International Journal of Zoology Studies
ISSN: 2455-7269; Impact Factor: RJIF 5.14
Received: 23-03-2020; Accepted: 25-04-2020; Published: 28-04-2020
www.zoologyjournals.com
Volume 5; Issue 2; 2020; Page No. 27-30

Ecological studies of the amphibian fauna and their distribution of Sidhi district (M.P.)

Balram Das[1], Urmila Ahirwar[2]
[1] Assistant Professor & Head, Department of Zoology, Govt. College, Amarpatan, Distt. Satna, Madhya Pradesh, India
[2] Research Scholar, S.G.S. Govt. P.G. College, Sidhi, A.P.S. University, Rewa, Madhya Pradesh, India

Abstract
The amphibians was represented by 15 species belonging to 13 genera of 6 families and 2 orders from Sidhi district, Madhya Pradesh, India, during 2018 to 2019. Considering number of species in each family Bufonids with 2 species, Dicroglossids 5 species, Microhylids 2 species, Ranids 2 species, Rhacophorids 2 species and 2 species of Ichthyophids. The highest number of amphibian species was recorded from Gopad Banas tehsil (13 species), while the lowest number of species was observed in Sihawal tehsil (2 species). Status of amphibians shows that 5 species are abundant, 2 are common and 8 species are rare in the study sites.

Keywords: Amphibian diversity, distribution, status, Sidhi district

1. Introduction
The growing attention of populace in cities and the sizeable pace of development and growth of city areas have led to the emergence of unique prerequisites forming populations and communities, which range notably from the natural. With the emergence of cutting-edge cities is related emergence of the urban ecosystems. The species composition, structure of populations and communities in these ecosystems is usually now not random, however is a reflection of objective strategies in particular conditions in urban areas (Vershinin, 1997) [1].
Invariable component of the city ecosystems are the amphibians and reptiles. They occur in a range of terrestrial and aquatic habitats and therefore suffer in various degrees the impact of human activity. This leads to discount in their diversity, compared to herbal environments and adjustments in the shape of their populations and communities. Scientific publications from latest years endorse possibilities for the use of amphibians and reptiles as a mannequin animal organization in complex urban research (Vershinin, 1997; Bolshakov *et al.*, 2001; Ficetola & Debernardi, 2004; Jellinek *et al.*, 2004) [1, 4].
The various topography, geographic location, excessive rainfall and humidity have probable to be supported to the survival of several species of amphibians in the Western Ghats and the Eastern Himalayas (Andrews *et al.*, 2005) [5]. Amphibian of India comprises of about 405 species (Dinesh *et al.*, 2017) [6], then again the specific number of species has now not been known considering the fact that new species of a amphibians are being discovered. The amphibian fauna of British India was first published by using Boulenger (1890) [7]. In India, several taxonomic revisions and new species have been described by Biju and Bossuyt (2009) [8], Vallan *et al.*(2010) [9], Biju *et al.* (2014) [10], Dahanukar *et al.* (2016) [11], Garg and Biju (2017) [12], and Padhye *et al.* (2015 and 2017) [13, 14]. However, most of the studies on amphibians in this district are constrained to quick surveys. Hence the current survey was undertaken to make an vast and systematic study of the amphibian fauna of Sidhi district with different reference to their diversity, distribution, habitat and status. This survey affords baseline information and scientific facts for conservation of amphibians from arid zone.

2. Material and Methods
The Sidhi district lies in between 81°-18' to 82°-42' longitudes and 23°-48' to 24°-42' latitudes north in the north-east corner of Rewa division of M.P. It is surrounded by the Mirzapur district of U.P. On the north-east side and by Korea district of Chattisgarh on the south side. The Rewa district lies towards the north side and the Satna district on the south-west side and the Shahdol district encircles it towards southern side. The district of Sidhi covers about 2.36% of the M.P. state area and with its total area of 10532 sq. kms., this district is also one of the largest district in size of the M.P. It lies mostly on the Vindhyan plateau.
Sidhi has a number of natural resources with the river Son draining the district, and with coal deposits which feed major industries across the country. Sidhi district comprises seven tehsils: Bahari, Churhat, Gopad Banas, Rampur Naikin, Majhauli, Kusmi and Sihawal.
The course of the rivers of the Sidhi district is towards north and hence the slope of the district in general is towards north side. Sidhi district is largely hilly with an undulated land in which the height of the land above the sea level varies from 243.68-609.00 metres.
The current learn about has been carried out from 2018 to 2019. Field studies were primarily performed by using visits to all seven tehsils of Sidhi district and to all the blanketed areas, throughout wet and dry season both in day and night. At all locations, intensive search for amphibians used to be undertaken by using visual encounters method; the fashionable technique formulated for measuring and monitoring the amphibian diversity by using IUCN/SSC-DAPTF (Crump, Heyer *et al.*, 1994) [15]. Here all possible sites such as the river bank, close to water bodies, along streams, in agricultural lands, grasslands, under leaf litter, on tree trunks, on foliages, under stones, logs, rock crevices and decaying vegetation had been searched. The looking out is made of frogs and toads the usage of torch lights for the

