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RESEARCH ARTICLE

Evaluation of tree species diversity in Bilaspur Conservancy with their threatened status and medicinal values

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Abstract

India, recognized as a mega diverse country, encompasses a wide range of ecosystems, including forests, grasslands, wetlands, coastal and marine environments, and deserts. Climate change has profoundly influenced forest ecosystems, altering species composition, biodiversity, and ecological functions. This study evaluates tree diversity and conservation status within the protected areas of Bilaspur, Chhattisgarh, emphasizing species resilience to climatic stress and the imperative for sustainable management. A comprehensive survey recorded 120 tree species distributed across 35 families and 120 genera, with Fabaceae emerging as the most dominant family. Conservation status assessments classified 95 species as Least Concern (LC), 3 as Data Deficient (DD), 3 as Near Threatened (NT), 5 as Vulnerable (VU), and 1 as Endangered (EN). Several species exhibit adaptive traits to semi-arid conditions, underscoring their ecological significance in the context of climate change. The findings highlight the urgent need for targeted conservation strategies integrating biodiversity conservation and sustainable resource utilization. Strengthening ecosystem governance and implementing adaptive management approaches are critical for maintaining biodiversity, ensuring ecological stability, and securing the long-term viability of forest ecosystems in the region.

Keywords: Conservancy; Diversity; Evaluation; Medicinal Values; Threatened Status; Tree.

1. Introduction

India is one of the 17 countries that have been categorised to be "mega diverse" on the earth (Williams et al., 2001). Despite comprising merely 2.4% of the Earth's terrestrial expanse, it harbours 8.1% of the global biodiversity (MoEFCC, 2018; FSI, 2023; Fahad et al., 2024). The most significant ecosystem of India encompassed forests, grasslands, wetlands, coastal and marine environments, and deserts. The forest cover of the country comprises around 25.17% (8,27,357 sq.km) of India's overall geographical area (FSI, 2023). India refers to 16 principal forest types, which are further divided into 221 subtypes (Champion and Seth, 1968).

The past few decades have significantly impacted our awareness of the evolution of trees and forests. Trees and forests beyond human lifespans, offering an atmosphere of stability, regularity, as well as protection (Watkins, 2014). In 2020, the worldwide forest encompassed around 4.1 billion hectares (ha), constituting 31% of the terrestrial area (FAO, 2024). Nevertheless, trees are also spreading beyond forested areas, integrated into agricultural and urban areas, in addition to in indigenous tree patterns characterised by limited crown cover. Our understanding of such trees outside forests remains extremely restricted on national and worldwide levels; however, certain research remains aimed at the significance of this tree source (Shvidenko et al., 2005; Smeets and Faaij, 2007; Schnell et al., 2015).

Over 3 trillion trees are estimated to exist on the Earth's surface, predominantly located in tropical and subtropical forests (Crowther et al., 2015). Trees serve essential ecosystem processes, including climate regulation, carbon sequestration, and providing habitat and sustenance (Brockerhoff et al., 2017; Myers, 1997). Trees are intricately connected to humans, offering social and cultural significance (O'Brien, 2005). The symbiotic relationship between trees and humans emphasises the importance of comprehending and conserving trees across natural and urban ecosystems in the context of climate change and numerous environmental issues such as deforestation, land degradation, and pollution (Lindner et al., 2010; De Marco et al., 2022; Esperon-Rodriguez et al., 2022; Kumar et al., 2022).

Notwithstanding the indisputable significance of trees, the rising level of exertion and globalisation of civilization's activities (Williams et al., 2015) during the Anthropocene present significant hazards to them, leading to habitat loss, dispersion, deterioration, and over-exploitation that could result in either the disappearance or decline of several tree species (Williams et al., 2015; Peng et al., 2023). This deterioration and depletion have significant repercussions across all nutritional layers (Ellison et al., 2005; Williams et al., 2015; Rivers et al., 2023). Consequently, a targeted and rigorous method of tree protection is required to avert species extinction. An essential preliminary process entails evaluating today's threats regarding all tree species (Perrings et al., 1992).

