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Spider Diversity in the Vicinity of "Amakoni Reservior", Sarangarh-Bilaigarh District, Chhattisgarh, India

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ABSTRACT

Spiders are a globally distributed group, with established populations in a wide range of habitats. The present study aimed to investigate spider faunal diversity within "Amakoni Reservoir," Sarangarh- Bilaigarh District, Chhattisgarh, India. This study was conducted from December 2024 to November 2025 Specimens were collected from the environs of Amakoni Reservoir (Putka Reservoir) using a variety of collection methods and subsequently identified using a taxonomic key for Indian spiders. This study was conducted to evaluate spider species richness and develop a detailed species checklist for the spider fauna of the Amakoni Reservoir area A total of 23 species, representing 8 families, were recorded from study area. The Araneidae family was the most prevalent, comprising six species. Shannon's Index (H)=-0.83031 and Simpson's Index (D)= 0.8425. This research yields significant and contemporary data regarding the species diversity within the "Amakoni Reservoir," Sarangarh- Bilaigarh District, Chhattisgarh and may serve as a useful resource for future research on spider fauna.

Key words- Spider, diversity, Araneidae Amakoni Reservoir, Sarangarh- Bilaigarh District.

Objectives- Objectives: This study was undertaken with the following primary objectives:

1. To assess the overall status of spider populations in the vicinity of the Amakoni reservoir.

2. To compile a comprehensive checklist of spider species identified at Amakoni reservoir.

INTRODUCTION

Spiders are fascinating creatures, they represent the most diverse and abundant group of invertebrate predators within terrestrial ecosystems (Wise, 1993). The fossil record indicates their emergence in the Devonian period approximately 380 million years ago (Shear et al., 1989). The current taxonomic classification recognizes 53'325 accepted species, distributed across 4391 genera within 135 families worldwide. (WSC2025 version-25) India is home to 1,442 spider species, distributed across 59 families and 361 genera, constituting 3.6% of the world's spider diversity, The family Salticidae exhibits the highest number of species (181), followed by Thomisidae (154) in India. (Silwal et al.2005) Currently Singh et al. (2022) recorded 336 spider species, belonging to 136 genera and 30 families, based on surveys conducted in 36 of the 52 districts of Madhya Pradesh. Furthermore, Singh's book details 2,110 species within 527 genera and 55 families found in India. (Singh et al 2023). In Chhattisgarh, 222 spider species from 96 genera of 23 families have been recorded by Choudhary et al. (2023).

Spiders are classified within the Phylum Arthropoda, Class Arachnida, order Araneae, and are exclusively predatory organisms. Their body structure is segmented into two primary divisions: the cephalothorax and the abdomen. Characteristically, spiders possess eight legs, which are attached to the cephalothorax. The two major groups of spiders are Mygalomorphs, referred to as ancient spiders, and Araneomorphs, known as present day

