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SEASONAL DIVERSITY AND POPULATION DYNAMICS OF OPHIDIAN FAUNA IN BULDHANA DISTRICT MAHARASTRA INDIA

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ABSTRACT

The present paper provides the information about the seasonal diversity and population dynamics of ophidian fauna from Buldhana District Maharashtra, India. The study conducted during February 2012 to January 2014. During study the effective protocol was adopted. Study reveals the presence of thirty three varieties of snakes belonging to six families of which ten species were Abundant, four species were Common, eight species were Occasional, and six species Frequent while five were Rare. A general trend of increased population was reported in monsoon while decreased reported during winter to early monsoon.

KEYWORDS : Diversity, Population, Ophidian Fauna, Buldhana.

Snakes! the very word evoke feelings of horror and disgust in most of us. Snakes are also perceived as messenger of death. They fascinate us more than any other animals of the world. Snakes occupied deserts, forests, marshy, swampy places, lakes, streams and rivers of difficult terrains (Dhamankar 2006). The different anthropogenic activities and modifying environment are the biggest threats to the fauna and our current knowledge about behaviour, natural history and status of ophidian species is far from complete. So, one of the prime objectives of study was to build a reliable data-base about the seasonal diversity and population dynamics of these fascinating snakes from Buldhana District (M.S.) India.

Buldhana district is situated in Amravati division of Maharashtra state in Western India. It is situated at the westernmost border of Vidarbha region of Maharashtra and is 500 km from the state capital, Mumbai. It lies between 19°51' and 21°17' N. latitude and 75°57' and 76°59' E. longitude. It has a total area of 9745 square kilometers (3761 square miles). The climate of this district is characterized by a hot summer, well-distributed rainfall during the south-west monsoon season and generally dry weather during the rest of the year. The cold season is from December to February (Joshi, 2011, Joshi et al., 2014).

METHODOLOGY

The study conducted during February 2012 to January 2014 aims to examine monthly and seasonal diversity and population dynamics of ophidian fauna from Buldhana district, (M.S.) India. After detection, specimen was photographed and identified with the help of visible structural features. For identification and comparative studies of observed specimens, keys and methods suggested by Daniel (2002) Whitaker and Captain (2004), and Khaire (2010) were adopted. The Diversity data was quantified with the help of PAST Version 1.60 software (Hammer et al. 2001). The differences between the diversity and evenness indices of snakes among different seasons were statistically analyzed using Analysis of Variance.

RESULTS AND DISCUSSION

Buldhana district of Maharashtra (India) has healthy environment and climatic condition, with classical demography setup as mountainous terrain, rugged configuration and sudden fall in elevation is phenomenal. The thirty three varieties of snakes belonging to six families have been identified within two years of search in the Buldhana district. In these, the maximum species were non venomous representing the Colubridae family. Such community composition was also observed by Nande and Deshmukh (2007) in Amaravati and Melghat (M.S.) India. In the observations, characters were found almost same as per existing records (Whitaker and Captain, 2008., Khaire, 2010).

A fauna was observed to be most diversified during monsoons. A general trend of increased population was also reported in monsoon while decreased reported during winter to early monsoon. Such trends were shown by

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Table 1: Representing the Status of Ophidian Species in Buldhana District Maharastra India