duration of night. On each and every amphibian sighting, statistics on species, habitats, microhabitat and altitude have been recorded. All amphibians determined for the duration of the find out about were photographed and after taking morphometric measurements they are released returned into their natural habitat, as per the wellknown methods for amphibians (Crump, Heyer *et al.*, 1994) [15]. Specimen identification was made on the basis of morphometry, calls, available literature Boulenger (1890) [7], Chanda (2002) [16], Daniels (2005) [17], Gururaja (2012) [18], Inger & Dutta (1986) [19], and with the help of other taxonomists. The nomenclatures of species were updated with the checklist by Dinesh *et al.* (2017) [6] and Frost (2017) [20].

3. Results and Discussion

A total of 15 species of amphibians were recorded from various parts of Sidhi district during the survey belonging to 13 genera of 6 families and 2 orders (Table 1). Considering number of species in each family Bufonids with 2 species, Dicroglossids 5 species, Microhylids 2 species, Ranids 2 species, Rhacophorids 2 species and 2 species of Ichthyophids (Table 1). 15 species of amphibians of Sidhi district fall under the various categories of the IUCN red list; endangered 1, least concerned 13 and 1 not assessed. 2 species were included in the schedules IV of Indian Wildlife (protection) act and two species come under Appendix II of cites.

The highest number of amphibian species was recorded from Gopad Banas tehsil (13 species), while the lowest number of species was observed in Sihawal tehsil (2 species). Status of amphibians shows that 5 species are abundant, 2 are common and 8 species are rare in the study area.

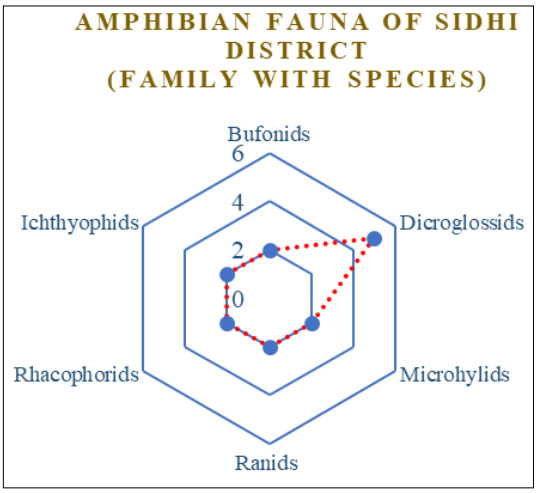

Fig 1

Table 1: Checklist of amphibian fauna of Sidhi district with distribution, status, IUCN status and WPA- cites.

