California Academy of Sciences, USA
Dr. Richard Gallon, 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: Digital illustration of *Impatiens chamchumroonii* in Krita by Dupati Poojitha.

Journal of Threatened Taxa | www.threatenedtaxa.org | 26 February 2026 | 18(2): 28263–28274

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

https://doi.org/10.11609/jott.10030.18.2.28263-28274

#10030 | Received 01 July 2025 | Final received 12 December 2025 | Finally accepted 28 January 2026

OPEN ACCESS

ARTICLE

Floristic composition and conservation significance of vascular plants in Kalatop-Khajjiar Wildlife Sanctuary, Himachal Pradesh, India

Sumit [1], Gulshan Kumar [2], Sumit Singh [3], Kanwaljeet Singh [4], Taslima Sheikh [5], P. Vishal Ahuja [6] & Arvind Kumar [7]

[1] Department of Botany, Govt. College Chamba, Himachal Pradesh 176314, India.
[2] Department of Botany, Career Point University, Hamirpur, Himachal Pradesh 176041, India.
[3] CSIR–Northeast Institute of Science and Technology, Jorhat, Assam 785006, India.
[4] Department of Education in Science and Mathematics, Regional Institute of Education, NCERT, Mysuru, Karnataka 570006, India.
[5] Citizen Science Expert, Inspire Foundation Trust, Baraura Hussain, Bari Balaganj, Lucknow, Uttar Pradesh 226003, India.
[6] Zoo Outreach Organisation, 3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India.
[7] Department of Botany, G.G.M Science College, Canal Road, Jammu 180001, India.
[1] suminirankari@gmail.com, [2] sharmagulshan1980@gmail.com, [3] ssumitthakur14@gmail.com (corresponding author),
[4] botanistkanwal64@gmail.com, [5] sheikhtass@gmail.com (corresponding author), [6] vishal@zooreach.org, [7] arvindkumarbotany@gmail.com

Abstract: Kalatop–Khajjiar Wildlife Sanctuary represents one of the ecologically significant forested landscapes of the northwestern Himalaya; however, updated and systematic documentation of its vascular flora has remained limited. In view of increasing anthropogenic pressures and climate variability, a comprehensive floristic survey was undertaken during 2023–2025 to assess the plant diversity and conservation status of the sanctuary. A total of 141 plant species representing 112 genera and 53 families were recorded. Out of these, 136 species belonged to angiosperms and five species to gymnosperms. Among dicotyledons, Asteraceae was the most dominant family, with 24 species. Among the monocotyledons, Orchidaceae was the most dominant family, with five species. The study area is dominated by native species, and only 9.93% of species were alien. The sanctuary hosts ten endangered plant species, including *Taxus contorta* and *Lilium polyphyllum*. The findings highlight the sanctuary as a reservoir of native and threatened plant diversity in the western Himalaya. The recorded baseline data serve as critical resources for biodiversity assessment, habitat management, and conservation strategy development. It is imperative to reinforce protective measures and support long-term ecological monitoring to safeguard this fragile ecosystem against emerging environmental challenges.

Keywords: Altitude gradient, angiosperms, conservation, endangered, endemism, flora, Himalayan plants, native, protected areas, threatened.

कलाटोप-खज्जियार वाइल्डलाइफ सैंक्चुअरी, उत्तर-पश्चिमी हिमालय रा इक बड़ा खास जंगली इलाका है; हालाँकि, इसदी संवहनी बूटियां री नोइ कने व्यवस्थित जानकारी घट है। बददे इंसानी दबाव कने बदलदे मौसमी हालातां जो दिखदे हुए,2023 का लेई करी 2025 तिक इक बड़ा बड्डा पौध्यां रा सर्वे कीता गया ताकि सैंक्चुअरी रे पौध्यां कने तिना रे संरक्षण रे बारे पता लगी सके। इस अंदर कुल 141 पौध्यां री प्रजातियां, जे कि 112 जेनेरा ते 53 फैमिली कने संबंधित थीयां, दर्ज कीती गईयां। इनां बिच 136 प्रजातियां एंजियोस्पर्म ते पंज प्रजातियां जिम्नोस्पर्म री थीयां। डाइकोटाइलडॉन अंदर, एस्टेरेसी प्रमुख फैमली थी, जिस अंदर 24 प्रजातियां थीयां । मोनोकोटाइलडॉन अंदर, ऑर्किडेसी प्रमुख फैमली थी, जिस अंदर पंज प्रजातियां दर्ज कीतियां गईयां। इस इलाके अंदर देसी प्रजातियां ज़्यादा हिन, कने सिर्फ़ 9.93% प्रजातियां बाहरे री थीयां। सैंक्चुअरी अंदर टैक्सस कॉन्टोर्टा कने लिलियम पॉलीफ़िलम समेत दस प्रजातियां संकटग्रस्त पाई गईयां। इनां नतीजेयां का पता लगदा कि ए सैंक्चुअरी पश्चिमी हिमालय अंदर देसी कने संकटग्रस्त पौध्यां रा खासमखास भंडार है। ए सर्वे इक जरूरी ते खास जानकारी दिन्दा, जिस कने आने वाले कल अंदर जैव विविधता रे मूल्यांकन कने आवास प्रबंधन ते सुरक्षा नीतियां बनाने अंदर मदद होई सकदी। इस नाज़ुक पारिस्थितिकी तंत्र जो पर्यावरण चुनौतियां का बचाणे तायीं, बचाव के उपा जो मज़बूत करणा कने लंबे समय तायीं पारिस्थितिक निगरानी जो बढ़ावा देणा बड़ा ज़रूरी है।

Editor: Afroz Alam, Banasthali Vidyapith, Rajasthan, India.

Date of publication: 26 February 2026 (online & print)

Citation: Sumit, G. Kumar, S. Singh, K. Singh, T. Sheikh, P.V. Ahuja & A. Kumar (2026). Floristic composition and conservation significance of vascular plants in Kalatop-Khajjiar Wildlife Sanctuary, Himachal Pradesh, India. *Journal of Threatened Taxa* 18(2): 28263–28274. https://doi.org/10.11609/jott.10030.18.2.28263-28274

Copyright: © Sumit et al. 2026. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use, reproduction, and distribution of this article in any medium by providing adequate credit to the author(s) and the source of publication.

Funding: This research received no external funding.

Competing interests: The authors declare no competing interests.

Author details, Author contributions & **Acknowledgements:** See end of this article.

INTRODUCTION

A thorough knowledge of the floristic composition of a plant community is essential for understanding the overall structure and function of an ecosystem (Gairola et al. 2010). Even in the present day, floristic research holds significant value, especially in geographic regions with limited knowledge of their flora, within protected areas, and in biodiversity hotspots (Wagensommer 2023). Such studies also help us in understanding the changes that take place in forest plant communities (Lalithalakshmi et al. 2024). Moreover, such data are essential for formulating effective conservation strategies (Wani et al. 2023; Sherafu et al. 2024).

The Indian Himalayan Region (IHR) is one of the most ecologically significant and biologically rich areas in the world. It is globally recognized as a major biodiversity hotspot due to its extraordinary range of climatic conditions and diverse altitude gradients that span from subtropical foothills to alpine and glacial zones (Palni & Rawal 2010; Haq et al. 2023). Covering roughly 18% of India, the Indian Himalayan Region (IHR) stretches over 2,800 km and varies in width from 220–300 km, with its altitudes ranging 200–8,000 m, harbours nearly 8,000 species of flowering plants, about 40% of which are endemic (Samant 2021).

