

Amphibians need legal protection

Situated at the confluence of two biodiversity hotspots – the Himalaya and Indo-Burma – the eight states of North East India are home to more than 160 species of amphibians, of which more than 60 species are endemic¹. The region also harbours 10 threatened species of frogs, including a critically endangered bush frog *Raorchestes shillongensis*, which is highly endemic to a small part of Khasi Hills in Meghalaya (Table 1)². Ironically, majority of the indigenous tribes of the region unsustainably

harvest more than 24 species of frogs as a source of food and medicine from the wild, including a vulnerable species, *Pterorana khare*^{3–8} (Table 2).

In India, amphibians are protected under two legislations – (a) Wildlife (Protection) Act of 1972 (WPA) and (b) Biological Diversity Act of 2002 (BDA). Among the amphibians found in NE India, five species are protected under WPA⁹ – salamander, *Tylototriton verrucosus* (Schedule II) and four anurans, viz. *Bufoides kempfi*, *Euph-*

lyctis hexadactylus, *Hoplobatrachus crassus* and *H. tigerinus* (Schedule IV), while BDA prohibits collection of eight species of amphibians that includes *R. shillongensis* too¹⁰. In the Convention on International Trade in Endangered Species (CITES) – the only international treaty that offers legal protection to wildlife – only *E. hexadactylus*, *H. tigerinus* and *Tylototriton* spp. are listed under Appendix II from India¹¹.

Besides the North Eastern Region (NER), India is home to two more biodiversity

Table 1. Threatened species of frogs in North East India (source: IUCN Red List database)

Species	Category	Species	Category
<i>Raorchestes shillongensis</i>	CR	<i>Ingerana borealis</i>	VU
<i>Bufoides meghalayanus</i>	EN	<i>Amolops aniqiaoensis</i>	VU
<i>Xenophrys medogensis</i>	EN	<i>Pterorana khare</i>	VU
<i>Nanorana annandalii</i>	NT	<i>Philautus garo</i>	VU
<i>Amolops viridimaculatus</i>	NT	<i>Theloderma moloch</i>	VU

CR, Critically endangered; EN, Endangered; NT, Near threatened; VU, Vulnerable.

Table 2. Amphibians consumed in NE India as food/medicine along with IUCN threatened category and legal protection status

Species	Used as	State	IUCN status	Legal protection
Family: Bufonidae				
<i>Duttaphrynus melanostictus</i>	Medicine	AS	LC	
Family: Dicroglossidae				
<i>Euphlyctis</i> cf. <i>cyanophlyctis</i>	Food	AS, NL	LC	
<i>Euphlyctis ghoshi</i> *	Food	NL	DD	
<i>Euphlyctis hexadactylus</i>	Food	AS	LC	CITES (Appendix-II); WPA (Schedule IV)
<i>Hoplobatrachus crassus</i>	Food	NL	LC	WPA (Schedule IV)
<i>Hoplobatrachus tigerinus</i>	Food/medicine	AR, AS, NL, MN, ML, MZ, TR	LC	CITES (Appendix-II); WPA (Schedule IV)
<i>Hoplobatrachus litoralis</i>	Food	NL	NE	
<i>Limnnectes</i> sp.	Medicine	NER	–	
<i>Minervarya teraiensis</i>	Food	NL	LC	
<i>Minervarya</i> sp.	Medicine	AR, AS, NL, MN, MZ, SK	–	
<i>Nanorana liebigii</i>	Food/medicine	NER	LC	
<i>Omrana sikimensis</i>	Food	SK	LC	
Family: Megophyridae				
<i>Xenophrys major</i>	Food	NL	LC	
<i>Xenophrys flavipunctata</i> *	Food	NL	NE	
<i>Xenophrys</i> spp.	Food	SK	–	
Family: Ranidae				
<i>Amolops</i> spp.	Food	AR, AS, NL, MN, ML, MZ, SK	–	
<i>Amolops formosus</i>	Medicine	SK	LC	
<i>Amolops</i> cf. <i>marmoratus</i>	Food	SK	LC	
<i>Odorrana mawphlangensis</i>	Food	ML	DD	
<i>Pterorana khare</i>	Food	NL	VU	
Family: Rhacophoridae				
<i>Polypedates</i> sp.	Medicine	AR, AS, NL, MN, MZ, SK, TR	–	
<i>Polypedates teraiensis</i>	Food	NL	NE	
<i>Rhacophorus bipunctatus</i>	Food	NL, ML	LC	
<i>Zhangixalus smaragdinus</i>	Food	AR, NL	LC	

