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Vulnerable Earthworm Species Identified from Nilgiri Biosphere Reserve

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ABSTRACT

Diversity of earthworms at Nilgiri Biosphere Reserve is less known even though it is one among the biodiversity hot spots. Unless an authentic record of available earthworm species is made, the consequences of human alternation or climate change on the earthworm species diversity cannot be assessed. In this regard, the present study is relevant. Earthworms were collected from twenty three sites of NBR. The findings of this study showed that out of the total earthworm species identified from selected areas of NBR, 83.4% are native species and 16.6% are exotic. This indicates the predominance of native species in the study area possibly due to low level of disturbance in the area. Among the species identified from Mukurthi, *Priodichaeta pellucida* (Bourne) which is listed as vulnerable and has not been encountered since its discovery about 100 years ago.

Key words: Earthworms, NBR, *Priodichaeta pellucida*, diversity

INTRODUCTION

Earthworms are considered as an important biological resource with tremendous potential in many ecosystems as they significantly affect soil physical structure, organic matter dynamics and promote plant growth (Lee, 1985; Lavelle *et al*., 1999). Earthworms comprise the highest biomass among soil fauna. Studies on the energetics revealed that they assimilate at least 13% the net annual primary productivity in the grasslands of India (Abbasi and Ramasamy, 2001; Ismail, 1997). Earthworm diversity, community structure and distribution patterns across the tropical parts of the world are not well documented in the literature and hence only little is known about the regional taxonomic richness of the earthworms in these regions (Blanchart and Julka, 1997; Suthar, 2011). As far as India is concerned, few reports are available on the diversity and distribution of earthworms.

Maximum diversity of earthworm species in India is found in Western Ghats and Eastern Himalaya regions which are recognised as biodiversity hot spots. Although the area is only 2% of the world's landmass, these regions support about 10.5% of the total known global earthworm diversity (Julka, 2010). The Western Ghats and West coast region have the richest earthworm diversity with 219 documented species which is about 52.4% of total earthworm species in India. Endemism, both at the genus and species level, is very high in India; about 71% of genera and 89% of earthworm species are endemic. Some exotic peregrine species of earthworms are also found and these are now widespread in disturbed habitats following deforestation and intensive cultivation

(Julka, 2008). The present study deals with the survey of earthworms in the Silent Valley National Park, Mukkurthi National park and Wayanad (Muthanga) Wildlife Sanctuary of Nilgiri Biosphere Reserve (NBR).

MATERIALS AND METHODS

Study area: Nilgiri Biosphere Reserve (NBR) is the first biosphere reserve in India established in the year 1986 and comprises the hill ranges of Nilgiri. It lies between 10°45' N and 12°00' N and 76°00' E and 77°15' E with a total area of 5520 km^2 spread across the three states i.e., Kerala, Karnataka and Tamil Nadu.

Earthworm sampling: The sampling was done at Silent Valley National Park, Muthanga Wildlife Sanctuary and Mukurthi National Park. Earthworms were collected from 23 randomly selected sites and at each site 2 to 4 quadrates were randomly laid. At each sampling point, a metallic frame (25×25 cm) was inserted. An outline of the metallic frame (quadrate) was made using the spade on the soil surface. The overlying litter was carefully removed, manually sorted in search of earthworms and the worms (if present) were collected in a container after recording their number. Once the surface litter was cleared, a trench was dug up to a depth of 40 cm of the quadrate area in order to get a soil monolith of size 25×25×40 cm (Bhadauria *et al.*, 2000). The soil was carefully hand sorted and earthworms were collected after recording their number. Juveniles, aestivating earthworms and cocoons were released back to the field. Earthworm samples with sufficient amount of native forest soil were collected in small containers and the containers were labeled. The container lid was perforated in order to facilitate the earthworms inside with sufficient aeration. Information about the habitat structure was also recorded at the time of sample collection. In the laboratory, the worms were washed to remove soil and dirt adhered and subsequently killed by using 90% rectified alcohol. The samples were finally preserved with 5% formalin. Earthworms were identified with the help of Zoological Survey of India.