Himachal Pradesh holds a prominent position among the Indian states comprising the IHR, due to its expansive forest cover, rich flora, and diverse habitats. Notably, the Chamba District, which lies in the northwestern part of Himachal Pradesh, is characterized by its rugged terrain, high mountains, and deep valleys. The Chamba District is home to five designated Wildlife Sanctuaries: Gamgul Siyabehi, Kalatop-Khajjiar, Kugti, Sech Tuan Nala, and Tundah (Kumar et al. 2018). Despite their ecological significance, these protected areas remain largely underexplored or, in some cases, completely unexplored in terms of their biodiversity and ecological potential. The Kalatop-Khajjiar Wildlife Sanctuary (KKWS) is the smallest sanctuary in the district and is an ecologically sensitive zone known for its scenic beauty and rich plant biodiversity. Khajjiar, 'Mini Switzerland' is a popular tourist destination that welcomes thousands of tourists annually (Verma & Kapoor 2011). This influx of vehicles on a daily basis leads to environmental pollution, posing a growing threat to the sanctuary's diverse flora due to both ecological and human-induced factors. Besides, a variety of abiotic and biotic factors, including pollution, deforestation, over-exploitation of forest resources, habitat destruction or fragmentation, and invasive species, significantly influence the ongoing transformation of ecosystems (Haq et al. 2023). Consequently, it is essential to periodically update the floristic inventory to achieve a thorough understanding of species interactions within their environment and among themselves. Furthermore, these serve as important indicators of shifts in floristic composition, recent invasions, and the current status of endemic and threatened taxa in a given phytogeographical area (Ravi et al. 2016). Keeping this in view, the current study was conducted to investigate the floral diversity of KKWS. Information pertaining to the floristic diversity of KKWS is scanty. Verma & Kapoor (2011) studied the floristic composition of the Sanctuary. In continuation, the present communication describes and analyses the floristic composition and life forms of KKWS.

MATERIALS AND METHODS

Study area

The KKWS was founded in 1958. It currently spreads over an area of 17.17 km^2 (Kumar et al. 2014). The altitude ranges 1,850–2,750 m (Kumar et al. 2018). The sanctuary is divided into two blocks – Khajjiar and Lakkarmandi, and six beats – Khajjiar, Khajroth, Talai, Lakkarmandi, Kalatop, and Dainkund (Kumar 2020). The area can be categorized into three ecosystems: dense forests of mixed fir, spruce and deodar with oak and rhododendron, a lake meadow-Khajjiar, surrounded on all sides by deodar trees, and a small portion of alpine pasture at the Dainkund area. Precipitation is in the form of rain and snow. The temperature ranges from sub-zero in winters to 32 °C in summers. The sanctuary represents the flora of sub temperate to alpine climate (Verma & Kapoor 2011).

Data collection

Extensive field surveys were conducted from 2023–2025 across various growing seasons to collect plant samples and to record data from various geographic locations of the study area. For each species, GPS coordinates (latitude, longitude, and altitude), as well as field data on plant habit, floral morphology, and phenology, along with other data such as date, location, voucher number, information about the flower colour and other features that are lost during pressing, were recorded in the field book. Plants that are uncommon or threatened were thoroughly examined, and data were documented. Digital photos of the collected vouchers were taken to record the presence of specific species in the specified regions. Voucher specimens were processed according to the methodologies outlined by Jain & Rao (1977) in their Herbarium Techniques, which involve pressing, drying,

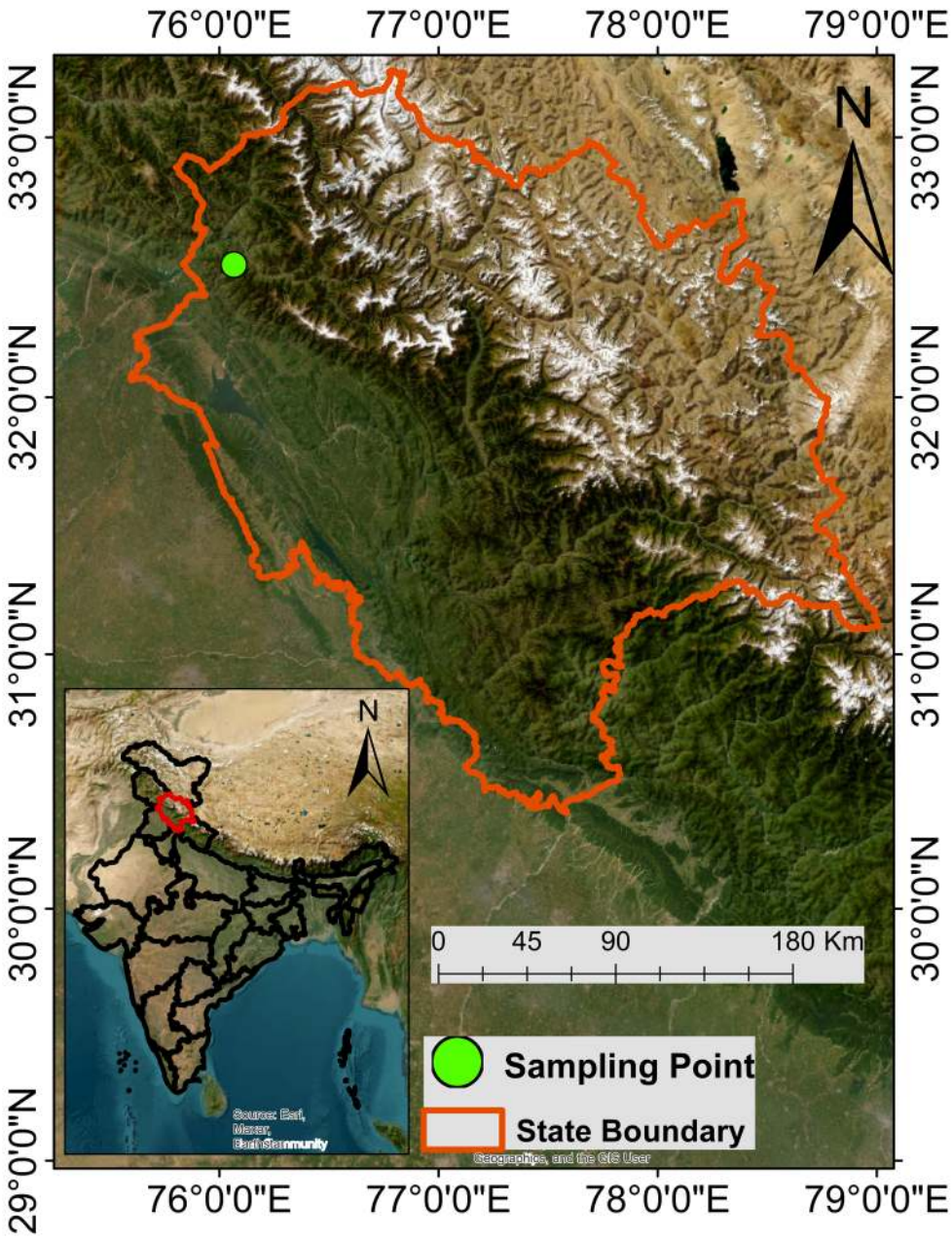


Figure 1. Map of the study area.

applying 1% mercuric chloride solution for preservation, mounting on standard-sized herbarium sheets of 28 x 42 cm, and subsequently stitching and labelling them. The identification of plant species was carried out using local and regional floras, including authoritative references such as Collett (1902); Chowdhery & Wadhwa (1984); Polunin & Stainton (1984); Stainton (1988); Aswal & Mehrotra (1994); Dhaliwal & Sharma (1999); Singh & Sharma (2006), scientific articles and herbarium of Career Point University Hamirpur. The collected plant specimens were deposited at the Herbarium of Career Point University, Hamirpur. Voucher specimens marked with an asterisk (*) were previously collected and deposited as a part of an earlier ethnomedicinal study in the same area (Sumit et al. 2025). These voucher specimens were included in the current research, and additional information for these species was collected during this investigation. Plant species identified for the first time in the present study were collected, processed, authenticated and assigned new accession numbers.

RESULTS AND DISCUSSION

In the present study, a total of 141 plant species representing 112 genera and 53 families were documented (Table 1 & 3). This constitutes approximately 14.02% of the total flora of the Chamba District and about 4.33% of the overall flora of Himachal Pradesh. Native species dominated (90.07%); only 9.93% of species were found to be alien. Out of these, 136 species were angiosperms (115 species of dicotyledons and 21 species of monocotyledons), and five species were gymnosperms. Among the dicotyledons, Asteraceae was the most dominant family (24 species) followed by Lamiaceae (9 species), Rosaceae (8 species), Caryophyllaceae (6 species), Fabaceae (5 species), Polygonaceae (5 species), Apiaceae (4 species), Balsaminaceae (4 species), Berberidaceae (3 species), Primulaceae (3 species), Onagraceae (3 species), Acanthaceae (3 species). Amaranthaceae, Brassicaceae, Crassulaceae, Caprifoliaceae, Scrophulariaceae, Geraniaceae, Hydrangiaceae, Mazaceae, Urticaceae and Adoxaceae were represented by two species each. Rest of the dicot families, Apocynaceae, Aquifoliaceae, Campanulaceae, Cornaceae, Ericaceae, Euphorbiaceae, Fagaceae, Haloragaceae, Moraceae, Orobanchaceae, Phyllanthaceae, Plantaginaceae, Ranunculaceae, Rubiaceae, Sapindaceae, Saxifragaceae, Ulmaceae, and Vitaceae were represented by one species each. Among the monocotyledons, Orchidaceae was the most dominant family (5 species), followed by Zingiberaceae (3 species), Poaceae (2 species), Juncaceae (2 species), Asparagaceae (2 species), and Smilacaceae (2 species). Families Acoraceae, Araceae, Commelinaceae, Dioscoreaceae, Liliaceae, were represented by one species only. Pinaceae was found to be the most represented family with four species and Taxaceae was represented by one species only.