A threatened species signifies a species that has been categorised as vulnerable, endangered, or critically endangered in its native environment, which is due to their populations continuing to decline as a result of multiple variables such as habitat loss, overexploitation, pollution, climate change, and the presence of invasive species. These species are crucial for sustaining biodiversity, sustaining balance in ecosystems, and delivering vital ecosystem functions (Sahu et al., 2022). The International Union for Conservation of Nature (IUCN) is acknowledged as the most reliable source for evaluating the endangered status of species. Conversely, forest tree species exhibit significant therapeutic

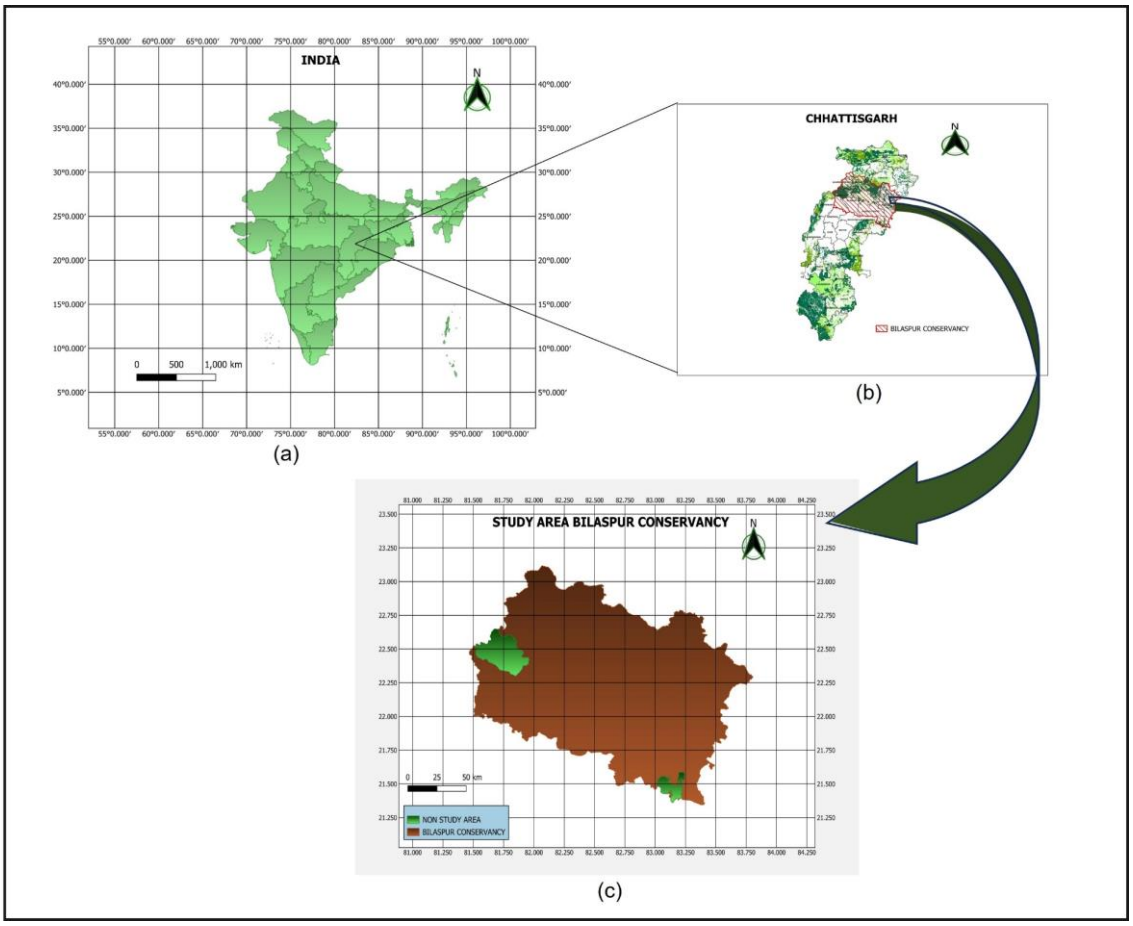

Figure 1. Map of the study area: (a) India map; (b) Chhattisgarh; (c) Bilaspur

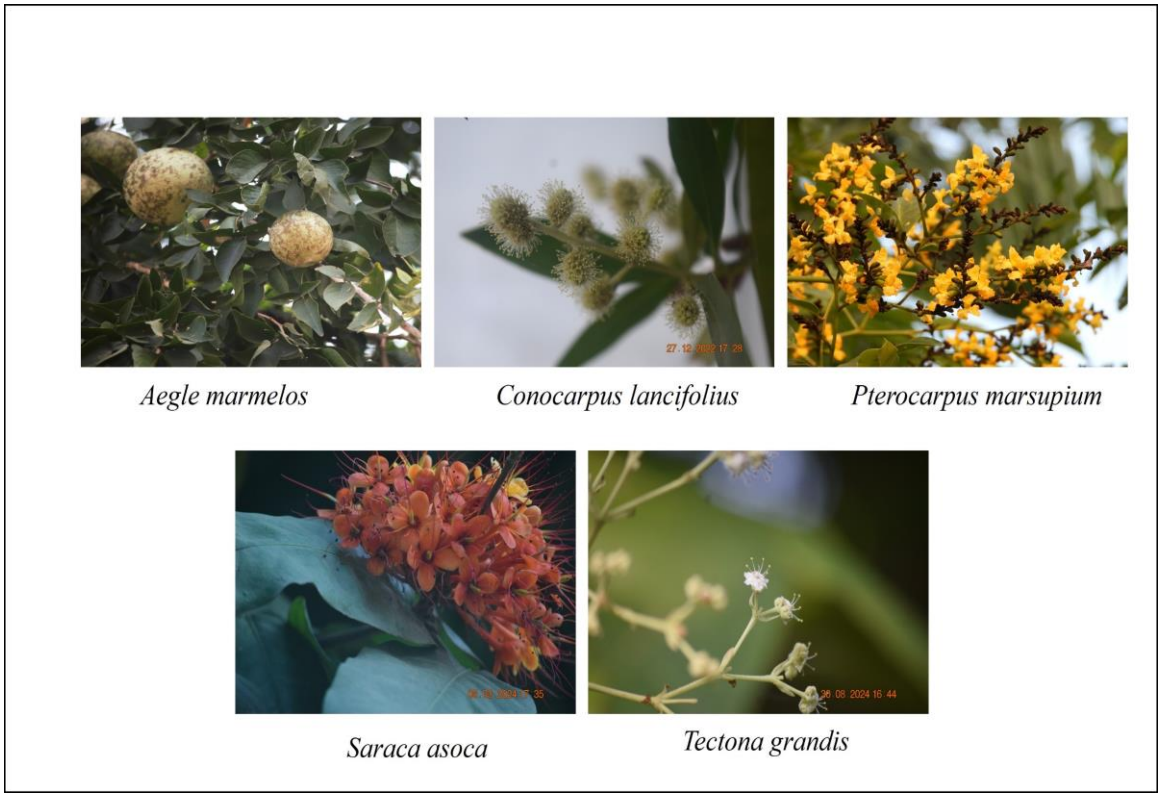

Figure 2. Some threatened tree species collected from the sites.

Table 1. Tree species evaluation with their IUCN categories and medicinal properties.

