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Research Article

Amphibian Diversity of Chandgad Taluka - Kolhapur: Northern Western Ghats

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ABSTRACT

In this paper 28 amphibian species are reported from Chandgad taluka in Kolhapur district of Southern Maharashtra in Northern Western Ghats. This contributes 6.26 % of amphibians reported from Indian Subcontinent and 52.83 % of amphibians recorded from Maharashtra. The documented amphibians representing 07 families and 16 genera. Among the amphibians recorded 03 species belongs to near threatened and 01 species belongs to each of endangered, vulnerable and critical category of IUCN.

Key words: Amphibians, Anura, Caecilian, Chandgad, Checklist, Western Ghats

INTRODUCTION

The Indian subcontinent represents 447 amphibians of which 406 are anurans, two species are of Salamanders and 39 species of caecilians (Dinesh *et al.*, 2020). Among these 239 are found in the Western Ghats (Dinesh *et al.*, 2017a). Recent studies (Biju & Bossuyt, 2005ab, 2006; Gururaja *et al.,* 2007; Giri *et al*., 2003; Gower *et al*., 2008; Howlader *et al*., 2015; Biju *et al*., 2011, 2014; Zachariah *et al*., 2011ab; Garga *et al*., 2018; Dinesh *et al.*, 2017b) show that, there are still several new species waiting to be discovered. Kulkarni *et al*., (2013) documented 36 amphibians from our neighboring state Goa. Whereas, Maharashtra state harbours 53 amphibians (Padhye & Ghate, 2012) contributing 11.86 % of amphibians found in India. Recently, 22 amphibians documented from Rahdhanagari Wildlife Sanctuary Kolhapur (Yadav & Yanckanchi, 2014) and 14 amphibians recorded from Shivaji University Campus Kolhapur (Yadav *et al*., 2014). Chandgad taluka in Kolhapur district of Southern Maharashtra is a part of the Northern Western Ghats. It is the border area between Karnataka and Goa. Since, - there are no published data on amphibian diversity from Chandgad, - an attempt is made to record the amphibian diversity.

Study Area:

The study area Chandgad taluka (15° 55' 60 N, 74° 23' 0 E) is located around 800 m asl. and temperature ranges from 14.75^{o} C to 36.10^{o} C. The annual rain fall ranges from 3000 to 5000 mm/year. Chandgad taluka consists of several temporary ponds, puddles, lakes, irrigation canals, paddy fields and agricultural fields. Habitat consists of moist mixed deciduous forest and semi evergreen mixed forest with acacia plantation, bamboo forest, open land, grass land. It is also traversed by several temporary streams and perennial Rivers such as Hiranykeshi, Ghathaprabha and Tamrapani.

MATERIAL AND METHODS

Regular field visits are made to different parts of the study area for documentation of amphibians from June 2017 to February 2019. We also added some field observation data made during June 2021 to September 2021. Surveys are made during early morning and in late evening by visual encounters survey method. Amphibians are intensively searched along the edges of streams, temporary water bodies, puddles, ditches, agricultural fields, grasslands, under leaf litter, in forest floors, on tree trunks, under stones, logs, rock crevices, decaying vegetation etc. We tried to identify the egg mass, tadpoles, froglet and adult amphibians in the field. The amphibians identified in the field were released after taking some images with mobiles, D5300 and D7200 Nikon Camera. The unidentified tadpoles and amphibians in the field were brought to the laboratory and their identification was made by referring the books and research articles (McDiarmid & Altig, 1999; Hiragond & Saidapur, 1999; Hiragond *et al.*, 2001; Saidapur, 2001; Altig & McDiarmid, 2015; Daniels, 1997abc, 2011; Gururaja, 2012; Daniel, 1963ab, 1975; Bhatta, 1998). Later they were released to the nature. We also identified some of the frogs based on their calls during the breeding season in late evening. Stereo zoom dissecting microscope was used for the observation of morphological details of tadpole and caecilian for their identity. The status of threatened category of amphibians is adopted from IUCN Red List of Threatened Species (2022).