The overall diversity includes 101 herbs, 17 shrubs, two climbing shrubs, 12 trees, four climbers, and five orchids (Figure 2). *Chaerophyllum reflexum*, *Selinum vaginatum*, *Polygonatum verticillatum* (Image 2I), *Artemisia absinthium*, *Berberis lycium* (Image 2J), *Podophyllum hexandrum* (Image 1D), *Valeriana jatamansi*, *Dioscorea deltoidea* (Image 1C), *Rhododendron arboreum, Malaxis muscifera* (Image 1A), *Pyrus pashia*, *Rosa macrophylla* (Image 2H), *Ulmus wallichiana*, *Urtica dioica*, *Cautleya spicata* (Image 2K), *Hedychium spicatum* (Image 2L), *Roscoea alpina* (Image 1G), *Cedrus deodara and Taxus contorta* (Image 1 F). Some exotic medicinal plants include *Acorus calamus*, *Vincetoxicum hirundinaria* and *Digitalis purpurea* (Image 1B). Some species were edible: leaves of

Table 1. Number of families, genera, and species reported from the study area.

Groups	Families total (% of the total)	Genera total (% of the total)	Species total (% of the total)
Angiosperms (i) Dicotyledons	40 (75.47)	89 (79.46)	115 (81.56)
(ii) Monocotyledons	11 (20.76)	18 (16.07)	21 (14.89)
Gymnosperms	02 (3.77)	05 (4.47)	05 (3.55)
Total	53 (100)	112 (100)	141 (100)

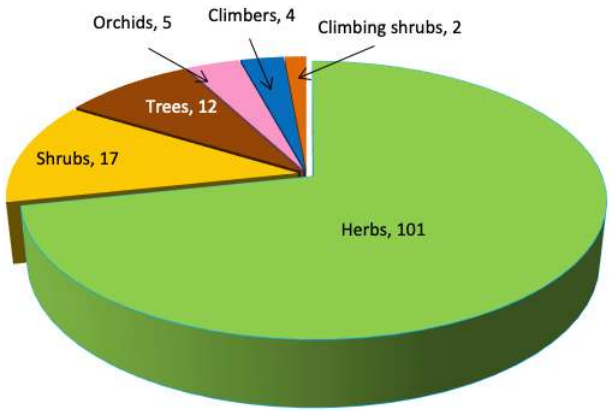


Figure 2. Floristic composition of Kalatop-Khajjiar Wildlife Sanctuary (depicts the total floristic diversity (native as well as exotic).

Stellaria media, *Rumex nepalensis*, *Nasturtium officinale*, *Pilea scripta*, and *Urtica dioica* are cooked as vegetables, flowers of *Rhododendron arboretum* and *Berberis napaulensis* (Image 2M) are used to make chutney, Ripe fruits of *Berberis lycium*, *Berberis napaulensis*, *Pyrus pashia,* and *Rubus macilentus* are edible. Leaves of *Quercus leucotrichophora*, *Ficus hederacea*, *Polygonum plebeium*, *Rumex nepalensis,* and *Cornus macrophylla* are used as fodder.

CONSERVATION STATUS

One-hundred-and-three of 114 species recorded from the study area are not assessed and 31 species as 'Least Concern' (LC) according to the IUCN Red List. Ten species from the study area were found to be threatened based on different assessment authorities. At the global level, as per IUCN Red List of Threatened Species, *Podophyllum hexandrum* and *Taxus contorta* are categorized as 'Endangered' (EN), while *Malaxis muscifera* and *Ulmus wallichiana* are listed as 'Vulnerable' (VU). *Lilium polyphyllum* is categorized as 'Critically Endangered' (CR) under the IUCN Red List.

Table 2. List of vascular flora of Kalatop-Khajjiar Wildlife Sanctuary, Chamba, Himachal Pradesh, India.

Family	Taxa	Voucher no.	Life form	Habitat	Flowering/fruiting	Altitude (m)	Latitude N	Longitude E	IUCN Red List status	Nativity
Acoraceae	*Acorus calamus* L.	CPUH14232*	Herb	Marshy area	June–September	1961	32.546°	76.058°	–	Alien
Acanthaceae	*Dicliptera bupleuroides* Nees	CPUH14215	Herb	Road side	November–June	1993	32.549°	76.059°	LC	Native
	Strobilanthes attenuata (Wall. ex Nees) Jacq. ex Nees	CPUH14135	Shrub	Forest margin, Road side	June–October	2374	32.549°	76.018°	NA	Native
	Strobilanthes penstemonoides (Nees) T.Anderson	CPUH14171	Shrub	Forest trail	July–October	2029	32.539°	76.053°	NA	Native
Adoxaceae	*Viburnum grandiflorum* Wall. ex DC.	CPUH14045	Shrub	Road side	March–June	2442	32.529°	76.033°	NA	Native
	Viburnum mullaha Buch.-Ham. ex D.Don	CPUH14100	Shrub	Forest area	May–October	2283	32.534°	76.044°	LC	Native
Amaranthaceae	*Cyathula capitata* Moq.	CPUH14133	Herb	Forest trail	July–October	2425	32.547°	76.019°	NA	Native
	Cyathula tomentosa (Schult.) Moq.	CPUH14177*	Herb	Forest margin	August–October	2198	32.535°	76.048°	NA	Native
Apiaceae	*Bupleurum longicaule* Wall. ex DC.	CPUH14137	Herb	Alpine slopes	June–September	2690	32.525°	76.026°	NA	Native
	Chaerophyllum reflexum Lindl.	CPUH14097*	Herb	Forest margin	May–September	2104	32.534°	76.054°	NA	Native
	Sanicula elata Buch.-Ham. ex D.Don	CPUH14075	Herb	Forest trail	June–October	2023	32.539°	76.054°	NA	Native
	Selinum vaginatum (Edgew.) C.B.Clarke	CPUH14200	Herb	Alpine slopes	July–October	2662	32.525°	76.025°	VU (CAMP 2010)	Native
Apocynaceae	*Vincetoxicum hirundinaria* Medik.	CPUH14118*	Herb	Open meadow	April–August	2452	32.534°	76.044°	–	Alien
Aquifoliaceae	*Ilex dipyrena* Wall.	CPUH14223	Tree	Forest area	April–September	2080	32.534°	76.051°	LC	Native
Araceae	*Arisaema propinquum* Schott	CPUH14068	Herb	Forest margin	June–September	2372	32.529°	76.042°	NA	Native
Asparagaceae	*Polygonatum govanianum* Royle	CPUH14040	Herb	Road side	May–August	2057	32.538°	76.054°	NA	Native
	Polygonatum verticillatum (L.) All.	CPUH14041*	Herb	Forest margin	May–August	2029	32.539°	76.053°	EN (CAMP 2010)	Native
Asteraceae	*Anaphalis triplinervis* (Sims) C.B.Clarke	CPUH14178*	Herb	Forest margin	July–October	2365	32.529°	76.033°	NA	Native
	Anaphalis busua (Buch.-Ham.) DC.	CPUH14207	Herb	Mountain slopes	August–October	2730	32.522°	76.030°	NA	Native
	Anaphalis nepalensis (Spreng.) Hand.-Mazz.	CPUH14210	Herb	Mountain slopes	July–September	2690	32.524°	76.027°	NA	Native
	Artemisia absinthium L.	CPUH14099*	Herb	Road side	July–September	2265	32.534°	76.046°	LC	Native
	Bidens pilosa L.	CPUH14191*	Herb	Road side	July–October	1950	32.538°	76.052°	–	Alien
	Bidens tripartita L.	CPUH14198	Herb	Marshy area	August–October	1935	32.545°	76.059°	LC	Native
	Carpesium abrotanoides L.	CPUH14091	Herb	Road side	August–October	2034	32.534°	76.051°	NA	Native
	Carpesium cernuum L.	CPUH14078	Herb	Road side	August–October	2053	32.534°	76.053°	NA	Native

