Monsoon Croaks Bioblitz-2023

(A frog mapping initiative by KFRI)

Centre for Citizen Science and Biodiversity Informatics
KSCSTE-Kerala Forest Research Institute
Peechi, Thrissur -680653, Kerala, India

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Acknowledgement

We thank all the participants for their tremendous effort and contributions in recording amphibians across Kerala. Your efforts are greatly admired and invaluable to the success of this project, and they will be highly beneficial for the conservation and management of these species. We also extend our gratitude to KFRI for their sustained support and funding for the project. Additionally, we thank the Ratufa Nature Club of Kerala Veterinary and Animal Sciences University, Pookode, for facilitating the workshop on Monsoon Croaks at their campus. We appreciate the media for their support through publicity and coverage.

Visit our greatly cherished and beloved Citizen scientists who made this effort stand out by clicking here

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Monsoon croaks, 2023 - Report

Fig. 1 Monsoon Croaks-2023 Summary

Summary

The Monsoon Croaks BioBlitz 2023 project engaged citizen scientists in documenting amphibian diversity across Kerala during the southwest monsoon season. Through the iNaturalist platform, 191 participants submitted 1223 observations of 80 amphibian species, including endangered,

vulnerable, and near-threatened species. The project highlights the potential of citizen science for amphibian biodiversity monitoring and conservation, particularly when coupled with education and awareness programs. However, sustaining citizen scientists' engagement and ensuring data quality requires ongoing training and support.

Introduction

Amphibians, constituting one of the most endangered groups of vertebrates, are believed to be at risk of extinction for over one-third of their known species, while an additional one-third are classified as having insufficient data. While numerous declines can be attributed to factors such as habitat loss and overutilization, an additional 48% of rapidly declining species face threats from unidentified processes, propelling them towards extinction at a rocketing pace (Stuart et al., 2004). However, policymakers and conservation efforts frequently overlook numerous endemic species, particularly invertebrates and those belonging to lower vertebrate groups. The freshwater-dependent fauna are particularly impacted (Darwall et al., 2011). The spatial distribution of certain endemic and threatened species, as well as those labelled as Data Deficient (DD), may be underestimated due to constraints in the available data. The 'Wallacean shortfall,' a situation in which the geographical distribution of species is inadequately understood due to knowledge gaps, can impact conservation planning in biodiversity hotspots, as highlighted by (Bini et al., 2006). Western ghats are no exception, many freshwater dependent species including amphibians are under-studied, and these species have the potential to face extinction if they remain unmonitored (Raghavan et al., 2016).

Engaging community scientists, also known as citizen scientists, in long-term monitoring efforts is known to help fill the data gaps, which aids in conserving the critical components of the ecosystem (Estes-Zumpf et al., 2022). Citizen science, the active public engagement in scientific research, has emerged as a valuable source of high-quality data for both scientists and policymakers (Strasser et al., 2019) These extensive data offer valuable insights into long-term trends and spatial variations (Gouraguine et al., 2019). In this background, a project titled Monsoon Croaks BioBlitz (2023) has been launched to document amphibian diversity in Kerala during the southwest monsoon season along with an active awareness programme to enhance amphibian monitoring through citizen science.

Objectives:

- To map the distribution of amphibians across the urban habitats of Kerala with the participation of citizen scientists during the south-west monsoon season

- To highlight the importance of public involvement in amphibian monitoring and its contributions to amphibian conservation efforts.

- To evaluate the impact of education and awareness on participatory monitoring of amphibian species.

Methodology:

Launched the "Monsoon Croaks BioBlitz 2023" project on iNaturalist to collect amphibian observations across Kerala during the southwest monsoon season (June 3 to October 2, 2023). The initiative was promoted with audience-tailored posters and info cards through social media platforms (Instagram, Facebook, and YouTube), and newspaper articles. Data collection was designed to be opportunistic and did not follow any prescribed methodology. Participants were requested to post photos or audio or both of any amphibian species they came across during the period as observations on iNaturalist. The project was created as a collection project which collects all the observations of amphibians falling under the confined project boundary (State of Kerala) within the prescribed period. Each observation was assisted by the inbuilt species suggestions provided by the iNaturalist platform. We relied on the community validation of each observation for identification. Once three or more community members reach a consensus on the identification, each observation is granted research-grade status.

