Assessment of biodiversity of shahpura hill forest, District Bhopal (MP) India

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ABSTRACT

The present study for the assessment of biodiversity status of Shahpura hill forest, Bhopal was carried out covering an area of 50 hectare land of city forest. With this context, field investigations were conducted at different intervals during the winter period and sampling was carried out based on the grid map of the area. With the identification of available flora and fauna detailed taxonomic inventory was prepared. Observations and results of phytodiversity assessment work revealed the floristic inventory of 201plant species belonging to 166 genera and 56 families. Faunal studies based on the field investigation recorded a total of 80 species belonging to 40 species of Vertebrates and Invertebrates each. Vertebrata, found under the categorization of five major groups : *viz.* mammals, birds, reptiles and amphibians and fishes. Most of the species observed belonged to avifauna as this group constituted about 73% of the total population. Total 40 species of non- chordate / Invertebrate were recorded, represented by Arthropods, which consisted of insect and butterflies contributing significantly 85% of the total observed arthopods, also the representation of Annelids, Molluscuns and Protozoons were recorded. The present work will help in use of green spaces in city planning considering the sustainable development, conservation of biodiversity within the urban area as city forest and will be useful also for education of nature.

Introduction

Urban forest or city forests are the unique landscapes that serve as nature reserves in highly urbanized region and harbour many plants, animals and microbial species living in ecologically sustainable manner, rendering ecological services to the place concerned. Monitoring of biodiversity of such green spaces, is an important aspect to realize the sign of ecological changes, need of conservation and status of ecology and ecosystem of confined natural habitats. Such a monitoring cannot be done without creating a database of flora and fauna of the area concerned. Hence proposed study is envisaged for the assessment of biodiversity and to have an in-depth investigation towards inventorizing the available flora and fauna of the Shahpura hill forest, Bhopal, M.P as a baseline study. Several taxonomic studies with reference to local phyto-diversity of Bhopal have been conducted[5-8,11]. Taxonomic study to prepare flora of Bhopal have been carried out. Identification of fauna was carried out[9,10] with the help of available taxonomic literature[1-4]. As the key issue the city planners should well realize the potential of such biodiversity, the ultimate need of its conservation and better utilization for the society and environment improvement. By comparing current biodiversity data with regular and systematic collection in future, temporal changes in biodiversity, species composition, exotic-invasive species management plans, new introduction of fauna, prediction of floral and faunal species which are at risk of local extinction, habitat study to support considerable biodiversity and role in environment improvement could be assessed. More such studies are required to develop long term management plans and urban planning issues.

TABLE-1: Habit wise distribution of representative plant species

S.No.	Habit	No. of Species
1.	Trees	100
2.	Shrubs	18
3.	Herbs	48
4.	Grasses	11
5.	Climbers	24
	Total	201

TABLE-2: Ten Dominant families with maximum number of genera and plant species

S. No.	Families	Number of Genera	Number of species
1	Papilionaceae	14	19
2	Apocyanaceae	10	12
3	Poaceae	10	10
4	Euphorbiaceae	09	10
5	Bignoniaceae	09	09
6	Asteraceae	08	08
7	Mimosaceae	06	13
8	Caesalpiniaceae	06	10
9	Rubiaceae	06	07
10	Acanthaceae	05	07

Material and Methods

Bhopal is located in the central part of India, in between the 23Ú 05ì to 23Ú 54ì northern latitude and 77Ú14ì to 77Ú 38ì east longitude. It is surrounded by upper limit of the Vindhya mountain ranges. Shahpura hill, Bhopal, as an urban forest, situated in the southeast part of the city. It has developed under Capital Project authority and now maintained by Department of Forest, is one of the important habitats of flora and fauna. It consists of different terrains with a little hilly and sloppy area. The region being adjacent to Shahpura Lake supports innumerable faunal species including butterflies and various types of reptiles, birds and mammals as well as rich diversity of plants Identification of plant species was carried out with the help of Floras and monographs and with the herbarium specimens available with the previous taxonomic studies. Bentham and Hooker system of classification was followed. During present investigation for observation and collection of fauna, hand nets, forceps, trays, glass bottle, binoculars and microscope including camera were used. Monographs, keys and faunal literature was used for the identification. For present investigation, availability of flora and fauna were studied in different parts of the existing forest area by covering entire study area and considering small sampling units by using grid map of the area (Fig.-4). Geo tagged photography of floral diversity was carried out for further investigation, relating to taxonomical categorization.