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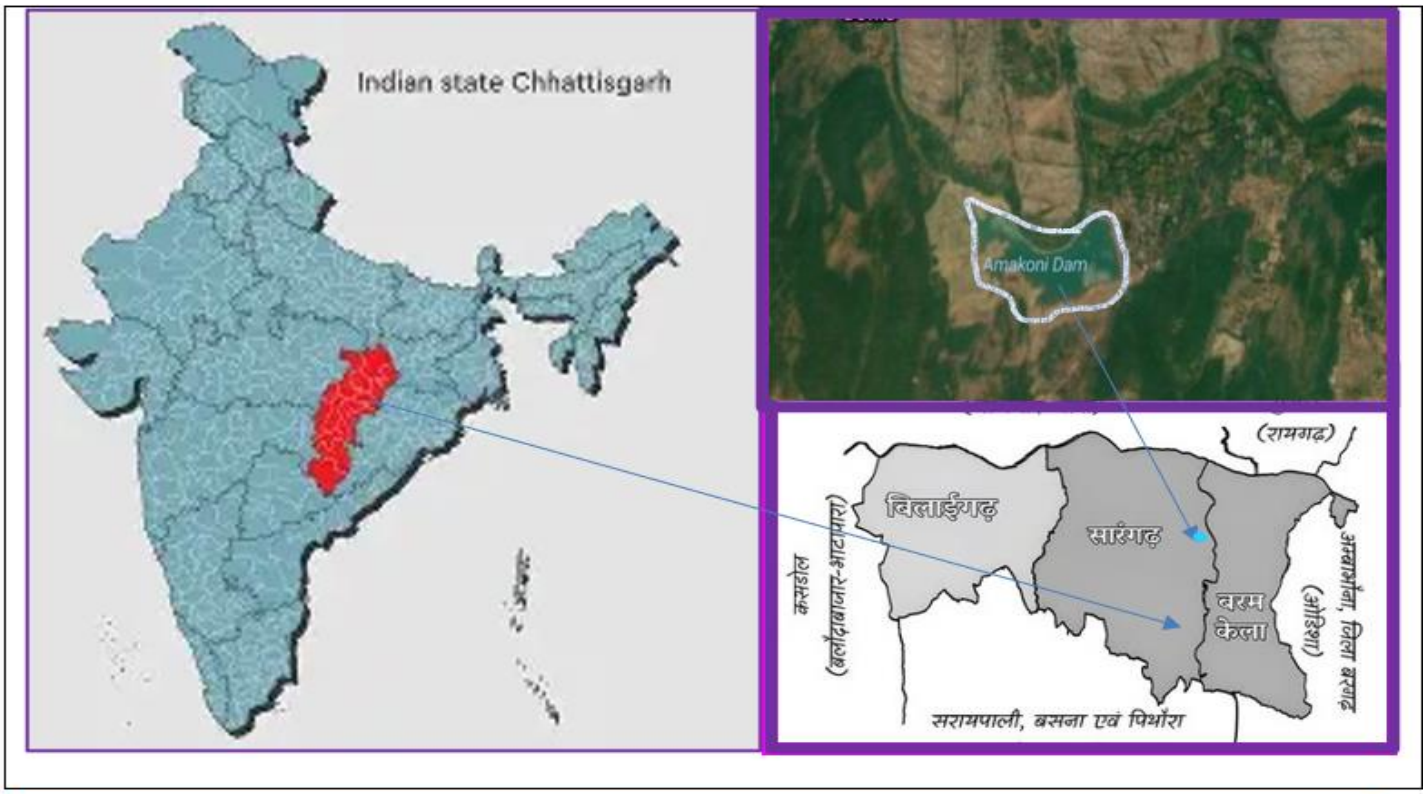
spiders. Spiders, characterized by their eight eyes, silk secretion, and web-spinning capabilities facilitated by spinnerets, are readily differentiated from insects.

As a dominant predator of insect pests, spiders fulfill a crucial ecological role. They contribute to the dynamic equilibrium of micro-level food webs and represent an essential component of Integrated crop Pest Management strategies. Spiders serve as efficient natural regulators of numerous insect-mediated diseases, including malaria and dengue. Spiders are significant biological pest regulators and serve as a food source for birds, reptiles, and mammals, thus maintaining the food web (Riechert & Lockley, 1984). They exhibit diverse distributions across habitats, contingent upon site suitability, and in feeding behaviors, occupying nearly all types of ecosystems. Spiders are a significant predatory group in terrestrial ecosystems, especially within agricultural and forest environments (Foelix, 2011); and play a crucial role in maintaining ecological balance. They are ecologically important for regulating insect populations (Nyffeler & Birkhofer, 2017).

Amakoni Reservoir, situated in the Amakoni village in Sarangarh–Bilaigarh district of Chhattisgarh, India. Chhattisgarh exhibits substantial forest coverage, encompassing approximately 44.21% of its total area. The dominant vegetation types are classified as Tropical Moist Deciduous and Tropical Dry Deciduous Forests (Champion & Seth, 1968). The reservoir, situated within a dry deciduous forest ecosystem, provides a distinctive interface between terrestrial and aquatic environments. The shining water body acts as a lifeline for Amakoni villagers. During the monsoon, the reservoir brims with fresh water, reflecting the dense canopy of Sal, Bhirra, Karra, Bija, Harra, Amla, Khair, Neem, Baheda, and Karanj, teak, and other deciduous trees that line its banks. This ecologically significant reservoir boasts considerable natural beauty and a calming atmosphere, with its banks supporting a wide variety of plant and animal life with spiders.

