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The significance of Ecopark, an urban park in Kolkata, West Bengal, in terms of the refuge of Herpetofauna

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Abstract
An ecosystem's functionality and stability are naturally influenced by biological diversity. Herpetofauna is the part of this biological diversity which provide support to maintenance of natural diversity. The present study was carried out at Ecopark, West Bengal, India from June 2021 to June 2022 with the objective to assess the diversity of herpetofauna in an urban park in the context of massive urbanization of the outside area called Rajarhat. Present survey revealed the richness of the urban park in its herpetofaunal diversity where 21 species of reptiles and 5 species of amphibians with one Near Threatened, three Vulnerable and one endangered species were found. Colubridae family species was found highest. Influence on herpetofaunal diversity, it was determined that this park may play an important role in the conservation of those species.

Keywords: Urban park, herpetofauna, amphibia, reptile, diversity

Introduction
The term herpetofauna refers to the faunal diversity of reptilian and amphibian species diversity of a particular region. Reptilies (crocodilians, snakes, lizards and tuatara) and amphibians (frogs, toads, salamanders, newts and caecilians) are generally cold-blooded vertebrates and preferred to live in forested areas, According to Global Reptile assessment, there are a total 10196 reptile species has been recorded till now, of which 21.1% are (57.9% turtle, 50% crocodile, 19.6% lizard and snakes) reported to be threatened with extinction [Cox. *et al*. 2022] [3]. On the other hand among 8490 no. of total species of reported amphibians [Amphibia web, 2022] [1] 40.7% are found to be threatened with extinction risk [Cox. *et al*. 2022] [3]. Land use change, habitat fragmentation, overexploitation introduction of exotic spices, change in climatic conditions, environmental toxicity are consider as the major threat to the herpetofaunal population [Urbin-Cardona, J N; 2008] [9]. Rapid forest anthropogenic activities leads the forest dwelling reptiles (26.6%) more threatened than the reptiles live in arid habitats (13.7%) [Cox *et al*. 2022] [3]. India is a mega diverse country with immense diversity of herpetofauna. Kolkata is the third most metropolitan city located in west Bengal, India processing a rapid urbanization. It has a tropical wet and dry climate, with a moderate to high humidity most of the year and dries in winter season [Mitra. S, 2019] [8]. Though there are a very few reports on herpetofauna diversity in Kolkata but none of them shows the importance of urban parks diversity in between maintain their faster development areas. This is the first paper that focuses on the importance of an urban park to support the herpetofauna diversity in Kolkata.

Materials and Methods
Study area
The current study was conducted from June 2021 to June 2022 to explore the variety of herpetofauna in Ecopark, Kolkata, West Bengal. Ecopark is an urban park with 480 acre area that has a diverse range of micro habitats, including a forest with mixed forest trees like Arjuna, Rain tree, Sal, Mahua, Simul, and Babul in the "rainforest" area, grassland in the "formal garden," "Golfarena," marshland known as pakhibitan, and a garden with shrubs and

herbs called "Butterfly Garden," as well as a 104-acre water body. The park's location in Kolkata, West Bengal, has a hot, tropical monsoon climate with highs of 42°C in the summer, 30°C during the monsoon season, and often lows of 10°C in the winter.

Methods

In order to explore the diversity of Herpetofauna in this study area, a variety of methods such as litter cleaning, digging loose soil, visual encounter, hand capturing, call survey were used during day and early night time throughout the year. Each habitat's was closely scrutinized, and the herpetofauna were documented. For photographed the documents Nikon Coolpix P600 was used. Digging tools, hand gulfs were also used. The unidentified species were identified with the help of experts and books.