Observations

The present study of Shahpura hill forest recorded 201 Angiospermic plant species from the study area.

Results and Discussion

In all, 201-plant species were reported belonging to 166 genera and 56 families. Habit wise analysis revealed that amongst the 201-plant species, there was representation of 50% Trees, 9% Shrubs, 24% Herbs, 5% Grasses and 12% Climbers (Table-1 and Fig. 1). Tree species diversity was found largest among the habit wise distribution and indicate a definite shape of the vegetation. Among the total angiospermic plant species, 187 species of Dicotyledons were recorded, distributed in 51 families, while 14 Monocotyledonous plants species were reported from 5 families (Table-3). This record reflected the dominance of dicots over monocots. The floral status clearly reflects a rich phyto-diversity within the study area. Among the tree species, 52% are reported as 'abundant', based on their occurrence within the study area and 48% as 'uncommon'. Most of the tree diversity (76%) was found growing wild and showing their luxuriant natural growth and regeneration, while 24 % tree species were found planted time to time (based on the record of planted tree species by Bhopal Forest circle). Papilionaceae was found as the most diverse and dominant plant family, representing 14 genera and 19 species. About 52% species diversity is restricted to the ten dominant families (Table- 2).

TABLE-3: Family wise number of plant species and genera found in the Shahpura Hill Forest

S. No.	Families	No. of genera	No. of sps.	S. No.	Families	No. of genera	No. of sps.
	Dicotyledonae				**Dicotyledonae**		
1	Annonaceae	2	3	30	Asteraceae	8	8
2	Menispermaceae	3	3	31	Rubiaceae	6	7
3	Capparidaceae	2	2	32	Ebanaceae	1	1
4	Cleomaceae	1	1	33	Sapotaceae	2	2
5	Flacourtiaceae	1	1	34	Nyctanthaceae	1	1
6	Malvaceae	3	4	35	Boraginaceae	2	3
7	Bombacaceae	2	2	36	Ehretiaceae	1	1
8	Sterculiaceae	2	2	37	Apocyanaceae	10	12
9	Tiliaceae	3	3	38	Periplocaceae	1	1
10	Oxalidaceae	2	2	39	Asclepidiaceae	1	1
11	Balsaminaceae	1	1	40	Convolvulaceae	4	5
12	Rutaceae	3	3	41	Bignoniaceae	9	9
13	Simaroubaceae	2	2	42	Acanthaceae	5	7
14	Burseraceae	2	2	43	Thunbergiaceae	1	1
15	Meliaceae	1	1	44	Verbenaceae	3	4
16	Celastraceae	3	3	45	Lamiaceae	2	2
17	Rhamnaceae	2	4	46	Nyctaginaceae	1	1
18	Vitaceae	1	1	47	Amaranthaceae	4	4
19	Sapindaceae	1	1	48	Santalaceae	1	1
20	Anacardiaceae	4	4	49	Euphorbiaceae	9	10
21	Moringaceae	1	1	50	Ulmaceae	1	1
22	Papilionaceae	14	19	51	Moraceae	1	4
23	Caesalpiniaceae	6	10		**Monocotyledonae**		
24	Mimosaceae	6	13	52	Dioscoreaceae	1	1
25	Combretaceae	3	6	53	Commelinaceae	1	1
26	Myrtaceae	3	3	54	Cyperaceae	1	1
27	Lytheraceae	2	2	55	Asparagaceae	1	1
28	Onagraceae	1	1	56	Poaceae	10	10
29	Cactaceae	1	1		**Total**	166	201

TABLE-4: Number of Animal Species recorded.