Sr. No.	Scientific Name*	Common Name*	Type	Length Max. (inch)	Relative Domin -ance	Occurr -ence Status
Family: Typhlopidae						
1.	*Grypotyphlops acutus*	Beaked worm snake	NV	014	1.175	F
2.	*Ramphotyphlops braminus*	Common worm snake	NV	006	4.837	C
Family: Pythonidae						
3.	*Python molurus molurus*	Indian rock python	NV	124	0.361	O
Family: Boidae						
4.	*Gongylophis conicus*	Common sand boa	NV	038	3.165	F
5.	*Eryx johnii*	Red sand boa	NV	036	0.814	R
Family: Colubridae (NV)						
6.	*Amphiesma stolatum*	Striped keelback	NV	018	1.537	F
7.	*Argyrogena fasciolata*	Banded racer	NV	040	5.244	A
8.	*Coronella branchyura*	Indian smooth snake	NV	012	0.271	O
9.	*Coelognathus h. helena*	Common trinket snake	NV	048	5.289	A
10.	*Coelognathus h. monticollaris*	Montane trinket snake	NV	030	0.407	O
11.	*Dendrelaphis tristis*	Bronzback tree snake	NV	046	1.627	F
12.	*Lycodon aulicus*	Common wolf snake	NV	018	8.002	A
13.	*Lycodon flavomaculatus*	Yellow spotted wolf snake	NV	014	3.526	C
14.	*Lycodon striatus*	Barred wolf snake	NV	016	5.154	A
15.	*Macropisthodon plumbicolour*	Green keelback	NV	024	3.526	C
16.	*Oligodon arnesis*	Common kukri snake	NV	018	6.419	A
17.	*Oligodon taeniolatus*	Russell's kukri snake	NV	014	0.723	O
18.	*Ptyas mucosa*	Indian rat snake	NV	090	10.17	A
19.	*Sibynophis subpunctatus*	Black headed snake	NV	018	0.949	O
20.	*Xenochrophis piscator*	Checkered keelback	NV	048	10.26	A
Family: Colubridae (SV)						
21.	*Ahaetulla nasuta*	Common vine snake	SV	036	0.769	O
22.	*Boiga trigonata*	Indian cat snake	SV	030	6.103	A
23.	*Elachistodon westermanni*	Indian egg eater	SV	030	0.045	R
24.	*Psammophis condanarus*	Condanarus sand snake	SV	042	1.763	F
25.	*Psammophis leithii*	Leith's sand snake	SV	036	0.587	O
26.	*Psammophis longifrons*	Stout sand snake	SV	048	0.587	O
Family: Elapidae						
27.	*Bungarus fasciatus*	Banded krait	V	036	0.045	R
28.	*Bungarus caeruleus*	Common krait	V	060	4.611	C
29.	*Calliophis melanurus*	Slender coral snake	V	015	0.135	R
30.	*Naja naja*	India spectacled cobra	V	075	6.645	A
Family: Viperidae						
31.	*Daboia russelii*	Russell's viper	V	048	6.238	A
32.	*Echis carinatus*	Saw-scaled viper	V	024	1.356	F
33.	*Trimeresurus gramineus*	Green pit viper	V	016	0.090	R
Type: NV- Non Venomous; SV - Semi Venomous; V - Venomous						
Occurrence Status: A- Abundant; C- Common; F-Frequent; O- Occasional; R- Rare						