No.	TREE SPECIES	FAMILY	IUCN CATEGORIES	MEDICINAL PROPERTIES
1.	*Butea monosperma* (Lam.) Kuntze	Fabaceae	LC	Possesses tonic, astringent, aphrodisiac, and diuretic qualities.
2.	*Vachellia leucophloea* (Roxb.) Maslin, Seigler & Ebinger	Fabaceae	LC	Used for snakebite, diabetes, ulcers, bleeding gums, fever, and skin problems
3.	*Delonix regia* (Bojer ex Hook.) Raf.	Fabaceae	LC	Used for anaemia, fever, gynaecological problems and pneumonia
4.	*Cassia fistula* L.	Fabaceae	LC	Used for constipation, leprosy, and ringworm
5.	*Senna siamea* (Lam.) H.S.Irwin & Barneby	Fabaceae	LC	Mostly used for malaria
6.	*Saraca asoca* (Roxb.) W.J.de Wilde	Fabaceae	VU	Mostly used for gynaecological disorders (PCOS/PCOD)
7.	*Parkia biglandulosa* Wight & Arrn.	Fabaceae	DD	Used for dental problems and pneumonia
8.	*Albizia lebbeck* (L.) Benth.	Fabaceae	LC	Mostly used for rat bite and dental problems
9.	*Albizia procera* (Roxb.) Benth.	Fabaceae	LC	Bark decoction used in pregnancy and leaves decoction used on blisters
10.	*Dalbergia sissoo* Roxb. ex DC.	Fabaceae	LC	Leaf is used for eye problems and bark powder used in leprosy
11.	*Dalbergia lanceolaria* subsp. *Paniculata* (Roxb.) Thoth.	Fabaceae	LC	Bark decoction is used for abdomen pain
12.	*Pongamia pinnata* (L.) Pierre	Fabaceae	LC	Used for wounds and skin ailments
13.	*Tamarindus indica* L.	Fabaceae	LC	Majorly used for constipation and abdomen pain
14.	*Pterocarpus marsupium* Roxb.	Fabaceae	NT	Majorly used for diabetes
15.	*Acacia auriculiformis* A.Cunn. ex Benth.	Fabaceae	LC	Used for wound healing and liver diseases
16.	*Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb.	Fabaceae	LC	Used for sore throat, mouth ulcers and dye
17.	*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb.	Fabaceae	LC	Gum is used for liver ailments and fever, bark used for bronchitis and dysentery
18.	*Albizia odoratissima* (L.f.) Benth.	Fabaceae	LC	To cure asthma, leprosy, and skin ailments
19.	*Samanea saman* (Jacq.) Merr.	Fabaceae	LC	Used for abdomen pain
20.	*Bauhinia purpurea* L.	Fabaceae	LC	Used for diabetes and blood related ailments
21.	*Bauhinia variegata* L.	Fabaceae	LC	Used for fever, tumers, and goiter
22.	*Pithecellobium dulce* (Roxb.) Benth.	Fabaceae	LC	Bark decoction is used for diarrhea and constipation
23.	*Prosopis cineraria* (L.) Druce	Fabaceae	LC	Used for leprosy and jaundice
24.	*Erythrina suberosa* Roxb.	Fabaceae	LC	Bark decoction is used for ulcers, ear troubles and eye ailments
25.	*Artocarpus hetereophyllus* Lam.	Moraceae	NE	Latex is used for ophthalmic ailments and aphrodisiac
26.	*Artocarpus lacucha* Buch.-Ham.	Moraceae	NE	Used for diarrhea, heart diseases and diabetes
27.	*Ficus benghalensis* L.	Moraceae	LC	Used for wound healing
28.	*Ficus carica* L.	Moraceae	LC	Used for liver ailments and skin ailments
29.	*Ficus benjamina* L.	Moraceae	LC	Used for fever, skin diseases, leprosy, malaria, and wound healing
30.	*Ficus racemosa* L.	Moraceae	LC	Leaf extract is use for hair growth, blisters and measles by local therapy
31.	*Ficus religiosa* L.	Moraceae	LC	Leaf extract is used for toothache, asthma, eye ailments and ear problems
32.	*Ficus hispida* L. f.	Moraceae	LC	Used for diabetes, anaemia, and ulcer
33.	*Ficus mollis* Vahl.	Moraceae	LC	Used for diabetes and kidney problems
34.	*Ficus virens* Aiton	Moraceae	LC	Used for diabetes, poultice, gynaecological problems, and blood purifier
35.	*Morus alba* L.	Moraceae	LC	Skin ailments, dianbetes, and blood purifiers

Table 1. Tree species evaluation with their IUCN categories and medicinal properties.

