

AN OVERVIEW OF AMPHIBIAN FAUNA OF MAHARASHTRA STATE

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Abstract

There are 43 species of amphibia in Maharashtra State of the 224 species found in India, distributed among six different families as: Icthyophiidae, Caecilidae, Bufonidae, Microhylidae, Ranidae and Rhacophoridae. Out of seven genera endemic to the Western Ghats, three are represented in Maharashtra State.

Keywords

Amphibians, Maharashtra State, overview,

Introduction

Maharashtra State (15°-22°N and 72°-81°E) is in the northwestern part of peninsular India. The northern parts of Western Ghats are present on the western margin of the state around 60 to 70km from the Arabian Sea coast. The Ghats extend east as well as west, at some places even up to the seashore. There is a peculiar geographical feature called *Konkan Kada*, which is a formation of a series of cliffs of height 200-300m (minimum) that extends almost throughout the length of Western Ghats in Maharashtra. Due to the *Konkan Kada*, Western Ghats form a hurdle in the way of southwestern monsoon clouds thereby receiving a very high rainfall (average ca. 6,000mm); some places like Mahabaleshwar and Bhimashankar receiving up to 10,000mm. The western districts of Kolhapur, Sindhudurga, Satara, Ratnagiri, Pune, Raigad, Nasik and Thane are rich in biodiversity as they harbour parts of the Western Ghats.

Western Ghats is one of the world's 25 biodiversity hotspots (Myers, 2000) with many species of plants and animals endemic to the region. The detailed biogeography of this region has been attempted earlier by several scientists in a book edited by M.S. Mani (1974). Recently even Myers (2000) has compiled recent information about Western Ghats. There are 117 species of amphibians in the Western Ghats, which fall in 21 genera, six families and two orders (Daniels, 1992a).

The middle as well as eastern parts of the State are, however, dry as compared to western Maharashtra. These parts are semiarid or arid with extreme climate. This constitutes a part of the Deccan Plateau and possesses mainly dry deciduous forests or scrubland.

The northern boundary of the State has forests in the Satpura Mountain ranges as those found in Kanha National Park and Melghat Sanctuary. Since the eastern most region of the State is nearer to the Bay of Bengal it is influenced by both onward and return monsoon. It shows some large forests at Tadoba National Park as well as in the Nagzira and Navegaon sanctuaries.

Since Boulenger's fauna volume on reptiles and amphibians of the then British India (Boulenger, 1890), there is no single monograph dealing with all Indian amphibian species. Inger and Dutta published an overview of the amphibian fauna of India in 1986. In 1992 Dutta published a species list of amphibians of India with distribution record. Dutta (1997) subsequently published an updated checklist of amphibians of India and Sri Lanka.

The first list of amphibians of Maharashtra State, which included 22 species, was prepared by Daniel for the Maharashtra State Gazetteer (Daniel, 1974). Prior to that and subsequently, Daniel published a series of papers dealing with the amphibians of western India (Daniel, 1963, 1975; Daniel & Sekar, 1989) and also commented on the distribution. Ravichandran and Pillai (1990) published a list of amphibians of Maharashtra. This paper is based on the examination of 223 amphibian specimens collected by the Western Regional Station of the Zoological Survey of India. The collection belonged to 13 species, of which one *Ansonia kamblei* was described as a new species. However, on the basis of known morphometry of juveniles of *Bufo melanostictus*, Dubois and Ohler (1999) have suggested that *Ansonia kamblei* should be treated as a synonym of *Bufo melanostictus* although they have not examined the holotype. Thus the assessment of the total faunistic wealth of amphibia of

Maharashtra should await a detailed study on the basis of additional surveys.

According to Dutta (1997), there are only 24 species of amphibians known from Maharashtra. Two Bufonid members (*Bufo microtypanum* and *B. parietalis*), which were recorded from Pune (Maharashtra) by Yazdani and Mahabal (1976), are not mentioned in Dutta's list. The list of amphibians of Maharashtra, published by Ravichandran and Pillai (1990), was also apparently not considered during this updating (most probably because the paper was actually published very late). This kind of distributional omission in an overview of the amphibian fauna of India, published by Inger and Dutta (1986), has been pointed out earlier by Sekar (1991).

The most recent publication on the amphibians of Maharashtra is by A.G. Sekar (1999). He reported four species for the first time from Maharashtra. With these additions, he compiles the list of amphibians from the State as 34. Even this list is incomplete, as he has not included a Rhacophorid, which was included as *Rhacophorus leucomystax* (Kuhl) by Ravichandran and Pillai (1990).

