



ELSEVIER

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

The disparity between species description and conservation assessment: A case study in taxa with high rates of species discovery



Benjamin Tapley^{a,*}, Christopher J. Michaels^a, Rikki Gumbs^{a,b}, Monika Böhm^{a,c}, Jennifer Luedtke^{d,e}, Paul Pearce-Kelly^a, Jodi J.L. Rowley^{f,g}

^a Zoological Society of London, Regent's Park, London NW1 4RY, United Kingdom

^b Science and Solutions for a Changing Planet DTP, and Life Sciences Department, Imperial College London, Silwood Park Campus, Ascot, Berkshire SL5 7PY, United Kingdom

^c Institute of Zoology, Zoological Society of London, Regent's Park, London NW1 4RY, United Kingdom

^d IUCN Species Survival Commission, Amphibian Specialist Group, Bath, United Kingdom

^e Global Wildlife Conservation, Austin, TX 78767, USA

^f Australian Museum Research Institute, Australian Museum, 1 William St, Sydney, NSW 2010, Australia

^g Centre for Ecosystem Science, School of Biological, Earth and Environmental Sciences, University of New South Wales, Sydney, NSW 2052, Australia

ARTICLE INFO

Keywords:

Amphibian
Conservation prioritization
Global amphibian assessment
IUCN red list of threatened species
Extinction risk

ABSTRACT

The IUCN Red List of Threatened Species (Red List) details the extinction risk of the world's species and presents an important biodiversity indicator for conservation policy. Its continued utility relies on it containing up-to-date information on the extinction risk of species. This requires both regular reassessments and the timely assessment of newly described species. We provide an overview of the status of amphibian Red List assessments to highlight the difficulties of keeping assessments updated for species groups with high rates of species description. Since the publication of the IUCN's Global Amphibian Assessment in 2004, description rates of new species and assessment rates were initially similar; yet while the former has remained consistent, the latter has recently sharply declined. Currently 61.3% of amphibian species are either Not Evaluated or have out-of-date assessments. The situation is particularly problematic in countries with the richest amphibian diversity, which typically have the highest rates of amphibian species discovery and face the greatest threats. Efforts to keep the Red List up-to-date are primarily limited by funding, we estimate that an annual investment of US \$170,478–\$319,290 is needed to have an up-to-date Red List for amphibians. We propose suggestions to increase assessment rates by improving the availability of data relevant to the process: authors of species descriptions or taxonomic revisions should publish information relevant to Red List assessments. Taxonomic journals should suggest inclusion of such information in their author guidelines. We suggest that contributors with significant input into assessments should be rewarded with co-authorship of published assessments.

1. Introduction

The IUCN Red List of Threatened Species (hereafter the 'Red List') is a centralised, widely accepted measure of global extinction risk used to identify threats and prioritize conservation actions (Lamoreux et al., 2003; Rondinini et al., 2014). The Red List tracks changes in extinction risk over time, and is important in measuring threats to biodiversity and evaluating the impact of conservation intervention on a global scale (Hoffmann et al., 2010). The Red List has significant influence over which research and conservation work is resourced as grant funding often prioritizes globally threatened species. It also underpins the Red List Index, an important biodiversity indicator steering conservation

policy (Butchart et al., 2004; Butchart et al., 2007; Butchart et al., 2010).

The Red List is currently supported by fund-raising efforts carried out by the IUCN and Red List Partners, and through philanthropy (Rondinini et al., 2014; Juffe-Bignoli et al., 2016). However, once a taxonomic group has been comprehensively assessed, funding for subsequent assessments is not readily available (Rondinini et al., 2014). Much of the work required to assess a species, particularly providing data and compiling draft assessments, falls on the good will of scientists and other contributors volunteering their time, data and expertise (Juffe-Bignoli et al., 2016).

The long-term effectiveness and relevance of the Red List, and the

* Corresponding author.

E-mail address: ben.tapley@zsl.org (B. Tapley).

conservation initiatives reliant on it, depend on its ability to reflect our changing understanding of biodiversity. In order to accurately gauge trends and prioritize taxa and regions, the Red List must not only ensure that assessments are sufficiently updated but also keep pace with assessing newly described species. In taxa such as birds and mammals, only a handful of new species are described annually (Ceballos and Ehrlich, 2009; Avibase, 2016), but in other groups species description rates are relatively high (Costello et al., 2012), presenting a challenge to the sustained relevance of the Red List.

