



Taxonomic errors and inaccuracies in Sri Lanka's Red List, 2007: a cautionary note

Mohomed M. Bahir¹ & Dinesh E. Gabadage²

^{1,2} Taprobanica Nature Conservation Society, 146, Kendalanda, Homagama, Sri Lanka
Email: ¹ goodwillserve@gmail.com

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Author Details: MOHOMED M. BAHIR, the coordinator of the Taprobanica Nature Conservation Society is a conservation research biologist working on freshwater crab and reptile taxonomy. Also, he has been working on amphibian life histories. DINESH E. GABADAGE, the secretary of the Taprobanica Nature Conservation Society is a conservation field biologist working on Sri Lankan herpetofauna and promoting conservation awareness of the value of biodiversity among Sri Lankan community.

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Abstract: The IUCN assesses the status of species and produces Red Lists to facilitate conservation. We have examined the Sri Lankan Red List for 2007 and have found several errors and inaccuracies concerning taxonomic and scientific issues. We show here that conservation science and biodiversity research in Sri Lanka is being directed by conservationists who are not familiar with the science of taxonomy, presenting an obstacle for the development of biodiversity conservation. Clearly, not enough experts were involved in finalizing the Red List for Sri Lanka. It is incumbent upon taxonomists, conservation scientists, educators, conservationists, legal advisors, officials, funding agencies and politicians to work together to conserve biodiversity.

Keywords: Biodiversity conservation, biodiversity hotspots, conservation science, conservation status, education.

BACKGROUND

Species extinction is a major issue in conservation science (Harvell et al. 2002; Brook et al. 2003; Stuart et al. 2004; Alford et al. 2007). Many species have become extinct even before being named (Stuart et al. 2004; Manamendra-Arachchi & Pethiyagoda 2005; Meegaskumbura et al. 2007). The wet zone of Sri Lanka was covered with rainforests before the colonial period (1505–1948), but by the time of independence much of the forest cover had been reduced to small islands (Pethiyagoda 2007a) and now <10% survives (Bahir et al. 2005; Pethiyagoda 2005). Remaining rainforest reserves are heavily affected by invasive alien species and are bordered by plantations and human settlements. Naturalists of the colonial era made some collections of animals and plants as a hobby, and either identified them themselves or sent them to their home countries, after which scientists identified or named them systematically (Pethiyagoda 2007a). Though these collections are a fraction of the existing diversity of the island, they now form a reservoir of evidence for the species diversity which existed over a century ago, and have shown that many species are now probably to be categorized as extinct (Stuart et al. 2004; Manamendra-Arachchi & Pethiyagoda 2005; Pethiyagoda 2005; Meegaskumbura et al. 2007). These specimens, kept in museums overseas for over a century, all too frequently represent species that are known only from these collections. Forest clearance has wiped out many species from the island, the most glaring examples being amphibians (Stuart et al. 2004; Manamendra-Arachchi & Pethiyagoda 2005; Meegaskumbura et al. 2007). Amphibians constitute one of the most popular groups of vertebrates at the moment among conservationists, scientists, evolutionary biologists and conservation funding agencies globally (Meegaskumbura et al. 2002; Biju & Bossuyt 2003; Hedges 2003; Bossuyt et al. 2004; Stuart et al. 2004; Gascon et al. 2007).

Conservation priorities are partly guided by biodiversity hotspots (Myers et al. 2000) and this concept has pushed forward and identified the most important areas for conservation (Mittermier et al. 2004). The biodiversity hotspot of the Western Ghats and Sri Lanka is one of the most important areas identified for conservation (Cincotta et al. 2000). Several studies have pointed out the uniqueness of these areas and highlighted the conservation value of Sri Lanka and the Western Ghats (Bossuyt et al. 2004; Bossuyt et al. 2005; Helgen & Groves 2005). However, recent studies also revealed that there are major inaccuracies in conservation publications from the hotspot, especially on taxonomic and scientific issues (Pethiyagoda 2007b; Bahir 2009; Bahir & Gabadage 2009).

The International Union for Conservation of Nature (IUCN) was established in 1948 as the world's first global environmental organization. Today it has more than 1000 member organizations in 140 countries, including 200 governments and 800 non-governmental organizations; it involves 11,000 voluntary scientists, and there are 1,000 professional staff in 60 offices worldwide. IUCN is a neutral forum for



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governments, NGOs, scientists and business communities to find pragmatic solutions to conservation and the challenges of development, and there are thousands of field projects and activities around the world. It is funded by governments, bilateral and multilateral agencies, foundations, member organizations and corporations worldwide to conserve nature with the vision of a just world that values and conserves nature, and it tries to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable (IUCN 2008a). Globally, scientists are convinced that IUCN plays a vital role in conserving nature; for example, its recent global amphibian assessment assessed the status of Anura (frogs and toads), Apoda (caecilians) and Urodela (newts and salamanders) (Stuart et al. 2004). The Red List is recognized as a key conservation tool (Vié et al. 2008), and it is vital that it be accurate and up-to-date. In addition, information from the Red List is now included in school curricula.