An education and awareness workshop was conducted at Kerala Veterinary and Animal Science University (KVASU), Pookode. Training was provided for students and enthusiasts on how to participate in citizen science initiatives for mapping amphibians, specifically using the platform iNaturalist. We assessed the impact of awareness and training programs by examining the contribution trends of participants during the pre-and post-training periods.

Results

A total of 1,223 observations of 80 amphibian species were submitted by 191 participants across Kerala. Eighty-two iNaturalist community members helped identify observations and out of the 1223 only 48.16% of all the observations reached research-grade status.

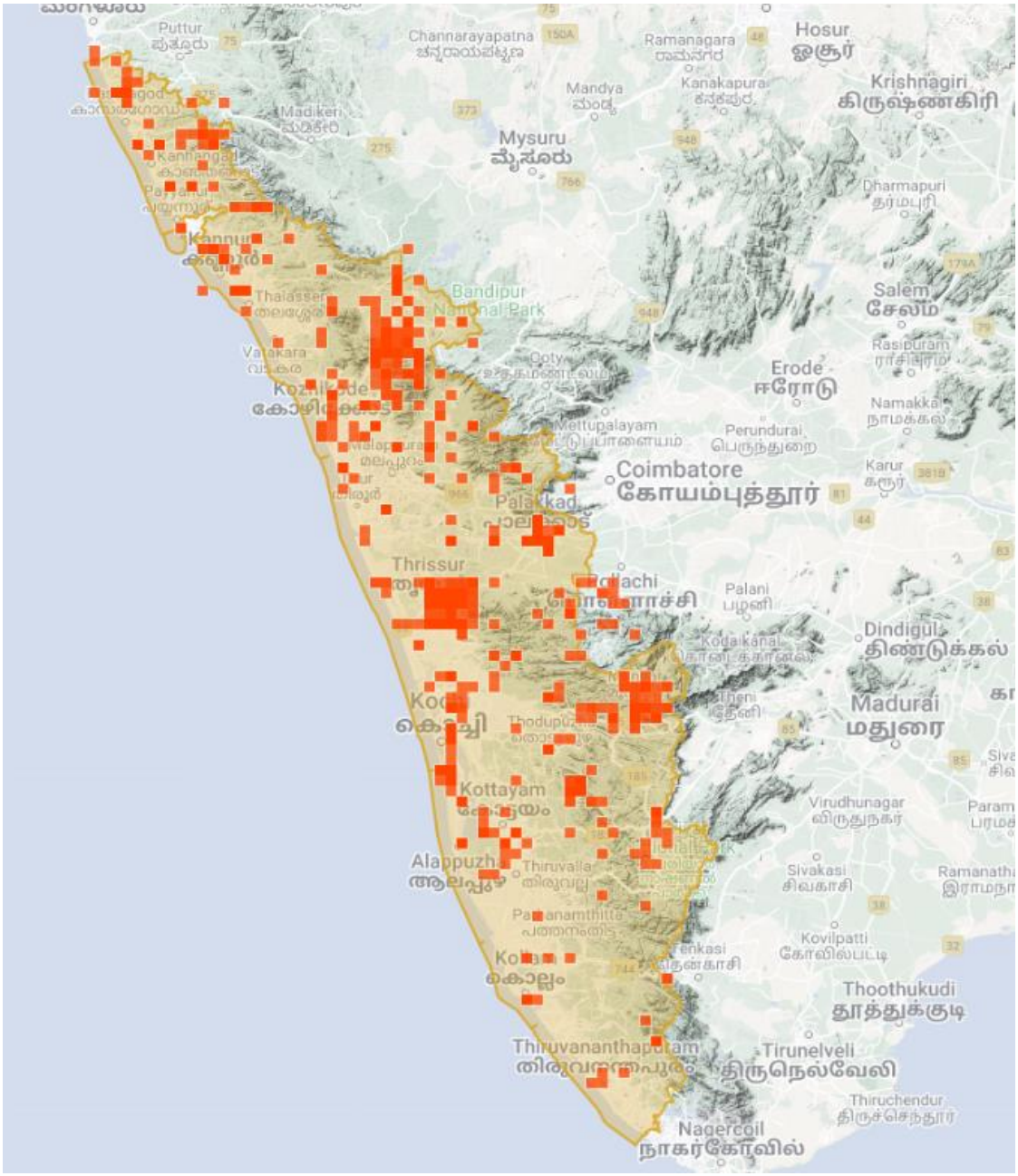

Fig. 2 Observations made by citizen scientists in Monsoon croaks 2023

The Wayanad bush frog (*Pseudophilautus wynaadensi*s), and the Asian common toad (*Duttaphrynus melanostictus*) were the most frequently recorded amphibians with number of observations 133 and 122 respectively. Followed by Indian bullfrog *(Hoplobatrachus tigerinus)* and Painted frog (*Uperodon taprobanicus*).