Family	Taxa	Voucher no.	Life form	Habitat	Flowering/fruiting	Altitude (m)	Latitude N	Longitude E	IUCN Red List status	Nativity
	Carpesium trachelifolium Less.	CPUH14230	Herb	Mountain slopes	August–October	2707	32.524°	76.028°	NA	Native
	Cordiofontis flexuosa (Royle ex Lindl.) G.L.Nesom	CPUH14197	Herb	Mountain slopes	July–September	2690	32.524°	76.027°	NA	Native
	Erigeron acris var. *multicaulis* (Wall. ex DC.) C.B.Clarke	CPUH14067	Herb	Forest trail	May–October	2323	32.531°	76.044°	NA	Native
	Erigeron canadensis L.	CPUH14186	Herb	Road side	June–October	2370	32.530°	76.039°	NA	Alien
	Gamochaeta pensylvanica (Willd.) Cabrera	CPUH14047	Herb	Road side	March–October	1979	32.539°	76.065°	NA	Alien
	Hypochaeris radicata L.	CPUH14055	Herb	Open grassland	July–October	2206	32.536°	76.046°	NA	Alien
	Jacobaea analoga (DC.) Veldkamp	CPUH14132	Herb	Forest margin	July–October	2285	32.532°	76.035°	NA	Native
	Leucanthemum vulgare Lam.	CPUH14049	Herb	Mountain slopes	April–October	1993	32.538°	76.065°	–	Alien
	Melanoseris brunoniana (Wall. ex DC.) N.Kilian & Ze H.Wang	CPUH14173	Herb	Forest margin	July–October	2167	32.533°	76.048°	NA	Native
	Myriactis wallichii Less.	CPUH14131	Herb	Road side	June–October	2009	32.544°	76.054°	NA	Native
	Oreoseris gossypina (Royle) X.D.Xu &V.A.Funk	CPUH14053*	Herb	Rocky surface	April–June	2201	32.534°	76.047°	NA	Native
	Pseudognaphalium affine (D.Don)	CPUH14106	Herb	Forest margin	May–October	2298	32.534°	76.046°	NA	Native
	Sigesbeckia orientalis L.	CPUH14182	Herb	Forest margin	August–October	2370	32.532°	76.036°	NA	Native
	Synotis rufinervis (DC.) C.Jeffrey&Y.L.Chen	CPUH14179	Herb	Forest margin	August–October	2365	32.531°	76.035°	NA	Native
	Taraxacum parvulum DC.	CPUH14023	Herb	Grassy open space	March–November	2029	32.539°	76.053°	NA	Native
	Youngia japonica (L.) DC.	CPUH14046	Herb	Shady places	March–August	2198	32.530°	76.039°	NA	Native
Balsaminaceae	*Impatiens amphorata* Edgew.	CPUH14170	Herb	Mountain slopes	July–September	1984	32.542°	76.061°	NA	Native
	Impatiens brachycentra Kar. & Kir.	CPUH14008	Herb	Road side	May–October	2019	32.540°	76.052°	NA	Native
	Impatiens edgeworthii Hook.f.	CPUH14082	Herb	Mountain slopes	July–September	2365	32.528°	76.041°	NA	Native
	Impatiens sulcata Wall.	CPUH14196*	Herb	Mountain slopes	June–September	2381	32.528°	76.041°	NA	Native
Berberidaceae	*Berberis lycium* Royle	CPUH14058*	Shrub	Mountain slopes	April–June	2206	32.536°	76.046°	LC	Native
	Berberis napaulensis(DC.) Spreng.	CPUH14005*	Shrub	Road side	January–April	2029	32.539°	76.053°	NA	Native
	Podophyllum hexandrum Royle	CPUH14025*	Herb	Forest trail	April–August	2057	32.538°	76.054°	EN	Native
Brassicaceae	*Nasturtium officinale* W.T.Aiton	CPUH14050*	Herb	Near water	April–September	1993	32.538°	76.065°	LC	Native
	Noccaea montana (L.) F.K.Mey	CPUH14015	Herb	Forest trail	April–July	2198	32.529°	76.034°	–	Alien
Campanulaceae	*Campanula pallida* Wall.	CPUH14152	Herb	Road side	May–October	2249	32.534°	76.054°	NA	Native
Caprifoliaceae	*Leycesteria formosa* Wall.	CPUH14064	Shrub	Forest trail	June–October	2208	32.536°	76.044°	NA	Native
	Valeriana jatamansi Jones ex Roxb.	CPUH14021*	Herb	Forest trail	March–August	2009	32.544°	76.054°	CR (FRLHT)	Native

Family	Taxa	Voucher no.	Life form	Habitat	Flowering/fruiting	Altitude (m)	Latitude N	Longitude E	IUCN Red List status	Nativity
Caryophyllaceae	*Schizotechium monospermum* (Buch.-Ham. ex D.Don) Pusalkar&S.K.Srivast.	CPUH14174	Herb	Mountain slopes	August–October	2167	32.533°	76.048°	NA	Native
	Silene baccifera (L.) Durande	CPUH14107	Herb	Road side	June–August	2172	76.044°	76.044°	NA	Native
	Silene edgeworthii Bocquet	CPUH14166	Herb	Road side	June–July	2330	76.054°	76.054°	NA	Native
	Spergularia rubra (L.) J.Presl&C.Presl	CPUH14208	Herb	Alpine slopes	May–September	2730	76.048°	76.048°	–	Alien
	Stellaria aquatica (L.) Scop.	CPUH14044	Herb	Shady places	May–September	2029	76.044°	76.044°	NA	Native
	Stellaria media (L.) Vill.	CPUH14003	Herb	Shady places	March–October	1972	76.054°	76.054°	NA	Native
Commelinaceae	*Cyanotis vaga* (Lour.) Schult. &Schult.f.	CPUH14154	Herb	Alpine slopes	July–October	2726	32.520°	76.034°	NA	Native
Coranaceae	*Cornus macrophylla* Wall.	CPUH14228	Tree	Road side	April–June	2076	32.534°	76.054°	LC	Native
Crassulaceae	*Rosularia rosulata* (Edgew.) H.Ohba	CPUH14042*	Herb	Rocky surface	April–July	2029	32.535°	76.541°	NA	Native
	Sedum multicaule Wall. ex Lindl.	CPUH14122	Herb	Shady places	July–September	1990	32.544°	76.054°	NA	Native
Dioscoreaceae	*Dioscorea deltoidea* Wall. ex Griseb.	CPUH14059*	Climber	Mixed forest margin	May–September	2206	32.536°	76.046°	EN (CITES)	Native
Ericaceae	*Rhododendron arboreum* Sm.	CPUH14235*	Tree	Ban oak forest	March–June	1983	32.540°	76.071°	LC	Native
Euphorbiaceae	*Euphorbia cornigera* Boiss.	CPUH14066	Herb	Road side	May–September	2316	32.529°	76.042°	NA	Native
Fabaceae	*Campylotropis speciosa* (Royle ex Schindl.) Schindl.	CPUH14190	Shrub	Road side	August–October	2030	32.538°	76.052°	NA	Native
	Hylodesmumpodocarpum (DC.) H.Ohashi&R.R.Mill	CPUH14089	Herb	Road side	July–September	1901	32.541°	76.067°	NA	Native
	Indigofera atropurpurea Buch.-Ham. ex Hornem.	CPUH14048	Shrub	Road side	May–July	1979	32.539°	76.065°	LC	Native
	Trifolium dubium Sibth.	CPUH14051	Herb	Grassy meadow	April–May	1993	32.539°	76.065°	–	Alien
	Trifolium resupinatum L.	CPUH14229	Herb	Grassy meadow	May–October	2713	32.523°	76.029°	LC	Native
Fagaceae	*Quercus leucotrichophora* A.Camus	CPUH14220*	Tree	Forest area	April–June	2198	32.535°	76.048°	NA	Native
Geraniaceae	*Geranium rectum* Trautv.	CPUH14095	Herb	Forest margin	June–July	2365	32.528°	76.041°	NA	Native
	Geranium ocellatum Jacquem. ex Cambess.	CPUH14004	Herb	Road side	March–June	1975	32.540°	76.064°	NA	Native
Haloragaceae	*Myriophyllum verticillatum* L.	CPUH14090	Herb	Lake side	July–September	1935	32.545°	76.059°	LC	Native
Hydrangeaceae	*Deutzia staminea* R.Br. ex Wall.	CPUH14037	Shrub	Road side	April–September	2029	32.535°	76.054°	NA	Native
	Hydrangea anomala D.Don	CPUH14225	Climbing shrub	Mixed coniferous forest	April–August	2000	32.539°	76.052°	NA	Native
Juncaceae	*Juncus articulatus* L.	CPUH14070	Herb	Lake side	May–October	1935	32.544°	76.058°	LC	Native
	Juncus concinnus D.Don	CPUH14140	Herb	Mountain slopes	July–October	2703	32.524°	76.028°	LC	Native