The present work is compilation of the previous information regarding the amphibian fauna of Maharashtra State in addition to our own surveys in various localities. It should be mentioned here that we have not conducted any deliberate, intensive survey of the entire State due to lack of both funds as well as trained manpower. Moreover, most of our survey localities are in the western part of the State in the Western Ghats region.

Observations and Discussion

Status of amphibians in Maharashtra State

Amphibians from Pune and nearby areas like Kas, Thoseghar, Mahableshwar, Kolhapur, Satara, Koyna, etc., from other neighbouring districts of Maharashtra State were also studied. Sporadic collections from distant places like Tadoba, Amboli, Harihareshwar, Alibag, Phansad, etc. were also studied. Our updated list (Table 1) shows 43 species of amphibia from Maharashtra, but we could not obtain all the species. We have so far observed only 31 species collected from different areas of Maharashtra State, by our colleagues, friends and our team (marked with *). During our surveys we observed nine of these species, which are new locality records (marked with **), that were not present in Selar's list (Sekar, 1999).

These 43 species of amphibia are distributed among six different families, namely, Ichthyophiidae, Caecilidae, Bufonidae, Microhylidae, Ranidae and Rhacophoridae. Table 2 shows the distribution of these 43 species within six different families. It also shows comparative status of family-wise distribution of amphibian species among 10 families in India, Western Ghats and Maharashtra State.

Out of 10 families from India, six (60%) are represented in Maharashtra State. Family Ranidae seems to predominate over the other families. Out of 224 Indian amphibian species only 19% (43 species) are known from the State.

There are seven genera, e.g., *Indotyphlus*, *Uraeotyphlus*, *Gegeneophis*, *Nyctibatrachus*, *Melanobatrachus*, *Micrixalus* and *Indirana*, which are endemic to Western Ghats (Molur & Walker, 1998). Three of these seven genera are represented in Maharashtra State, viz., *Nyctibatrachus*, *Indotyphlus* and *Indirana*.

So far as the status of these species is concerned, it is difficult to make any concrete statements as hard data are wanting. Reliable population data from monitoring is not available in India for most amphibians. Keeping in view our inability to give any quantitative information and hence true status, we present information only on the basis of qualitative data.

As far as the members of Gymnophiona are concerned the situation is worst. We are not aware if any one has observed or collected *Ichthyophis subterrestris* from the locality from where it was once collected, at least in the last 25 years or so. *Indotyphlus battersbyi*, which is originally described from Lonawla - Khandala, has not been observed there (to our knowledge) for many years. However, recently a specimen was collected from Supegaon (Bhat, 1997). With the exception of a few species of *Ichthyophis*, most Gymnophiona should be considered threatened, however, extensive surveys may reveal their exact status. Only a handful of biologists are working on this group of interesting animals and biology of most of the species is not known. Bhat (1997) published a checklist of Gymnophiona of Western Ghats and recently Ravichandran and Pillai (1999) published the *Fauna of Gymnophiona of India*.

Species of Bufonidae, overall, seem to be doing well. *Bufo melanostictus* is very common while *B. stomaticus* is perhaps the next common member. *B. stomaticus* was collected from only one locality (Chakan) near Pune and should be protected as this locality is changing due to industrialisation. *B. koynayensis* is found only in restricted localities nearby type-locality and should be protected. Nothing can be said with certainty about *B. beddomii*, *B. parietalis* and *B. microtypanum*; we have not personally observed any one of these species near Pune. These are relatively small and cryptic forms and are perhaps present as small populations in restricted areas.

Of the microhylid frogs perhaps the most common and widely distributed species is *Microhyla ornata* (found all over the State), while *M. rubra* is so far known only from a single locality - Wasumbe Tank, Wita, District Sangli (Ravichandran & Pillai, 1990; Kamble & Ghate, 1994). Similarly, *Ramanella variegata*

Table 1. Checklist of amphibia of Maharashtra (compiled data).