No.	TREE SPECIES	FAMILY	IUCN CATEGORIES	MEDICINAL PROPERTIES
36.	*Casuarina equisetifolia* L.	Casuarinaceae	LC	Bark decoction is used for dental problems and ulcer
37.	*Conocarpus lancifolius* Engl.	Combretaceae	VU	Leaf extract mostly used for diabetes
38.	*Terminalia anogeissiana* (Roxb. ex DC.) Wall. ex Guill. & Perr.	Combretaceae	LC	Majorly used for wound healing and skin diseases
39.	*Terminalia pendula* (Edgew.) Gere & Boatwr.	Combretaceae	LC	Mostly used for gastric problems
40.	*Terminalia chebula* Retz.	Combretaceae	LC	Mostly used in Constipation treatment and gastric problem (Triphala churna)
41.	*Terminalia elliptica* B.Heyne ex Roth	Combretaceae	LC	Bark is used to treat liver ailments, diabetes and also has anti aging properties
42.	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae	LC	Used in Scorpion sting, eye ailments, and constipation (Triphala churna)
43.	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Combretaceae	LC	Mostly used in gynaecological disorder (PCOS/PCOD)
44.	*Terminalia catappa* L.	Combretaceae	LC	Used in wound healing, oil is used in hair growth
45.	*Aegle marmelos* (L.) Corrêa	Rutaceae	NT	Fruit and leaf is mostly used in constipation relief
46.	*Bergera koenigii* L.	Rutaceae	LC	Leaf is mostly used in hair growth and gastric problems
47.	*Limonia acidissima* L.	Rutaceae	NE	Used in jaundice and blood impurities
48.	*Chloroxylon swietenia* DC.	Rutaceae	VU	Leaf decoction is used in wound healing and snakebites
49.	*Bixa orellana* L.	Bixaceae	LC	Leaf extract is used to treat sore throat and eye ailments, roots for fever and jaundice
50.	*Shorea robusta* C.F.Gaertn.	Dipterocarpaceae	LC	It has wound healing properties and also used for eye ailments, leprosy and ear problems
51.	*Bombax ceiba* L.	Malvaceae	LC	Leaves are used in blood purifier and thorny part is used in acne problem
52.	*Ceiba pentandra* (L.) Gaertn.	Malvaceae	LC	Used in skin ailments, arthritis, and eye ailments
53.	*Sterculia urens* Roxb.	Malvaceae	LC	Gum is used in constipation, throat infection, and wound healing
54.	*Thespesia populnea* (L.) Sol. ex Corrêa	Malvaceae	LC	Paste of fruit and leaf used in skin diseases
55.	*Kydia calycina* Roxb.	Malvaceae	LC	It has antiseptic properties, and also used in diabetes, and infertility
56.	*Sterculia foetida* L.	Malvaceae	LC	Used in skin diseases
57.	*Sterculia villosa* Roxb. ex Sm.	Malvaceae	LC	Used in anaemia and diabetes
58.	*Moringa oleifera* Lam.	Moringaceae	LC	Leaves are used to low cholesterol, and has diuretic propertires
59.	*Couroupita guianensis* Aubl.	Lecythidaceae	LC	It is used in kidney ailments and stomach problem
60.	*Careya arborea* Roxb.	Lecythidaceae	NE	Bark is used in dysentery and ear-ache
61.	*Madhuca longifolia* (L.) J.F.Macbr.	Sapotaceae	NE	Bark is used in diabetes, bleeding, and ulcer
62.	*Mimusops elengi* L.	Sapotaceae	LC	Powder of dried flower is used as an ointment for wound healing and liver ailments
63.	*Manilkara zapota* (L.) P.Royen	Sapotaceae	LC	Used for diabetes and arthritis
64.	*Gardenia latifolia* Aiton	Rubiaceae	LC	Used for heart disease and diabetes
65.	*Gardenia gummifera* L.f.	Rubiaceae	LC	Leaf paste used in chickenpox, measles, and skin problems
66.	*Adina cordifolia* (Roxb) Brandis	Rubiaceae	LC	Used in jaundice, stomach disorder, and diabetes
67.	*Mitragyna parvifolia* (Roxb.) Korth.	Rubiaceae	LC	Bark decoction is used in fever, burning, and gynaecological ailments
68.	*Wendlandia heynei* (Schult.) Santapau & Merchant	Rubiaceae	LC	Used in dysentery, diabetes, coughing, and asthma