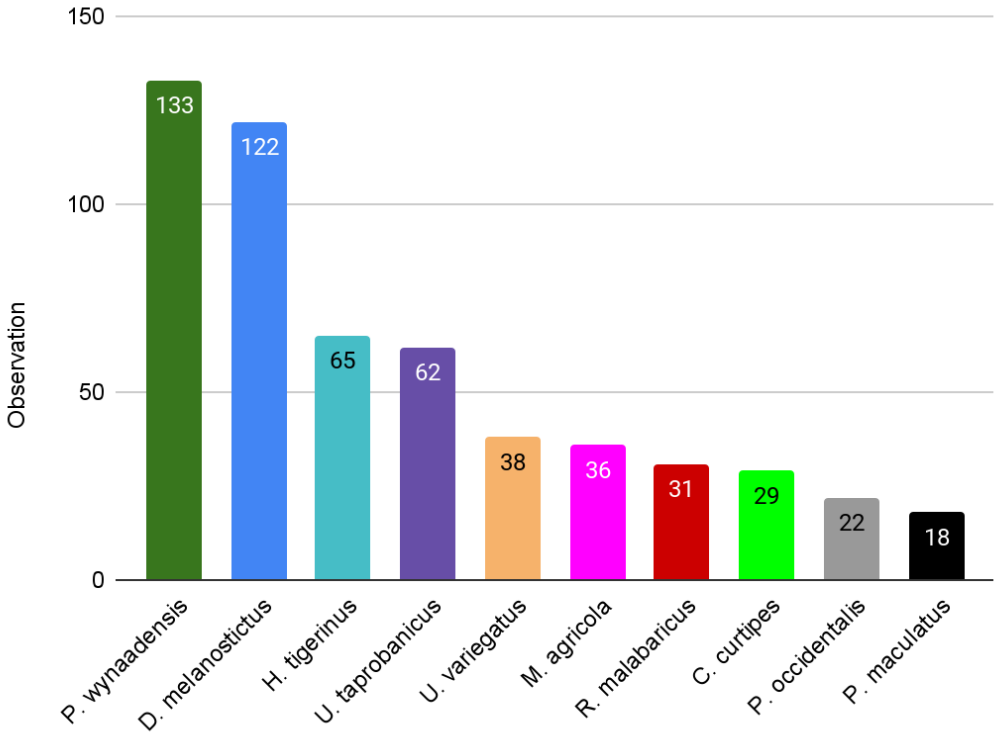

Fig. 3 Frequency of species observed in Monsoon croaks

Fig. 4 *Pseudophilautus wynaadensis* (Image: Nithin Divakar)