S. No.	Name of species	Common names	Location of species	Status	IUCN Red Least	WPA-cites
ORDER: ANURA (Fischer von Waldheim) FAMILY: BUFONIDAE (Gray)						
1.	*Duttaphrynus melanostictus* (Schneider 1799) [21]	Common Indian Toad	Bahari, Churhat, Gopad Banas, Rampur Naikin, Majhauli, Kusmi and Sihawal	Abundant	LC	
2.	*Xanthophryne koynayensis* (Soman, 1963) [22]	Koyna Toad	Bahari, Gopad Banas	Rare	EN	
FAMILY: DICROGLOSSIDAE (Anderson)						
3.	*Euphlyctis cyanophlyctis* (Schneider, 1799) [21]	Indian Skittering Frog (Indian Skipper Frog)	Bahari, Churhat, Gopad Banas, Rampur Naikin, Majhauli, Kusmi	Abundant	LC	Sch. IV APP.II
4.	*Fejervarya cepfi* (Garg and Biju, 2017) [12]	CEPF Burrowing Frog	Gopad Banas,	Rare	Not Assessed	
5.	*Hoplobatrachus tigerinus* (Daudin, 1802) [23]	Indian Bull frog	Bahari, Churhat, Gopad Banas, Rampur Naikin, Majhauli, Kusmi	Abundant	LC	Sch. IV APP.II
6.	*Sphaerotheca breviceps* (Schneider, 1799) [21]	Indian Burrowing Frog	Bahari, Churhat, Gopad Banas, Rampur Naikin, Majhauli, Kusmi	Abundant	LC	
7.	*Sphaerotheca dobsonii* (Boulenger, 1882) [7]	Dobson's Burrowing Frog	Gopad Banas	Rare	LC	
FAMILY: MICROHYLIDAE (Gunther)						
8.	*Microhyla ornata* (Dumeril and Bibron, 1841) [24]	Ornate Narrow-mouthed Frog	Bahari, Churhat, Gopad Banas, Rampur Naikin, Majhauli, Kusmi	Abundant	LC	
9.	*Uperodon globulosus* (Gunther, 1864) [25]	Grey Balloon Frog	Bahari, Gopad Banas, Majhauli, and Sihawal	Common	LC	
FAMILY: RANIDAE (Rafinesque)						
10.	*Clinotarsus curtipes* (Jerdon, 1853) [26]	Bicoloured Frog	Bahari, Gopad Banas	Rare	LC	Sch. IV
11.	*Hydrophylax bahuvistara* (Padhye, Jadhav, Modak, Nameer and Dahanukar, 2015) [13]	Fungoid Frog	Rampur Naikin, Gopad Banas	Rare	LC	Sch. IV
FAMILY: RHACOPHORIDAE Hoffman						
12.	*Polypedates maculatus* (Gray, 1830) [27]	Common Indian Tree Frog (Chunam Frog)	Churhat, Rampur Naikin, Majhauli	Common	LC	
13.	*Pseudophilautus amboli* (Biju and Bossuyt, 2009) [8]	Amboli Bush Frog	Gopad Banas	Rare	LC	
ORDER: GYMNOPHIONA (Muller) FAMILY: ICHTHYOPHIIDAE (Taylor)						
14.	*Ichthyophis beddomei* (Peters, 1879) [28]	*Beddome's Caecilian*	Majhauli	Rare	LC	
15.	*Ichthyophis bombayensis* (Taylor, 1960) [29]	Bombay caecilian	Gopad Banas	Rare	LC	

Rare- species found in 1-2 tehsils, Common- species found in 3-5 tehsils and Abundant- species found in more than 6 tehsils EN-

Endangered, CE- Critically Endangered, VU- Vulnerable, LC- Least Concerned, DD-Data Deficient, NT- Near Threatened. Schedules IV- Indian Wildlife (protection) Act App. II of CITES - The Conservation on International Trade in Endangered Species of Wild Flora and Fauna.

Table 2: Amphibian fauna of Sidhi district with habitat, microhabitat, altitude range, annual temperature and annual rainfall