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No.	TREE SPECIES	FAMILY	IUCN CATEGORIES	MEDICINAL PROPERTIES
69.	*Neolamarckia cadamba* (Roxb.) Bosser	Rubiaceae	NE	Used in blood disorders as well as skin ailments
70.	*Tamilnadia uliginosa* (Retz.) Tirveng. & Sastre	Rubiaceae	LC	Mostly used in fever, wound healing, and ulcer
71.	*Cordia dichotoma* G.Forst.	Boraginaceae	LC	Used to treat fever, ulcer, and kidney diseases
72.	*Cordia macleodii* (Griff.) Hook.f. & Thomson	Boraginaceae	NE	Mostly used to treat arthritis, jaundice, and aphrodisiac
73.	*Ehretia laevis* Roxb.	Boraginaceae	DD	To treat ulcer and skin diseses
74.	*Oroxylum indicum* (L.) Kurz	Bignoniaceae	LC	Mostly used to treat jaundice, diabetes, and dysentery
75.	*Spathodea campanulata* P.Beauv.	Bignoniaceae	LC	To treat malaria, skin disorders, and epilepsy
76.	*Millingtonia hortensis* L.f.	Bignoniaceae	LC	To treat lungs ailments (pneumonia)
77.	*Radermachera xylocarpa* (Roxb.) Roxb. Ex K.Schum	Bignoniaceae	LC	To treatment for snakebite and insects
78.	*Tectona grandis* L.f.	Lamiaceae	EN	Wood paste to use leprosy and diabetes
79.	*Gmelina arborea* Roxb. ex Sm.	Lamiaceae	LC	Fruits are used for hair growth
80.	*Schrebera swietenioides* Roxb.	Oleaceae	LC	To treat liver ailments
81.	*Alangium salviifolium* (L.f.) Wangerin	Cornaceae	LC	To treat arthritis and diabetes
82.	*Schleichera oleosa* (Lour.) Oken	Sapindaceae	LC	Kusum oil is to cure acne, rashes and itching
83.	*Ailanthus excelsa* Roxb.	Simaroubaceae	DD	To cure dysentery and skin ailments
84.	*Simarouba glauca* DC.	Simaroubaceae	LC	Bark is used in dysentery, fever and leaves are used in gynaecological disorders
85.	*Alstonia scholaris* (L.) R.Br.	Apocynaceae	LC	Bark is used in asthma, fever, dog bite, leves are used in ulcer and root is used in leprosy
86.	*Wrightia tinctoria* (Roxb.) R.Br.	Apocynaceae	LC	Majorly used in jaundice
87.	*Holarrhena pubescens* Wall. Ex G.Don	Apocynaceae	LC	Leaf is used in diabetes, anaemia and bark is used to treat diarrhea, and blood related disorders
88.	*Annona reticulata* L.	Annonaceae	LC	Majorly used in constipation, ulcer, and infectious diseases
89.	*Annona squamosa* L.	Annonaceae	LC	Used to treat in diabetes and ulcer
90.	*Boswellia serrata* Roxb.	Burseraceae	NE	Gum is used to treat diabetes
91.	*Garuga pinnata* Roxb.	Burseraceae	LC	Leaves are used in to enhance memory as well as entire plant is used to treat jaundice
92.	*Lagerstroemia parviflora* Roxb.	Lythraceae	LC	Leaves extract are used to cure cough problems
93.	*Lagerstroemia speciosa* (L.) Pers.	Lythraceae	LC	Leaves paste are used to treat malaria and cracked feet
94.	*Cocos nucifera* L.	Aracaceae	NE	To cure constipation, infectious diseases, oral problems, and used in hair growth
95.	*Diospyros malabarica* (Desr.) Kostel.	Ebenaceae	NE	Bark powder is used in diarrhea, leprosy, skin diseases, leaves are used to cure kidney disorders, snake bite, and fever
96.	*Diospyros melanoxylon* Roxb.	Ebenaceae	NE	To cure diabetes, kidney disorders, and skin diseases
97.	*Flacourtia indica* (Butrm.f.) Merr.	Salicaceae	LC	Resin are used to cure malaria, and jaundice
98.	*Putranjiva roxburghii* Wall.	Putranjivaceae	LC	Bark is used to treat broken bones
99.	*Dillenia indica* L.	Dilleniaceae	LC	Bark is used to treat diabetes, kidney disorders, liver problems, and eye ailments
100.	*Dillenia pentagyna* Roxb.	Dilleniaceae	NE	Bark is used to cure wound and fruit is used as blood purifier
101.	*Santalum album* L.	Santalaceae	VU	Bark powder is used in skin diseases, jaundice and blood purifier
102.	*Ventilago madraspatana* Gaertn.	Rhamnaceae	NE	Root are used in fever, skin diseases, and itching
103.	*Ziziphus mauritiana* Lam.	Rhamnaceae	LC	Fruit is used to treat constipation and diarrhea