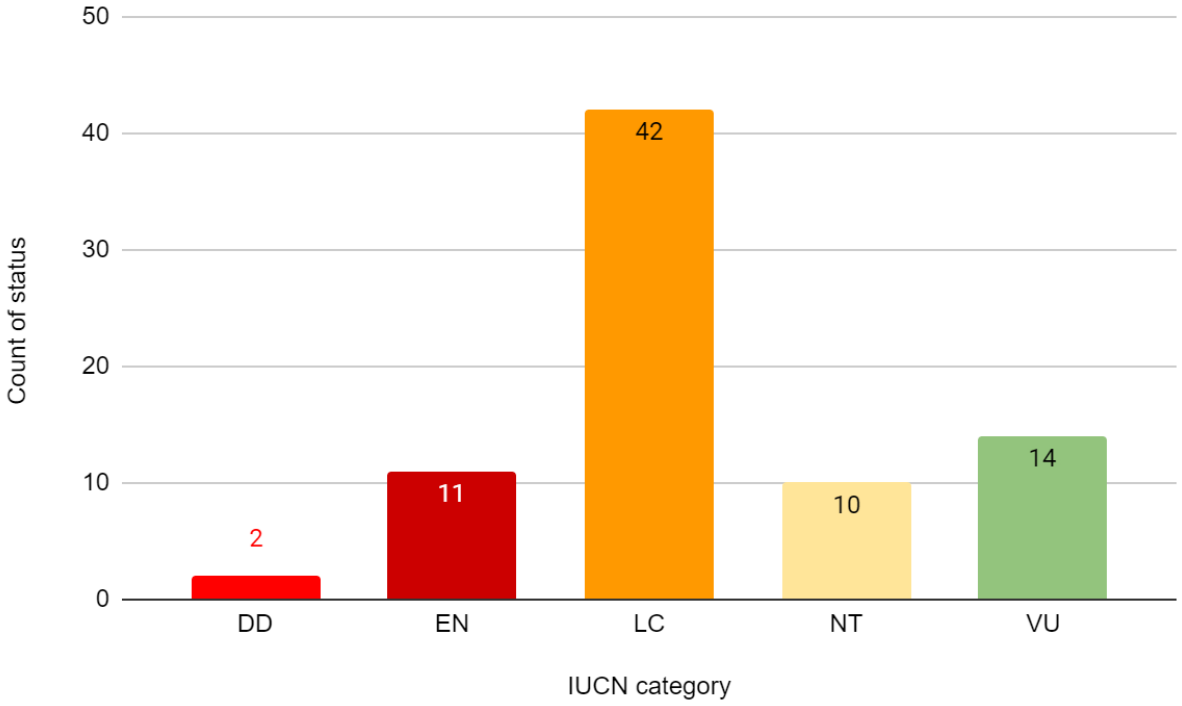

Fig. 5 No. of IUCN red-listed species observed

Fig. 6 Participants engaged in a training program conducted at the KVASU campus

Notably, eleven endangered, fourteen vulnerable, and ten near-threatened species were among the observed amphibians. Others include two data deficient, and 42 least concerned species.

We assessed the observation pattern of 10 individuals who participated in the training and awareness program conducted at the KVASU campus. Some of the participants were new to iNaturalist and started only after receiving the training program. We observed that the observation pattern of participants showed a hike in number after receiving the training program. Observation frequency seemed to decline with time in the post-training period. This indicates that the training program provided has positively influenced the participants to contribute to citizen science on a higher frequency.