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RESULTS AND DISCUSSION

During regular field visits to different parts of the study area we found egg clutches of *Microhyla nilphamariensis, Clinotarsus curtipes, Indosylvirana caesari, Duttaphrynus melanostictus, Hoplobatrachus tigerinus, Polypedates maculatus, Nyctibatrachus petraeus* and some unidentified egg masses. We also observed the tadpoles of *H. tigerinus, D. melanostictus, C. curtipes, M. nilphamariensis, E. cynophlyctis, P. maculatus, N. petraeus* and some unidentified tadpoles in their natural habitat like ponds, puddles, streams etc. We have sighted several adult frogs in their natural habitats namely *I. caesari, D. melanostictus, Sphaerotheca breviceps, Hydrophylax malabaricus, Minervarya goemchi, H. tigerinus, Duttaphrynus scaber, M. nilphamariensis, Microhyla rubra, Rhacophorus malabaricus* etc enlisted in table 1. During the rainy season we encountered several calling males (Images 4, 13, 15a, 16b) and newly metamorphosed frogs (froglets) of *I. caesari, D. melanostictus, H. tigerinus, E. cynophhlyctis, M. nilphamariensis*. We also encountered three individuals of a caecilian from Patne phata, Halkarni and along the mining road in Chandgad which were brought to the laboratory for further observation. We identified the said caecilian up to the genus level and confirmed that, it belongs to *Gegenophis* genus following Bhatta (1998). The morphological details of the said caecilian compared with congeners of the known *Gegenophis* genus. We are working on molecular analysis of the said caecilian. As per our best of knowledge we are first time reporting the above said caecilian. We also observed lot of morphological variations in *Pseudophilautus amboli* (Image 10abc) and *Minervarya syhadrensis* (Image15abc) frogs in nature.

We recorded 28 amphibians (Table 1) from the study area representing seven families (Figure 1) and 16 genera (Figure 2) that contribute 6.26% of Indian amphibians (Dinesh *et al*., 2020), 52.83% of amphibians recorded in Maharashtra (Padhye & Ghate, 2012) and 77.78% of amphibians documented in Goa state (Kulkarni *et al*., 2013). Our findings show that, Chandgad taluka is rich in amphibian diversity. We recorded 93.33% of amphibians documented in Sangli district (Sajjan *et al*., 2017) and 90.32% of amphibians reported from Pune district (Padhye *et al*., 2002) in Maharashtra. Sajjan *et al*., (2018) recorded 17 anuran species from Solapur district. Whereas, this paper reports 27 anurans from study area which shows the richness of amphibians in Chandgad taluka. Microhylidae dominate the study area followed by Dicroglossidae and, Bufonidae and Rhacophoridae (Figure 1). Among the genera *Uperodon* represents the maximum number of species followed by *Duttaphrynus* (Figure 2). During rainy season in Tillari at late night we found adult *D. melanostictus* with a leech attached on its ventral surface. We removed the leach from its body and released in its natural habitat (Image 17bc). Photo plate 1 (Images 1 to 20) shows some of the anurans, caecilian and egg mass recorded during the field work.

Among the amphibians documented *Pseudophilautus amboli* belongs to Critically Endangered category; *Raorchestes bombayensis* belongs to vulnerable category; *Uperodon mormoratus* belongs to Endengered category; *Duttaphrynus parietalis, Uperodon montanus* and *Clinotarsus curtipes* belongs to Near Threatened category and, 19 anuran species belong to Least Concern category (Table 1, Figure 3) of IUCN conservation status (IUCN, 2022). Most of the times we found difficulty in identification of egg masses and tadpoles in the field. Studies are needed on developmental stages of anuran larvae, identification of egg clutches and tadpoles. Since, - caecilians are very rare and burrowing in habitat, it is difficult to find them in their natural habitat. Hence, studies are needed to concentrate on habitat, diversity and biology of caecilians in the study area which could open a window for researchers to continue further research on amphibian developmental biology and behavioral studies. It is also necessary to take up some conservation aspect projects to conserve critically endangered species *P. amboli* and vulnerable species *R. bombayensis*.

