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Diversity and habitat preferences of mantids in Gorewada reserve forest, Nagpur, Maharashtra

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Abstract

A study on diversity and habitat preferences was carried out from September 2018 to September 2020 at Gorewada Reserve Forest which is located 10 km from Zero Milestone of Nagpur city which is also considered as the geographical center of India. The geographical location of the study area is 21°11'N 79°2'E located 336 m above sea level. The study area of 19.14 Sq. Km. was surveyed and attempts to locate mantids were made. Visual encounters were recorded to prepare the checklist. Photographic documentation was done using a digital camera (Model Canon 1100D) and a mobile camera (Redmi Note 3). The sites were visited in the morning, noon & evening hours to locate mantids, the records of species, date, time, location, and habitat were accordingly maintained. For the species identification reference books, experts and publications were referred. During the study, no collection was performed. Based on the current study a checklist of common species of mantids found in Gorewada Reserve Forest was prepared. A total of 9 species were identified as belonging to 14 genera and 6 families.

Keywords: Mantidae, diversity, habitat preferences, seasonal diversity, Gorewada reserve forest

Introduction

India is one of the 18 Mega diverse countries in the world. 21.67% of the geographical area is under forest cover (India State of Forest Report, Forest Survey of India, MoEF & CC, Government of India, 2019) ^[1]. The tropical climate of the country provides a conducive environment for many life forms to thrive and grow. There are 63,880 species of insects in India which is 5.97% of the total population of insects in the world Sen *et al.*, (2016) ^[2]. Mantidae family consists of 434 genera and 2500 known species around the world Patel & Singh, (2016) ^[3]. They are commonly referred to as 'Praying Mantises' owing to the prayer posture of the forelegs. As predators, they play an important role in the ecosystem and keep a check on the population of moths, butterflies, flies, grasshoppers, and pest insects. They have unique camouflage and mimicry abilities which they utilize to fetch prey and as a defense strategy. Their feeding behavior is unique they are considered farmers' friends as they check the population of pests that raid crops and cause economic loss. They have a unique ability to rotate their heads in 180°. Some reports have highlighted the prevalence of cannibalism during courtship in few species Raut and Gaikwad (2016) ^[4]; Gelperin, 1968 ^[5]. Most of the species of mantids that have been studied are diurnal while the other few are nocturnal. They are known to be attracted to artificial illuminations during the night. Ecosystem services could be jeopardized and the food webs are expected to have cascading effects due to loss of insect diversity and abundance (Hallmann *et al.*, 2017) ^[6]. In this context, it becomes important to study the diversity of insects, and therefore, the diversity and habitat preferences of mantids were chosen as the subject of the present study.

Study Area

The present study was carried out from September 2018 to September 2020 at Gorewada Reserve Forest which is located 10 km from Zero Milestone of Nagpur city which is also considered as the geographical center of India. The GPS coordinates of the study area are 21°13'12.3" N 78°05'23.5" E to 21°10'30.1" N 79°03'04.7" E at 336m to 545m MSL with gradual terrain. The area comprises dry deciduous forest with *Tectona grandis* dominating the landscape.

Material and Methods

The study area of 19.14 Sq. Km. was surveyed and attempts to locate mantids were made. Visual encounters were recorded to prepare the checklist. Photographic documentation was done using a digital camera (Model Canon 1100D) and a mobile camera (Redmi Note 3). The sites were visited in the morning, noon & evening hours to

locate mantids. The records of species, season, date, time, location, and habitat were accordingly maintained. For the species identification reference books Zoological Survey of India (Occasional Paper No. 267 & 305), experts and publications were referred. During the study, no collection of the specimen was done.



