

**ASSESSMENT OF FAUNAL DIVERSITY OF FORESTS
SURROUNDING DABHIL VILLAGE IN SAWANTWADI TALUKA,
SINDHUDURG, M.S., INDIA**

Patil V., Mhaske C., Stalin D., Saste M., Patil P.

¹Manager-Projects, Vanashakti, Mumbai-400046, Maharashtra, India,

²Education Officer, Vanashakti, Mumbai-400046, Maharashtra, India

³Director, Vanashakti, Mumbai-400046, Maharashtra, India.

⁴Volunteers, Vanashakti, Mumbai-400046, Maharashtra, India

⁵Chief CSR officer, Vanashakti, Mumbai-400046, Maharashtra, India..

*Correspondence: vicky.vanashakti@gmail.com

ABSTRACT: Forests are among the most bio-diverse ecosystems on Earth, playing a pivotal role as habitats for an array of flora and fauna. Their complex structure, comprising various canopy layers, understory vegetation, and diverse microhabitats, offers niches and resources crucial for the survival and proliferation of countless species commonly referred to as biodiversity. Despite the valuable ecosystem services provided by forests, the present era is marked by a widespread and pervasive occurrence of deforestation, primarily propelled by infrastructural projects like dams and highways. This extensive deforestation engenders various environmental problems, underscoring the pressing need for scientific interventions and sustainable practices to address these challenges and ensure the continued well-being of our planet. The present study focuses on the assessment of faunal diversity within the forests surrounding the Dabhil Mauli River in the Konkan region of Maharashtra. The bio-diversity survey was conducted, revealing a high species richness. Systematic direct field observations were employed to evaluate the present state of the forests, emphasizing ecological dynamics, biodiversity metrics, and inter-species interactions. The study documented a total of 145 species of fauna, including 70 species of birds, 8 species of mammals, 52 species of butterflies and moths, 5 species of dragonflies and damselflies, 5 species of spiders, and 5 species of reptiles.

KEYWORDS: Biodiversity Assessment, Western Ghats, Dabhil, Dabhil Mauli River

INTRODUCTION:

Forests serve as dynamic hubs of complex biological interactions that facilitate intertwined food webs and intricate relationships among organisms. The structural complexity present

within forest ecosystems is characterized by vegetation stratification and delicate interplays between different species. This enhances their ecological vibrancy in forests. The interconnection of symbiotic relationships within these ecosystems significantly bolsters the overall health and resilience of the surrounding landscape. The biodiversity these forests harbor is of immense ecological importance, as they contribute to ecosystem stability and resilience and provide ecosystem services vital for human well-being. However, over the years, there has been a concerning decline in biodiversity within these ecosystems, primarily due to anthropogenic activities such as deforestation, habitat fragmentation, and unsustainable land use practices. The loss of biodiversity not only threatens the integrity of forest ecosystems but also compromises their ability to support human societies and maintain ecological balance.

The Indian subcontinent harbours remarkable biodiversity, encompassing a mosaic of varied ecosystems ranging from the tall Himalayan peaks to the lush green Western Ghats. Having diverse climatic zones and varied topography, India holds about 7–8% of the world's recorded biodiversity. India is one of the 12 mega-diverse countries and is home to approximately 91,000 animal species, including majestic animals like the Royal Bengal tiger, Indian elephant, and Indian rhinoceros. In addition, wetlands, mangroves, and coastal ecosystems support a wealth of aquatic biodiversity, with over 2,000 fish species. The Western Ghats in India are renowned as a global biodiversity hotspot encompasses areas in Gujarat, Goa, Maharashtra, Karnataka, Kerala, and Tamil Nadu. One can find five different climatic conditions giving rise to a spectrum of forest types, ranging from dry scrub to semi-evergreen and evergreen forests (Pascasl, J.P., 1982, 1988; Ramesh, B.R., *et.al.*, 1997). 508 species of birds, 290 species of fish, 203 species of reptiles, 137 species of mammals, and 181 amphibians find shelter in the Western Ghats (Radhakrishnan, C., and Rajmohana, K., 2012). An analysis of endemic species reveals that the Western Ghats, being comparatively older than the Himalayan Mountains, support a substantial number of relics, or paleoendemic.

