DIVERSITY OF COLEOPTERAN BEETLES IN PAINGANGA WILDLIFE SANCTUARY, DISTRICT YAVATMAL OF MAHARASHTRA

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Abstract
The present study was conducted from February 2024 to January 2025 to evaluate the diversity, abundance, and species richness of Coleopteran beetles in Painganga Wildlife Sanctuary, District Yavatmal, Maharashtra. Systematic and effective sampling methods were employed to document beetle fauna across the study period. A total of 53 species belonging to 10 families were recorded, reflecting substantial coleopteran diversity in the sanctuary. Scarabaeidae emerged as the most dominant family with the highest species richness, followed by Carabidae, while other families were represented by fewer species. Based on field observations, beetles were categorized as abundant, common, frequent, occasional, and rare, showing considerable variation in distribution patterns. Occasional species formed the largest group, whereas only two species were found to be abundant, indicating differences in habitat preference and resource availability. The dominance of dung beetles emphasizes their important role in nutrient recycling and soil health. Overall, the findings provide valuable baseline information for future biodiversity assessments and conservation planning in the region.
***Keywords**: Beetle, Abundance, Diversity, Paingaga Wildlife Sanctuary, Umarkhed*

Introduction

Coleopteran beetles (Order: Coleoptera) are the largest and most diverse group of insects on Earth. They are found in almost all types of habitats, from forests and grasslands to freshwater bodies. Beetles play an important role in maintaining ecological balance by helping in the decomposition of organic matter, recycling nutrients, improving soil quality, pollination, and controlling pest populations. Because they respond quickly to changes in vegetation, habitat conditions, and environmental stress, beetles are often used as indicators of ecosystem health (Saxena *et al.,* 2021; Sreedevi *et al.,* 2022; Ruptake and Ahire, 2023; Ghagargunde and Paingankar, 2024).

India supports a rich diversity of beetles due to its wide range of climates and habitats. Several studies from Maharashtra, especially the Vidarbha region, have reported a high diversity of coleopteran beetles in forest ecosystems, highlighting the importance of protected areas in conserving insect biodiversity. However, detailed and site-specific studies are still lacking for many wildlife sanctuaries, including Painganga Wildlife Sanctuary.

Painganga Wildlife Sanctuary, situated in Yavatmal District of eastern Maharashtra, consists of dry deciduous forests, open grasslands, riverine areas, and seasonal water bodies along the Painganga River. This variety of habitats creates suitable conditions for different groups of beetles such as predators, plant feeders, dung feeders, and decomposers. Despite this ecological richness, information on the diversity and occurrence of coleopteran beetles in this sanctuary is very limited. The present study therefore aims to document the diversity of coleopteran beetles in Painganga Wildlife Sanctuary by preparing a systematic checklist of species, noting their occurrence status, and outlining their ecological roles. The study provides baseline data that can support future biodiversity assessments, conservation planning, and sustainable management of forest ecosystems in the Painganga region and the wider Vidarbha area.

Materials And Methods

The study was conducted during February 2024 to January 2025 to assess Diversity, Abundance and Species Richness of Coleopteran Beetles in Painganga Wildlife Sanctuary, District Yavatmal of Maharashtra. An effective protocol was adopted.

Study area:

Painganga Wildlife Sanctuary is a protected forest on the side of the Painganga River which is divided into Vidarbha and Marathwada region. This sanctuary is surrounded by water from three sides. During the monsoon, one can experience real treasure of nature. Sahastrakund Waterfall in Painganga River near Jewali village is 50 km away

from Umarkhed. Visitors come here in August, September and October. Painganga Sanctuary was founded on 1 January 1986. The area of the sanctuary is approximately 325 sq km. During 2014, borders were extended to 424 sq. km. with adding new area of 100.27 sq. km. Akola deputy conservator Wildlife has supervision and direct control of the sanctuary (Gazette of India, 2016).