METHODOLOGY

Study Area- The current study was conducted “Amakoni Reservoir” also called "Putka Reservoir”, situated in the Amakoni village in Sarangarh–Bilaigarh district of Chhattisgarh, India, is a tranquil waterbody encompassed by tropical dry deciduous forests. The geographical coordinates of this area are 21° 35' 15.71" N, 83° 4' 25.37" W, and the elevation is 217 m (712 ft).



Study Area -India- Chhattisgarh-Sarangarh-Amakoni Reservoir

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue II, February 2026

Study Area- Amakoni Reservoir

Climate Of Study Area- The climate of a region plays a crucial role in shaping the biodiversity of its spider population, impacting both the variety of species present and their numbers throughout the different seasons. The town of Sarangarh is located at an altitude of 231.33 meters, which is equivalent to 758.96 feet, above the average sea level. In terms of rainfall, Sarangarh experiences an average annual precipitation of approximately 46.69 millimetres, which translates to about 1.84 inches. This rainfall is distributed across the year, occurring on roughly 34.92 days annually, which means that rainfall is experienced around 9.57% of the time. The overall climate in this district is characterized by a relatively high average annual temperature, reaching about 30.28 degrees Celsius, or 86.5 degrees Fahrenheit. These climatic factors collectively influence the spider communities found in the Sarangarh area, affecting their distribution, behavior, and overall ecological balance. The interplay of temperature, rainfall, and altitude creates a specific environmental niche that supports certain spider species and influences their seasonal cycles of activity and reproduction.

Sampling Method- This study was conducted across all three sessions (summer, rainy, and winter) from December 2024 to November 2025. The following techniques were employed for specimen collection:

1. **Ground-hand Collection:** This method was utilized to collect spiders observed on the ground surface.
2. **Aerial Hand Collection:** This method was employed to collect web-building and free-living spiders from the foliage, herbaceous plants, stems of living or dead shrubs, and tree bark.
3. **Active visual surveys** - Active visual surveys were conducted within the habitat to locate spiders. Specimens were collected from ground-level and subterranean locations, as well as above-ground microhabitats, including folded leaves, plant branches, bark, rock surfaces, and grassland, in a collection vial.
4. **Litter sampling** -Litter sampling involves to the gathering arachnids specifically from the litter layer of an environment.

Photography And Identification

All spiders observed were photographed using a digital single-lens reflex (DSLR) camera and a Vivo mobile application. Following photographic documentation, collected spiders were released back into their natural habitats. Deceased specimens were preserved in 70% ethanol. Data regarding collected specimens, including date and location, were recorded, and morphological features were clearly observed and documented.

Spider specimens were identified using established taxonomic keys and morphological characteristics, following the guidelines in the published literature (Pocock, 1900; Tikader, 1975, 1987; Tikader & Malhotra, 1980; Barrion & Litsinger, 1995; Majumder, 2004; Gajbe, 2008; Platnick, 2013; Peter & Sebastian, 2009).