Fig 1: Physical Boundaries of Gorewada Reserve Forest

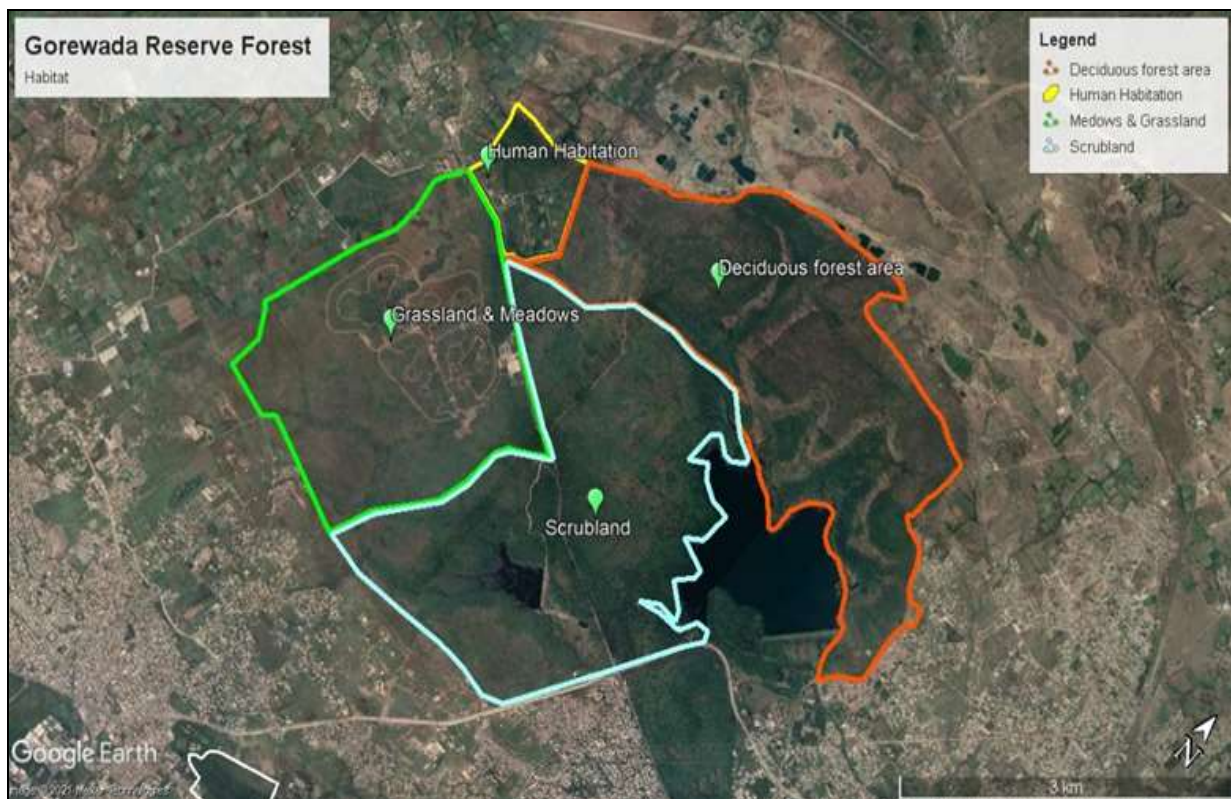
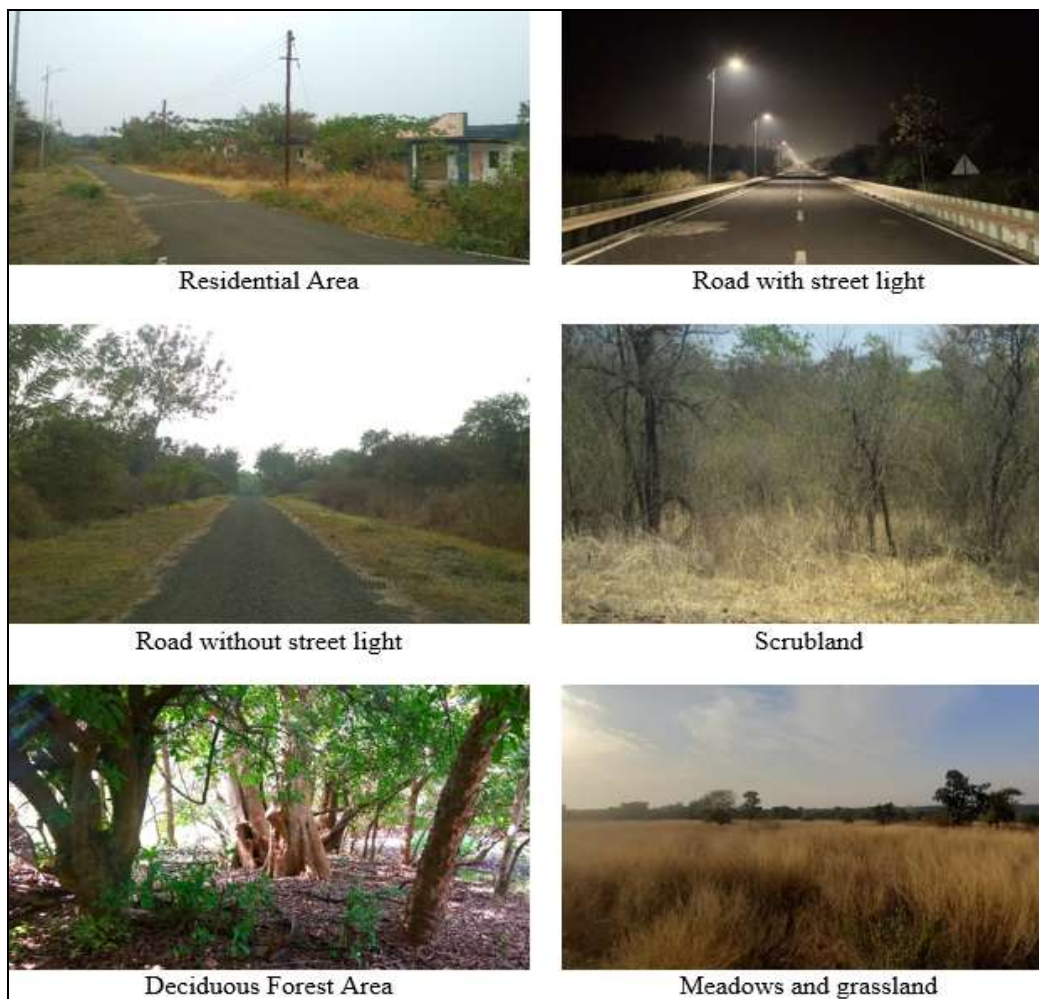