Family	Taxa	Voucher no.	Life form	Habitat	Flowering/fruiting	Altitude (m)	Latitude N	Longitude E	IUCN Red List status	Nativity
Lamiaceae	*Elsholtzia fruticosa* (D.Don) Rehder	CPUH14180	Herb	Road side	July–November	2365	32.529°	76.033°	NA	Native
	Elsholtzia strobilifera (Benth.) Benth.	CPUH14199	Herb	Alpine slopes	June–October	2662	32.525°	76.026°	NA	Native
	Isodon coetsa (Buch.-Ham. ex D.Don) Kudô	CPUH14172*	Herb	Road side	September–November	2158	32.535°	76.048°	NA	Native
	Lamium album L.	CPUH14030	Herb	Road side	April–October	2052	32.541°	76.054°	LC	Native
	Leonurus cardiaca L.	CPUH14116	Herb	Forest trail	July–September	2426	32.534°	76.015°	–	Alien
	Melissa axillaris (Benth.) Bakh.f.	CPUH14130	Herb	Road side	June–December	1997	32.541°	76.560°	NA	Native
	Nepeta govaniana (Wall. ex Benth.) Benth.	CPUH14147	Herb	Forest area	August–October	2696	32.524°	76.027°	NA	Native
	Nepeta podostachys Benth.	CPUH14202	Herb	Alpine slopes	July–September	2690	32.525°	76.262°	NA	Native
	Stachys splendens Wall. ex Benth.	CPUH14109	Herb	Road side	September–November	2363	32.529°	76.040°	NA	Native
Liliaceae	*Lilium polyphyllum* D.Don	CPUH14086*	Herb	Forest area	June–August	2206	32.537°	76.462°	CR	Native
Mazaceae	*Mazus pumilus* (Burm.f.) Steenis	CPUH14088	Herb	Mixed forest slopes	April–October	1950	32.539°	76.066°	NA	Native
	Mazus surculosus D.Don	CPUH14072	Herb	Mixed forest slopes	May–October	1969	32.546°	76.056°	NA	Native
Moraceae	*Ficus hederacea* Roxb.	CPUH14098	Climber	Forest area	May–July	2127	32.534°	76.051°	NA	Native
Onagraceae	*Epilobium amurense* subsp. *amurense*	CPUH14087	Herb	Road side	May–October	2053	32.532°	76.049°	NA	Native
	Epilobium laxum Royle	CPUH14104	Herb	Road side	July–September	2285	32.534°	76.045°	NA	Native
	Oenothera rosea L'Hér. ex Aiton	CPUH14092	Herb	Road side	May–October	2034	32.534°	76.051°	–	Alien
Orchidaceae	*Calanthe plantaginea* Lindl.	CPUH14024	Orchid	Forest area	April–May	2053	32.539°	76.054°	NA	Native
	Epipactis helleborine (L.) Crantz	CPUH14102*	Orchid	Forest area	July–September	2285	32.534°	76.045°	LC	Native
	Goodyera repens (L.) R.Br.	CPUH14158	Orchid	Forest area	July–September	2726	32.520°	76.035°	LC	Native
	Malaxis muscifera (Lindl.) Kuntze	CPUH14157*	Orchid	Forest area	July–September	2730	32.523°	76.029°	VU	Native
	Spiranthes sinensis (Pers.) Ames	CPUH14156	Orchid	Alpine slopes	March–September	2662	32.525°	76.026°	–	Alien
Orobanchaceae	*Euphrasia himalayica* Wettst.	CPUH14139	Herb	Alpine slopes	May– August	2690	32.524°	76.026°	NA	Native
Phyllanthaceae	*Leptopus cordifolius* Decne.	CPUH14162	Shrub	Forest trail	May–October	2001	32.532°	76.447°	NA	Native
Plantaginaceae	*Digitalis purpurea* L.	CPUH14110	Herb	Road side	May–October	2363	32.531°	76.032°	–	Alien
Poaceae	*Drepanostachyum falcatum* (Nees) Keng f.	CPUH14236	Bamboo	Road side	–	2033	32.545°	76.054°	NA	Native
	Oplismenus undulatifolius (Ard.) P.Beauv.	CPUH14129	Herb	Shady places	August–October	1993	32.538°	76.065°	NA	Native
Polygonaceae	*Persicaria pubescens* (Blume) H.Hara	CPUH14161	Herb	Moist places	July–October	2285	32.534°	76.045°	LC	Native

Family	Taxa	Voucher no.	Life form	Habitat	Flowering/fruiting	Altitude (m)	Latitude N	Longitude E	IUCN Red List status	Nativity
	Persicaria minor (Huds.) Opiz	CPUH14167	Herb	Road side	July–October	1901	32.540°	76.066°	NA	Native
	Polygonum aviculare L.	CPUH14145	Herb	Grassy meadow	July–October	2726	32.521°	76.032°	NA	Native
	Polygonum plebeium R.Br.	CPUH14203	Herb	Grassy meadow	October–April	2730	32.523°	76.029°	LC	Native
	Rumex nepalensis Spreng.	CPUH14043*	Herb	Road side	April–July	2029	32.539°	76.053°	NA	Native
Primulaceae	*Androsace rotundifolia* Hardw.	CPUH14032	Herb	Rocky surface	April–June	2057	32.540°	76.053°	NA	Native
	Androsace sarmentosa Wall.	CPUH14148	Herb	Alpine slopes	May–August	2726	32.520°	76.035°	NA	Native
	Lysimachia debilis Wall.	CPUH14073	Herb	Road side	June–July	1950	32.539°	76.066°	NA	Native
Ranunculaceae	*Clematis connata* DC.	CPUH14187	Climber	Forest area	August–October	1942	32.532°	76.049	NA	Native
Rosaceae	*Geum roylei* Wall.	CPUH14027	Herb	Road side	May–September	1942	32.542°	76.062°	NA	Native
	Potentilla indica (Andrews) Th.Wolf	CPUH14007*	Herb	Road side	March–August	2031	32.548°	76.055°	NA	Native
	Potentilla nepalensis Hook.	CPUH14117	Herb	Grassy meadow	June–October	2452	32.530°	76.024°	NA	Native
	Pyrus pashia Buch.-Ham. ex D.Don	CPUH14213	Tree	Road side	February–March	1960	32.540°	76.065°	LC	Native
	Rosa macrophylla Lindl.	CPUH14060*	Shrub	Road side	April–September	2206	32.536°	76.046°	NA	Native
	Rubus macilentus Cambess.	CPUH14031	Shrub	Road side	April–October	1984	32.542°	76.061°	NA	Native
	Rubus pedunculosus D.Don	CPUH14113	Shrub	Road side	June–August	2410	32.531°	76.032°	NA	Native
	Sorbaria tomentosa (Lindl.) Rehder	CPUH14063	Shrub	Road side	May–October	2208	32.536°	76.044°	NA	Native
Rubiaceae	*Galium elegans* Wall.	CPUH14074	Herb	Moist places	May–November	2009	32.544°	76.054°	NA	Native
Sapindaceae	*Acer cappadocicum* Gled.	CPUH14218	Tree	Roads ide	April–September	2080	32.534°	76.051°	LC	Native
Saxifragaceae	*Saxifraga moorcroftiana* (Ser.) Wall. ex Sternb.	CPUH14146	Herb	Alpine slopes	August–September	2726	32.520°	76.033°	NA	Native
Scrophulariaceae	*Buddleja crispa* Benth.	CPUH14219	Shrub	Road side	March–May	2167	32.534°	76.047°	NA	Native
	Scrophulariahimalensis Royle ex Benth.	CPUH14183	Herb	Road side	July–September	2370	32.531°	76.039°	NA	Native
Smilacaceae	*Smilax elegans* Wall. ex Kunth	CPUH14009	Climber	Road side	May–October	2019	32.539°	76.052°	NA	Native
	Smilax vaginata Decne.	CPUH14226	Shrub	Road side	May–June	2204	32.536°	76.044°	NA	Native
Ulmaceae	*Ulmus wallichiana* Planch.	CPUH14227*	Tree	Road side	March–April	2198	32.536°	76.046°	VU	Native
Urticaceae	*Pilea scripta* (Buch.-Ham. ex D.Don) Wedd.	CPUH14076	Herb	Moist places	June–October	2029	32.534°	76.054°	NA	Native
	Urtica dioica L.	CPUH14115*	Herb	Forest area	June–August	2057	32.532°	76.044°	LC	Native
Vitaceae	*Parthenocissus semicordata* var. semicordata	CPUH14175*	Climbing shrub	Forest area	May–August	2193	32.537°	76.046°	NA	Native