Despite their environmental challenges, the Western Ghats remain a reservoir of immense biological wealth. However, the region faces severe threats, particularly from mining, irrigation projects, and monoculture plantations. The destruction of these forests for such activities jeopardizes the delicate ecological balance and necessitates urgent scientific efforts for conservation and sustainable management. Dabhil Village, in Sawantwadi Taluka, comprises a mixed- use landscape with naturally forested areas interspersed among private

forests and horticultural plantations. The Dabhil Mauli River, originating in the Sahayadri Mountain ranges near Dabhil village, provides a year-round supply of fresh water. The forests around the village support a healthy biodiversity. The forests, the biodiversity, and the indigenous people living in such areas within the Western Ghats are under threat of development requiring forest clearance and submergence of fertile land. The forested areas around Dabhil village and the Dabhil Mauli River are facing a threat of submergence due to the proposed "Sarambale Medium Irrigation Project." An area accounting for more than 700 hectares of land is going to be submerged. This will directly impact the biodiversity that these forested areas support and also have an impact on the lives of the local people. The current study involved rapid assessment of biodiversity within the forest around the Dabhil village and the Dabhil Mauli River, located in one of the biodiverse hotspots of the world, the Western Ghats (Myers N., *et.al.*, 2000).

MATERIAL AND METHODS:

The current study involved assessment of existing fauna within the forest adjoining the Dabhil Mauli River and Dabhil Village, with the aim of devising conservation and management strategies for forests nestled within the Sahayadri mountain ranges. This rapid biodiversity assessment serves as a guide for a detailed study with a focus on the biodiversity of the forests. The Sindhudurg District, situated between latitudes 15°37' to 16°40' N and longitudes 73°19' to 74°18' E, represents the southern coastal region of western Maharashtra, encompassing an area of 5,207 sq.kms. Characterized by a tropical climate, the annual cycle is delineated into three distinct seasons: summer (February to May), monsoon (June to September), and winter (October to January). The topography predominantly comprises hilly terrain interspersed with coastal lowlands (Patil, M.D. *et.al.*, 2021). Approximately 52% of the district is covered by moist deciduous and semi-evergreen forests, as per data from the Forest Survey of India in 2015. Of this forested area, 89% is under the ownership of private landholders and communities (Patil M.D., 2016). The present study was carried out in forested areas near Dabhil village, which is positioned within the Sawantwadi tehsil of the Sindhudurg district in Maharashtra, India. It is situated at a distance of 28km from the sub-district administrative centre of Sawantwadi (tehsildar office) and 60 km from the district administrative centre of Oras Bk. According to statistical data from 2009, Konshi Dabhil serves as the gram panchayat governing Dabhil village. The total geographical area of the

village is 799.91 hectares. (<https://villageinfo.in/Maharashtra/sindhudurg/sawantwadi/dabhil.Html>).

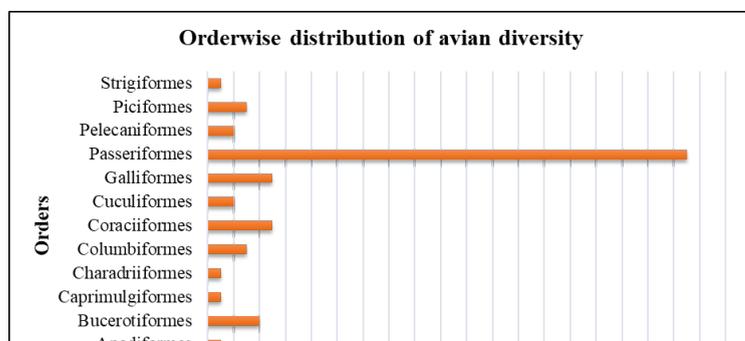
Various rapid assessment techniques have been developed for biodiversity assessment (Lu et al., 2012). To select an appropriate method for assessing the current hot specks in the Western Ghats, existing techniques were reviewed. Faunal diversity assessment involved a mammal survey using reconnaissance techniques (Plumptre, A.J., 2000), an avifaunal survey employing a species inventory approach (Hill, D. et.al., 2005), and reptile and spider surveys conducted through visual encounter surveys (Adams M.J. et.al., 1998). Butterfly diversity was observed through encounters during the survey. Along with it, literature based on the biodiversity surveys carried out at the study location previously was referenced.