Gymnophiona (Limb-less amphibia)		30) <i>Rana temporalis</i> Günther *	Koyna, Mahabaleshwar, Satara Dt.
Ichthyophiidae		31) <i>Rana curtipes</i> Jerdon	
1) <i>Ichthyophis subterrestris</i> Taylor		32) <i>Sphaerotheca breviceps</i> [<i>Tomopterna breviceps</i> (Schneider)] *	Pune City and Mulshi, Pune Dt.
Caecilidae		33) <i>Sphaerotheca rufescens</i> [<i>Tomopterna rufescens</i> (Jerdon)] *	Mulshi, Pune Dt.
2) <i>Indotyphlus battersbyi</i> Taylor *	Supegaon - Raygad Dt., and Lonavla - Pune Dt.: Vivek Gour-Broome, pers. comm.].	34) <i>Sphaerotheca dobsonii</i> [<i>Tomopterna dobsonii</i> (Boulenger)] **	Mulshi, Lonawla, Pune Dt.
Anura (Frogs and Toads)		Rhacophoridae	
Bufoidea		35) <i>Philautus bombayensis</i> (Annandale) *	
3) <i>Bufo beddomii</i> Günther		36) <i>Philautus sp.</i> (closer to <i>bombayensis</i>) **	Mulshi, Pune Dt.
4) <i>Bufo koynayensis</i> Soman *	Koyna - Satara District: Ashok Captain, pers. comm.	37) <i>Philautus glandulosus</i> (Jerdon)	
5) <i>Bufo melanostictus</i> Schneider *		38) <i>Philautus sp.</i> (closer to <i>glandulosus</i>) **	Mulshi, Pune Dt.
6) <i>Bufo microtypanum</i> Boulenger		39) <i>Philautus leucorhinus</i> (Lichtenstein and Martens) *	Mulshi, Pune Dt.
7) <i>Bufo stomaticus</i> Lutken *	Pune City, and Chakan, Pune Dt.	40) <i>Polypedates maculatus</i> (Gray) *	
8) <i>Bufo parietalis</i> Boulenger		41) <i>Polypedates leucomystax</i> (Gravenhorst) ?@	
Microhylidae		42) <i>Polypedates sp.</i> (different from <i>maculatus</i>) **	Mulshi, Pune Dt.
9) <i>Microhyla ornata</i> (Duméril and Bibron) *		43) <i>Rhacophorus malabaricus</i> Jerdon	
10) <i>Microhyla rubra</i> Jerdon			
11) <i>Ramanella montana</i> (Jerdon) *	Mulshi, Pune Dt.		
12) <i>Ramanella variegata</i> (Stoliczka)			
13) <i>Uperodon globulosus</i> (Günther) *	Pashan, Pune City and Jambhe Village, Pune Dt.		
Ranidae			
14) <i>Indirana beddomeii</i> [<i>Rana beddomeii</i> (Günther)] *	Mulshi, Lonawla, Bhimashankar, Pune Dt.		
15) <i>Indirana leithii</i> [<i>Rana leithii</i> Boulenger] *	Simvagad, Mulshi Pune Dt., Matheran, Thane Dt.		
16) <i>Indirana phrynoderma</i> [<i>Rana phrynoderma</i> Boulenger] **	Mulshi, Pune Dt.		
17) <i>Limnonectes keralensis</i> [<i>Rana keralensis</i> Dubois] *			
18) <i>Limnonectes nilagirica</i> [<i>Rana nilagirica</i> Jerdon] **	Mulshi, Pune Dt.		
19) <i>Limnonectes limnocharis</i> [<i>Rana limnocharis</i> Gravenhorst] *			
20) <i>Limnonectes brevipalmata</i> [<i>Rana brevipalmata</i> Peters]			
21) <i>Limnonectes syhadrensis</i> [<i>Rana syhadrensis</i> Annandale] *			
22) <i>Hoplobatrachus tigerinus</i> [<i>Rana tigerina</i> Daudin] *			
23) <i>Hoplobatrachus crassus</i> [<i>Rana crassa</i> Jerdon] ?**	Mulshi, Pune Dt.		
24) <i>Nyctibatrachus humayuni</i> Bhaduri and Kripalani *	Bhimashankar, Pune Dt. and Thoseghar, Satara Dt.		
25) <i>Nyctibatrachus major</i> Boulenger **	Mulshi and Lonawala, Pune Dt.		
26) <i>Euphlyctis cyanophlyctis</i> [<i>Rana cyanophlyctis</i> Schneider] *			
27) <i>Euphlyctis hexadactylus</i> [<i>Rana hexadactyla</i> Lesson]			
28) <i>Rana malabarica</i> Tschudi *			
29) <i>Rana aurantiaca</i> Boulenger **	Thoseghar, Satara Dt.		

? - Species identification yet to be confirmed.

* - Species we (our colleagues, friends and our team) have observed from different areas of Maharashtra State.