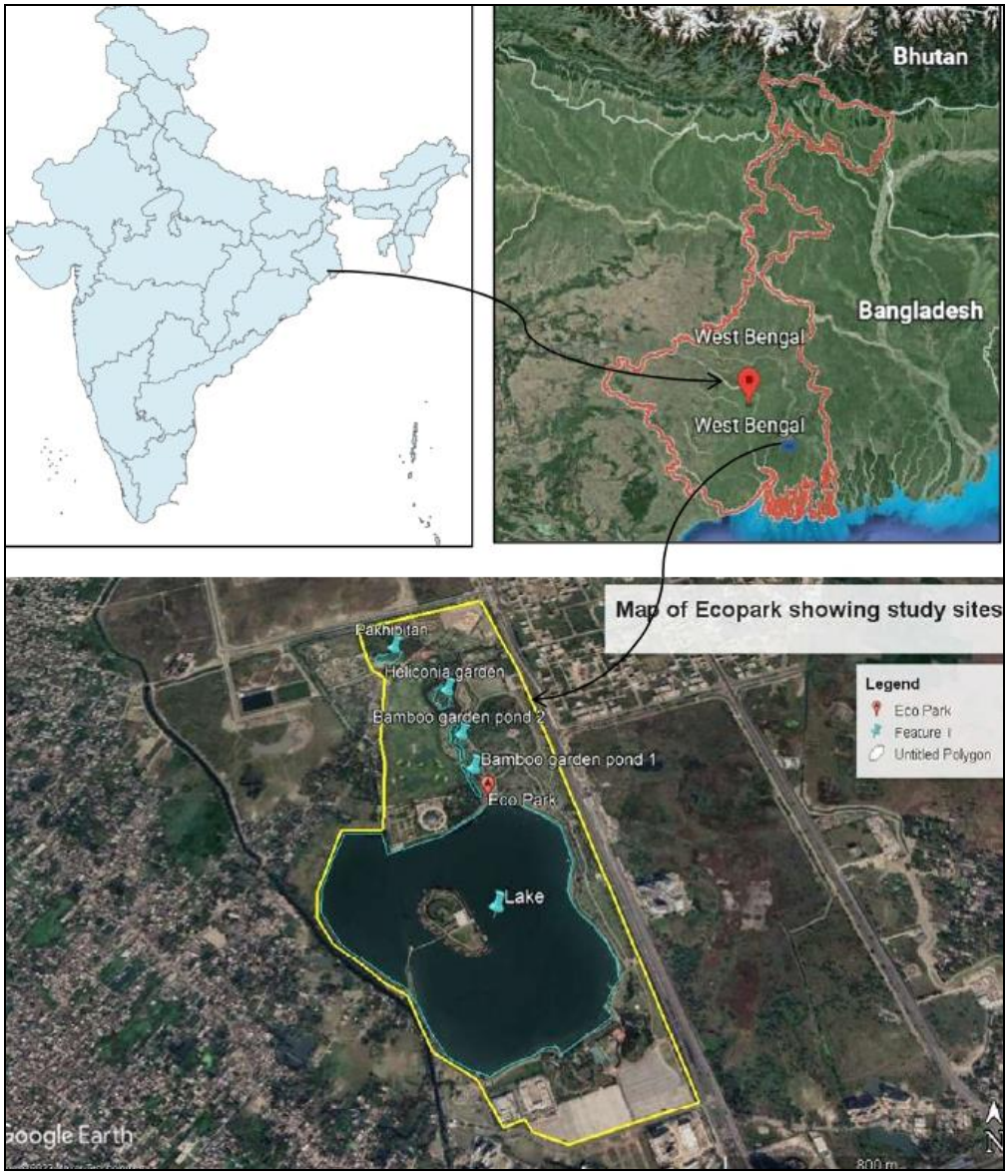

Fig 1: Map of the study area

Results

After one year of intensive study at Ecopark, we found twenty-six species of herpetofauna which included twenty-one reptile 2 orders (Squamata and testudines), 9 families (Colubridae [10], Typhlopidae [11], Viperidae [12], Agamidae [13], Gekkonidae [13], Scincidae [13], Varanidae [14], Geoemydidae [15], Trionychidae [15] and five amphibian's species under the order Anura, 3 families (Bufonidae [13], Dicroglossidae, Microhylidae [11, 13]) (Table1). Colubridae [10] family species was found highest with 27% followed by Varanidae [14] [15%], Dicroglossidae [11] and Gekkonidae [13] each 11%, Geoemydidae, Scincidae [13] and Trionychidae each with 8%, Agamidae [13], Bufonidae [13], Microhylidae [11, 13] each with 4% (Fig2). According to IUCN Status among those twenty-six species 20 were LC, Yellow Monitor Lizard was found only one species under EN, Bengal Monitor Lizard was only one NT Species and three VU species were found named Indian Roofed Turtle, Indian Flapshell Turtle form turtle, Painted keelback from snake. One data was insufficient (Fig3). 43% species were found very common such as Rat Snake, Indian Garden Lizard, Asian House Gecko, Indian Roofed Turtle, Indian Bull Frog etc. 29% species were common such as Buff-striped Keelback, Bengal Monitor Lizard etc, 21% of species were found as rare such as Olive Keelback Water Snake, Indian Pond Terrapin etc. and 7% species were found very rare such as Painted keelback, Yellow Monitor Lizard (Fig 4). According with the result order Squamata was highest with 69% followed by Anura 19% and Testudines 12% (Fig5).