Fig 2: Map of Gorewada Reserve Forest showing different types of habitat



Observations

Based on the current study a checklist of species of mantids found in Gorewada Reserve Forest was prepared. A total of 9 species belonging to 14 genera and 6 families were identified

(Table 1 & 2, Fig.3). The number of species encountered in different seasons and the habitats preferred by these species was documented and the records were maintained accordingly (Table 3 & 4).

Table 1: Showing number of species categorized as per their families

Sr. No.	Family	No. of Species
1.	Mantidae	5
2.	Toxoderidae	2
3.	Hymenopodidae	3
4.	Tarachodidae	1
5.	Eremiaphilidae	1
6.	Nanomantidae	2

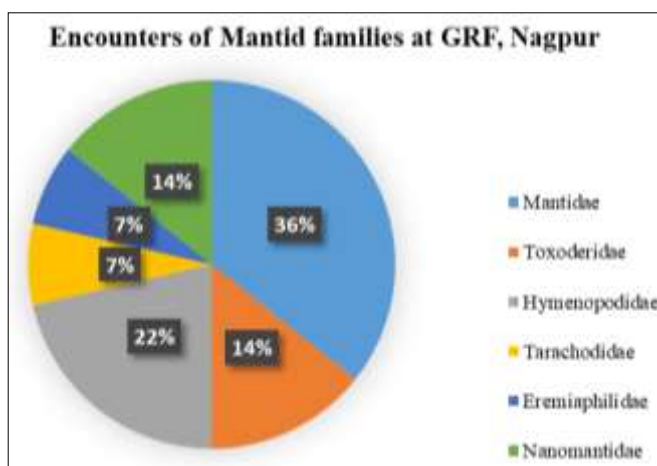


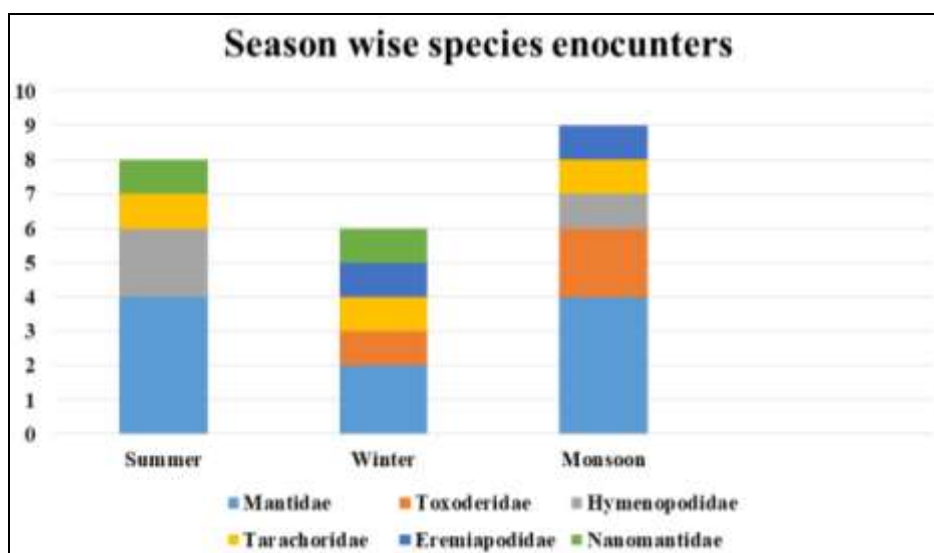
Fig 3: Pie-chart showing encounters of Mantid families at GRF, Nagpur

Table 2: Showing checklist of Mantid species at Gorewada Reserve Forest, Nagpur, Maharashtra

Sr. No.	Common Name	Scientific Name	Family
1.	Indian grass mantis	<i>Schizocephala bicornis</i>	Mantidae
2.	Chinese mantis	<i>Tenodera fasciata</i>	Mantidae
3.	Praying mantis	<i>Elmantis trincomaliae</i>	Mantidae
4.	Praying mantis	<i>Mantis genus</i>	Mantidae
5.	Praying mantis	<i>Tenoderagenus</i>	Mantidae
6.	Twig mantis	<i>Toxoderopsis taurus</i>	Toxoderidae
7.	Indian stick mantis	<i>Aethalochroa insignis</i>	Toxoderidae
8.	India flower mantis	<i>Creobroter apicalis</i>	Hymenopodidae
9.	Boxer mantis	<i>Ephestiasula pictipes</i>	Hymenopodidae
10.	Praying mantis	<i>Astyliasula genus</i>	Hymenopodidae
11.	Indian horned mantis	<i>Didymocorypha lanceolata</i>	Tarachodidae
12.	Praying mantis	<i>Dysaules longicollis</i>	Eremiaphilidae
13.	Praying mantis	<i>Tropidomantis genus</i>	Nanomantidae
14.	Boxer bark mantis	<i>Paraoxyphilus genus</i>	Nanomantidae

Table 3: Number of species encountered in different seasons

Family	Summer	Monsoon	Winter
Mantidae	4	2	4
Toxoderidae	-	1	2
Hymenopodidae	2	-	1
Tarachodidae	1	1	1
Eremiaphilidae	-	1	1
Nanomantidae	1	1	-

**Fig 3:** Graph showing the season-wise species encounters (Seasons are shown on the x-axis while the number of species shown on the y-axis)**Table 4:** Habitat preferred by Mantid species

Sr. No.	Habitat type	No. of Species
1	Road with street light	5
2	Road	7
3	Residential area	10
4	Grassland	1
5	Scrubland	3
6	Wooded area	1