Groups		No of Species
A. Vertebrates	Mammals	10
	Birds	23
	Reptiles	4
	Amphibian	2
	Fishes	1
B. Invertebrates	Arthropoda	34
	Annelida	2
	Mollusca	2
	Protozoa	2
	Total	**80**

Results of the present faunal studies recorded a total of 80 species belonging to Vertebrates and Invertebrates (Table- 4). During the period of investigation 40 species recorded under vertebrata altogether are categorized in five major groups : *viz.* mammals, birds, reptiles, amphibians and fishes (Fig. 2). As a dominant part of the species observed belonged to avifauna as this group constituted about 73% of the total population. Contribution of other groups *viz* mammals, birds, reptiles, amphibian and fishes were 25%, 57%, 10% 5% and 3% respectively. Total 40 species of non- chordate / Invertebrate were recorded which are represented by Arthropoda in which contribution of insect and butterflies were significant comprising 85% of the total, representation of Annelids was about 5%, Molluscuns contributed 5% and Protozoons contributed 5% of species observed (Fig. 3). Various species of Butterflies were observed on specific sites within the study area and a large number of peafowls were spotted which signifies that the area is congenial for their existence.

Conclusion

Such biodiversity inventorization will make the urban society conscious about the physical, ecological, social and aesthetic value of biodiversity in their neighbourhood. These areas will prove their significance as green spaces in urban planning and an ideal instrument
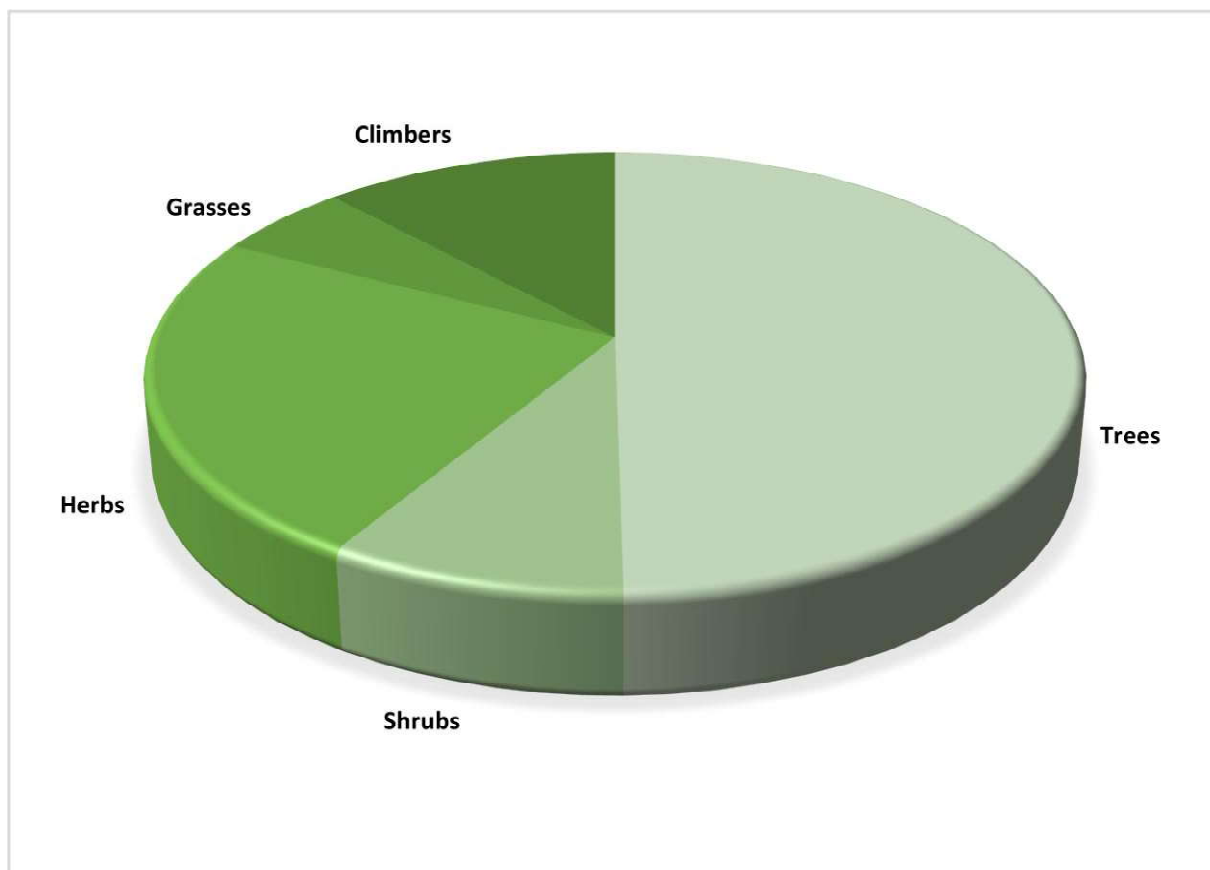