The study area experiences a tropical climate with hot summers, a well-defined south-west monsoon, and generally dry conditions during the rest of the year. Summers extend from March to May, with temperatures occasionally reaching 42–45 °C, while winters (December–February) are mild and relatively cool. The average annual rainfall is about 796.6 mm, nearly 85% of which occurs during the monsoon months from June to September, with July being the wettest month. Humidity remains high during the monsoon but is low in summer, and the region experiences mostly light winds, seasonal cloud cover, and occasional thunderstorms associated with monsoon activity.

Field Visits and Observations:

Field surveys were conducted in Painganga Wildlife Sanctuary over one year during pre-monsoon, monsoon, and post-monsoon seasons to assess coleopteran diversity. A combination of pitfall traps, sweep netting, beating tray, light trapping, and hand collection methods was used following Chaudhary (2024) with minor modifications to cover different habitats and beetle guilds. Important field observations on habitat, behaviour, and natural history were recorded to prepare a comprehensive database.

Identification of Species:

Beetle species were identified using morphological characters and photographs taken with a Nikon D7000 camera. Specimens difficult to identify in the field were preserved and examined in the laboratory using standard taxonomic keys and reference literature (Hanski and Cambefort, 1991; Arrow, 1917; Vazirani 1968, 1984; Ghosh and Nilsson 2012).

Result and Discussion

The present study recorded a total of 53 species of Coleopteran beetles belonging to 10 families, indicating considerable beetle diversity in the study area. Among the recorded families, Scarabaeidae was the most dominant, represented by 29 species, followed by Carabidae with 9 species. Other families such as Meloidae (3 species), Tenebrionidae (4 species), Dytiscidae (2 species), and Cerambycidae (2 species) showed moderate representation, while Buprestidae, Chrysomelidae, Gyrinidae, and Hydrophilidae were represented by a single species each.

Based on occurrence status, the beetle fauna comprised Abundant (A), Common (C), Frequent (F), Occasional (O) and Rare (R), species. Occasional species formed the largest proportion, indicating sporadic distribution across habitats. Common and frequent species were well distributed and regularly encountered during surveys, reflecting habitat suitability and resource availability. Rare species, including *Calosoma orientale*, *Heliocopris bucephalus*, *Balboceras orientalis*, and *Orphnus spp.*, were recorded in low numbers, suggesting restricted distribution or specialized habitat requirements.

Only two species, *Holotrichia serrata* and *Onthophagus gazella*, were categorized as abundant, highlighting their ecological adaptability and dominance in the study area. The predominance of dung beetles within Scarabaeidae underscores the ecological importance of grazing-associated habitats and organic matter availability.

The observed beetle species composition in the present study is in good agreement with earlier reports, which documented similar patterns of coleopteran diversity and family dominance (Arjun *et al.,* 2022; Sundareswari *et al.,* 2022; Pande *et al.,* 2023; Yadav *et al.,* 2023; Paunikar and Kushwaha, 2023; Venkataramana and Nagalakshmi, 2024; Mangalawede and Dasar, 2024; Kadbe *et al.,* 2025; Yadav and Saxena 2025 and Prajapat *et al.,* 2025).

Overall, the results demonstrate high species richness with varied abundance patterns, reflecting habitat heterogeneity and ecological complexity of Painganga Wildlife Sanctuary, District Yavatmal of Maharashtra.

Conclusion

The present investigation reveals a high diversity of Coleopteran beetles, with 53 species across 10 families, reflecting the ecological richness and habitat complexity of the study area. The dominance of Scarabaeidae, particularly dung beetles, underscores their crucial role in ecosystem functioning such as organic matter decomposition, nutrient cycling, and soil aeration. Variations in occurrence status from abundant to rare that indicate differences in habitat suitability, resource availability, and ecological adaptability among species. The presence of several rare species highlights the need for habitat conservation and continued monitoring. Overall, this study provides essential baseline information on coleopteran diversity, which can serve as a reference for future ecological studies, biodiversity conservation strategies, and long-term monitoring of ecosystem health.