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No.	TREE SPECIES	FAMILY	IUCN CATEGORIES	MEDICINAL PROPERTIES
104.	*Azadirachta indica* A.Juss.	Meliaceae	LC	Whole plant is used to treat diverse ailments, i.e., skin diseases, hair problems, and cancer
105.	*Melia azedarach* L.	Meliaceae	LC	Used to treat diabetes, diarrhea, and kidney problems
106.	*Soymida febrifuga* (Roxb.) A.Juss.	Meliaceae	LC	Majorly used to treat fever
107.	*Syzygium cumini* (L.) Skeels	Myrtaceae	LC	Fruits used to treat diarrhea, constipation, and diabetes
108.	*Eucalyptus tereticornis* Sm.	Myrtaceae	LC	Leaves are used as insect repellent and antiseptic
109.	*Eucalyptus globulus* Labill.	Myrtaceae	LC	Leaves are used as insect repellent and as an antiseptic
110.	*Eucalyptus grandis* W.Hill ex Maiden	Myrtaceae	NT	Leaves are used as antiseptic and insect repellent
111.	*Psidium guajava* L.	Myrtaceae	LC	Leaves decoction are used in cough and diarrhea on the other hand fruits decoction are used in skin ailments, diabetes, fever and constipation
112.	*Anacardium occidentale* L.	Anacardiaceae	LC	Good source of healthy fats and its used in anaemia, urinary ailments, digestive ailments
113.	*Buchanania lanzan* Spreng.	Anacardiaceae	LC	Leaf extract to treat blood ailments, digestive ailments, and wound healing
114.	*Lannea coromandelica* (Houtt.) Merr.	Anacardiaceae	LC	Bark powder is used on wounds, cut, leaf decoction is used in elephantiasis and fruit paste is majorly used for bone fracture
115.	*Mangifera indica* L.	Anacardiaceae	LC	Whole plant is used for therapeutic treatment, i.e., snake bite, dental problems, wound healing, constipation
116.	*Semecarpus anacardium* L.f.	Anacardiaceae	LC	Fruit used in arthritis and infectious diseases
117.	*Mallotus philippensis* (Lam.) Müll.Arg.	Euphorbiaceae	LC	Fruit powder is used in ulcers, wounds, bladder stone, ringworm, and piles
118.	*Cleistanthus collinus* (Roxb.) Benth. ex Hook.f.	Phyllanthaceae	VU	Used as an pesticides
119.	*Bridelia retusa* (L.) A.Juss.	Phyllanthaceae	LC	Bark is used for kidney ailments, ulcer, and arthritis
120.	*Phyllanthus emblica* L.	Phyllanthaceae	LC	Used in Triphala churna for constipation, diabetes, infectious diseases and also it has diuretic properties

properties that can fulfil medicinal requirements for people living in remote and hilly areas. This approach will alleviate individuals' demand on commercial pharmaceuticals for therapy of specific ailments, mitigating the danger associated with acquiring these allegedly contemporary medications due to their expensive prices (Lanting and Palaypayon, 2002).

2. Material and method

2.1. Study area

Bilaspur Conservancy is located in the Chhattisgarh Plains, located between 21°37'N and 22°54'N, and 81°12'E and 83°47'E, that covers an area of roughly 22,000 square kilometres. The maximum length from Lormi in the west, via Bilaspur town to Pardhiyapali, measures 239 km, whereas the maximum width from north to south is approximately 130 km. The conservancy is delineated by Orissa to the east and Madhya Pradesh to the west. To the north, it is bordered by the districts of Manendragarh-Chirmiri-Bharatpur, Surajpur, Surguja, and Jashpur, while the southern boundary addresses the districts of Kabeerdham (Kawardha), Bemetara, Baloda-Bazar, and Mahasamund (Sharma, 2008). It covers almost 11% of total forest cover in Chhattisgarh (Figure 1) (FSI, 2023).