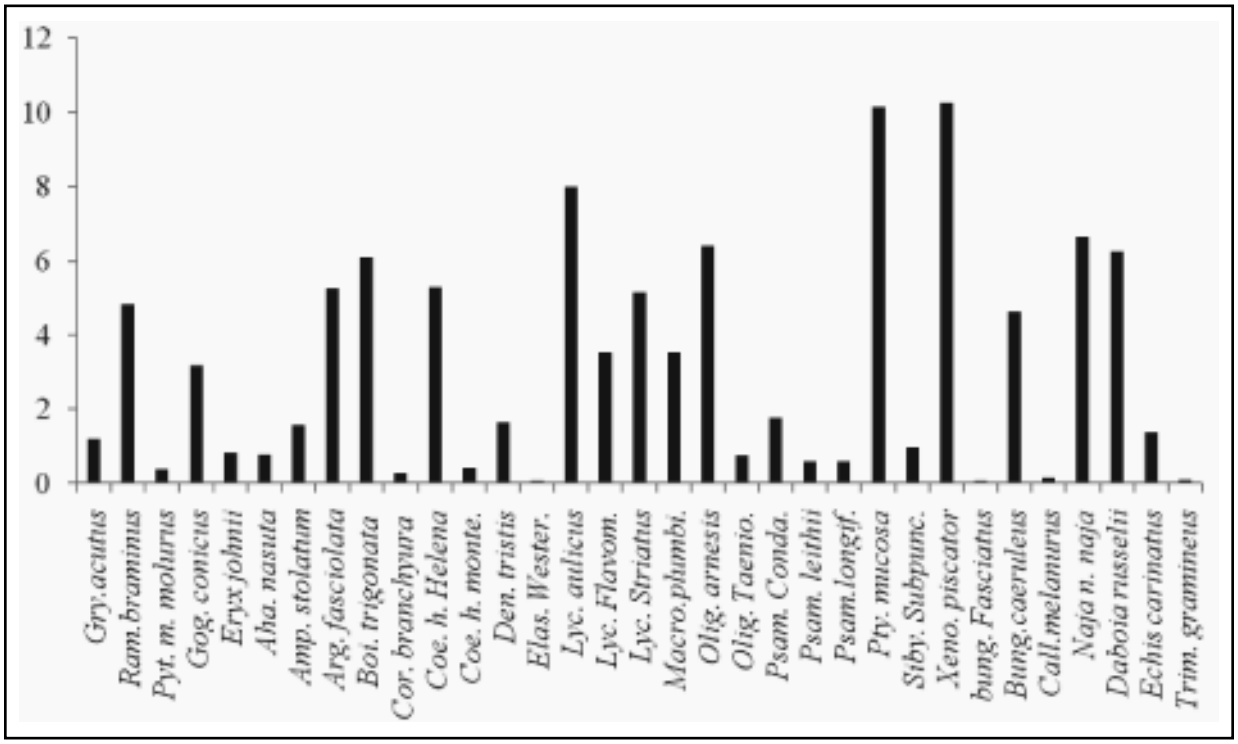


Figure 1: Representing Status of Ophidian Species in Buldhana District Maharastra, India

Table 2: Representing Status of Ophidian Families in Buldhana District Maharastra India

Sr. No.	Family	Percent occurrence	Relative occurrence	Occurrence Status
1.	**Typhlopidae**	6.060	6.009	F
2.	**Pythonidae**	3.030	0.366	R
3.	**Boidae**	6.060	3.977	O
4.	**Colubridae**	63.64	70.55	A
5.	**Elapidae**	12.12	11.42	C
6.	**Viperidae**	9.090	7.678	F
Occurrence Status: A- Abundant; C - Common; F -Frequent; O - Occasional; R- Rare				

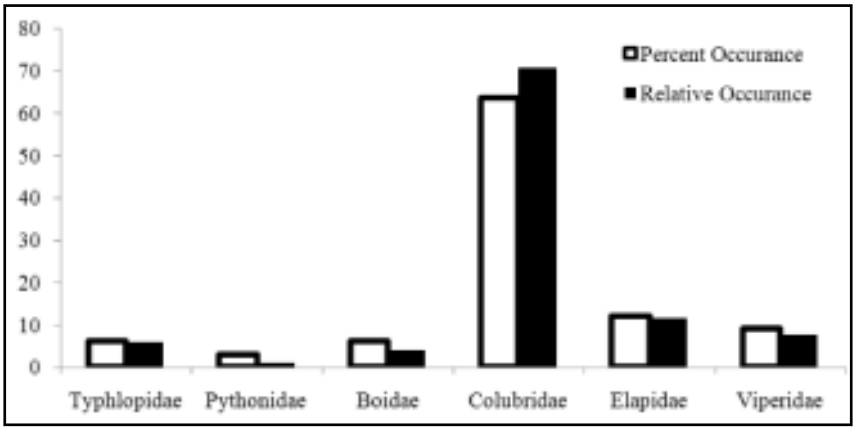


Figure 2 : Representing Status of Ophidian Families in Buldhana District Maharastra India

Table 3: Diversity of Ophidian Fauna During February 2012 to January 2014 in Buldhana District Maharastra India

Year / Month	No. of species	Mean % abundance[a]	Shannon diversity[b]	Equitability[c]	Species richness[d]
2012-13					
Summer	22	09.684	2.851	0.9224	4.667
Monsoon	28	27.994	2.981	0.8947	5.403
Winter	21	11.472	2.664	0.8750	4.289
2013-14					
Summer	19	09.324	2.671	0.9071	4.041
Monsoon	27	28.357	3.056	0.9274	5.117
Winter	25	13.169	2.964	0.9208	4.706

a = Mean percent abundance of snake populations was significantly different ($F=31.413$, $df=05$, $p<0.05$). b = Diversity values of snake populations was significantly different ($F=8.191$, $df=05$, $p<0.05$). c = Species equitability among different seasons was significantly different ($F=17.274$, $df=05$, $p<0.05$). d = Species richness among different seasons was significantly not different ($F=1.412$, $df=05$, $p>0.05$).