RESULTS AND DISCUSSION

The list of earthworm species identified from Silent Valley National Park, Mukkurthi National Park and Wayanad Wildlife sanctuary are given in the Table 1. Out of the total number of worms

Table 1: Earthworm species identified from NBR

Name of species	Collected from	Family	Native (N)/Exotic (E) species
Argilophilus (= *Plutellus*) sp.	S, W	Acanthodrilidae	N
Perionyx ceylanensis Michaelsen	S, W	Megascolecidae	N
Pontoscolex corethrurus Muller	S, W	Glossoscolecidae	E
Drawida grandis Bourn	S, M	Moniligastridae	N
Drawida parva Bourne	S	Moniligastridae	N
Drawida nr. *travancorensis* Michaelsen	S	Moniligastridae	N
Drawida sulcata Michaelsen	S	Moniligastridae	N
Drawida nr. *parambikulamana* Stephenson	S	Moniligastridae	N
Drawida sp. (Nr. *D. modesta* Rao)	W	Moniligastridae	N
Drawida nr. *robusta* Gates	M	Moniligastridae	N
Priodichaeta pellucida Bourne	M	Octochaetidae	N
Amynthas corticis Kinberg	M	Megascolecidae	E

S: Silent valley, W: Wayanad, M: Mukurthi

collected from Silent valley *Drawida* nr. *parambikulamana* Stephenson represented 57.14% followed by *Drawida parva* (Bourne) (16.07%), *Drawida* nr. *Travancorensis* Michaelsen (14.28%), *Drawida sulcata* Michaelsen (8.03%), *Argilophilus* (= *Plutellus*) sp. (5.25%), *Drawida grandis* (Bourne) (2.67%), *Perionyx ceylanensis* Michaelsen (1.78%) and *Pontoscolex corethurus* (Miller) (1%). Except *P. corethurus*, rest are native species. *Drawida* species was dominating in the Wayanad Wild Life Sanctuary. The presence of *Drawida grandis, Drawida* nr. *robusta* Gates, *Priodichaeta pellucida* (Bourne), *Amynthas cortices* (Kinberg) are observed from the Mukurthi National Park.

The most significant finding of this study is the identification of *Priodichaeta pellucida* (Bourne) in Mukurthi. This species is listed as vulnerable and has not been encountered since its first citing made 100 years ago (Julka, 2008). *Priodichaeta pellucida* coming under the family Acanthodrilidae, is widely distributed in Australia, New Zealand, South Africa, South America and North America.

This study resulted into the identification of five different families (Acanthodrilidae, Megascolecidae, Moniligastridae, Glossoscolecidae and Octochaetidae). Among the twelve earth worm species identified ten (83.4%) are native and two (16.6%) belong to exotic. Thus the study concludes that the parts of the NBR sampled for this study are rich with native earthworm species. Only 16.6% of the total species are exotic. This is a positive indication that the habitat is not disturbed. The spread of exotic earthworm species is recorded mostly in disturbed habitats like deforested, cultivated lands (Julka and Paliwal, 2005). Another significant finding of this study is the spotting of *Priodichaeta pellucida* which is listed as vulnerable species and not spotted since its discovery made 100 years ago. This indicates that the Mukurthi area from where *P. pellucida* has been spotted still has the undisturbed and suitable habitat for the survival of vulnerable earthworm species.

CONCLUSION

Among the total earthworm species identified from selected areas of NBR 83.4% are native species and 16.6% are exotic species. This indicates the predominance of native species in the study area. The results of the study indicate that the portion of NBR sampled for this study has good number of native earthworm species. This is an indication that their habitat is not much disturbed. Among the species identified from Mukurthi, sighting and collection of *Priodichaeta pellucida* (Bourne) which is listed as vulnerable and not been encountered since its discovery about 90-100 years is a significant observation of this study, indicating that the habitat is suitable to such kind of rare and vulnerable earthworm species.

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