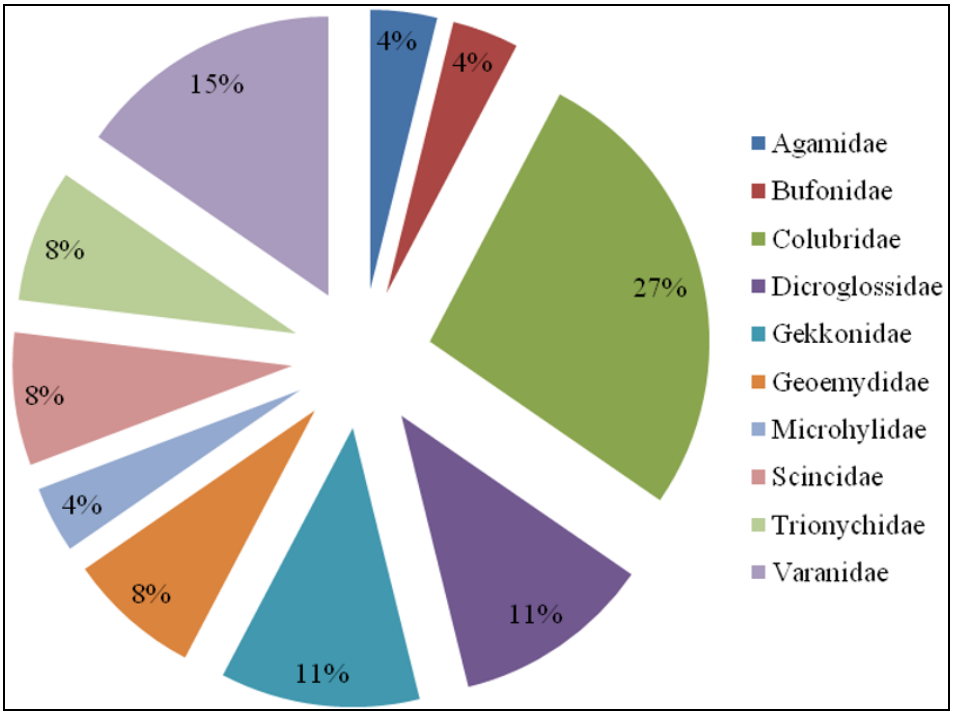

Fig 2: Family wise percentage composition of Herpetofauna

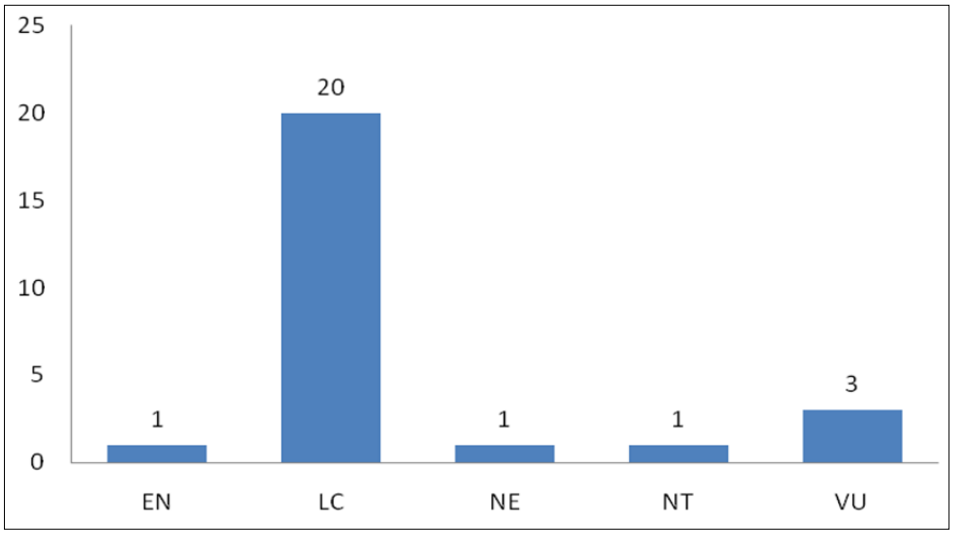

Fig 3: Composition of Herpetofauna according to ICUN status