** - Species not present in Sekar's (1999) list, which are new locality records.

@ - Included as *Rhacophorus leucomystax* by Ravichandran and Pillai (1990). New names after Dutta, 1997; Das and Dutta, 1998; and Vences *et al.*, 2000. Old names are given in square brackets beside the new names.**Table 2. Comparative status of family-wise distribution of amphibian species among 10 families in India, Western Ghats and Maharashtra State.**

Family	India	Western Ghats	Maharashtra
Salamandridae	1	0	0
Ichthyophiidae	11	7	1
Ureotyphlidae	5	4	0
Caecilidae	5	3	1
Pelobatidae	10	0	0
Bufoidea	22	13	8
Hyllidae	1	0	0
Microhylidae	18	12	5
Rhacophoridae	60	30	8
Ranidae	91	48	20
Total	224	117	43

and *R. montana* are perhaps found only in a few forested areas. We collected *R. montana* from Mulshi area. Sekar (1991) pointed out that *R. variegata* is also found in Maharashtra, as per the records of Bombay Natural History Society's collection data. However, no recent sightings or reports are available on this species from the State. One of our students brought an injured specimen of *Uperodon globulosus* from Alibag. We found a small population of *U. globulosus* in Pune and breeding of this species is observed in very restricted localities. We have also collected tadpoles of *U. globulosus* from Pashan-Pune but could not locate the adults. However it is present in a farmhouse of one of our friends at Jambhe Village, near Pune City. Distribution and present status of *Ramanella* and *Uperodon* in Maharashtra however is absolutely uncertain and needs more extensive survey.

Ranidae members, with the exception of a few species, are distributed widely all over the Western Ghats. In spite of this, many are living precariously due to onslaught of deforestation, urbanization, pollution and concomitant habitat destruction. *Hoplobatrachus tigerinus* (*Rana tigerina*), once common around Pune, Satara, Kolhapur, whole of the Konkan area, etc., was hardly observed. However, conditions have certainly improved in the last 10 years since the ban on trade of froglegs and stopping the use of this frog for teaching purpose. This is evident from the calls of these frogs, which were heard from good many localities and the young ones seen around since about 1993. *Euphlyctis cyanophlyctis* (*Rana cyanophlyctis*) is still the commonest frog in Maharashtra (and perhaps elsewhere in the country). *Indirana leithii* (*Rana leithii*) is common in hill streams in places like Sinhagad, Rajgad, Matheran, and other hills, slightly away from crestline area of Western Ghats whereas *I. beddomeii* (*Rana beddomeii*) is perhaps more common in the crestline areas. *Limnonectes keralensis* (*Rana keralensis*) is was only recently recorded from Maharashtra (Daniels, 1992b) and seems to inhabit crestline areas, but it is a common species down south. *L. limnocharis* (*Rana limnocharis*) and *L. syhadrensis* (*Rana syhadrensis*) seem to be more common in Maharashtra. *Rana temporalis* and *R. malabarica* are also still common species though they are more restricted in distribution in this State. *R. temporalis* lives and breed away from human habitation. It is more common in Konkan and restricted patches in crestline areas like Mahableshwar and Wasota (Koyna Reservoir). For the first time we have observed and collected specimens of *R. aurantiaca* from Thoseghar, a locality near Satara. There is also a recent report of *R. curtipes* from Amboli (Sekar 1999). *R. malabarica* is found in relatively undisturbed habitats in the hilly areas. It prefers paddy fields for breeding and is more common in western parts of Nasik, Pune, Satara and Kolhapur districts. It is also commonly found in Konkan area. One of our students has also collected a specimen from Tadoba, the eastern most part of the state.

Other Ranidae members like *Sphaerotheca* (= *Tomopterna*) are burrowing species and are seen only during monsoon, however these species are still common in peripheral urbanizing parts of Pune City and in rural areas around Pune City. It is common perhaps all over Maharashtra in suitable habitats like arid and semiarid lands. They usually breed in abandoned stone quarries and temporary rain pools along with *Microhyla ornata*. Of these, *Sphaerotheca dobsonii* (*Tomopterna dobsonii*) has been reported from Maharashtra (specimens studied from Panchagani and Khandala by Dutta, see Dutta 1997b). However, Sekar (1999) did not include it in the list of Maharashtra amphibians. Our *S. dobsonii* from Mulshi as well as Lonavla compares fairly well with the description given by Boulenger (1890), Pillai (1982) and Dutta (1986). The identity of the specimens was confirmed by Dr. S.K. Dutta.

Nyctibatrachus humayuni or the Wrinkled Frog is also common in forested crestline areas of the Western Ghats. The genus *Nyctibatrachus*, with only a few species, is endemic to the Western Ghats and as such deserves special attention from the conservation point of view. For the first time we have collected *N. major* from Tamhini in Mulshi Taluk, Pune District (identified by Dr. M.S. Ravichandran).