S. No.	Name of species	Habitat	Microhabitat	Altitude (m.)		Mean annual Temp. (°C)		Annual rainfall (mm.)	
				Max.	Min.	Max.	Min.	Max.	Min.
1.	*Duttaphrynus melanostictus*	Terrestrial, near human habitats	On bare land, under stone, in crevices, under street lamps, near water bodies, agriculture land	1050	450	38	16	2540	480
2.	*Xanthophryne koynayensis*	Terrestrial, On lateritic rock	On plateau, under rock, in crevices, in grasses surrounded by forest	1140	860	28	17	2550	1450
3.	*Euphlyctis cyanophlyctis*	Aquatic, littoral	Found in almost all kinds of fresh water bodies	1050	450	36	16	2500	450
4.	*Fejervarya cepfi*	Semi aquatic, burrowing frog	Wet soil, on forest floor, forest edge, in grasses near water bodies, paddy and sugar cane field	1050	550	26	16	2800	1400
5.	*Hoplobatrachus tigerinus*	Semi aquatic, near human habitation	Agricultural fields, in ponds, lakes, wells and on forest floor	1050	400	40	17	2800	1450
6.	*Sphaerotheca breviceps*	Terrestrial, near human habitation	Moist soil, near water bodies, in agricultural land, on bare ground. Burrowing species	1000	500	40	17	2000	500
7.	*Sphaerotheca dobsonii*	Terrestrial, burrowing frog	In leaf litter, on forest flour, moist soil close to water bodies, in paddy field, forest edge habitat	1000	450	26	20	2500	950
8.	*Microhyla ornata*	Semi aquatic, near human habitation	In grasses, in and near water bodies, under stones, in crevices, on bare ground	1050	500	36	15	2450	500
9.	*Uperodon globulosus*	Terrestrial, burrowing frog	Termite Mountain, On bare ground, near water bodies, agriculture land	1000	600	30	22	2450	950
10.	*Clinotarsus curtipes*	Semi aquatic, forest dwelling	Forest floor, leaf litter, found near water bodies, slow running streams	1050	600	25	16	2900	950
11.	*Hydrophylax bahuvistara*	Semi aquatic	found near water bodies, forest floor, leaf litter, in paddy and sugar cane field	1000	500	28	18	1900	800
12.	*Polypedates maculatus*	Arboreal	On herbs, shrubs, trees, on sugarcane plantation	1050	450	26	16	1400	400
13.	*Pseudophilautus amboli*	Arboreal	On herbs, shrubs, trees in forest	1050	450	24	22	2900	950
14.	*Ichthyophis beddomei*	Fossorial	In moist loose soil, in forest, in marshes, cultivated land, in leaflitter	1100	900	26	12	2800	900
15.	*Ichthyophis bombayensis*	Fossorial	In humus rich soil, in leaf litter in forest, cultivated land, under rocks, in marshes	1500	700	26	18	2800	1400

Duttaphrynus stomaticus, *Fejervarya caperata*, *Fejervarya cepfi* (Garg and Biju 2017) [12], *Sphaerotheca pashchima* (Padhye *et al.* 2017) [14], *Pseudophilautus amboli* and *Ichthyophis bombayensis* are first reports from the study area. We found *Ichthyophis bombayensis* road killed specimen in Gopad Banas, Sidhi (M.P.).

4. Conclusion

Survey of amphibians in Sidhi district concludes that the non-endemic frogs viz. *Duttaphrynus melanostictus*, *Euphlyctis cyanophlyctis*, *Hoplobatrachus tigerinus*, *Sphaerotheca breviceps* and *Polypedates maculatus* are widely distributed, well adapted and occur in all microhabitats. Environmental prerequisites and habitat of species play a necessary position in the distribution and diversity of species. Hence this survey provides baseline records and scientific records for conservation of amphibians from arid zone.

5. References

1. Vershinin V. Ecological features of amphibian populations in urban areas - Ekaterininburg, Russia, 1997.
2. Bolshakov, V., Pyastolova, O. and Vershinin, V. Specific features of the formation of animal species communities in technogenic and urbanized landscapes. Russian Journal of Ecology. 2001; 32(5):315-325.
3. Ficetola G, Debernardi F. Amphibians in a human-dominated landscape: the community structure is related to habitat features and isolation. Biological Conservation. 2004; 119:219-230.
4. Jellinek S, Driscoll D, Kirkpatrick J. Environmental and vegetation variables have a greater influence than habitat fragmentation in structuring lizard communities in remnant urban bushland. Austral Ecology. 2004; 29:294-304.
5. Andrews MI, George S, Joseph, J. A survey of the amphibian fauna of Kerala-distribution and Status. Zoos' Print Journal. 2005; 20(1):1723-1735.
6. Dinesh KP, Radhakrishnan C, Channakeshavamurthy BH, Kulkarni NU. A Checklist of Amphibia of India Updated till April, 2017.
7. Boulenger GA. Fauna of British India, including Ceylon and Burma, Reptilia and Batrachia. London, Taylor and Francis, 1890.
8. Biju SD, Bossuyt F. Systematic and phylogeny of Philatus Gistel, 1848 (Anura, Rhacophoridae) in Western Ghats of India, with description of 12 new species. Zoolgy Journal of the Linnean Society. 2009; 155(2):374-444.
9. Vallan D, Vences M, Glaw F. Forceps delivery of a new treefrog species of the genus Boophis from eastern Madagascar (Amphibia: Mantellidae). Amphibia-Reptilia, 2010; 31:1-8.