RESULTS AND DISCUSSION:

The overall environmental status of the Western Ghats is experiencing a rapid change in landscape and land-use patterns. The once continuous and impenetrable tracts of forest interspersed by the small hamlets of its agropastoral people are now highly intensively used for other land-use purposes. Thus, the process has changed river tributaries into lakes, forests into blanks due to mining, and most recently, wilderness into townships. Further developing a set of Protected Areas mainly through the notification of new Protected Areas during the World Bank Forestry Project (1984), has not been able to stem the onslaught of unsustainable development in the Ghats. Unscientific developmental projects and mining within the forests of the Western Ghats have drastically reduced the forest cover, thus endangering the native flora and fauna. Currently, the floral and faunal species of the northern Western Ghats have elements that are fairly distinctive to the region and have extremely patchy distributions; hence, one can find high endemism in these areas. During the present biodiversity assessment, it was observed that forest areas adjoining the Dabhi Mauli River and Dabhil Village were found to be highly diverse. The study revealed 70 species of birds, 8 species of mammals, 52 species of butterflies and moths, 5 species of dragonflies and damselflies, 5 species of spiders, and 5 species of reptiles.

Avian diversity:

Birds are recognized as valuable biological indicators due to their

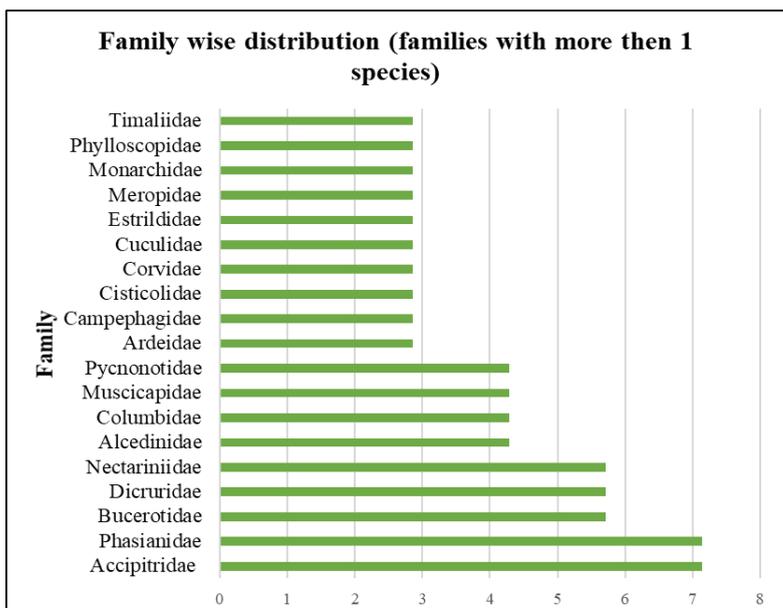


ecological adaptability and widespread distribution across diverse habitats. There is extensive documentation of avian fauna within various regions of the Western Ghats and Maharashtra. Prasad A. (2003) documented approximately 450 bird species from western Maharashtra, while Bawa et. al. (2007) recorded 508 species of birds within the Western Ghats. Borthakur, A., et.al. (2010) recorded 328 species of resident birds in the Northern Western Ghats. Additionally, Gole P. (1998) conducted a study on bird species specific to the Sahyadri region. Out of the total bird species recorded within the Indian Subcontinent, 15%, i.e., 208 species from 64 families, were recorded during the study carried out in Amboli (Satose V. et.al., 2018). During the current assessment, a total of 70 bird species belonging to 13 orders and 35 families were documented. *Buceros bicornis*, *Anthracoceros coronatus*, *Ocyrceros birostris*, *Columba elphinstonii*, *Aethopyga vigorsii*, *Dicrurus bracteatus*, *Dicaeum erythrorhynchos*, etc. are a few of the bird species observed. The order Passeriformes dominated the avian diversity with a contribution of about 51.38%, accounting for 37 species out of the entire 70 species recorded during the study.

