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Use of *Ficus religiosa* and *Ficus benghalensis* as habitat and food resources by peri-urban forest dwelling fauna in Chitrakoot

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Abstract
Tree on the road side or out of forest have critical role in biodiversity conservation and sustainable development. Present research work is focused on the importance of road side trees in ecosystem and biodiversity conservation for sustainable development. The present research was conducted in Chitrakoot, U.P. – M.P. Border, India from November to May. Fifty-three animal species, dependent on tree occurred in ten different tree ecosystems. The present investigation assists to distinguish why and how an individual tree play critical role in ecological conservation and sustainable development.

Keywords: Conservation, diversity, ecosystem, bionetwork

Introduction

A tree is an important factor of a forest ecosystem. It also plays an important role as individual ecosystem itself. The living resources of tree interact with non- living components of tree canopy and make a bionetwork and the bionetwork produce ecological processes in tree ecosystem. There is a rising requirement to perceive ecological services of roadside trees because the world is too directed to the development and urbanization of earth. It made compulsion to know which tree or plants will be compatible to our development and nature both. Through knowing the ecological services of different plant, it can be easily specify that which tree species should be planted initially and not to be demolished based on its ecological services. Ecological services of a tree includes oxygen production, animal associated to the tree, leaves precipitation to the soil, nitrogen fixation, carbon storage, reduction of soil erosion and air pollutant, purifying the air, maintaining soil fertility (Nell Greenfieldboyse, 2015) [6], providing shelter to various animals and maintain ecological balance in the developed and developing areas. The presented research is focussed on the tree associated invertebrates (macro organisms) and vertebrates animals. Various animals, associated with the tree, provide faunal status of the tree and its interaction with tree and other components of tree canopy. There are very few plants which provide habitat and niche to many of wildlife animals. Leaves, flowers, fruits, buds, stem, bark, and branches etc. are used by various animals in different ways. Animal biodiversity and population both are influenced by habitat fragmentation. Data evidences related to species diversity and richness are very important for biological conservation and sustainable development. Species diversity is a key factor which determines the stability, functioning and productivity of ecosystem nutrient and resource cycle. (Gautam & Mandal, 2018) [3].

Aims and objectives

1. To find out which animal species population associated with the selected trees (*Ficus religiosa and Ficus benghalensis,*).
2. To calculate biodiversity and evenness by Shannon-Weiner index within the canopy of selected tree sites on the road side.
3. To explore variation and similarities of species associated with *F. religiosa* and *F. benghalensis*.

Materials and Methods

The methodology to investigate faunal status of certain trees was opted from the research of Martínez, 2008. The research was conducted in trees along Parikrama Marg (Kamtan, Chitrakoot), Chitara, and Karwi- Ramghat road, Chitrakoot M.P. and U.P. border. In The observation and data collection is done via road side census counting method. 6 trees (3 *Ficus religiosa*, 3 *Ficus benghalensis,)* were selected as research sites for observation which was situated at road side.

Table 1

Sr. No.	Roosting location	Types of tree	Geographical data	
			Latitude	Longitude
1	Pilikothi	*F. religiosa*	25º10'34.86"	80º50'43.86"
2	Parikrama path, near Saryudhara	*F. religiosa*	25º10'24.948"	80º50'56.646"
3	Kalika devi mandir, near karwi – ramghat road	*F. religiosa*	25º10'5.628"	80º52'6.384"
4	Near Pilikothi, Parikrama path	*F. benghalensis*	25º10'30.486"	80º50'39.408"
5	Kamtan near Saryudhara	*F. benghalensis*	25º10'27.684"	80º50'57.258"
6	Sitapur, karwi- Ramghhat road	*F. benghalensis*	25º11'8.478"	80º52'10.392"

1. **Sampling Methods:** After choosing our roosting site, initially, a list of animals those are associated with that roosting site, was compiled. These lists are served as a reference list of animals, found on those roosting site. These lists had been changing on the basis of our regular survey and observation.

We observed and surveyed our roosting sites mainly in the morning and evening, other required roosting measurements are done in the noon time at 12 'o' clock.

2. Required apparatus

We used binoculars to observe birds which are sit on tree branch. our bird's identification is based binocular observation.

We used inch tape to measure roosting site required measurements (canopy, trunk diameter)

We used GPS data app to get roosting site location.