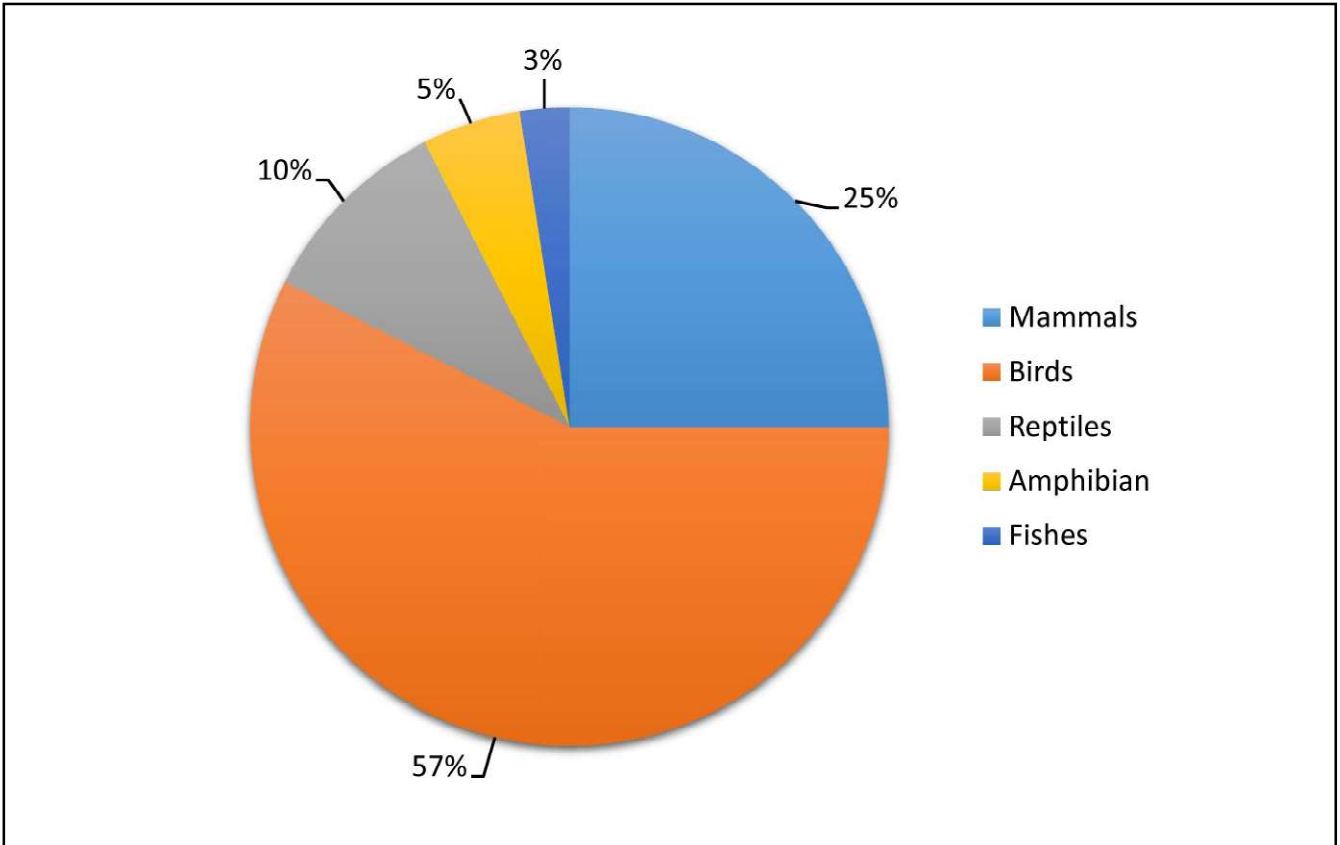**Fig. 1: Habit wise distribution of representative plant species**