Figure 4: Order-wise distribution of avian diversity

All the other 12 remaining orders, i.e., Accipitriformes, Coraciiformes, Galliformes, Bucerotiformes, Columbiformes, Piciformes, Cuculiformes, Pelecaniformes, Apodiformes, Caprimulgiformes, Charadriiformes, and Strigiformes, contributed less than 49% of the avian diversity encountered within the area. The Apodiformes, Caprimulgiformes, Charadriiformes, and Strigiformes orders were represented by only a single species. The order of the predatory birds, Accipitriformes, was represented by *Accipiter badius*, *Spilornis cheela*, *Milvus migrans*, *Pernis ptilorhynchus*, and *Circaetus gallicus*.

The family-wise distribution of birds revealed that birds belonging to 35 families were observed. The maximum number of species belonging to the Accipitridae and Phasianidae families were documented, which were 5 species each. The Bucerotidae, Dicruridae, and Nectariniidae families were represented by four species each. Out of the 35 families, only nine, i.e., Accipitridae, Bucerotidae, Dicruridae, Nectariniidae, Alcedinidae, Columbidae, Muscicapidae, and Pycnonotidae, accounted for 48.5% of the avian diversity observed within the forest



around Dabhil Village. The family-wise distribution of birds revealed that birds belonging to 35 families were observed. The maximum number of species belonging to the Accipitridae and Phasianidae

families were documented, which were 5 species each. The Bucerotidae, Dicruridae, and Nectariniidae families were represented by four species each. **Figure 5: Family-wise distribution of avian diversity (More than 1 species)** Out of the 35 families, only nine, i.e., Accipitridae, Bucerotidae, Dicruridae, Nectariniidae, Alcedinidae, Columbidae, Muscicapidae, and Pycnonotidae, accounted for 48.5% of the avian diversity observed within the forest around Dabhil Village. A similar trend was observed with respect to the floral diversity, where 11 families covered more than 40% of the recorded diversity. A rapid biodiversity assessment carried out by Giri V. et al. (2013) revealed 16 species of birds in Dabhil, of which the Red-Wattled Lapwing (*Vanellus indicus*) and Indian Robin (*Saxicoloides fulicatus*) were not observed during the present assessment. Out of the total bird species documented during the present study, 66 species have been classified as Least Concern (LC) as per the IUCN Red List. This suggests that the majority of the birds observed have a stable population owing to the availability of resources and the environmental conditions resulting from their widespread distribution.

On the other hand, divergence of forest for non-forest-based activities like infrastructure development, mining, plantation, and agriculture has resulted in the loss of forested patches, depriving these wild creatures of their required habitat. Malabar Pied Hornbill (*Anthracoceros coronatus*) is classified as Near Threatened (NT), whereas Malabar Grey Hornbill (*Ocyrceros griseus*), Nilgiri Wood Pigeon (*Columba elphinstonii*), and Great Hornbill (*Buceros bicornis*) are classified as Vulnerable (VU) as per the IUCN Red List, suggesting a decline in population over the year mainly due to a reduction in habitat. As these species are endemic to the Western Ghats and have limited distribution across Southeast Asia, deforestation has a severe impact on them. Nilgiri Wood Pigeon (*Columba elphinstonii*), Crimson-backed Sunbird (*Leptocoma zeylonica*), and Malabar Grey Hornbill (*Ocyrceros griseus*) are endemic to the Western Ghats, while Malabar Pied Hornbill (*Anthracoceros coronatus*) and Jerdon's Nightjar (*Caprimulgus atripennis*) are endemic to forests in southern India and Sri Lanka. Species endemic to the Indian subcontinent that were recorded during the study were Indian Peafowl (*Pavo cristatus*), Jungle Bush Quail (*Perdicula asiatica*), Red Spurfowl (*Galloperdix spadicea*), Indian Scimitar Babbler (*Pomatorhinus horsfieldii*), Jungle Babbler (*Turdoides striata*), Red-vented Bulbul (*Pycnonotus cafer*), Tickell's Flowerpecker