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue II, February 2026

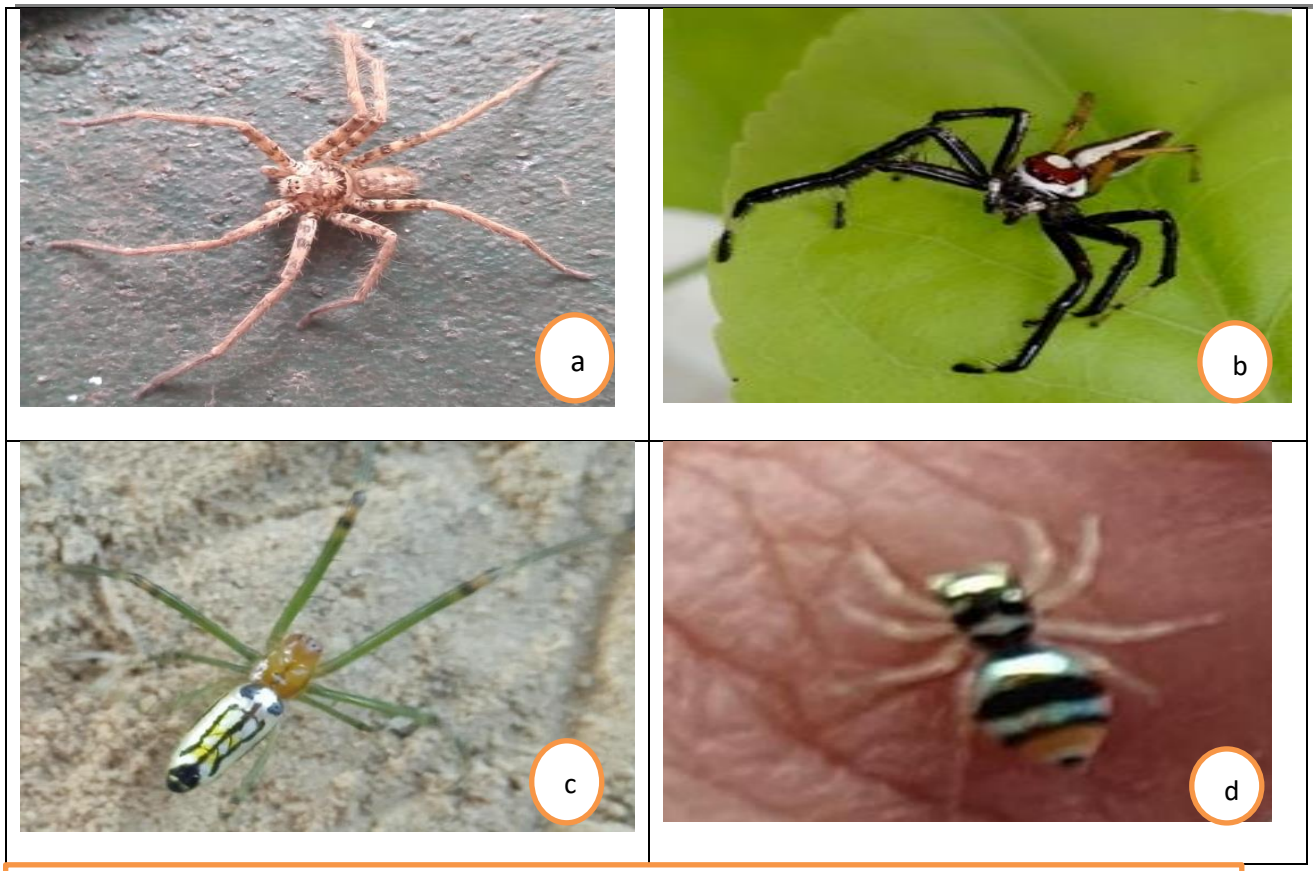


Plate-1- a Heteropoda venatoria, b - Telamonia dimidiate, c Leucauge decorata,- d- Phintella vittata

Calculation-

Table for calculations Biodiversity of following samples from the area: **Amakoni reservoir**

family	Number of individuals (n)	n/N	p_i=n/N	logp_i	p_i logp_i	n−1	n(n−1)
Araneidae	30	30/137	0.219	−0.65956	−0.14444	29	870
Hersiliidae	14	14/137	0.1022	−0.99055	−0.10123	13	182
Lycosidae	08	8/137	0.0584	−1.23359	−0.07204	07	56
Oxyopidae	25	25/137	0.1825	−0.73874	−0.13482	24	600
Pholcidae	05	5/137	0.0365	−1.43771	−0.05248	04	20
Salticidae	28	28/137	0.2044	−0.68952	−0.14094	27	756
Sparassidae	06	6/137	0.0438	−1.35853	−0.0595	05	30
Tetragnathidae	21	21/137	0.1533	−0.81446	−0.12486	20	420