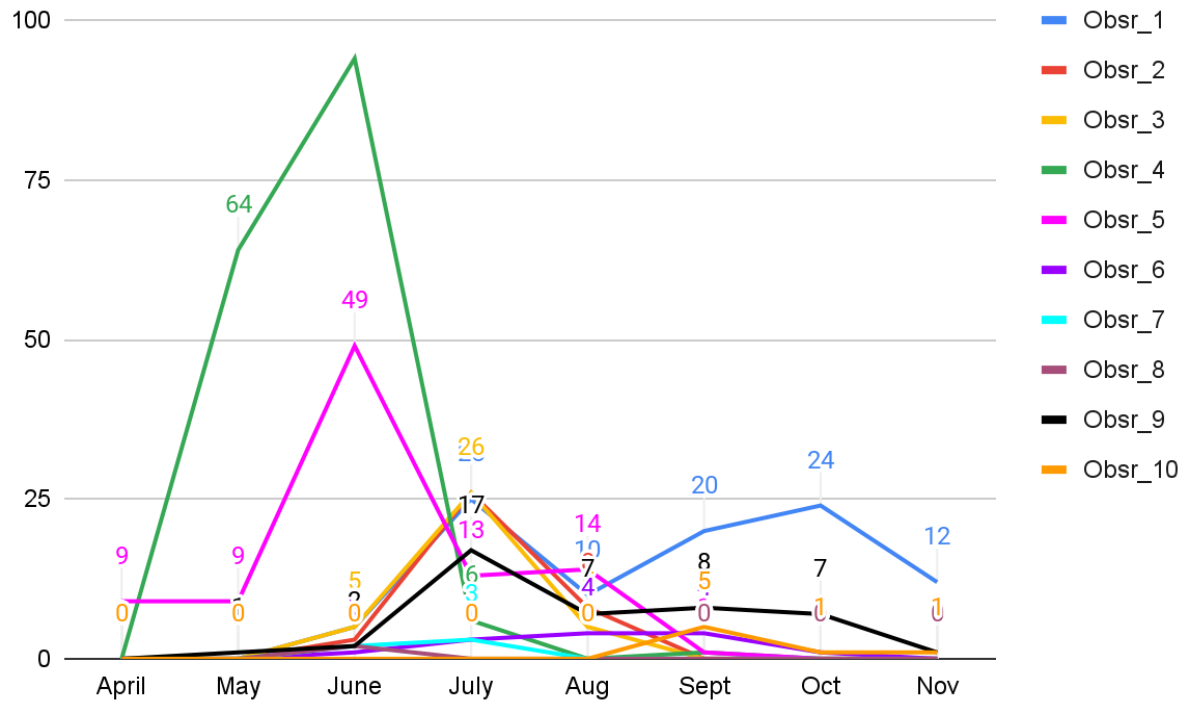

Fig. 7 Observation pattern of the participants of the training program

The gradual decline in observation frequency indicates the sublimation of the effect of training programs with time. From this, it can be interpreted that frequent training and awareness programs are required for the consistent contribution of citizen scientists in biodiversity data collection, especially for monitoring elusive fauna such as amphibians.

Discussion

The findings of this study provide valuable insights into the potential of citizen science for amphibian biodiversity monitoring in Kerala. With 1223 observations of 80 amphibian species submitted by 191 participants, the study demonstrates a significant level of public engagement in amphibian conservation efforts. This is further supported by the identification of endangered, vulnerable, and near-threatened species among the observed amphibians, highlighting the importance of citizen science in monitoring rare and threatened species.

The observation pattern of the trained participants further strengthens the argument for citizen science. The hike in observation frequency after receiving the training program indicates that training can effectively increase citizen scientists' engagement and contribution (Kosmala et al., 2016). However, the gradual decline in observation frequency over time suggests that the effect of training may fade without ongoing support and reinforcement (Crall et al., 2013). This highlights the need for frequent training and awareness programs to sustain citizen scientists' motivation and engagement (Haklay, 2013).

Furthermore, the research-grade status of only 46% of the observations points to the importance of providing adequate training and support to citizen scientists in data collection and identification methodologies, especially for monitoring elusive fauna such as amphibians, as demonstrated previously for snakes (Balakrishnan, 2010; Bonney et al., 2014). This can be achieved through online resources, workshops, and field training programs, which can significantly improve data quality and reliability (Lewandowski & Specht, 2015).

The study's findings align with previous research suggesting that citizen science can be a valuable tool for amphibian biodiversity monitoring (Dickinson et al., 2010). Additionally, citizen science can foster public engagement in conservation efforts, leading to increased awareness and appreciation for amphibian biodiversity (McKinley et al., 2017).

In conclusion, this study provides compelling evidence for the potential of citizen science in amphibian biodiversity monitoring in Kerala. By engaging the public in data collection and identification efforts, citizen science can significantly enhance our understanding of amphibian distribution, abundance, and conservation status. However, sustained engagement and high-quality data collection require ongoing training and support. By addressing these challenges, citizen science can play a critical role in amphibian conservation efforts in Kerala and beyond.

Conclusion

This study has demonstrated the effectiveness of citizen science in contributing to amphibian biodiversity monitoring in Kerala. With over 1,223 observations of 80 amphibian species, including endangered, vulnerable, and near-threatened species, the study highlights the valuable role citizen scientists can play in data collection and conservation efforts.

The significant increase in observation frequency following the training program underscores the importance of providing adequate training and support to citizen scientists. However, the gradual decline in activity over time emphasises the need for ongoing support and reinforcement through frequent training and awareness programs. Furthermore, the low proportion of research-grade observations (46%) indicates the need for further improvement in data quality. This can be achieved through enhanced training on data collection protocols and identification methodologies, as well as the development of user-friendly tools and resources.

Overall, this study provides compelling evidence for the potential of citizen science in amphibian conservation in Kerala. By addressing the challenges of ongoing training, data quality, and infrastructure development, citizen science can be a powerful tool for monitoring amphibian populations, promoting public engagement, and informing conservation strategies. Therefore, we recommend the continued development and support of citizen science initiatives for amphibian conservation in Kerala and beyond.