Table 4.1. Checklist of Coleopteran Beetles from Painganga Wildlife Sanctuary, Yavatmal (Maharashtra)

Sr. No.	Family	Species	Status
1.	*Buprestidae (Wood-boring beetles)*	*Psiloptera orientalis (Laporte and Gory, 1837)*	O
2.	*Carabidae (Ground beetles)*	*Anthia sexguttata (Fabricius, 1787)*	F
3.		*Brachinus crepitans (Linnaeus, 1758)*	C
4.		*Calosoma orientale (Hope, 1831)*	R
5.		*Chlaenius circumdatus* (Brullé, 1834)	O
6.		*Chlaenius posticalis* (Motschulsky, 1860)	C
7.		*Melanius bimaculatus* (Linnaeus, 1761)	R
8.		*Pheropsophus hilaris* (Fabricius, 1787)	F
9.		*Scarites subterraneus* (Fabricius, 1775)	C
10.		*Siagona europaea* (Dejean, 1825)	R
11.	*Cerambycidae (Longhorn beetles)*	*Mallodon dasystomus (Say, 1824)*	R
12.		*Omphra hirta* (Fabricius, 1781)	O
13.	*Chrysomelidae (Leaf beetles)*	*Cryptocephalus sexsignatus (Fabricius, 1798)*	O
14.	*Dytiscidae (Predaceous diving beetles)*	*Sandracottus dejeanii (Brullé, 1835)*	F
15.		*Hydaticus vittatus (Fabricius, 1775)*	C
16.	*Gyrinidae (Whirligig beetles)*	*Dineutus indicus (Aubé, 1838)*	F
17.	*Hydrophilidae (Water scavenger beetles)*	*Sternolophus rufipes (Fabricius, 1792)*	C
18.	*Meloidae (Blister beetles)*	*Mylabris phalerata* (Pallas, 1782)	C
19.		*Mylabris pustulata* (Thunberg, 1821)	F
20.		*Epicauta pennsylvanica (De Geer, 1775)*	O
21.	*Scarabaeidae (Scarab beetles)*	*Anomala bengalensis (Blanchard, 1851)*	C
22.		*Balboceras orientalis* (Westwood, 1848)	R
23.		*Catharsius molossus (Linnaeus, 1758)*	F
24.		*Catharsius sagax (Smith, 1858)*	O
25.		*Chiloloba acuta (Wiedemann, 1823)*	C
26.		*Clinteria clugi (Hope, 1831)*	O
27.		*Copris sinicus (Hope, 1831)*	F
28.		*Copris imitans (Hope, 1831)*	O
29.		*Heliocopris bucephalus (Fabricius, 1775)*	R
30.		*Holotrichia serrata* (Fabricius, 1798)	A
31.		*Hybosorus orientalis (Westwood, 1845)*	C
32.		*Onitis lama (Lansberge, 1886)*	O
33.		*Onitis philemon (Fabricius, 1775)*	F
34.		*Onitis subopacus (Arrow, 1931)*	O
35.		*Onthophagus abreui (Arrow, 1931)*	R
36.		*Onthophagus catta (Fabricius, 1787)*	F
37.		*Onthophagus dama (Fabricius, 1798)*	O
38.		*Onthophagus gazella (Fabricius, 1787)*	A
39.		*Onthophagus hindu (Arrow, 1931)*	O
40.		*Onthophagus pactolus (Fabricius, 1787)*	F
41.		*Onthophagus quadridentatus (Fabricius, 1798)*	C
42.		*Onthophagus ramosus (Wiedemann, 1823)*	O
43.		*Onthophagus turbatus Walker, 1858*	O
44.		*Orphnus impressus (Wiedemann, 1823)*	R
45.		*Orphnus parvus (Arrow, 1912)*	R
46.		*Phyllognathus dionysius (Fabricius, 1792)*	O
47.		*Schizonycha ruficollis* (Fabricius, 1775)	C
48.		*Schizonycha fuscescens* Blanchard, 1850	F
49.		*Tiniocellus spinipes (Fabricius, 1787)*	R
50.	*Tenebrionidae (Darkling beetles)*	*Coelocnemis californicus (Mannerheim, 1843)*	R
51.		*Rhytinota indica* (Solier, 1835)	C
52.		*Rhytinota rufipes* (Fairmaire, 1896)	O
53.		*Opatrum sabulosum (Linnaeus, 1761)*	C

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