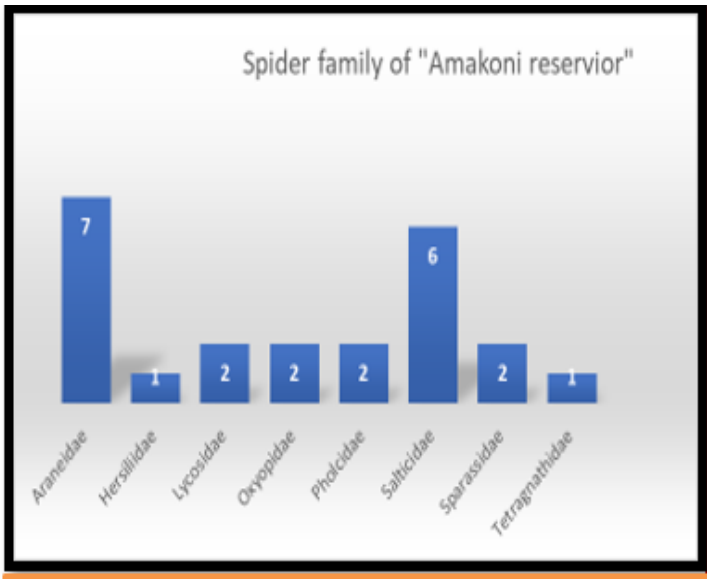
S (number of species) = n −0.83031 2934

N (Total number of individuals) = 137,

Shannon's Index (H) = $\sum_{i=1}^{s} p_i \log p_i$ =−0.83031

Simpson's Index (D)= $1-\frac{\sum n(n-1)}{N(N-1)} = 1-\frac{2934}{18632} = \frac{15698}{18632} = 0.8425$

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue II, February 2026



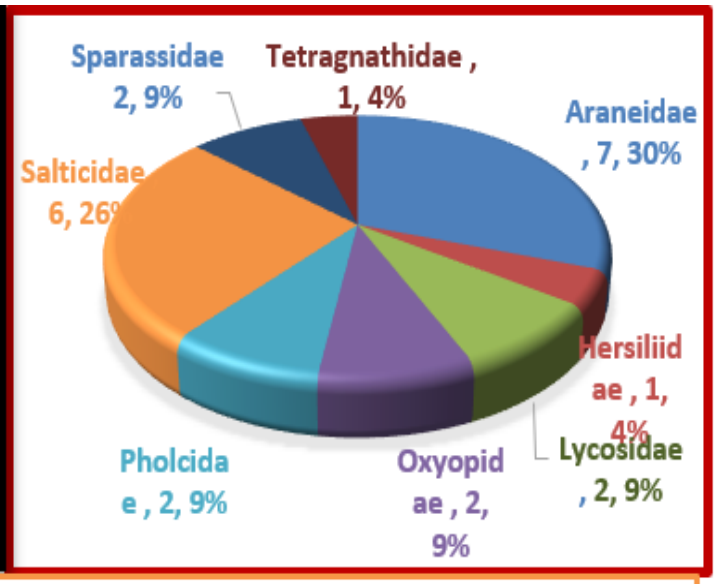


Figure 1: Abundance of Spider Families Figure 2: Percent of Spider Families in the "Amakoni

Percentage of Spider family in the "Amakoni reservoir".

Table 1. Spider checklist of Putka Reservoir, (Amakoni Reservoir,) in Sarangarh–Bilaigarh district of Chhattisgarh. -

S.N.	**Family/ Genus**	**Species**	**Common name**
1,	Araneidae Clerck, 1757		
	Argiope Savigny, 1825	Argiope aemula (Female) (Walckenaer, 1842)	Orb- weaver spider
		Argiope anasuja Thorell, 1887	Orb- weaver spider
		Argiope bruennichi (Scopoli, 1772)	Orb- weaver spider
		Argiope pulchella Thorell, 1881	Orb- weaver spider
		Argiope trifasciata (Forskål, 1775)	Orb- weaver spider
	Cyrtophora Simon, 1864	Cyrtophora cicatrosa	Garden tent-web spider
	Nephila Leach, 1815	Nephila pilipes (Fabricius, 1793	golden orb-weaver.
2.	Hersiliidae Thorell, 1869		
	Hersilia Savigny, 1825	Hersilia savignyi Lucas, 1836	Hersilia spider.
3.	Lycosidae Sundevall, 1833		
	Arctosa C.L. Koch, 184	Trochosa sp.	Indian wolf
	Pardosa C.L. Koch, 1847	Pardosa jabalpurensis Gajbe & Gajbe, 1999	Pardosa wolf spider.
4.	Oxyopidae Thorell, 1869		
	Oxyopes Latreille, 1804	Oxyopes sp.	
	Peucetia Thorell, 1869	Peucetia viridana (Stoliczka, 1869)	green lynx spider.
5.	Pholcidae C.L. Koch, 1850		
	Holocnemus Simon, 1873	Holocnemus pluchei (Scopoli, 1763)	marbled cellar spider