2.2. Methodology

The thorough field study was carried out between August 2023 and August 2024 in both urban and forest regions. Field investigations were conducted frequently to assess the ethnomedicinal significance throughout various seasonal intervals. For tree species identification, the identification cell at the Department of Botany, Guru Ghasidas Vishwavidyalaya, was consulted, along with appropriate research and field manuals regarding threatened tree species. The official website of the IUCN (International Union for Conservation of Nature and Natural Resources) is being discussed. The IUCN (International Union for Conservation of Nature) is a global organisation committed to nature conservation and the sustainable use of natural resources. The IUCN Red List serves as a comprehensive inventory detailing the conservation status of various species, including plants and animals. It classifies species according to various levels of extinction risk, from "Least Concern" to "Extinct."

3. Result

Bilaspur Conservancy exhibits a significant diversity of tree species in both urban and outskirts forest regions, with the most variety of trees recorded in this region. Among these, 120 tree species are currently listed in the context of the IUCN Red List, categorised from NE (not evaluated) to EN (endangered) (Figure 2) as well as the ethnomedicinal properties reported by local communities and various tribes, such as the Baigas and Urao, are evaluated in Table 1.

4. Discussion

Climate change has altered the structure and functioning of forest ecosystems globally. A drastic increase in global temperature can alter environmental factors, which may change the structure of forest community and local species composition (Vinodia and Dixit, 2017; Sahu et al., 2022). Diverse number of species belonging to 120 genera and 35 families present in Bilaspur Conservation Areas, C.G. The region is mainly dominated by the Fabaceae family, which includes *Butea monosperma* (Lam.) Kuntze, *Vachellia leucophloea* (Roxb.) Maslin, Seigler and Ebinger, *Delonix regia*

(Bojer ex Hook.) Raf., *Cassia fistula* L., *Senna siamea* (Lam.) H.S.Irwin & Barneby, *Saraca asoca* (Roxb.) W.J.de Wilde, *Parkia biglandulosa* Wight and Arrn., etc. Additionally, the presence of *Vachellia leucophloea* and *Delonix regia* suggests adaptation to semi-arid conditions, making them important for maintaining biodiversity under climate stress (EL Sabagh et al., 2020). Given that some species fall under different IUCN conservation categories, conservation efforts should priorities the protection of vulnerable species while promoting sustainable use of medicinal plants (Mark, 2018). The functional diversity of these tree families also plays a role in carbon sequestration, climate regulation and habitat provision, which reinforces the importance of forests in mitigating the effects of climate change (Varshney et al., 2022). This investigation recorded 3 trees with data deficiency (DD), 95 trees of Least Concern (LC), 3 Nearly Threatened (NT) tree species, 5 Vulnerable species (VU), 1 Endangered species (EN) and 13 Not Evaluated species (NE). As a result, these current IUCN red-listed and therapeutically important tree species must be conserved and protected. Scientific methods of natural resources initiatives and ecosystem governance strategies are crucial for maintaining certain IUCN red-listed tree species.

5. Conclusion

The significance of collecting in the preservation of species has been an issue of constant debate. During the history of humanity, forests have been taken advantage of, leading to the extinction of several plant and tree species. This exploitation remains a primary threat to species. Research on species exploitation has predominantly concentrated on vertebrate animals, especially mammals and fish, with comparatively limited attention given to trees. Numerous individuals rely on the illegal harvesting of wildlife for their livelihoods, and this dependency is projected to keep growing. The combined approach of protection with utilisation is an essential rather than a consideration. Therefore, it is vital to investigate the combination of species conservation and utilization. Trees exhibit unique traits compared to animals that affect their potential for sustainable use; their stationary nature and more prominent appearance facilitate monitoring of exploitative practices. Our study highlights the complexity of balancing species protection and sustainable forest management in the Bilaspur Conservancy, Chhattisgarh. Through our assessment, we identified a total of 120 tree species, categorized across different conservation statuses. The majority (95 species) fall under the Least Concern (LC) category, while a smaller fraction includes 3 Data Deficient (DD) species, 3 Near Threatened (NT) species, 5 Vulnerable (VU) species, and 1 Endangered (EN) species. These findings emphasize the need for targeted conservation efforts, particularly for species at risk, alongside broader forest management strategies. Addressing the inherent tension between species protection and forest sustainability is crucial to ensuring the long-term viability of both individual tree species and the ecosystem as a whole.

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Conflict of interest

The authors declared that they have no conflict of interest.

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