*Endemic. NER, North Eastern Region; AR, Arunachal Pradesh; AS, Assam; MN, Manipur; ML, Meghalaya; MZ, Mizoram; NL, Nagaland; TR, Tripura; SK, Sikkim; LC, Least concern; DD, Data deficient; NE, Not evaluated; VU, Vulnerable.

hotspots, namely the Western Ghats and the Sundaland (that includes Andaman and Nicobar group of islands), with similar threat to biodiversity. With over 405 species, about 308 are endemic to India⁶. Thus, the legal protection accorded to amphibians in the country appears to be grossly inadequate.

With rapid climate change, and in view of the high endemicity and vulnerability, including anthropogenic pressures such as habitat destruction, unplanned urbanization, pollution of wetlands, harvest from wild, etc. the amphibian diversity from northeast India is facing an unprecedented risk of local extinction. Therefore, there is an urgent need to revise various national and international legislations and include more amphibians based on their endemicity and vulnerability to maintain ecosystem health and services.

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BHASKAR SAIKIA
BIKRAMJIT SINHA*

*Zoological Survey of India,
North Eastern Regional Centre,
Shillong 793 003, India
e-mail: sinhabj@gmail.com

Indian S&T journals: the way forward

The article by Mahesh¹ in *Current Science* raises important issues with regard to the quality of Indian S&T journals. It also urges Indian authors to publish their works in Indian journals so that it helps improve the standard of these journals. I have discussed how the quality and visibility of Indian S&T journals can be improved in light of recent developments in scholarly communication.

There is a lack of research culture in the Indian academia. After receiving his/her Ph.D. degree, there are not many formal courses/programmes through which a researcher could learn the skills of writing and publishing in high-quality journals, with a few exceptions like the Science Writing Course offered by the Current Science Association. This needs to be changed; Indian S&T journals and publishers should come forward to extend their support in language-editing and provide a platform for instant feedback to improve manuscripts and also for funding promising works. By extending support in language-editing and other aspects of manuscript writing, Indian journals can solicit articles from Indian authors. Hence Indian researchers can be encouraged to publish in Indian journals. There have been debates on how developed countries can extend support to improve the quality of research publications in developing countries, since the former have been ruling the scientific

world for many decades and have a strong financial back-up².

The peer-review process also needs to be changed radically to improve Indian journals at par with international standards. Reviewers are not being given due credit for their intellectual labour in India and elsewhere³. Many journals published in India do not provide sufficient information on how the peer-review process is conducted. If we consider peer review as a formal work and recognize the same in faculty tenure promotions, assessments, and in awarding research grants (also introducing the best reviewer award), Indian researchers would take peer review seriously and participate in it actively.

Another barrier for Indian researchers is to access the scholarly literature in their respective institutions. Except premier institutions such as IITs, IISc and IISERs, Defence and CSIR research laboratories, very few universities and colleges have a subscription to citation databases such as the Web of Science (WoS) and Scopus, and scholarly journals. Most of the Indian universities subscribe to databases, e-journals and e-books through e-SodhaSindu, which is a centralized Consortium for Higher Education Electronic Resources. Most of the time, researchers have to access scholarly literature only through academic social media platforms such as ResearchGate, academia.edu and pirated

websites like Sci-Hub. With the proposed 'one nation, one subscription policy', access to scholarly literature will be much more centralized and institutions will have no say in the scholarly literature required for their researchers. There must be hassle-free access to scholarly literature required at the institutional level for researchers to improve the quality of their research publications.

Mahesh¹ further emphasizes on nurturing the Indian journals that have been indexed in WoS. This is a good suggestion. However, given the number of researchers pursuing their Ph.Ds and M.Phil. degrees in India and those working in various research institutions, we need to encourage learned societies to start new research publications with quality mechanisms in place, such as a diversified editorial board and transparent, open peer-review system. As mentioned in the article¹, we do not know exactly how many journals are now published in India. Also, there are no journals in some niche areas. Thus, it is time to have our own journal aggregator system, like those of the African Journals Online (AJOL), and this South American journal aggregators such as SciELO and Redalyc indexing system developed to showcase their research visibility to the global scientific community. With regard to citation index, we do not have a robust citation database of our own. The Indian Citation Index