Family	Taxa	Voucher no.	Life form	Habitat	Flowering/fruiting	Altitude (m)	Latitude N	Longitude E	IUCN Red List status	Nativity
Zingiberaceae	*Cautleya spicata* (Sm.) Baker	CPUH14108*	Herb	Road side	August–September	2302	32.529°	76.042°	LC	Native
	Hedychium spicatum Sm.	CPUH14149*	Herb	Road side	August–September	2208	32.537°	76.045°	LC	Native
	Roscoea alpina Royle	CPUH14010*	Herb	Forest area	July–August	2398	32.529°	76.047°	VU (CAMP 2010)	Native
Pinaceae	*Abies pindrow* (Royle ex D.Don) Royle	CPUH14111*	Tree	Forest area	September–October	2397	32.538°	76.018°	LC	Native
	Cedrus deodara (Roxb. ex D.Don) G.Don	CPUH14221*	Tree	Forest area	October–November	2198	32.535°	76.048°	LC	Native
	Picea smithiana (Wall.) Boiss.	CPUH14205	Tree	Forest area	September–October	2730	32.524°	76.026°	LC	Native
	Pinus wallichiana A.B.Jacks.	CPUH14231*	Tree	Forest area	September–October	2422	32.530°	76.024°	LC	Native
Taxaceae	*Taxus contorta* Griff.	CPUH14114*	Tree	Forest area	October–November	2703	32.534°	76.020°	EN	Native

* denotes accession numbers used for ethnobotanical studies.

At the national and regional level, assessments by the Conservation Assessment and Management Plan, 2010 for Himachal Pradesh categorize *Dioscorea deltoidea* and *Polygonatum verticillatum* as Endangered (EN) within the state (CAMP 2010). Additionally, *Selinum vaginatum* and *Roscoea alpina* are listed as Vulnerable (VU) in Himachal Pradesh under CAMP assessments.

Regarding legal protection and trade regulation, *Dioscorea deltoidea* is included in Appendix II of CITES (2025) (Appendices 2025), indicating that although it is not necessarily threatened with extinction globally, its trade must be regulated to avoid utilization incompatible with its survival. Furthermore, *Valeriana jatamansi* has been categorized as Critically Endangered (CR) by FRLHT (Foundation for Revitalisation of Local Health Traditions) under national medicinal plant conservation assessments (ENVIS Centre on Medicinal Plants 2024).

CONCLUSION

The present study offers valuable insights into the floristic diversity and conservation status of the flora of KKWS, contributing to our understanding of its rich botanical heritage. The sanctuary, distinguished by its diverse ecosystems, serves as a vital habitat for a range of rare and threatened plant species. Despite its protected status, the sanctuary is not immune to anthropogenic disturbances, including tourism pressure, habitat fragmentation, resource extraction, and the growing impacts of climate variability. The outcomes of this investigation establish a significant baseline database that can support efforts in biodiversity management, restoration planning, and policy creation. Continuous floristic assessments, paired with habitat protection strategies and community-based conservation initiatives, are necessary to maintain the Sanctuary's ecological integrity. Strengthening awareness, regulating tourism, and implementing science-based management strategies will be crucial for the sustainable conservation of this ecologically sensitive and biologically rich Himalayan region.

REFERENCES

Appendices (2025). Appendix II of CITES, https://cites.org/eng/app/appendices.php. Accessed on 29.v.2025.

Aswal, B.S. & B.N. Mehrotra (1994). *Flora of Lahaul Spiti (A Cold Desert in North West Himalaya).* Bishen Singh Mahender Pal Singh, Dehradun, 761 pp.

CAMP (2010). Threatened Medicinal Plants of Himachal Pradesh, Report of the 'CAMP' Workshop (Conservation Assessment & Management



Image 1. A—*Malaxis muscifera* (Lindl.) Kuntze | B—*Digitalis purpurea* L. | C—*Dioscorea deltoidea* Wall. ex Griseb. | D—*Podophyllum hexandrum* Royle | E—*Lilium polyphyllum* D.Don | F—*Taxus contorta* Griff. | G—*Roscoea alpina* Royle. © Sumit.



Image 2. H—*Rosa macrophylla* Lindl. | I—*Polygonatum verticillatum* (L.) All. | J—*Berberis lycium* Royle | K—*Cautleya spicata* (Sm.) Baker | L—*Hedychium spicatum* Sm. | M—*Berberis napaulensis* (DC.) Spreng. © Sumit.

Prioritisation) held at Shimla on 1–4 December 2010. Sponsored by National Medicinal Plants Board, Government of India. Organised by Himachal Pradesh Forest Department, 3 pp.

Chowdhery H.J. & B.M. Wadhwa (1984). *Flora of Himachal Pradesh, Analysis, Vol 1–3.* Calcutta, Botanical Survey of India. https://bsi.gov.in/page/en/state-flora. Accessed on 9.ix.2023.

Collett, H. (1902). *Flora Simlensis*. Thacker Spink and Co. Calcutta and Shimla, Reprinted (1971). Bishen Singh Mahender Pal Singh, Dehradun, 652 pp.

Dhaliwal, D.S. & M. Sharma (1999). *Flora of Kullu District (Himachal Pradesh)*. Bishen Singh Mahender Pal Singh, Dehradun, 744 pp.

ENVIS Centre on Medicinal Plants (2024). Plant Details for *Valeriana jatamansi* JONES. https://envis.frlht.org/plantdetails/c29831e028df24eeb3495344f850bd67/a26dfe103c612b61931ee48ce8884460. Accessed on 29.v.2025.

Gairola, S., C.M. Sharma, C.S. Rana, S.K. Ghildiyal & S. Suyal (2010). Phytodiversity (angiosperms and gymnosperms) in Mandal-Chopta forest of Garhwal Himalaya, Uttarakhand, India. *Nature and Science* 8(1): 1–17.

Haq, S.M., A.A. Khoja, F.A. Lone, M. Waheed, R.W. Bussmann, E.A. Mahmoud & H.O. Elansary (2023). Floristic composition, life history traits and phytogeographic distribution of forest vegetation in the western Himalaya. *Frontiers in Forests and Global Change* 6: 1169085. https://doi.org/10.3389/ffgc.2023.1169085

Jain, S.K. & R.R. Rao (eds.) (1977). *A Handbook of Field and Herbarium Methods.* Today & Tomorrow's Printers & Publisher, New Delhi, 157 pp.

Kumar, A., R. Paliwal & U. Saikia (2014). Avifauna of Kalatop-Khajjiar Wildlife Sanctuary and adjacent areas, Himachal Pradesh, India. *Bird Populations* 13: 36–48.

Kumar, A., S.S. Samant, L.M. Tewari & S. Paul (2018). Diversity, distribution, indigenous uses, and status of orchids in Kalatop-Khajjiar Wildlife Sanctuary, Chamba district, Himachal Pradesh. *The Journal of the Orchid Society of India* 32: 93–98.

Kumar, R. (2020). Management Plan of Kalatop Khajjiar Wildlife Sanctuary (2019–20 to 2028–29). https://hpforest.gov.in/storage/files/1/pdf/Management%20Plan/Approved%20MP%20Khajjiard.pdf. Accessed on 27.xi.2025.