Family Rhacophoridae includes frogs that are more or less arboreal, hence presence of vegetation is essential for them. *Philautus bombayensis* was once a common frog in the shrubby vegetation nearby Pune City. Now this frog is available in much remote places where suitable vegetation is available. It is common in Sinhagad, Matheran, Bhimashankar, Mahableshwar and other places in the crestline areas. *P. leucorhinus* is however found in restricted patches and is also very rare. Same is true for *P. glandulosus*. We have so far seen species that is close to *P. glandulosus* only in Mulshi area of Pune District. *Philautus* is a difficult genus and appropriate keys are not available. *Polypedates maculatus* is very common both in Konkan as well as forested areas of rest of the state. We have observed this frog from different areas right from Tadoba and Mahoor - the eastern end of the state to Harihareshwar and Hedvi - the western end of the state.

We have recently observed a few specimens from Mulshi area in Pune District, which are distinctly different from *Polypedates maculatus* in having longer tibia and broader head. This unidentified species is not as common as that of the *P. maculatus*; found very rarely and only in some pockets. These variants are forwarded to the experts for comments.

Habitat destruction and its effects on amphibians of Pune have been discussed earlier (Ghate & Padhye, 1996). The situation is more or less same for all major townships and cities in the state where urbanization and industrialization are the major threats to amphibian populations, but hard data is wanting. This has

created a problem regarding the conservation of amphibia (Daniels, 1991).

Moreover, introduction of exotic fishes like *Gambusia* and *Tilapia* (*Oreochromis*) in waterbodies, which serve as amphibian breeding sites, has also wiped out amphibian populations. We have highlighted this issue earlier (Ghate & Padhye, 1996). Knowing the voracious feeding habits of *Tilapia*, it is definitely going to affect the amphibian breeding in future. Tyler (as cited by Duellman & Trueb, 1986) has already remarked that *Gambusia* and *Tilapia* are a threat to Australian frogs.

Speaking of data, we had very scanty quantitative estimates. However, the first international conference of IUCN (SSC), ISRAG at Bhubaneswar, Orissa, in 1992, and the Conservation Assessment and Management Plan (CAMP) workshop in 1997 motivated and oriented many amphibian workers in this direction. Consequently, some data was collected in last few years. Molur and Walker (1998) have given a broad overview of the status of amphibia in India and also the status of their research, conservation and management scenario. However, we still have hardly any significant quantitative data with respect to population size, reproductive potential, survival rates of tadpoles and metamorphosing frogs/toads etc., for the various species of amphibia in our country. In the absence of such data it will be impossible to note the changes in their populations. It may also be pointed out here that the natural history of several species is still not fully known.

In addition there is an urgent need for keys (with as many diagrams and photographs as possible) of amphibians. Fortunately, some notable efforts are being made for the frogs of Western Ghats since the time of Daniel (1963, 1975), Daniel and Sekar (1989) and recently by Daniels (1997a,b,c). Similar efforts are also taken by Chanda (1994) for amphibians of northeastern India. Also a key to Gymnophiona of India is provided recently by Pillai and Ravichandran (1999). However, with addition of some new species as well as revision of a few older ones, it becomes necessary to have a recent effort to accommodate all the Indian amphibian species. Therefore intense efforts are necessary to provide naturalists with up-to-date keys. Checklists alone do not serve this purpose. Due to lack of such keys, newcomers to the field are frustrated. If we want to lure more students to taxonomy and systematics as a whole then we must prepare good illustrated keys to our valid species.

Even for widely distributed species, microhabitat requirements are quite specific and slight modification can be detrimental. We do not know much about temperature, humidity and rainfall requirement of many of our species. An attempt in this direction has been made by Daniels (1992a). On the basis of his own observations on 35 species as well as some previous records,

he had presented patterns of geographical distribution and endemism of 117 Western Ghats amphibians. However, the data are from observations for only one year. Much more information is needed and unless such meaningful data incorporating all the ecological information of different species are collected, our efforts to conserve amphibia will be directionless, futile and hence wasted. Financial assistance and trained manpower is not available for extensive surveys of the entire state. If such surveys are not carried out in near future then we may never know the status of amphibians in Maharashtra State because there is considerable amount of habitat destruction all over Maharashtra.

We have recently conducted fresh surveys in an attempt to find out the status of amphibians in and around Pune City as well as in Pune District, on the background of such a large scale habitat destruction. The outcome of these surveys is presented separately (Padhye *et al.*, in press).

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