3. Observation period

We observed and surveyed our roosting sites mainly in the morning and evening, other required roosting site measurements are done in the noon time at 12 'o' clock.

4. Population count methods of individuals

We used mainly visual count method to count major groups of animals (mammals, aves, reptiles, amphibians and arthropods) and for some insects and arachnids.

We used expected count method for ants, pollinator insects, and leaf insect.

Observations and data collection were done from November to June. We observed and surveyed our roosting sites mainly in the morning and evening; other required roosting measurements are done in the noon time at 12 PM. We used mainly visual count method to count major groups of animals (arthropods, amphibians, reptiles, aves, and mammals) and for some insects and arachnids, ants, pollinator insects, and leaf insect, expected count method were used. The primary data of various species populations and interaction with the tree was collected through daily observation. The animals were identified through its morphological characters.

Calculation of Biodiversity

After collecting observed data, the Shannon- Weiner index (Krebs, 2014) [5] was calculated through the following formula

$$H = -\sum_{i=1}^{S} (P_i) ln(P_i)$$

Where H= index of species diversity

P_i= proportion of the i^{th} animal species of the total sample size

Ln= natural logs (Log_e)

S= total number of species

H_{Max}= Maximum species diversity under maximum equitability

Species evenness or equitability (Krebs, 2014) [5],

$$E = \frac{H}{H_{Max}}$$

Result and Discussion

Data collected from the selected 10 research sites =shows that total 11835 individuals of 53 species were recorded. After observation, 2032 individuals of 41 animal species recorded in *Ficus religiosa*, 40 species with 1977 individuals in *Ficus benghalensis* were found associated with the selected trees.

In S1 (*Ficus religiosa*, Pilikothi), 1158 individuals of 8 invertebrate species (92.94%) and 88 individuals of 14 vertebrate species (7.06%) occurred associated with *Ficus religiosa.* 1173 individuals of 10 invertebrate species and 120 individual of 17 species were recored in S2 (*Ficus religiosa*, near Saryudhara, Parikramapath). 685 individuals of 10 invertebrate species and 115 individuals of 16 vertebrate species in S3 (*Ficus religiosa*, Kalka Devi Mandir, Karwi – Ramghat Marg). In S4 (*Ficus benghalensis*, near Pilikothi), 1539 individuals of 9 invertebrate species and 171 individuals of 19 vertebrate species occurred associated with the tree. In S5 (*Ficus benghalensis*, Kamtan, near Saryudhara), 971 individuals of 8 invertebrate species and 139 individuals of 17 vertebrate species found associated to the tree. 1416 individuals of 7 invertebrate species and 92 individuals of 16 vertebrate species were recorded in S6 (*Ficus benghalensis*, Sitapur).

Table 2: Invertebrates

Sr. No.	Zoological name	No. of animals	
		F. religiosa	***F. benghalensis***
1	*Trilocha varians* (Wild silk worm)	65	0
2	*Camponotus pennsylvanicus* (Black carpenter ant)	245	247
3	*Solenopsis invicta* (Red fire ant)	200	367
4	*Paratrechina longicornis* (Crazy ants)	170	267
5	*Camponotus compressus* (Common Indian black ant)	340	350
6	*Oecophylla smaragdena* (Weaver ants)	70	120
7	*Wasmania auropunctata* (Little fire ant)	250	400
8	*Cryptotermes cavifrons* (Drywood termite)	35	0
9	*Periplanata Americana* (Cockroach)	5	7
10	*Apis dorsata* (Honey bee)	320	0
11	*Poslistes olivaces* (Yellow paper wasp)	150	0
12	*Spermophora senoculata* (Short bodied cellar spider)	7	7
13	*Holocnemus pluchei* (Marbled cellar spider)	4	5
14	*Crossoprizo lyoni* (Cellar spider)	4	0
15	*Plexippus paykulli* (Jumping spider)	4	5
16	*Dysdera crocata* (Wood louse spider)	3	0
17	*Evarcha proszynskii* (Jumping spider brown and cream)	0	4