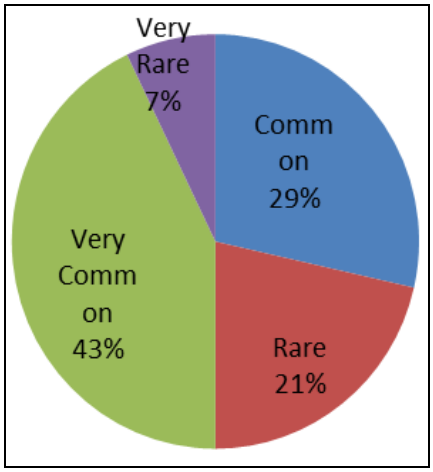

Fig 4: Percentage of Herpotofauna according to spotting frequency

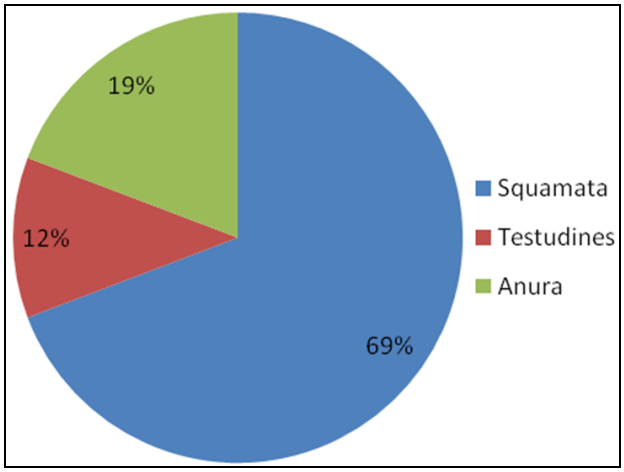

Fig 5: Order wise percentage of Herpetofauna

Table 1: List of Herpetofauna in Ecopark.