Appendices

Fig. 8 A demonstration of how to add an observation in the iNaturalist application

Fig 9 Explaining different ways to use iNaturalist for amphibian monitoring

Fig. 10 Participants recording observation

Fig. 11 Uperodon sp. (Image: Ahirbudhnyan)

Table. 1 Species observed in Monsoon Croaks (2023) project

No.	*Species*	Status	No of observations
1	*Pseudophilautus wynaadensis*	LC	129
2	*Duttaphrynus melanostictus*	LC	116
3	*Hoplobatrachus tigerinus*	LC	64
4	*Uperodon taprobanicus*	LC	62
5	*Uperodon variegatus*	LC	38
6	*Minervarya agricola*	LC	36
7	*Rhacophorus malabaricus*	LC	30
8	*Clinotarsus curtipes*	LC	29
9	*Polypedates occidentalis*	LC	21
10	*Polypedates maculatus*	LC	18
11	*Euphlyctis cyanophlyctis*	LC	17
12	*Microhyla ornata*	LC	13
13	*Euphlyctis karaavali*	LC	13
14	*Minervarya rufescens*	NT	11
15	*Raorchestes akroparallagi*	LC	10
16	*Raorchestes ochlandrae*	LC	9
17	*Fejervarya limnocharis*	LC	8
18	*Uperodon triangularis*	NT	8
19	*Raorchestes anili*	LC	7
20	*Minervarya keralensis*	VU	7
21	*Micrixalus saxicola*	LC	6
22	*Rhacophorus pseudomalabaricus*	VU	6
23	*Raorchestes beddomii*	LC	5
24	*Hydrophylax malabaricus*	LC	5
25	*Indosylvirana urbis*	VU	5
26	*Blaira ornata*	VU	5
27	*Nasikabatrachus sahyadrensis*	NT	4
28	*Rhacophorus lateralis*	VU	4
29	*Minervarya sahyadris*	LC	4

30	*Raorchestes jayarami*	EN	4
31	*Raorchestes sushili*	EN	4
32	*Indosylvirana sreeni*	LC	4
33	*Indirana brachytarsus*	LC	3
34	*Ghatixalus asterops*	NT	3
35	*Raorchestes munnarensis*	EN	3
36	*Raorchestes resplendens*	EN	3
37	*Raorchestes uthamani*	NT	3
38	*Indosylvirana indica*	LC	3
39	*Nyctibatrachus kempholeyensis*	LC	2
40	*Indirana semipalmata*	LC	2
41	*Indirana beddomii*	EN	2
42	*Raorchestes tuberohumerus*	LC	2
43	*Rhacophorus calcadensis*	VU	2
44	*Raorchestes dubois*	VU	2
45	*Raorchestes ponmudi*	LC	2
46	*Raorchestes chlorosomma*	EN	2
47	*Nyctibatrachus poocha*	NT	2
48	*Nyctibatrachus vrijeuni*	VU	2
49	*Raorchestes luteolus*	LC	2
50	*Uperodon montanus*	NT	2
51	*Uperodon anamalaiensis*	LC	2
52	*Micrixalus herrei*	EN	2
53	*Indosylvirana doni*	NT	2
54	*Indirana paramakri*	EN	2
55	*Uraeotyphlus bombayensis*	LC	2
56	*Duttaphrynus parietalis*	LC	1
57	*Pedostibes tuberculosus*	LC	1
58	*Microhyla rubra*	LC	1
59	*Nyctibatrachus aliciae*	VU	1
60	*Hoplobatrachus crassus*	LC	1

61	*Raorchestes griet*	VU	1
62	*Ichthyophis longicephalus*	NT	1
63	*Ghatixalus variabilis*	EN	1
64	*Pelophylax chosenicus*	VU	1
65	*Pseudophilautus kani*	LC	1
66	*Raorchestes chromasynchysi*	VU	1
67	*Nyctibatrachus grandis*	EN	1
68	*Raorchestes kadalarensis*	NT	1
69	*Sphaerotheca breviceps*	LC	1
70	*Micrixalus adonis*	EN	1
71	*Hydrophylax bahuvistara*	LC	1
72	*Indosylvirana flavescens*	VU	1
73	*Ghatixalus magnus*	VU	1
74	*Sphaerotheca pluvialis*	DD	1
75	*Minervarya neilcoxi*	DD	1
76	*Minervarya mysorensis*	LC	1
77	*Euphlyctis aloysii*	LC	1
78	*Euphlyctis hexadactyla*	LC	1
79	*Minervarya nilagirica*	LC	1
80	*Hylarana Sp.*		1

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