Table 3: Vertebrate

Sr. no.	Zoological aname	No. of animals	
		F. religiosa	***F. benghalensis***
19	*Rana tigrina (*Common frog)	4	3
20	*Chamaeleo zeylanicus (*Indian chameleon)	0	0
21	*Hamidactylus flaviviridis (*House lizard)	3	2
22	*lus bowringii (*Tree geocko)	3	3
23	*Acrido thestristis (*Common myna)	8	10
24	*Dicrurus macrocercus* (Black drongo*)*	2	5
25	*Pavo cristatus* (Peacock)	1	0
26	*Psittacula krameri* (Rose ringed parakeet)	6	8
27	*Corvus splendens* (Common crow)	12	15
28	*Passer domesticus* (House sparrow*)*	11	17
29	*Cinnyris asiaticus* (Purple sun bird)	7	8
30	*Spilopelia senegalensis (*Laughing dove)	6	7
31	*Columba livia* (Rock dove)	8	7
32	*Pycnonotus cafer* (Red vented bulbul)	15	12
33	*Oenanthe fusca* (Indian chat)	0	7
34	*Athene brama* (Spotted owlet)	1	1
35	*Milvus migrons* (Black kite)	0	0
36	*Centropus sinensis* (Greater coucal)	0	0
37	*Upupa epops* (Hoopoe)	5	4
38	*Psittacula cynocephali* (Plum headed parakeet)	10	6
39	*Spilopelia chinensis* (Spotted dove)	2	4
40	*Vanellus indicus* (Red wattled lawping)	0	0
41	*Coracias benghalensis* (Indian roller)	0	4
42	*Ploceus philippinus* (Baya weaver)	0	8
43	*Acridothere sgingias* (Bank myna)	5	10
44	*Eudynamys scolopaceus* (Asian koel*)*	0	1
45	*Turdoides caudate* (Common babbler)	5	0
46	*Sturuns cortra* (Asian pied starling)	0	5
47	*Turdoides striata* (Jungle blabber)	7	5
48	*Funambulus palamarus* (Squirrel)	3	3
49	*Macaca mullata* (Red monkey)	18	25
50	*Semnopithecus entellus* (Hanuman langurs)	6	10
51	*Bos taurus* (Cow)	5	3
52	*Cannis lupisfamiliaris* (Common street dog)	4	3
53	*Bulbalus bubalis* (Common indian buffalo)	3	2

Species richness of *Ficus religiosa* at first sample site is 3.135, at second sample site is 3.296 and at third sample site is 3.258. Species richness of *Ficus Benghalensis* at fourth sample site is 3.332, at fifth sample site is 3.219 and at sixth sample site is 3.178.

Table 4

Variable	F- statistics	P- Value	Result
H	0.019	0.896	No significant variance
E	0.036	0.858	No singnificant variance
Species count	0.038	0.854	No significant variance

There is no statistically significant difference between *Ficus religiosa and Ficus benghalensis* groups for any of the three ecological indices after applying annova.

Table 5

Variables	R-value	P-value	Result
H Vs. E	0.995	0.001	Very strong positive correlation
H Vs. Species count	0.863	0.027	Strong Positive correlation
E vs Species Count	0.812	0.050	Moderate Strong positive correlation

Strong and positive correlation shows that as species diversity increase both species evenness and species richness also increase which indicate all sample sites have stable and diverse ecosystem.

Table 6

Sr. No.	Tree Species	Shannon-Weiner diversity index (H)	Species Evenness (E)	No. of species	Communit structure
1.	*Ficus religiosa* S1	1.54	0.492	23	More Stable
2.	*Ficus religiosa* S2	2.15	0.652	27	Very stable
3.	*Ficus religiosa* S3	2.37	0.729	26	Very stable
4.	*Ficus benghalensis* S4	2.23	0.667	28	Very stable
5.	*Ficus benghalensis* S5	1.99	0.618	25	Very stable
6.	*Ficus benghalensis* S6	1.72	0.543	24	Very Stable