(*Dicaeum erythrorhynchos*), and Brown-headed Barbet (*Megalaima zeylanica*). Higher endemism has been reported in various studies carried out on biodiversity of Western Ghats.

Butterfly diversity:

Butterflies and moths are an integral part of the rich biodiversity, having persisted for approximately 50 million years, with evolutionary origins dating back some 150 million years (Kasambe R., 2016). This taxonomic group exhibits remarkable diversity, encompassing over 250,000 species, representing approximately one-quarter of all documented species. There are about 17,200 species of butterflies recorded worldwide, out of which 1,504 are recorded within India (Arya M.K. and Dayakrishna C.R., 2014). Butterflies serve as indicators of ecosystem health, and regions characterised by high butterfly and moth diversity typically exhibit correspondingly high diversity among other invertebrates. Collectively, these invertebrates provide multifaceted ecological benefits, including crucial roles in pollination and natural pest regulation. Additionally, butterflies and moths occupy pivotal positions within food webs, serving as prey for various avian species (e.g., bee-eaters, drongos, and flycatchers), bats, and other insectivorous organisms such as lizards and geckos (Gupta, I. J., and Mondal, D.K., 2005). The ecological significance of butterflies and moths extends beyond their individual species, encompassing their interactions within complex ecological networks and their contributions to ecosystem functioning. Goankar, H., (1996) has recorded 330 species of butterflies from the Western Ghats, of which 37 are endemic, while 208 species of butterflies were documented during the study.

The current assessment study revealed the presence of 50 species of butterflies and 2 species of moths spanning 7 families: the Hesperidae, Lycaenidae, Nymphalidae, Papilionidae, and Pieridae families of butterflies, and the Erebidae and Geometridae families of moths. Striped Tiger Butterfly (*Danaus genutia*), Grey Pansy (*Junonia atlites*), Plane Tiger (*Danaus chrysippus*), Southern Blue Oakleaf (*Kallima horsfieldi*), Malabar Banded Peacock (*Papilio Buddha*), etc. Additionally, sightings of the state butterflies of Maharashtra and Karnataka, i.e., Blue Mormon (*Papilio polymnestor*) and Southern Birdwing (*Troides minos*), further enrich the biodiversity inventory of the area. Of the

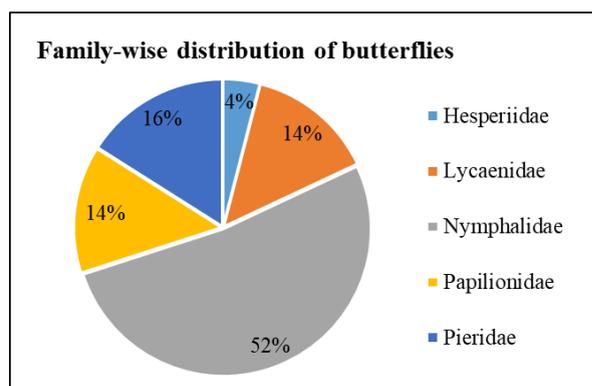


Figure 6: Family-wise diversity of butterfly

observed butterfly species, 54% belong to the Nymphalidae family, signifying its dominance within the forest ecosystem surrounding Dabhil Village. The family Nymphalidae is represented by 26 species, followed by Pieridae with 8 species, Papilionidae with 7 species, and Lycaenidae with 6 species. Family Erebidae and Geometridae were represented by a single species.