Given this history, it is evident that conservationists, journalists, scientists, policy makers, students, funding agencies and the general public should not expect inaccurate publications from the IUCN. But unfortunately, as we examine "The 2007 Red List of Threatened Fauna and Flora of Sri Lanka" we encounter many errors and serious inaccuracies that require elucidation. We demonstrate the importance of red listing in biodiversity conservation being up to date with the existing scientific literature, nomenclature and quality publications. It is obvious, in addition, that the IUCN must consult appropriate specialists to produce and finalize Red Lists, otherwise it amounts to a waste of funds, time and energy in addition to creating problems for conservation rather than serving the remaining biodiversity.

SRI LANKA RED LIST, 2007

Errors in Taxonomic issues and nomenclature

The cover photograph of the IUCN 2007 Red List is *Philautus poppiae* Meegaskumbura & Manamendra-Arachchi, 2005, but it is captioned as "*Philautus poppie*" - an egregious misspelling, although on page 27 the name is spelt correctly.

IUCN 2007 nomenclature is woefully out of date for some amphibian genera. Recently Frost et al. (2006) reviewed the nomenclature of Amphibians on a global scale; this is freely available online (Frost 2009). Despite this, the red-listing team overlooked the description of the new genus *Duttaphrynus* and the evidence of the validity of *Hylarana*. *Bufo noellerti* and *Rana temporalis* should be referred to as *Duttaphrynus noellerti* and *Hylarana temporalis*, respectively. Perhaps the description of the genus *Duttaphrynus* and the validation of *Hylarana* appeared after the expert reviews were submitted to the IUCN. If so the organization or the relevant committee should have updated the nomenclature prior to publication or consulted the relevant experts.

On pages 26–28, under the category of Endangered, all the endangered rhacophorid and ranid species are placed under the family Microhylidae. All extinct rhacophorid species are placed under the family Ranidae. *Cnemaspis tropidogaster* (Boulenger 1885) is actually an extinct species and known only from its lectotype BMNH 71.12.14.49, the specimen donated by W. Thwaites. But IUCN 2007 lists it as an Endangered

species, without acknowledging that it is almost certainly extinct.

Taxonomists are responsible for laying the foundations of conservation science (Evenhuis 2007), and for starting conservation projects the description of species is always essential. Therefore, in the Red Lists the names of species should, at least at first mention, be followed by the names of the authors and the years of publication; the names should always be spelt properly, otherwise misspellings will be perpetuated again and again in the scientific literature. IUCN (2007) lists the synonym of Critically Endangered *Cophotis dumbarae* Manamendra-Arachchi, Silva & Amarasinghe, 2006 as *Cophotis dumbara* Samarawickrama, Ranawana, Rajapakshe, Ananjeva, Orlov, Ranasinghe & Samarawickrama, 2007. Species names of these two names which differ just by the single letter "e" at the end. The name *Cophotis dumbara* appeared in 2007 and not 2006 as incorrectly listed in many recent publications, including IUCN (2007); although the period covered by vol. 13 no. 3 of the Russian Journal of Herpetology is stated to be September–December, 2006, the printed edition of this issue was not available prior to January 2007, so the year of publication *sensu* Article 8 of the International Code of Zoological Nomenclature (1999) is, therefore, 2007, and we here confirm the validity of *Cophotis dumbarae* according to the principles of priority (Article, 23 of the International Code of Zoological Nomenclature), since copies of Manamendra-Arachchi et al. (2006) were freely available in the libraries of IUCN Sri Lanka, the British Museum, National Science Foundation and National Museum of Sri Lanka in December, 2006. Describing a new species from a small island, whose rich biodiversity we are celebrating at the moment (Dassanayake & Fosberg 1980–1991; Dassanayake et al. 1994–1995; Dassanayake & Clayton 1996–2000; Myers et al. 2000; Bossuyt et al. 2004; Mittermier et al. 2004; Bossuyt et al. 2005; Helgen & Groves 2005; Gunawardene et al. 2007), should not be subject to problems like this. Samarawickrama et al. (2007) explicitly consulted international scientists, even though there are agamid taxonomists locally (see Pethiyagoda & Manamendra-Arachchi 1998; Bahir & Maduwage 2005; Bahir & Silva 2005). If there is no understanding and unity among local scientists, Sri Lanka will face further problems of this nature, leaving scientists and conservationists to argue, wasting their valuable time while conserving the biodiversity.