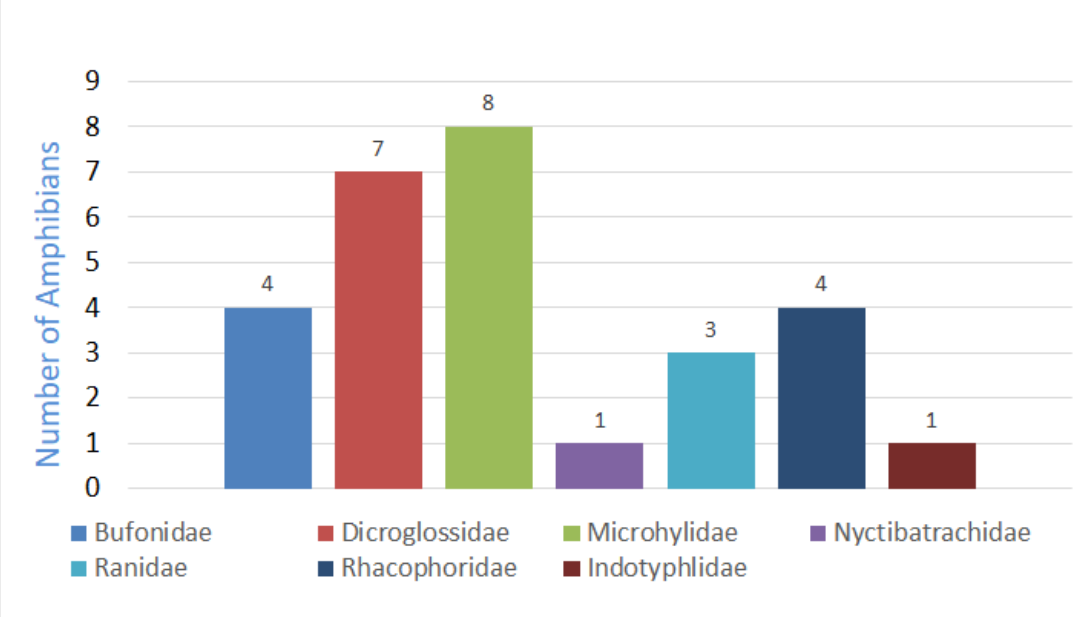

Figure 1. Shows Family wise number of Amphibian Species Recorded in Chandgad Taluka of Kolhapur