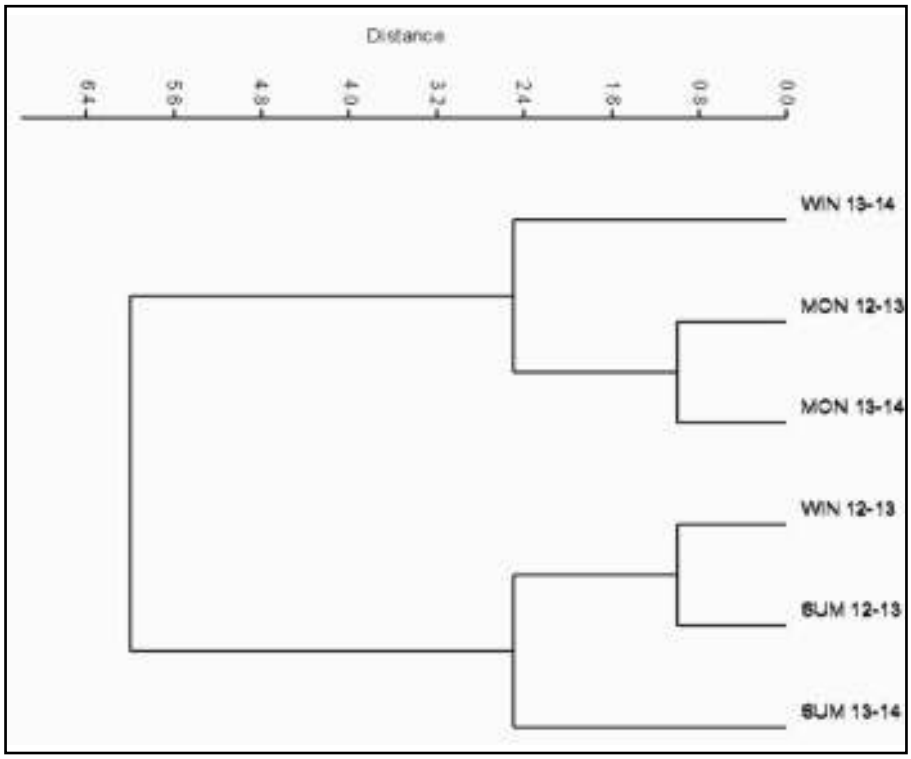


Figure 3.1 : Dendrogram Showing the Similarity of Ophidian Fauna in Different Seasons During February 2012 to January 2014 in Buldhana District Maharastra India

every species from all families of snakes. As the Snakes are cold-blooded animals accordingly during winter to early summer they hibernate in their burrows or resting places, which was the cause behind their minimum diversity in the winter to early summer season. Due to favourable environmental condition, monsoon is the breeding season for most of the snakes' which leads to their maximum population in rainy season (Joshi 2009, Pal et al. 2012).

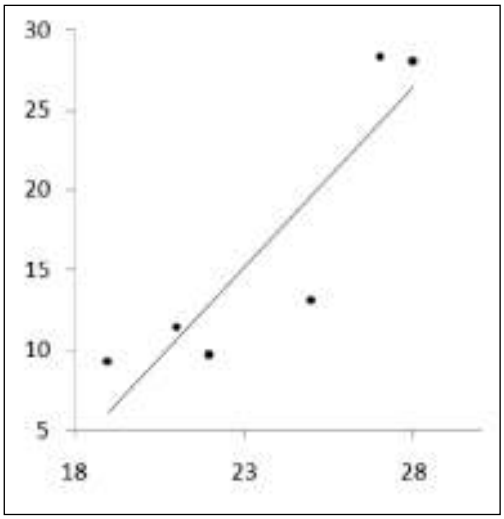
The following tables provide complete information about all the observed species.