According to the IUCN Red List, 10 recorded butterfly species are classified as Least Concern (LC), while one species is categorized as Near Threatened (NT), and another as Threatened (TH). Notably, the Common Bluebottle (*Graphium sarpedon*) is categorised as Threatened, while the Common Tit (*Hypolycaena erylus*) is classified as Near Threatened. Additionally, 37 species remain uncategorized or lack sufficient data, thus being classified as Not Evaluated (NE). The Western Ghats region, renowned for its endemic biodiversity, harbors species like the Southern Blue Oakleaf, Malabar Banded Peacock, Southern Birdwing, and Blue Tiger Moth, all endemic to this ecological hotspot. Previous studies have reported 10 butterfly species from the forests adjoining Dabhil Village, with the Lemon Pansy (*Junonia lemonias*) absent in the current assessment. The presence of moist soils near waterfalls and streams acting as mud-puddling grounds, coupled with abundant wild flora, renders the forest a conducive habitat for butterfly diversity.

Mammals:

The Western Ghats region sustains a rich diversity of mammalian life, comprising 135 species, which represents approximately 32% of India's terrestrial mammal species. Further, it harbours a plethora of endemic and Red-listed mammal species, including the iconic Lion-tailed Macaque, Slender Loris, Nilgiri Marten, Travancore Flying Squirrel, Nilgiri Langur, Nilgiri Tahr, Elephant, etc. To safeguard these invaluable mammalian treasures, numerous National Parks and Wildlife Sanctuaries have been designated across the region. However, despite conservation efforts, these species persistently encounter grave threats, with habitat destruction arising from deforestation emerging as a dominant concern. Even with numerous threats, mammalian diversity in the Western Ghats is thriving and sustaining thanks to the last remaining tracts of forest within the valleys and on the mountains. Nameer P.O., *et.al.* (2001) documented a comprehensive check-list of mammals accounting for 137 species, which included 32 species categorized as threatened globally or in India.

Eight species of mammals belonging to four orders were encountered during the present assessment. Order Rodentia was represented by Indian Crested Porcupines (*Hystrix indica*) and Indian giant squirrels (*Ratufa indica*), whereas Order Carnivora was represented by Indian Grey Mongoose (*Herpestes edwardsii*), Palm Civet (*Paradoxurus hermaphrodites*), and Oriental Small-clawed Otter (*Aonyx cinerea*). Grey Langur (*Semnopithecus sps.*) was the only member of order Primate documented during the assessment. The order Artiodactyla was represented by Sambar (*Rusa unicolor*) and Wild Boar (*Sus scrofa*). Interaction with the locals also revealed the presence of mammals like the Royal Bengal Tiger (*Panthera tigris*), Indian Leopard (*Panthera pardus*), Sloth Bear (*Melursus ursinus*), Wild Dogs (*Cuon alpinus*), and Gaur (*Bos gaurus*). Rapid assessment by Giri V. *et.al.* (2013) revealed 6 species of mammals, including Indian Leopard (*Panthera pardus*), Sambar (*Rusa unicolor*), Asiatic Wild Dogs (*Cuon alpinus*), Oriental Small-clawed Otter (*Aonyx cinerea*), Wild Boar (*Sus scrofa*), and Indian Grey Mongoose (*Herpestes edwardsii*). Out of the mammal species recorded, 2 species, i.e., the Oriental Small-clawed Otter (*Aonyx cinerea*) and the Sambar (*Rusa unicolor*), are categorized as Vulnerable (VU) by the IUCN, while 1 species, i.e., the Grey Langur (*Semnopithecus sps.*) is categorized as Near Threatened (NT). All the other species were categorized as Least Concern (LC).