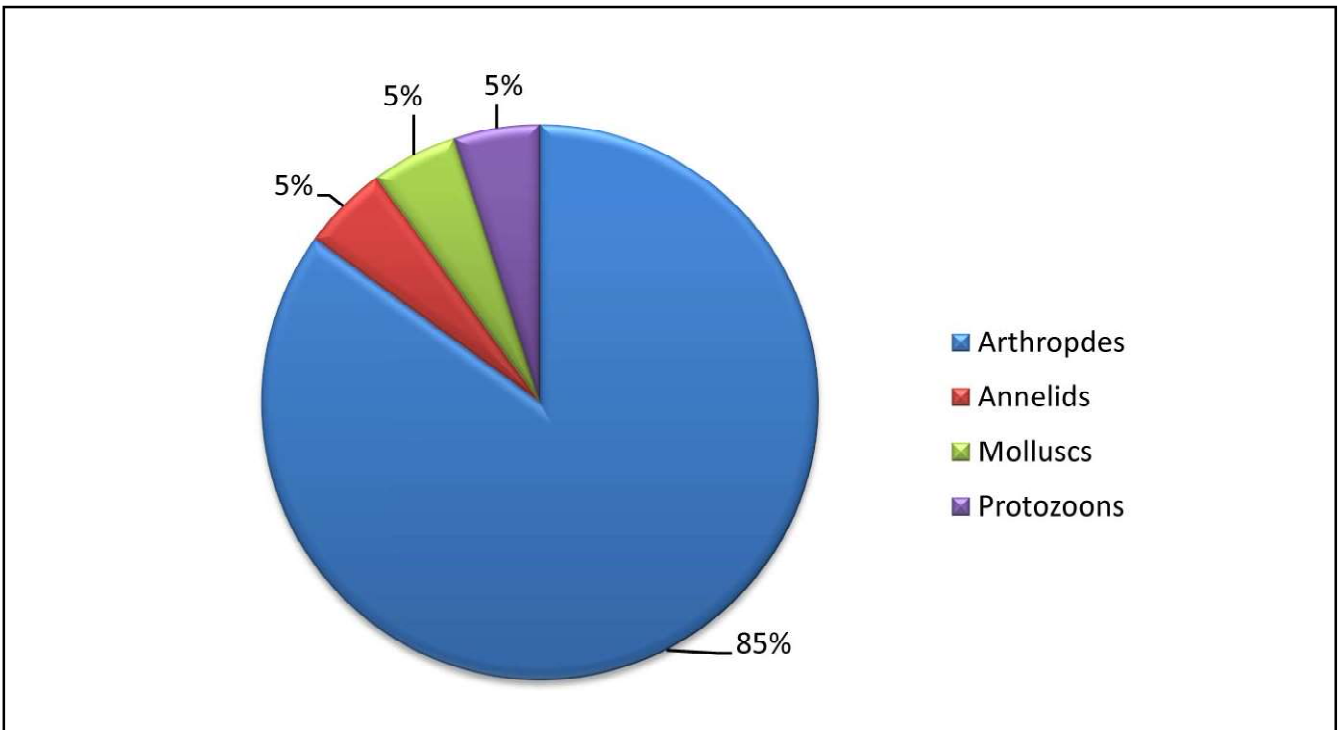**Fig. 2: Percent contribution of species of Vertebrates**