The *Ptyas mucosa* and *Xenochrophis piscator* were showed the maximum while *Calliophis melanurus*, *Elachistodon westermanni* and *Trimeresurus gramineus* were observed with least relative dominance. (Figure 1)

The Colubridae family contributes maximum percent as well relative occurrence while least was showed by Pythonidae and Viperidae. (Figure 2)

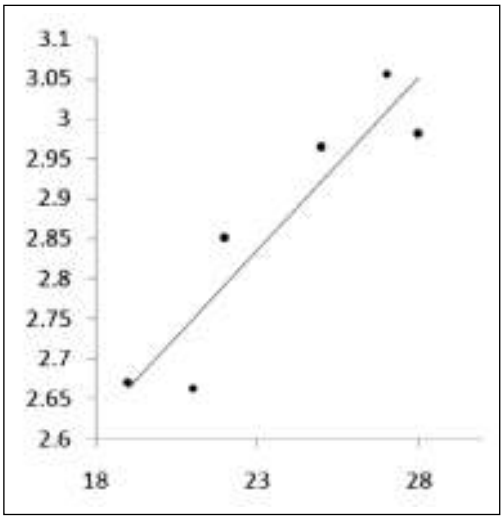
The similarity in species composition with number of species was observed maximum in Monsoon followed by winter and summer (Figure 3.1). The number of species in different seasons showed the significant relationship with different diversity indices (Figure 3.2).

R^2= 0.261 / P< 0.0001



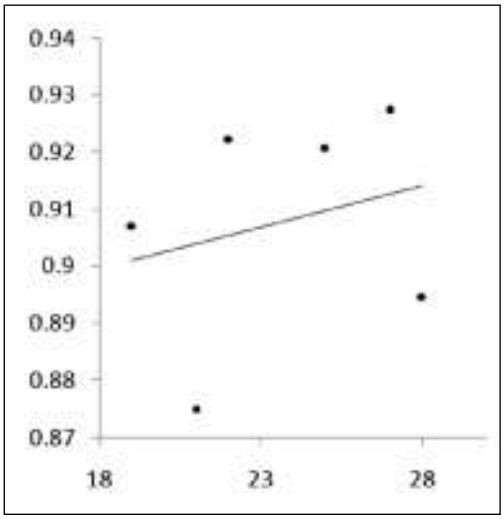
a. No. of Species Vs. Mean % Abundance

R^2= 0.356 / P< 0.0001



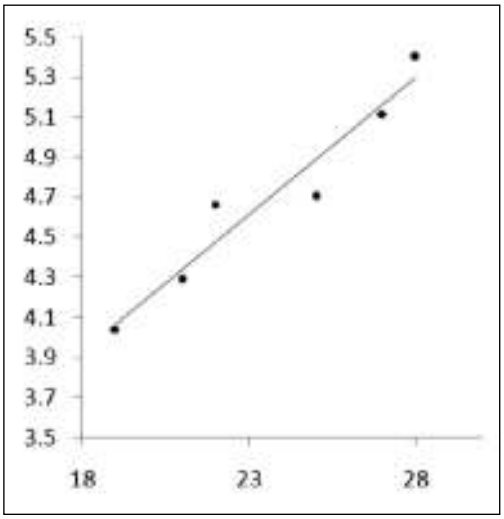
b. No. of Species Vs. Shannon Diversity

R^2= 0.195 / P< 0.0001



c. No. of Species Vs. Equitability

R^2= 0.205 / P< 0.0001



d. No. of species Vs. Species Richness

Figure 3.2. Relation Between No. of Ophidian Species And Different Diversity Indices

CONCLUSION

According to the observations, it has been concluded that the Buldhana district Maharastra India, has healthy environmental and demographic setup which accommodates rich ophidian diversity. The snakes are the Keystone species which plays an important role in ecosystem functioning but are threatened by anthropogenic activities as well as environmental alternation. The laws and legislation are not just sufficient for protection of these animals but it is necessary to raise the awareness levels by providing important information about snakes to different sections of people for conservation of ophidian biodiversity in Buldhana district Maharastra, as well as neighborhood. Because it is clear that disappearance of snakes will have tremendous social and ecological implications.

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