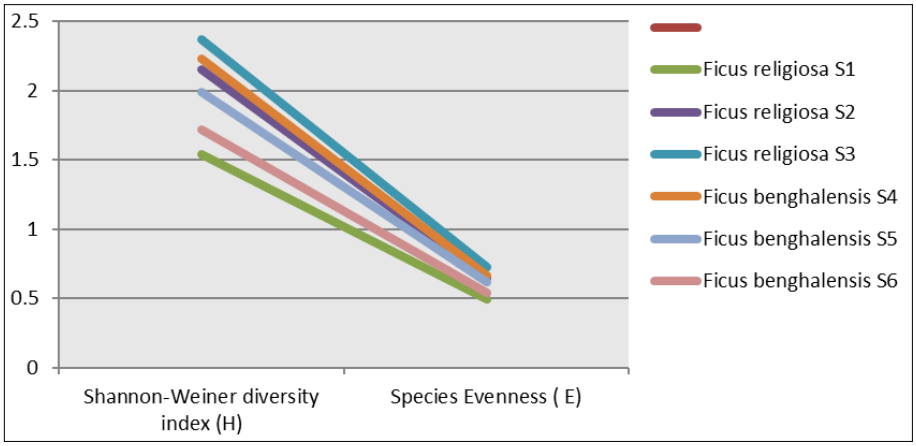

Fig 1

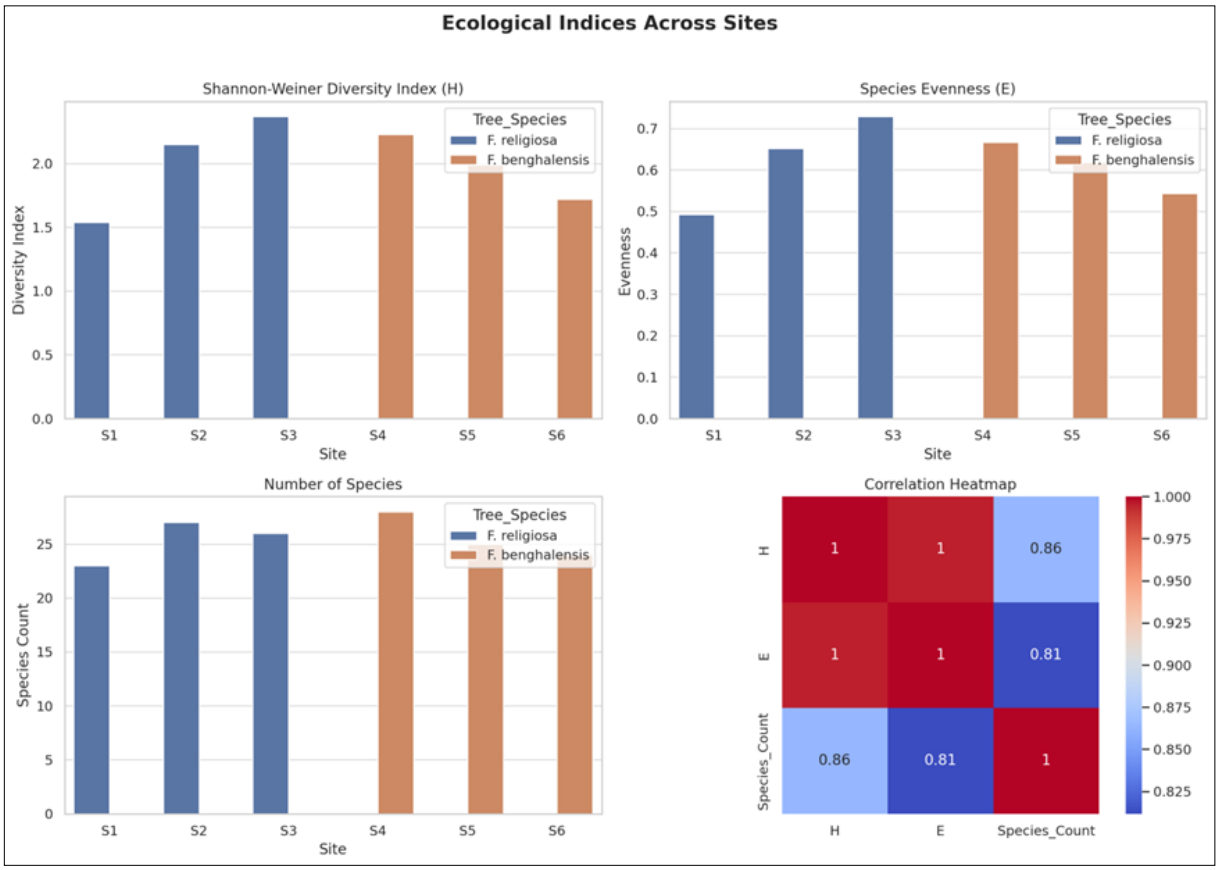

Fig 2

Conclusion

The present study shows that the tree ecosystems on the road side are as stable community as forest ecosystem of Chitrakoot. In 2022, Singh and Umrao *et al.*, (2022) [9] estimated the Shannon- Weiner diversity of trees in 5 different forest range of Chitrakoot. The highest Shannon – weiner index value occurred in Markundi (3.232). In Karwi (Chitrakoot), the value of Shannon Weiner index was recorded 3.103. As selected tree ecosystem showed proximate value of the Shannon – Weiner index as stable community structure (Reflinaldon and Hamid, 2023) [8]. 56 animal species occurred dependent to selected trees in the present investigation on selected tree ecosystem. Tree outside the forest play a crucial role in ecosystem services and biodiversity conservation.

It is irrefutable that many of anthropogenic and natural factors are degrading biodiversity and natural resources continuously from many decades. Forests and trees mitigate climate changes by carbon sequestration ((Hou *et al.*, 2019) [4], Nunes *et al.*, (2020) [7] and helpful in biodiversity conservation by providing shelter to many animal and plant species (Valdes 2020). The present investigation shows that F. religiosa and F. benghalensis provide shelter and roosting sites to approx 56 faunal species. Tree outside forests (TOFs) are considered as an avenue of carbon sequestration, biodiversity conservation, climate change mitigation, and livelihood support in urban and rural areas (Acharya, 2006) [2].

References

1. Abelleira Martínez Oscar J. Observations on The Fauna That Visit African Tulip Tree (Spathodea Campanulata Beauv.) Forests in Puerto Rico. Acta Científica, 2008, 22(1-3).

2. Acharya KP. Linking Trees on Farms with Biodiversity Conservation in Subsistence Farming Systems in Nepal. Biodiversity and Conservation,2006:15(2):631–646. Available from: https://doi.org/10.1007/s10531-005-2091-7