Table 1. Showing Amphibian Diversity Recorded in Chandgad Taluka of Kolhapur

Sl. No.	Order/Family	Common Name	Scientific Name	IUCN Conservation Status
	1. Order Anura			
1	Bufonidae	Ferguson's Toad	*Duttaphrynus scaber* (Schneider, 1799)	LC
2	Bufonidae	Asian Common Toad	*Duttaphrynus melanostictus* (Schneider, 1799)	LC
3	Bufonidae	Ridged Toad	*Duttaphrynus parietalis* (Boulenger, 1882)	NT
4	Bufonidae	Marbled Toad	*Duttaphrynus stomaticus* (Lutken, 1864)	LC
5	Dicroglossidae	Indian Bull Frog	*Hoplobatrahcus tigerinus* (Daudin, 1802)	LC
6	Dicroglossidae	Jerdon's Bull Frog	*Hoplobatrachus crassus* (Jerdon, 1853)	LC
7	Dicroglossidae	Skittering Frog	*Euphlyctis cyanophlyctis* (Schneider, 1799)	LC
8	Dicroglossidae	Bombay Wart Frog	*Minervarya syhadrensis* (Annandale, 1919)	LC
9	Dicroglossidae	Goan large fejervarya	*Minervarya goemchi* (Dinesh, Kulkarni, Swamy and Deepak, 2018)	NA
10	Dicroglossidae	Indian Burrowing Frog	*Sphaerotheca breviceps* (Schneider, 1799)	LC
11	Dicroglossidae	Roland's Burrowing Frog	*Sphaerotheca rolandae* (Dubois, 1983)	LC
12	Microhylidae	Ornate Narrow-Mouthed Frog	*Microhyla nilphamariensis* (Howlader, Nair, Gopalan and Merilä, 2015)	NA
13	Microhylidae	Guangdong Rice Frog	*Microhyla rubra* (Jerdon, 1853)	LC
14	Microhylidae	Indian Dot Frog	*Uperodon mormoratus* (Rao, 1937)	EN
15	Microhylidae	Marbled Globular Frog	*Uperodon systoma* (Schneider, 1799)	LC
16	Microhylidae	Indian Globular Frog	*Uperodon globulosus* (Günther, 1864)	LC
17	Microhylidae	Sri Lankan Bullfrog	*Uperodon taprobanicus* (Parker, 1934)	LC
18	Microhylidae	Jerdon's Ramanella	*Uperodon montanus* (Jerdon, 1853)	NT
19	Microhylidae	Eluru Dot Frog	*Uperodon variegatus* (Stoliczka, 1872)	LC
20	Nyctibatrachidae	Castle Rock Night Frog	*Nyctibatrachus petraeus* (Das and Kunte, 2005)	LC
21	Ranidae	Bronzed Frog	*Indosylvirana caesari* (Biju, Garg, Mahony, Wijayathilaka, Senevirathne and Meegaskumbura, 2014)	NA
22	Ranidae	Malabar Fungoid Frog	*Hydrophylax malabaricus* (Tschudi, 1838)	LC
23	Ranidae	Bicoloured Frog	*Clinotarsus curtipes* (Jerdon, 1853)	NT
24	Rhacophoridae	Malabar Gliding Frog	*Rhacophorus malabaricus* (Jerdon, 1870)	LC
25	Rhacophoridae	Indian Tree Frog	*Polypedates maculatus* (Gray, 1830)	LC
26	Rhacophoridae	Amboli Bush Frog	*Pseudophilautus amboli* (Biju and Bossuyt, 2009)	CE
27	Rhacophoridae	Bombay Bush Frog	*Raorchestes bombayensis* (Annandale, 1919)	VU
	2. Order Gymnophiona (Apoda)			
28	Indotyphlidae	-	*Gegenophis sp.*	-

Abbreviations used: NT- Near Threatened, CR- Critically Endangered, EN- Endangered, NA – Not Assessed, VU – Vulnerable, LC- Least concerned.

Photo plate 1.

1. *Indosylvirana caesari*

2. *Polypedates maculatus*

3. *Rhacophorus malabaricus*

4. *Duttaphrynus scaber*

5. *Sphaerotheca breviceps*

6. *Hydrophylax malabaricus*

7a. *Hoplobatrachus tigerinus*

7b. *Hoplobatrachus tigerinus* froglet

8. *Hoplobatrachus crassus*

9. *Nyctibatrachus Petraeus*

10a. *Pseudophilautus amboli*

10b. *Pseudophilautus amboli*

10c. *Pseudophilautus amboli*

11. *Euphlyctis cyanophlyctis*

12. *Uperodon mormoratus*

13. *Uperodon systoma*

14. *Minervarya goemchi*

15a. *Minervarya syhadrensis*

15b. *Minervarya syhadrensis*

15c. *Minervarya syhadrensis* (Female)

16a. *Microhyla nilphamariensis*

16b. *Microhyla nilphamariensis* calling

17a. *Duttaphrynus melanostictus*

17b. *D. melanostictus* ventral surface with leech

17c. *D. melanostictus* - leech removed from its body

18. *Caecilian - Gegenophis sp.*

19. Egg mass of *Clinotarsus curtipes*

20. Egg mass of *Polypedates maculatus*

Photo plate 1. Images 1 to 20 shows some of the Amphibians and Egg mass Recorded in Chandgad Taluka of Kolhapur