Errors in citations and names of contributors

Recently the conservation status of Sri Lanka's agamid lizards was assessed according to the IUCN Criteria, 2001 (Bahir & Surasinghe 2005), but this article is not cited in the 2007 Red List and the authors assessed it separately without citing that paper. A major paper on conservation within Western Ghats-Sri Lanka biodiversity hotspot by Bossuyt et al. (2004) is also not cited in the Red List. In the section "Biodiversity of Sri Lanka: a brief overview" (IUCN, 2007, p. 5) it says "This recent research (especially molecular investigations) also highlights a higher degree of endemism than hitherto estimated among most groups of fauna in the island", which was demonstrated by Bossuyt et al. (2004).

As has been usual in other publications (see Pethiyagoda 2007b) "Wickramasinghe" is misspelled as "Wickremasinghe" in three places on page 19 and as "Wickramasingha" on page 110. One of the recent publications of IUCN is cited in the

Red List as follows: "Bambaradeniya, C.N.B. 2006. Species Richness of Fauna in Sri Lanka: Current Status and Future Prospects. In: Bambaradeniya, C.N.B. (ed.). Fauna of Sri Lanka: Status of Taxonomy, Research and Conservation. The World Conservation Union, Colombo, Sri Lanka, and Government of Sri Lanka. 308pp." The title of this document does not actually contain the words "Species Richness of Fauna in Sri Lanka: Current Status and Future Prospects": the compilers have expanded the reference.

Nannophrys naeyakai Fernando, Wickramasingha & Rodirigo, 2007: the authors' names are constantly misspelled. Their paper is cited in the main reference list of the Red List as "Fernando, S.S., Wickramasingha, L.J.M. and Rodirigo, R. K. 2007...", and under references on pages 110 "Fernando, S. S. Wickramasingha, L.J.M. and Rodirigo, R.K. 2007...". The actual citation should be: Fernando, S.S., Wickramasingha, L.J.M. and Rodirigo, R.K. 2007. A new species of endemic frog belonging to genus *Nannophrys* Günther, 1869 (Anura: Dicroglossinae) from Sri Lanka. *Zootaxa*, 1403, 55–68. The name Wickramasinghe, in fact, is misspelled elsewhere in the document, in the context of other papers.

Errors in data

The Red List says that there are 44 endemic freshwater fish species in Sri Lanka, but when this document was published only 29 freshwater fish were confirmed as endemic (Pethiyagoda 1991; Bailey & Gans 1998; Pethiyagoda 1998; Pethiyagoda & Kottelat 2005; Pethiyagoda 2006). Because of subsequent advances in understanding, 38 species of freshwater fish are now known to be endemic to Sri Lanka (IUCN 2008b; Meegaskumbura et al. 2008; Pethiyagoda et al. 2008a; Pethiyagoda et al. 2008b; Pethiyagoda et al. 2008c; Pethiyagoda et al. 2008d; Silva et al. 2008). It is obvious to us that "Freshwater fishes of Sri Lanka" (Goonatileke 2007) unwittingly published personal communications, without knowing the seriousness of taxonomic issues and obviously those are directly fed in to the IUCN 2007. On page 23, "extinct" is misspelled "extint".

There are many more major and minor errors in references and in the text and in the lists of species here that we refrain from discussing further. Consequently, conservationists, taxonomists and other scientists should apply extreme caution when using conservation publications such as the 2007 Red List.

CONCLUSION

We have looked at the Red List only briefly and have listed several errors; we refrain from listing many additional severe and minor ones. We find it puzzling that sources such as Bossuyt et al. (2004) and Bahir & Surasinghe (2005) were not used for the Red List. It is not because the red-listing team was not aware of these relevant publications, because one of them (Bossuyt et al. 2004) is referred to in another IUCN publication (e.g., see Amarasinghe et al. 2006; Bahir & Pethiyagoda 2006; de Silva 2006; Miththapala 2006; Perera & Bambaradeniya 2006; Pethiyagoda et al. 2006).

In our opinion the procedures for the appointment of red-listing teams to conduct biodiversity studies should be revised to contribute and finalize the Red Lists towards the conservation of the country's vanishing biodiversity heritage. If

biodiversity research in Sri Lanka is directed by conservationists who are not familiar with the science and results of taxonomy, this will be an obstacle for the development of biodiversity conservation within the island and this is perhaps true for many other biodiversity hotspots as well.

Mistakes in the Red List might have been identified if more researchers, especially conservationists and taxonomists, were involved in finalizing. It is mandatory for amateur naturalists, taxonomists, conservation scientists, conservation managers, government officials, legal advisors, funding agencies, policy makers and politicians to pay serious attention to solving biodiversity problems, especially in national-level publications, and it is incumbent upon conservation managers, educators, funding agencies and policy makers to work along with research scientists who are familiar with conservation science and taxonomy to safeguard the island's vanishing natural heritage.

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