10. Biju SD, Garg S, Mohony S, Wijayathilaka N, Senevirathne G, Meegaskumbura M, *et al*. DNA barcoding, phylogeny and systematic of Golden-backed frog (Hylarana, Ranidae) of Western Ghats-Sri Lanka biodiversity hotspots, with the description of nine new species. Contribution to Zoology. 2014; 83(4):296-335.
11. Dahanukar N, Modak N, Krutha K, Nameer P, Padhye A, Molur S, *et al*. Leaping frog (Anura: Ranixalidae) of the Western Ghats of India, An integrated taxonomic review. Journal of Threatened taxa. 2016; 8(10):9221-9288.
12. Garg S, Biju SD. Description of four new species of burrowing frog in the Fejervaeya rufescens complex (Dicroglossidae) with notes on morphological affinities of Fejervarya species in Western Ghats. Zootaxa. 2017; 4277(4):451-490.
13. Padhye AD, Jadhav A, Modak N, Nameer D, Dahanukar N. Hydrophylax bahuvistara, a new Species of Fungoid frog (Amphibia: Ranidae) from Peninsular India. Journal of Threatened taxa. 2015; 7(11):7744-7760.
14. Padhye AD, Dahanukar N, Sulakhe S, Dandekar N, Limaye S, Jamdade K, *et al*. Sphaerothica pashchima, a new species of burrowing frog (Anura: Dicroglossidae) from Western India. Journal of Threatened taxa. 2017; 9(6):1028610296.
15. Crump ML, Scott NJ. Jr. Visual Encounter Surveys. pp: 84–92 in: Heyer W R, Donnelly MA, Mc-Diarmid RW, Hayek LC and Foster MS (eds.) Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians. Smithsonian Institution Press, Washington, D.C, 1994.
16. Chanda SK. Hand book of Indian Amphibians. Zoological Survey of India, Kolkata, India, 2002, 1-335.
17. Daniels RJR. Amphibians of peninsular India. Universities Press, Hyderabad, 2005, 268.
18. Gururaja, K.V. Pictorial guide to Frogs and Toads of Western Ghats. Gubbi Labs LLP. http//www. gubbilabs.in, 2012, 1-153.
19. Inger RF, Dutta SK. An overview of the Amphibian Fauna of India. Journal of Bombay Natural History Society. 1986; 83(Suppl.):135-146.
20. Frost DR. Amphibian Species of the World: an online reference. Version 6.0 (30/04/2017). http://research.amnh.orglvz!herpetology/amphibia/index.h tml. Journal of American Museum of Natural History, New York, USA, 2017.
21. Schneider JG. Historia Amphibiorum Naturalis et Literarariae. Fasciculus Primus. Continens Ranas, Calamitas, Bufones, Salamandras et Hydros in Genera et Species Descriptos Notisque suis Distinctos. Jena: Friederici Frommanni, 1799.
22. Soman PW. A new Bufo from Maharastra. Journal of Biological Sciences. Bombay, 1963, 6:73.
23. Daudin FM. "An. XI". Histoire Naturelle des Rainettes, des Grenouilles et des Crapauds. Quarto version. Paris: Levrault, 1802.
24. Duméril AMC, Bibron G. Erpétologie Générale ou Histoire Naturelle Complète des Reptiles. Volume 8. Paris: Librarie Enclyclopedique de Roret, 1841.
25. Günther ACLG. The Reptiles of British India. London: Ray Society by R. Hardwicke, 1864.
26. Jerdon TC. Catalogue of reptiles inhabiting the Peninsula of India. Journal of the Asiatic Society of Bengal. 1853; 22:522-534.
27. Gray JE. Illustrations of Indian Zoology; Chiefly Selected from the Collection of Major-General Hardwicke, F. R. S. Volume 1. Part 3. London: Treuttel, Wurtz, Treuttel, Jun. and Richter, 1830.
28. Peters WCH. 1880 "1879". Über die Eintheilung der Caecilien und insbesondere über die Gattungen Rhinatrema und Gymnopis. Monatsberichte der Königlichen Preussische Akademie des Wissenschaften zu Berlin, 1879, 924-945.
29. Taylor EH. On the caecilian species Ichthyophis glutinosus and Ichthyophis monochrous, with description of related species. University of Kansas Science Bulletin, 1960; 40:37-120.