3. Gautam TP, Mandal TN. Effect of disturbance on plant species diversity in moist tropical forest of eastern Nepal. Our Nature,2018:16(1):1–7. Available from: https://doi.org/10.3126/on.v16i1.21558
4. Hou G, Delang CO, Lu X, Olschewski R. Valuing Carbon Sequestration to Finance Afforestation Projects in China. Forests,2019:10(9):754. Available from: https://doi.org/10.3390/f10090754
5. Krebs CJ. Ecology: The experimental analysis of distribution and abundance. 6th ed., Pearson new international ed. Pearson, 2014.
6. Greenfieldboyse N. Tree Counter Is Astonished by How Many Trees There. KERA News, 2015. Available from: https://www.keranews.org/2015-12-26/tree-counter-is-astonished-by-how-many-trees-there-are
7. Nunes LJR, Meireles CIR, Pinto Gomes CJ, Almeida Ribeiro NMC. Forest Contribution to Climate Change Mitigation: Management Oriented to Carbon Capture and Storage. Climate,2020:8(2):21. Available from: https://doi.org/10.3390/cli8020021
8. Reflinaldon, Hasmiandy H. Insect Diversity on Wheat as a new cultivation crop in West Sumatera. Iop Conference Series: Earth and Environmental Science,2023:1133(1):012068. Available from: DOI:10.1088/1755-1315/1133/1/012068
9. Singh Pratap Atul, Umrao Rajiv, Kumar Hemant, Apurva Kumari. Tree Species distribution and composition of dense forest in different ranges of Chitrakoot forest division Uttar Pradesh. The Pharma Innovation Journal,2022:SP-11(12):1216-1219.
10. Valdés A, Lenoir J, De Frenne P, Andrieu E, Brunet J, Chabrerie O, Cousins SAO, Deconchat M, De Smedt P, Diekmann M, Ehrmann S, Gallet-Moron E, Gärtner S, Giffard B, Hansen K, Hermy M, Kolb A, Le Roux V, Liira J, *et al*. High ecosystem service delivery potential of small woodlands in agricultural landscapes. Journal of Applied Ecology,2020:57(1):4–16. Available from: https://doi.org/10.1111/1365-2664.13537