Lalithalakshmi, K., A. Selvam & M. Udayakumar (2024). Woody flora of Karumpuliyuthu Hill, Tenkasi, Tamil Nadu, India: a checklist. *Journal of Threatened Taxa* 16(6): 25453–25460. https://doi.org/10.11609/jott.8855.16.6.25453-25460

Palni, L.M.S. & R.S. Rawal (2010). Conservation of Himalayan bioresources: an ecological, economical and evolutionary perspective, pp. 369–402. In: Sharma, V.P. (ed.). *Nature at Work: Ongoing Saga of Evolution*. Springer, New Delhi. https://doi.org/10.1007/978-81-8489-992-4_23

Polunin, O. & A. Stainton (1984). *Flowers of the Himalaya.* Oxford University Press, Delhi, 580 pp.

Samant, S.S. (2021). Floristic diversity of the Himalaya in relation to climate change: status, values and conservation. *Journal of Graphic Era University* 9(1): 31–54.

Sherafu, Z., M.C. Egigu & J.M. Sasikumar (2024). Floristic composition, diversity, and regeneration of woody plant species of Dabal forest in southeastern Ethiopia: implication for Conservation. *Scientifica* 2024(1): 7414375. https://doi.org/10.1155/2024/7414375

Singh, H. & M. Sharma (2006). *Flora of Chamba District (Himachal Pradesh).* Bishen Singh Mahender Pal Singh, Dehradun, 881 pp.

Sumit, Singh, S., Kumar, G. & K. Singh (2025). Revitalizing traditional wisdom: Exploring medicinal, plant-based healthcare practices in Kalatop-Khajjiar Wildlife Sanctuary, Himachal Pradesh, India. Ethnobotany Research and Applications 31. https://doi10.32859/era.31.26.1-30

Stainton, A. (1988). *Flowers of Himalaya, A Supplement.* Oxford University Press, Delhi, 86 pp.

Verma, R.K. & K.S. Kapoor (2011). *Kalatop- Khajjiar Wildlife Sanctuary Chamba Himachal Pradesh–An Appraisal to its Plant Diversity.* Shimla, HFRI, 121 pp

Wani, S.A., M.A. Mugal, F.A. Dar, C.S. Reddy, I. Rashid & A.A. Khuroo (2023). Biodiversity data synthesis on trees of Indian Himalayan Region: Policy and management implications. *Global Ecology and Conservation* 48: e02698. https://doi.org/10.1016/j.gecco.2023.e02698

Wagensommer, R.P. (2023). Floristic studies in the light of biodiversity knowledge and conservation. *Plants* 12(16): 2973. https://doi.org/10.3390/plants12162973

Author details: Ms. Sumit serves as an assistant professor of botany at Government College Chamba, Himachal Pradesh. She holds an M.Phil. and a master's degree in Botany and brings over 26 years of rich teaching experience at the undergraduate level. A committed educator and emerging researcher, she is currently pursuing her PhD in Botany, with a research focus on floristic diversity and ethnobotany, particularly within the Himalayan region. She has actively contributed to the academic community through participation in numerous national and international conferences. Dr. Gulshan Kumar is an accomplished academician associate professor of botany at Career Point University, distinguished for his expertise in ethnobotany, agro-biodiversity, and climate-resilient agriculture. Born on 23 October 1980, he has extensive academic, research, and extension experience, advancing sustainable agro-technologies and indigenous knowledge systems for Himalayan ecosystems and rural development initiatives across regions today. Dr. Sumit Singh is a renowned plant taxonomist currently working as scientist C at CSIR-NEIST, Assam. He has done his PhD from CSIR-IIIM, Jammu in the Year 2022 with expertise in alpine Himalayan flora. During his research tenure, Dr. Singh has published more than 20 research articles in different international Journals. Dr. Singh is also the Fellow of renowned scientific societies like Linnean Society of London, Royal Asiatic Society, Royal Geographic Society, etc. Dr. Taslima Sheikh is a biodiversity researcher specializing in species diversity and field based ecological documentation. Her work focuses on systematic assessments, distribution patterns, and conservation-oriented studies across India. During her research tenure, she has published more than 15 research articles and served as reviewer for various peer reviewed Journals. Dr. Kanwaljeet Singh is currently working as assistant professor (botany) in the department of Education in Science and Mathematics, Regional Institute of Education Mysuru (NCERT). He holds the PhD degree in the field of plant taxonomy and ethnobotany. Dr Singh has published more than 20 research articles in renowned international journals. Mr. P. Vishal Ahuja is a dedicated conservation biologist and academic researcher from Chamba District, Himachal Pradesh, India. He holds a master's degree in botany reflecting both his scientific expertise and commitment to environmental awareness and education. Since joining the Zoo Outreach Organisation in 2012, he has been actively engaged in biodiversity conservation and ecological restoration initiatives. He currently serves as the principal investigator of a Native Forest Restoration Project in Chamba District, spearheaded by the Zoo Outreach Organisation. Mr. Arvind Kumar is a renowned botanist currently serving as assistant professor (botany) in department of higher education, Jammu and Kashmir. Mr. Kumar is an accomplished teacher and author with teaching experience of more than 10 years. He has published various research articles in the field of plant diversity and ethnobotany.

Author contributions: Sumit Singh conceptualized and designed the study. Sumit and P. Vishal Ahuja conducted the field study, collected the specimens and wrote the manuscript. Sumit Singh and Taslima Sheikh were involved in supervision, data analysis, and critical review. Gulshan Kumar provided supervision, materials and assisted in data collection. Kanwaljeet Singh contributed to data interpretation. All authors reviewed and approved the final manuscript.

Acknowledgements: The authors express their sincere gratitude to the head, Department of Botany, Career Point University, and the vice chancellor for providing the necessary facilities. We are also thankful to the forest officials of Kalatop-Khajjiar Wildlife Sanctuary for their support and cooperation during the fieldwork.

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. Lional Monod, Natural History Museum of Geneva, Genève, Switzerland.
Dr. Asheesh Shivam, Nehru Gram Bharti University, Allahabad, India
Dr. Rosana Moreira da Rocha, Universidade Federal do Paraná, Curitiba, Brasil
Dr. Kurt R. Arnold, North Dakota State University, Saxony, Germany
Dr. James M. Carpenter, American Museum of Natural History, New York, USA
Dr. David M. Claborn, Missouri State University, Springfield, USA
Dr. Kareen Schnabel, Marine Biologist, Wellington, New Zealand
Dr. Amazonas Chagas Júnior, Universidade Federal de Mato Grosso, Cuiabá, Brasil
Mr. Monsoon Jyoti Gogoi, Assam University, Silchar, Assam, India
Dr. Heo Chong Chin, Universiti Teknologi MARA (UiTM), Selangor, Malaysia
Dr. R.J. Shiel, University of Adelaide, SA 5005, Australia
Dr. Siddharth Kulkarni, The George Washington University, Washington, USA
Dr. Priyadarsanan Dharma Rajan, ATREE, Bengaluru, India
Dr. Phil Alderslade, CSIRO Marine And Atmospheric Research, Hobart, Australia
Dr. John E.N. Veron, Coral Reef Research, Townsville, Australia
Dr. Daniel Whitmore, State Museum of Natural History Stuttgart, Rosenstein, Germany.
Dr. Yu-Feng Hsu, National Taiwan Normal University, Taipei City, Taiwan
Dr. Keith V. Wolfe, Antioch, California, USA
Dr. Siddharth Kulkarni, The Hormiga Lab, The George Washington University, Washington, D.C., USA
Dr. Tomas Ditrich, Faculty of Education, University of South Bohemia in Ceske Budejovice, Czech Republic
Dr. Mihaly Foldvari, Natural History Museum, University of Oslo, Norway
Dr. V.P. Uniyal, Wildlife Institute of India, Dehradun, Uttarakhand 248001, India
Dr. John T.D. Caleb, Zoological Survey of India, Kolkata, West Bengal, India
Dr. Priyadarsanan Dharma Rajan, Ashoka Trust for Research in Ecology and the Environment (ATREE), Royal Enclave, Bangalore, Karnataka, India

Fishes

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

Amphibians

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

Reptiles

Dr. Gernot Vogel, Heidelberg, Germany
Dr. Raju Vyas, Vadodara, Gujarat, India
Dr. Pritpal S. Soorae, Environment Agency, Abu Dubai, UAE.
Prof. Dr. Wayne J. Fuller, Near East University, Mersin, Turkey
Prof. Chandrashekher U. Rivonker, Goa University, Taleigao Plateau, Goa. India
Dr. S.R. Ganesh, Kalinga Foundation, Agumbe, 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 Sundev, Professor of Ornithology, Ulaanbaatar, Mongolia
Prof. Reuven Yosef, International Birding & Research Centre, Eilat, Israel
Dr. Taej Mundkur, Wetlands International, Wageningen, The Netherlands
Dr. Carol 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, 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, Tiruchirapalli, 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.