Reptiles:

Borthakur, A. *et.al.* (2010) observed 157 species of reptiles, which were primarily dominated by snake species in the Northern Western Ghats. Giri V. *et.al.* (2013) observed 4 species of reptiles from Dabhil, including Duméril's Black-headed Snake (*Sibynophis subpunctatus*), Roux's Forest Calotes (*Calotes rouxii*), Skink (*Eutropis sps.*), and Brook's Gecko (*Hemidactylus brookii*). The present study revealed 5 reptile species, accounting for 3 lizards and 2 snake species. Checkered Keelback (*Xenochrophis piscator*), Bronzeback Tree Snake (*Dendrelaphis tristis*), Brahminy Skink (*Eutropis carinata*), Brook's Gecko (*Hemidactylus brookii*), and Roux's Forest Calotes (*Calotes rouxii*) were the reptilian species recorded. All the observed reptile species were categorised as Least Concern (LC) as per the IUCN Red List.

Odonates:

Dragonflies and damselflies, collectively referred to as odonates, are freshwater insects commonly used as indicator taxa due to their sensitivity to environmental changes. In the

Western Ghats region, approximately 174 species of odonates have been documented, with 56 of them being endemic to this biodiverse area. Koparde, P. *et.al.*, (2014). During the present study, 5 species belong to 4 families of the order Odonata. Crimson Marsh Glider (*Trithemis aurora*), Pied Paddy Skimmer (*Neurothemis tullia*), Stream Ruby (*Heliocypha bisignata*), Clear-winged Forest Glory (*Vestalis gracilis*), and White Dartlet (*Agriocnemis pieris*) were recorded during the present study.

Arachnids:

Spiders constitute the seventh-largest animal order in terms of species diversity and serve as prominent predatory arthropods across terrestrial and numerous aquatic ecosystems. Their ubiquity renders them pivotal components within their respective habitats, functioning as valuable indicators of overall species richness and terrestrial community health. Within the Western Ghats, a total of 275 spider species spanning 139 genera across 39 families have been documented, reflecting the region's notable biodiversity in this taxonomic group. Sebastian, P. *et.al.* (2012). 5 species of spiders belonging to 5 families were recorded during the study. Funnel Web Spider (*Hippasa sp.*), Giant Wood Spider (*Nephila sp.*), Signature Spider (*Argiope sp.*), Striped lynx spider (*Oxyopes salticus*) and Jumping Spider belonging to the Salticidae family. The dominance of Giant Wood Spiders was observed in the forest, with webs appearing almost every 5 meters along the trail, indicating a thriving population of these arachnids. This also prompts considerations for conservation efforts and management strategies to maintain a balance between forest and human activities.

CONCLUSION:

The Western Ghats, renowned as a global biodiversity hotspot, sustain an unparalleled array of flora and fauna, representative of their ecological significance and evolutionary heritage. The Gadgil Commission recommended that the entire expanse of the Western Ghats should be designated as an ecologically sensitive area (ESA). Conversely, the Kasturirangan Committee proposed a reduction to 37% of the region to strike a balance between economic development and conservation imperatives. At present, the Western Ghats region hosts 2 Biosphere Reserves, 10 National Parks (NPs), 37 Wildlife Sanctuaries (WLS), and Reserved Forests, all serving as vital bastions for biodiversity conservation and ecological preservation. Even after possessing huge ecological importance, forests within the Western Ghats are facing threats due to divergence for projects involving highways, dams, and mining. This has

threatened the biodiversity within these forests, and eventually it has declined over the past decades.

Through the current faunal diversity assessment within the forests adjoining Dabhil Village, a glimpse of biodiversity within this region has been revealed. The findings of this rapid biodiversity assessment underscore the urgent need for conservation interventions to mitigate anthropogenic threats such as submergence due to irrigation projects, deforestation, habitat fragmentation, and unsustainable land use practices. The initiation of a dam construction project is anticipated to result in the inundation of surrounding forested areas, precipitating habitat degradation and the eventual displacement of indigenous biodiversity already under threat. Conservation efforts should prioritize the protection of critical habitats, the restoration of degraded ecosystems, and the sustainable management of natural resources. Additionally, community engagement and stakeholder participation are paramount for the effective conservation of biodiversity within the Western Ghats.

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