S. No.	Class	Order	Family	Common Name	Scientific name	IUCN Status	Spotting frequency
1	Reptilia	Squamata	Colubridae	Common Bronzeback	*Dendrelaphis tristis* (Daudin, 1803)	LC	C
2	Reptilia	Squamata	Colubridae	Common Wolf Snake	*Lycodon aulicus* (Linnaeus, 1758)	LC	R
3	Reptilia	Squamata	Colubridae	Buff-striped Keelback	*Amphiesma stolatum* (Linnaeus, 1758)	LC	C
4	Reptilia	Squamata	Colubridae	Checkered Keelback	*Fowlea piscator* (Schneider, 1799)	LC	VC
5	Reptilia	Squamata	Colubridae	Indian Rat Snake	*Ptyas mucosa* (Linnaeus, 1758)	NE	VC
6	Reptilia	Squamata	Colubridae	Olive Keelback Water Snake	*Atretium schistosum* (Daudin, 1803)	LC	R
9	Reptilia	Squamata	Colubridae	Painted keelback	*Xenochrophis cerasogaster* (Cantor, 1839)	VU	VR
7	Reptilia	Squamata	Typhlopidae	Brahminy Blind Snake	*Indotyphlops braminus* (Daudin, 1803)	LC	C
8	Reptilia	Squamata	Viperidae	Russell's viper	*Daboia russelii* (Shaw & Nodder, 1797)	LC	C
10	Reptilia	Squamata	Agamidae	Indian Garden Lizard	*Calotes versicolor* (Daudin, 1802)	LC	VC
11	Reptilia	Squamata	Gekkonidae	Asian House Gecko	*Hemidactylus frenatus* Duméril & Bibron, 1836	LC	VC
12	Reptilia	Squamata	Gekkonidae	Yellow Green House Gecko	*Hemidactylus flaviviridis* Rüppell, 1835	LC	VC
13	Reptilia	Squamata	Gekkonidae	Brooke's House Gecko	*Hemidactylus brookii* Gray, 1845	LC	VC
14	Reptilia	Squamata	Scincidae	Common Grass Skink	*Lampropholis guichenoti* (A.M.C. Duméril & Bibron, 1839)	LC	VC
15	Reptilia	Squamata	Scincidae	Bronze Grass Skink	*Eutropis macularia* (Blyth, 1853)	LC	C
16	Reptilia	Squamata	Varanidae	Water Monitor Lizard	*Varanus salvator* (Laurenti, 1768)	LC	R
17	Reptilia	Squamata	Varanidae	Bengal Monitor Lizard	*Varanus bengalensis* (Daudin, 1802)	NT	C
18	Reptilia	Squamata	Varanidae	Yellow Monitor Lizard	*Varanus flavescens* (Hardwicke & Gray, 1827)	EN	VR
19	Reptilia	Testudines	Geoemydidae	Indian Pond Terrapin	*Melanochelys trijuga* (Schweigger, 1812)	LC	R
20	Reptilia	Testudines	Geoemydidae	Indian Roofed Turtle	*Pangshura tecta* (Gray, 1831)	VU	VC
21	Reptilia	Testudines	Trionychidae	Indian Flapshell Turtle	*Lissemys punctata* (Lacépède, 1788)	VU	VC
22	Amphibia	Anura	Bufonidae	Common Asian Toad	*Duttaphrynus melanostictus* (Schneider, 1799)	LC	VC
23	Amphibia	Anura	Dicroglossidae	Skittering Frog	*Euphlyctis cyanophlyctis* (Schneider, 1799)	LC	C
24	Amphibia	Anura	Dicroglossidae	Indian Cricket Frog	*Fejervarya limnocharis* (Gravenhorst, 1829)	LC	C
25	Amphibia	Anura	Dicroglossidae	Indian Bull Frog	*Hoplobatrachus tigerinus* (Daudin, 1803)	LC	VC
26	Amphibia	Anura	Microhylidae	Asian Painted Frog	*Kaloula pulchra* (Gray, 1831)	LC	R

Note: IUCN Status: LC- Least Concern; NT-Near Threatened; VU-Vulnerable; EN- Endangered; NE-Not Evaluated (IUCN, 2022); VC-Very Common, C-Common, R-Rare, VR-Rare;]