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue II, February 2026

	Pholcus Walckenaer,1805	Pholcus phalangioides(Fuesslin, 1775)	long-bodied cellar spider,
6.	Salticidae Blackwall, 1841		
	Carrhotus Thorell, 1891	Carrhotus viduus (C.L. Koch, 1846)	Carrhotus jumping spider
	Chrysilla Thorell, 1887	Chrysilla volupe (Karsch, 1879)	Jumping spider
	Menemerus Simon, 1868	Menemerus bivittatus (Dufour, 1831	jumping spiders
	Phintella Strand, 1906	Phintella vittata (C.L. Koch, 1846)	Phintella jumping spiders
	Plexippus C.L. Koch, 1846	Plexippus paykulli (Audouin, 1825)	Pantropical jumping spider
	Telamonia Thorell, 188	Telamonia dimidiate (Simon, 1899)	Jumping spider
7.	Sparassidae Bertkau, 1872		
	Heteropoda Latreille, 1804	Heteropoda venatoria (Linnaeus, 1767	Brown huntsman
	Olios Walckenaer,1837	Olios lamarcki(Latreille, 1806)	Lamark's huntsman spider
8.	Tetragnathidae Menge, 1866		
	Leucauge White, 1841	Leucauge decorata(Walckenaer, 1842)	long-jawed orb weaver

RESULT AND DISCUSSION

The Amakoni reservoir supports a diverse spider population. A survey of the reservoir identified 23 spider species, representing 8 families and 19 genera. The Araneidae family was the most abundant. The study documented 7 species from the Araneidae, 6 from the Salticidae, and 2 each from the Lycosidae, Oxyopidae, Pholcidae, and Sparassidae. Single species were recorded from Hersiliidae and Tetragnathidae, (Table-1) and species richness was 0.000266 per square feet.

Leucauge decorata generally found in grassland and shrub Compared to other regions of India, comprehensive data regarding the diversity and distribution of spiders in Chhattisgarh is limited. Pandey & Agrawal (2025) reported a total of 32 species, representing 28 genera and 12 families, during a survey of Madosilli Waterfall, Chhattisgarh.

The Araneidae family exhibited the highest diversity, comprising 8 species. Previous research includes Ekka, and Kujur (2015), who documented 118 species representing 52 genera under 17 families, in Ram Jharna, Raigarh district Chhattisgarh. A 2014 study by Khandelwal P. investigated the spider population of Saranpuri Lake and its surrounding garden and forest areas. The survey documented 50 spiders, encompassing 7 families and 16 species. The family Araneidae was found to be the most dominant, represented by 5 species. Parmar, B.M; (2020) documented 142 spider species, encompassing 86 genera and 25 families, in the area surrounding the Dharoi Reservoir, North Gujarat.

The families Araneidae and Salticidae were the most abundant, followed by Thomisidae. Subsequently, a comprehensive survey of spider fauna across several lakes in Ved Nagar, Gujarat (Parmar; 2025), revealed a total of 118 species. The Araneidae family was the most dominant, represented by 26 species, followed by Salticidae with 25 species.

Oxyopidae and Thomisidae were also significantly represented. Cardoso et al. (2015) identified 37 species from 11 families in their sampling of spider diversity in highland ponds. Gupta and Chandra (2016) identified 33 species pertaining to 30 genera under 5 families in Achanakmar Wildlife Sanctuary, Bilaspur, Chhattisgarh, India

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue II, February 2026

and Sen (2021) reported a total of 55 species belonging to 42 Genus under 11 families in North East Gariaband Forest Regions of Chhattisgarh, India.

CONCLUSION

This study represents the first investigation of Araneae diversity within the Amakoni Reservoir. It elucidates the ecological significance of this taxonomic group, which has been historically underrepresented in regional arachnological literature. As key predators in the food chain, spiders play a vital role in maintaining the ecosystem. These findings offer significant utility for subsequent research, conservation strategies, and reserve management. Based on these findings, conservation strategies should be developed to protect spider habitats and promote biodiversity. Furthermore, this study advances the broader understanding of India's arachnid diversity, facilitating more informed conservation planning.

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