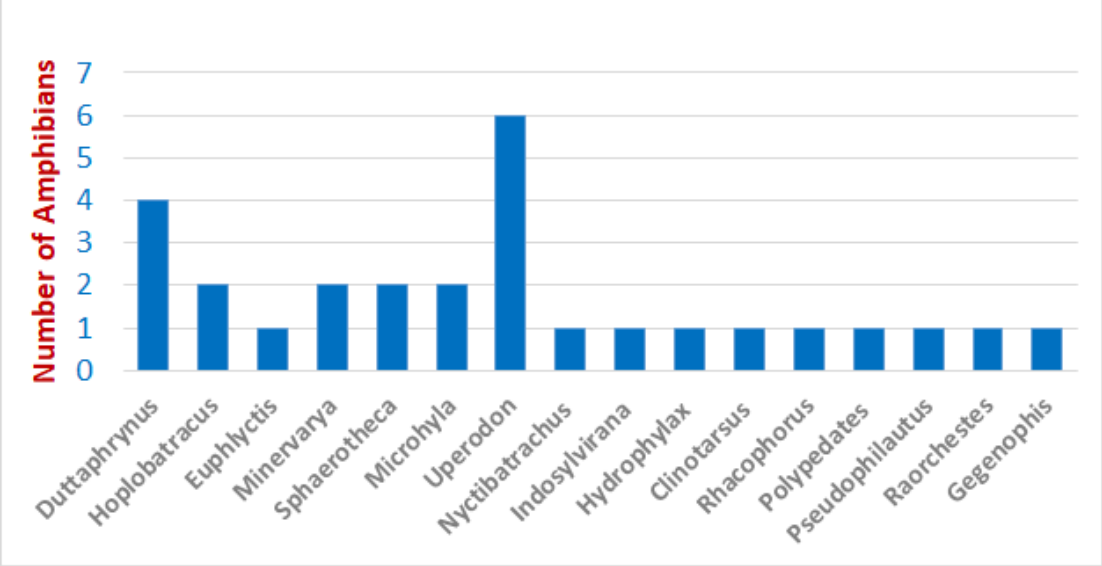

Figure 2. Shows Genera wise number of Amphibian Species Recorded in Chandgad Taluka of Kolhapur

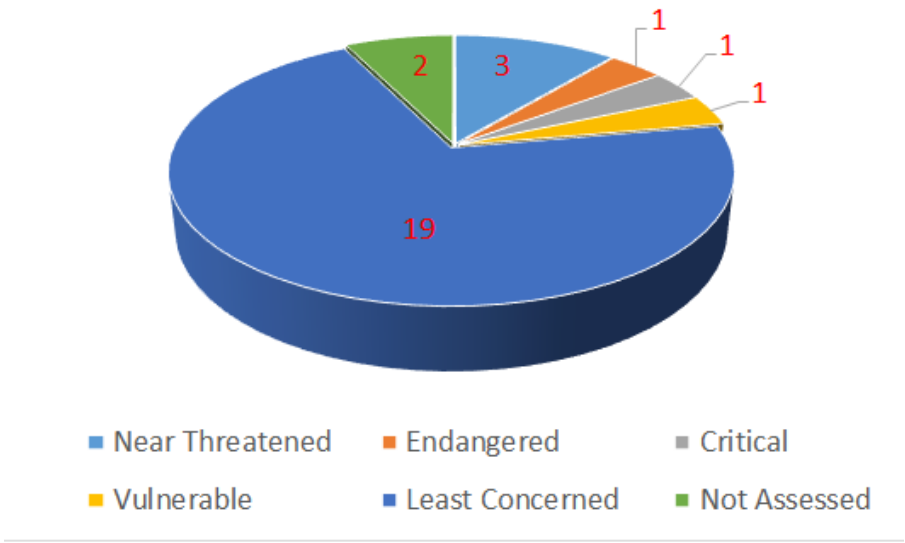

Figure 3. Showing IUCN Conservation Status of Anurans Recorded in Chandgad Taluka of Kolhapur

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