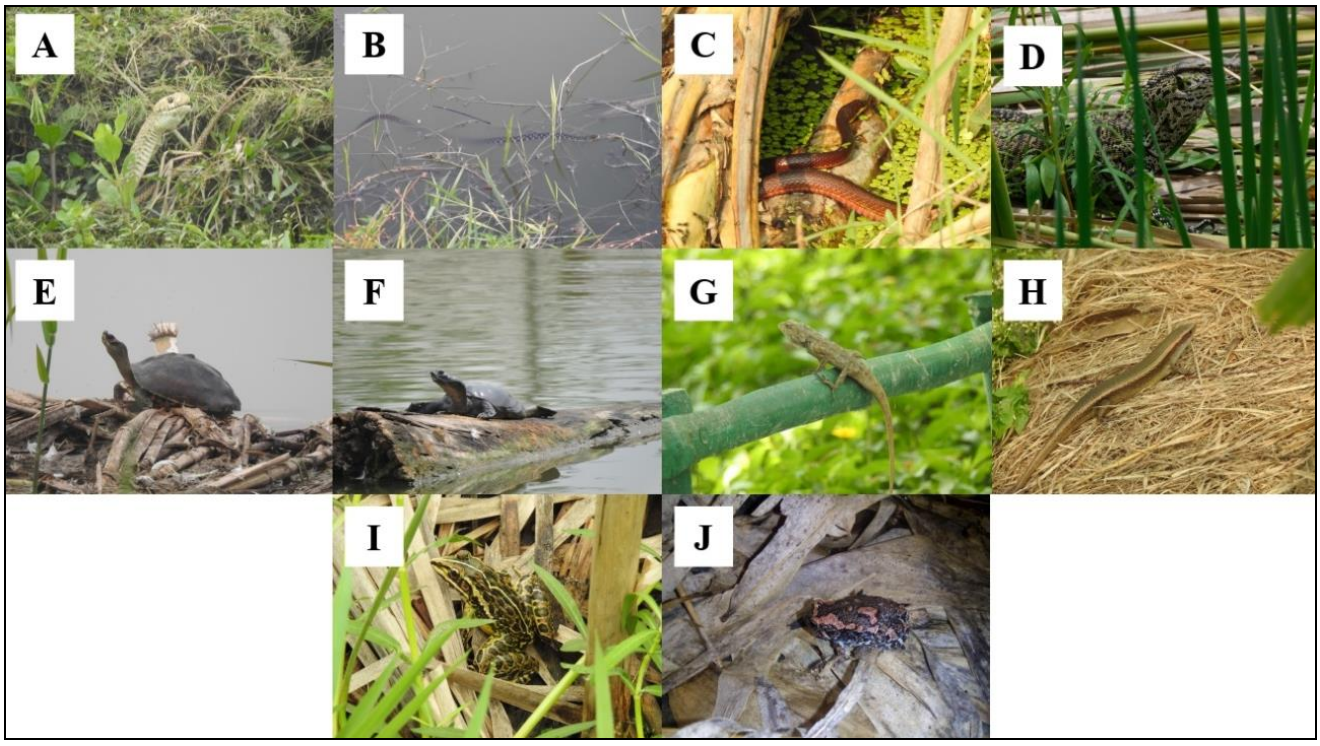

Fig 6: Some of the pictures of herpetofauna from study area- A) *Ptyas mucosa*, B) *Fowlea piscator*, C) *Xenochrophis cerasogaster*, D) *Varanus salvator*, E) *Pangshura tecta*, F) *Lissemys punctata*, G) *Calotes versicolor*, H) *Lampropholis guichenoti*, I) *Hoplobatrachus tigerinus*, J) *Kaloula pulchra*

Discussion

26 species of herpetofauna found in an urban park, which is fairly good.

Nine snake species were discovered during this investigation, most of which are found in marshland, freshwater water bodies and trees. The water body, marsh, and grassland also give them food like fish, frogs, rats, etc., therefore the diversity of snakes is high in this area. A vulnerable snake species was identified here. Areas of land with cooler, moister and denser vegetation are used by garden lizards to survive. Geckoes were found in the well of the construction in the park some were found in the garden area. Skinks were found to use the land with fallen leaves. Three types of Monitor Lizard were found here, one of the species is under EN, and one is NT. Another one is LC which is very common here. Monitor lizard were found to use the marshland and lakes water

bodies. Turtles, one LC species and two VU species were found to naturally live here in the water of small ponds and lakes. The food source of these spices in this area is aquatic plants and animals. After the rescue, some of them are released here. They utilized the man-made islands as their sunbathing area. The frogs were observed commonly prefer fields, marshes, and forests with fallen leaves.

Conclusion

Over the past few years, extensive development in the Rajarhat area has led to a significant loss of variation in the vegetative structure and in the types of land. The objective of the current study, which was carried out at Ecopark was to assess the diversity of herpetofauna in this location. According to the survey's findings, this urban park appears to provide a haven for the local herpatofauna species. Although the park's anthropogenic activity has an effect on the population of herpatofauna species, but additional conservation-related actions are may be keep the park a favorable environment for the herpetofauna and preserve these species in long-term under this changing environmental situation.

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