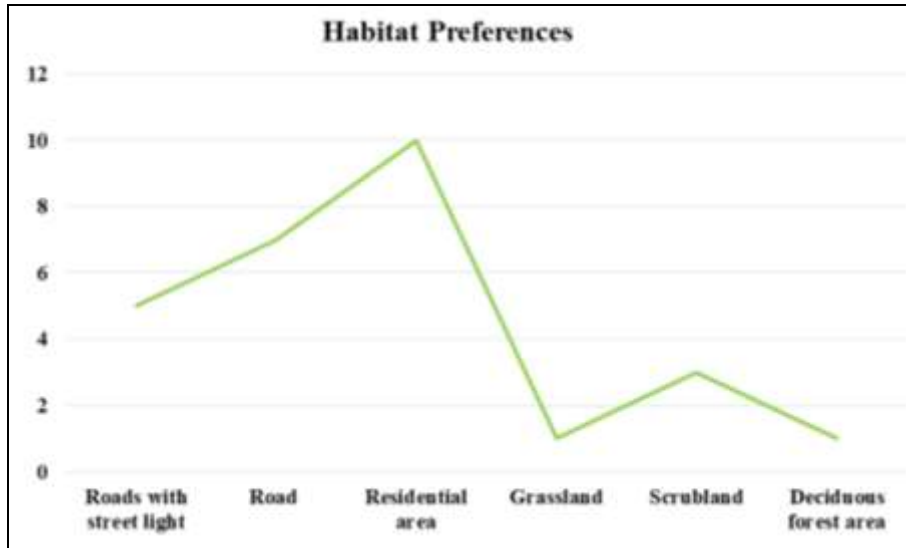


Fig 4: Graph showing habitat preferred by the Mantid species (Habitat types are shown on the x-axis while the number of species shown on the y-axis)

Photo Plate: 2





7. *Didymocorypha lanceolata*



8. *Ephestiasula pictipes*



9. *Dysaules longicollis*



10. *Mantis genus*



11. *Tropidomantis genus*



12. *Astylasula genus*



13. *Paraoxyphilus genus* (perfectly camouflaged)



14. *Tenodera genus*

Result & Discussion

In the current study, 9 species of mantids were identified at Gorewada Reserve Forest, Nagpur. The most abundant species belonged to the Mantidae family (36%) represented by 4 species and 1 genus (*Schizocephala bicornis*, *Tenodera fasciata*, *Elmantis trincomaliae*, *Mantis* genus), followed by Family Toxoderidae (14%) represented by 2 species (*Toxoderopsis taurus*, *Aethalochroa insignis*) followed by Hymenopodidae (22%) represented by 3 species (*Creobroter apicalis*, *Ephestiasula pictipes*, *Astyliasula* genus). Family Hymenopodidae was followed by Tarachodidae (7%) with 1 species (*Didymocorypha lanceolata*), and Eremiaphilidae (7%) with 1 species (*Dysaules longicollis*) and Nanomantidae (14%) with 2 genera (*Tropidomantis* genus, *Paraoxyphilus* genus) were identified and recorded during the study.

Earlier studies by Ghate *et al.*, 2012^[7] identified 56 species of mantids belonging to 31 genera and 8 families in the state of Maharashtra. Similarly, Patel *et al.*, 2018^[8] identified 21 species of mantids belonging to 15 genera and 5 families in south Gujarat. Also, More and Prashant, 2018^[9] identified 21 species of mantids belonging to 17 genera and 8 families in the Tilari forest area of Chandgarh, Kolhapur. Patel *et al.*, 2018^[8], identified a total of 21 species of mantids belonging to 15 genera and 5 families from different ecosystems in Navsari, Gujarat, India. Dwari & Mondal (2018)^[10] recorded 10 species and 9 genera from the Howrah District, West Bengal, India. Sureshan and Sambath (2009)^[11] recorded 25 species of mantis belonging to the 21 genera, 16 subfamilies, and 8 families from old Bihar. Mukherjee, *et al.*, 2017^[12] recorded 30 species, 26 genera, 8 families, and 20 subfamilies in different forests along within urban and rural areas of India. Mukherjee *et al.*, 1995^[13] have recorded 162 species of mantids belonging to the 68 genera from India. Koli and Bhawane 2011^[14] recorded 11 species belonging to 11 genera, 3 families, and 7 subfamilies in Chandoli National Park. The study conducted by Jadhav *et al.* 2006^[15] indicated the presence of 14 species of Mantids in Pench National Park spread across a 257.3 km² area.

Conclusion

In view of the above, the current study has added information on the diversity of Mantids of the Nagpur region. For the current study an area of 19.14 sq. km. was studied for two years, wherein the presence of 14 species of Mantids was identified and noted. The study of mantids in the vicinity of Nagpur has not been reported till date. This study has provided basic information on the diversity and habitat preferences of Mantids in Nagpur. Most of the sightings of the Mantids were reported from the periphery of human habitations of the Gorewada Reserve Forest. The probable reason for this abundance might be the illumination of human habitations that attract moths and grasshoppers which form the basic prey base of the Mantids. This is the first report on Mantid diversity in Gorewada Reserve Forest, Nagpur. The rich diversity of mantid species may be attributed to the attractive habitat types and availability of prey. This study provides the basic data on the diversity of mantids for further studies of the said Order in Nagpur and adjoining areas.

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