Fig. 3: Percent contribution of species of Invertebrates

for promoting conservation education. Its existence serves as the 'lungs' of the city, the greenery will act as sponges to absorb carbon dioxide emission and will prove as urban environmental sustainability model and as carbon sink. Therefore, such city forests should be developed and conserved for their manifested benefits for the society
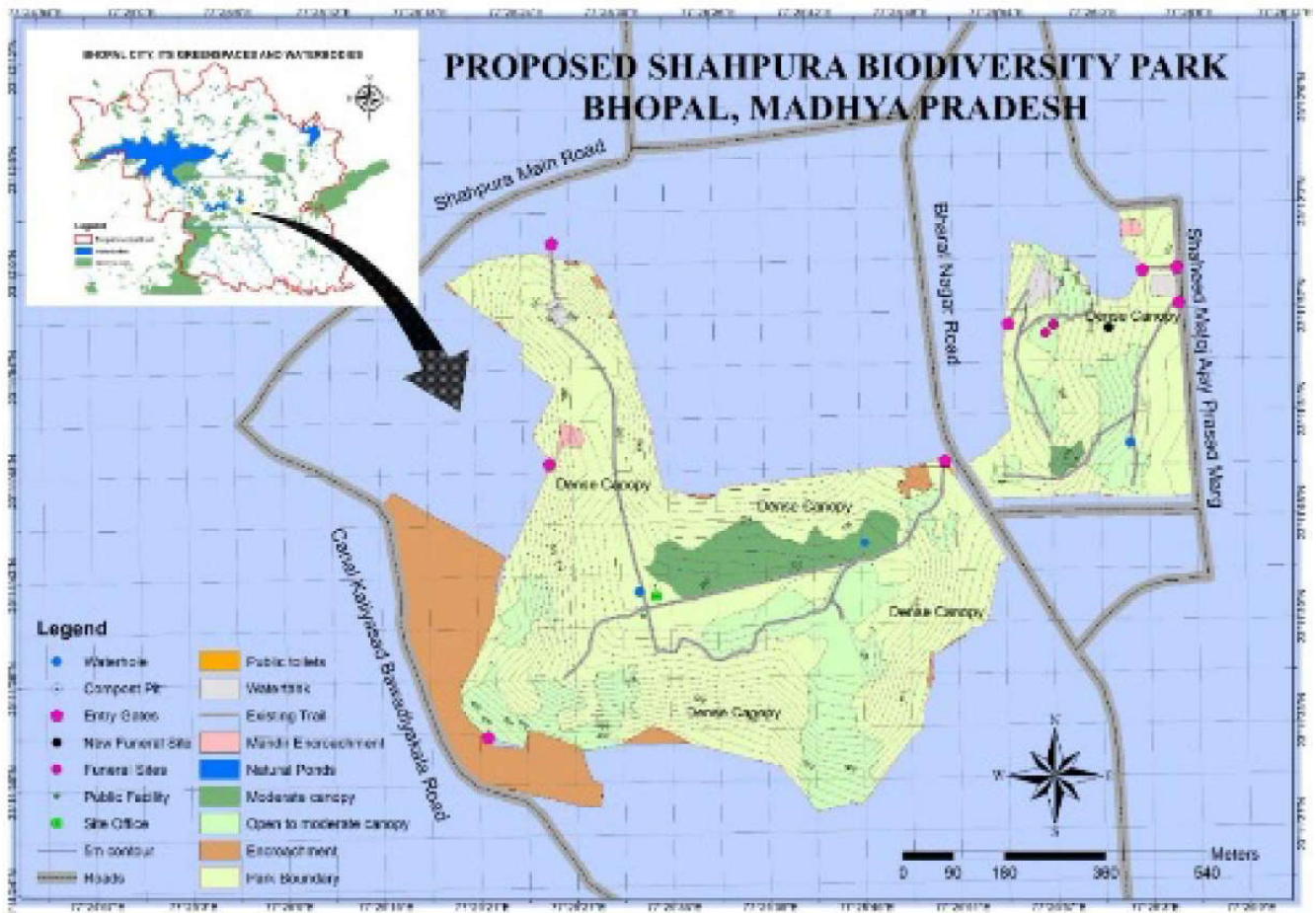
Fig.-4: Grid map of Shahpura Hill forest, Bhopal (M.P.)

and ecology improvement. The diversity of butterflies observed in the study area suggests their conservation because they serve as an important plant pollinator in the local environment and are sensitive to habitat degradation, hence are good bio-indicators.

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