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,
3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore,
Tamil Nadu 641006, India
ravi@threatenedtaxa.org & ravi@zooreach.org

Journal of Threatened Taxa

www.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 unless otherwise mentioned. JoTT allows 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)

February 2026 | Vol. 18 | No. 2 | Pages: 28262–28454
Date of Publication: 26 February 2026 (Online & Print)
DOI: 10.11609/jott.2026.18.2.28262-28454

Articles

Floristic composition and conservation significance of vascular plants in Kalatop-Khajji-ar Wildlife Sanctuary, Himachal Pradesh, India
– Sumit, Gulshan Kumar, Sumit Singh, Kanwaljeet Singh, Taslima Sheikh, P. Vishal Ahuja & Arvind Kumar, Pp. 28263–28274

Assessing the tree diversity along the Dudhganga River in Kolhapur District of Maharashtra, India
– Sachin Chavan & Rajaram Gurav, Pp. 28275–28286

Flower bud growth, mortality rate, and population structure of *Sapria himalayana* Griffith f. *albovinosa* Banziger & Hansen (Rafflesiaceae) in a subtropical forest, northeastern India
– K. Shamran Maring & Athokpam Pinokiyo, Pp. 28287–28295

Comparing three sampling techniques for surveying and monitoring arthropods in Moroccan agroecosystems
– Hanae El Harche, Pp. 28296–28306

Community structure of Lepidoptera in Nantu-Boliohuto Wildlife Reserve, Sulawesi, Indonesia
– Chairunnisah J. Lamangantjo, Marini Susanti Hamidun, Sasmianti & Dewi Wahyuni K. Baderan, Pp. 28307–28316

Foraging niche segregation among woodpeckers in the oak-pine forest of Kumaon Himalaya, Uttarakhand, India
– Rafat Jahan, Satish Kumar & Kaleem Ahmed, Pp. 28317–28328

Local knowledge, attitudes, and perceptions of ecosystem services and disservices provided by the Painted Stork *Mycteria leucocephala* Pennant, 1769 (Aves: Ciconiidae) in northern India: insights for conservation
– Yashmita-Ulman & Manoj Singh, Pp. 28329–28342

Communications

Analysis revealed minuscule DNA sequence data availability for Indian marine macroalgal diversity
– Digvijay Singh Yadav, Aswin Alichen & Vaibhav A. Mantri, Pp. 28343–28349

Checklist of rust fungi of the Nuratau Nature Reserve, Uzbekistan
– I.M. Mustafaev, M.M. Iminova, I.Z. Ortiqov, S.A. Teshaboyeva & N.Q. Iskanov, Pp. 28350–28357

Checklist of moths (Lepidoptera: Heterocera) from the campus of University of North Bengal, Siliguri, India
– Abhirup Saha, Ratnadeep Sarkar, Rujas Yonle, Subhajit Das, Prapti Das & Dhiraj Saha, Pp. 28358–28369

Vulture diversity and long-term trends in the Ranikhet region, Kumaon Himalaya, Uttarakhand, India
– Mirza Altaf Baig, Nazneen Zehra & Jamal Ahmad Khan, Pp. 28370–28377

Nesting dynamics of Red-wattled Lapwing *Vanellus indicus* Boddaert, 1783 in urban and rural regions of Indore, India
– Kratika Patidar & Vipul Keerti Sharma, Pp. 28378–28386

Assessing avian diversity and conservation status in Dhamapur Lake World Heritage Irrigation Structure, Sindhudurg, Maharashtra, India
– Yogesh Koli, Pravin Sawant & Mayuri Chavan, Pp. 28387–28398

Population status and habitat use of Indian Grey Wolf *Canis lupus pallipes* in Pench Tiger Reserve, Madhya Pradesh, India
– Iqra Rabbani & Sharad Kumar, Pp. 28399–28405

Activity budgets of a zoo-housed Mishmi Takin *Budorcas taxicolor taxicolor* (Mammalia: Artiodactyla: Bovidae) herd
– Nabanita Ghosh, Pranita Gupta, Joy Dey & Basavaraj S. Holeyachi, Pp. 28406–28412

Extended distribution of *Nymphoides peltata* (S.G.Gmel.) Kuntze (Menyanthaceae) in Manipur, India
– Aahen Chanu Waikhom & Bimolkumar Singh Sadokpam, Pp. 28413–28418

Short Communications

***Impatiens chamchumroonii* (Balsaminaceae), a new record for the flora of Vietnam**
– Cuong Huu Nguyen, Diep Quang Dinh, Dinh Duc Nguyen & Keooudone Souvannakhoummane, Pp. 28419–28423

Occurrence of the wood fern *Arachniodes sledgei* Fraser-Jenk. (Pteridophyta: Dryopteridaceae) in the northern Western Ghats, India
– Sachin Patil & Jagannath Patil, Pp. 28424–28427

Notes

A note on the Petal-less Caper *Maerua apetala* (B.Heyne ex Roth) Jacobs (Capparaceae)
– Shamsudheen Abdul Kader & Bagavathy Parthipan, Pp. 28428–28429

Record of *Euploea mulciber* (Cramer, [1777]) (Lepidoptera: Nymphalidae) in Delhi, India: evidence of range extension in a restored urban ecosystem
– Aisha Sultana, Mohammad Shah Hussain & Balwinder Kaur, Pp. 28430–28432

Hump-nosed Pit Viper *Hypnale hypnale* feeding on an Allapalli Skink *Eutropis allapallensis* in Karwar, India
– Nonita Rana, Karthy Shivapushanam, S.J.D. Frank & Govindan Veeraswami Gopi, Pp. 28433–28435

Sighting of vagrant Red-backed Shrike *Lanius collurio* in the coastal areas of Thoothukudi, Tamil Nadu, India
– Kishore Muthu, Anand Shibu & Santhanakrishnan Babu, Pp. 28436–28437

First record of the Diamond Dove *Geopelia cuneata*, an Australian endemic, in Sikhna Jwhwlao National Park, Assam, India
– Bibhash Sarkar, Bijay Basfore, Leons Mathew Abraham & Anjana Singha Naorem, Pp. 28438–28440

First photographic record of the Rusty-spotted Cat *Prionailurus rubiginosus* (I. Geoffroy Saint-Hilaire, 1831) (Mammalia: Carnivora: Felidae) in Kuldiha Wildlife Sanctuary, Odisha, India
– Tarun Singh, Harshvardhan Singh Rathore, N. Abhin, Subhalaxmi Muduli, Yash Deshpande, Vivek Sarkar, Diganta Sovan Chand, Samrat Gowda, Prakash C. Gogineni, Manoj V. Nair, Bivash Pandav & Samrat Mondol, Pp. 28441–28443

First photographic evidence of the Rusty-spotted Cat *Prionailurus rubiginosus* (I. Geoffroy Saint-Hilaire, 1831) (Mammalia: Carnivora: Felidae) in Kapilash Wildlife Sanctuary, Odisha, India
– Alok Kumar Naik, Sumit Kumar Kar, Shyama Bharati, Ashit Chakraborty & Ashis Kumar Das, Pp. 28444–28446

Record of a Tiger *Panthera tigris* (Linnaeus, 1758) (Mammalia: Carnivora: Felidae) in Saptari District of eastern Nepal: implications for conservation and habitat connectivity
– Gobinda Prasad Pokharel, Chiranjibi Prasad Pokheral, Ashish Gurung, Bishnu Singh Thakuri, Ambika Prasad Khatiwada, Aastha Joshi, Birendra Gautam, Mithilesh Mahato, Naresh Subedi & Madhu Chetri, Pp. 28447–28450

Book Review

At the Point of No Return? – Reading Pankaj Sekhsaria's Island on Edge: The Great Nicobar Crisis
– Himangshu Kalita, Pp. 28451–28454

Publisher & Host

WILD zoOreach
Zoo Outreach Organisation

Threatened Taxa