Amphibians provide an excellent case study of the challenges and requirements of an up-to-date Red List. Currently, amphibians are the most threatened vertebrate class with 42% of assessed species threatened with extinction (IUCN, 2016). The 2004 GAA,¹ the first comprehensive global assessment of amphibians on the Red List, assessed all 5743 amphibian species described at the time and highlighted the global plight of amphibian species (Stuart et al., 2004). Updates to the GAA were published in 2006 and 2008, consisting mostly of newly described species, and the initiative was subsequently passed on to the IUCN SSC Amphibian Specialist Group, which established its Amphibian Red List Authority in 2009. Since the GAA was launched, there has been a 25% increase in known species, with > 7600 amphibian species currently described (Amphibian Species of the World, 2017). The relatively high rate of amphibian species discovery has continued for decades due to increased survey effort, and the incorporation of molecular and bioacoustics data in delineating species and increased collaboration (Köhler et al., 2005; Vieites et al., 2009; Catenazzi, 2015), and shows no signs of slowing. Given that newly described species are more likely to have smaller ranges and hence be threatened (Pimm et al., 2014), the challenge of assessing their conservation status is an important one; this challenge is further compounded by the pressing need to reassess species on a regular basis as assessments are considered by IUCN to be out-of-date when they are over ten years old.

Here we assess the trends in species description and Red List assessment and reassessment rates for amphibians since the GAA was launched in 2004. We also examine the regional trends in species richness, amphibian species discovery and Red List assessments. We reviewed amphibian species descriptions in 2016 to determine whether or not authors of species descriptions had observed the species they describe in nature and whether or not they included specific information on threatening processes in species descriptions. Finally, we provide some basic and pragmatic solutions to discrepancies found between species assessment and description, while highlighting important hurdles which need to be overcome to facilitate an up-to-date Red List into the future.

2. Methods

We compiled a list of new amphibian species recognised by the Amphibian Species of the World database (<http://research.amnh.org/vz/herpetology/amphibia/>) per year from the 1st January 2004 to the end of our data collection period (11th December 2016); we then used the Red List (IUCN, 2016) to record the number of those species that are assessed, the lag-time (in whole years) between description and first assessment, and the extinction risk category determined for each species. Using the Red List's search function, we also obtained for each country the proportion of existing up-to-date assessments (i.e. species that have undergone assessment within the last 10 years) for native amphibian species. We calculated the total amphibian species richness for each country as the sum of Not Evaluated species (ascertained by comparing all described amphibian species from Amphibian Species of the World to the Red List 2016) and of assessed native species (introduced, vagrant and uncertain species were excluded). We also calculated the percentage of native amphibian species in each country that

had up-to-date Red List assessments. We assigned each newly described species to only the country from which the holotype was collected, as the exact distributional range of newly described species is often poorly known; our estimates of diversity for some countries are therefore likely underestimates. We used the Red List's search function by year to record the number of amphibian species that had been reassessed from 2005 to 2016 inclusive. This search by year returned a number of assessments in 2016 where the taxonomy was the only part of the assessment that had been updated; these updated assessments were excluded from the analysis as they do not represent any new assessment of extinction risk. To assess whether or not authors of the most recent amphibian species descriptions could potentially comment on threats to the species they describe, we read the species descriptions for new amphibian species described between 1st January 2016 to 11th December 2016 and recorded if any potential, observed or projected threat processes to the species or localities were explicitly mentioned. We also recorded whether or not any of the describing authors had visited the site from which a species was described and had observed the species in situ.

We calculated a rough estimate of how much it would cost to bring the amphibian Red List up to date by using two estimates of cost. We used the figure of US \$189.00 per species assessment (Juffe-Bignoli et al., 2016) and the estimated \$1.6 million cost of the GAA in 2004 (A. Angulo pers. comm.) which was then adjusted for inflation over the study period (US Inflation Calculator, 2016) where US \$1.60 million would be equivalent to US \$2.03 million in 2016. The total cost of the GAA was divided by the number of species assessed when it was launched; this resulted in a figure of US \$353.98 per species assessment. We then calculated the average investment needed to keep Red List assessments for amphibians up-to-date by assuming that the mean annual rate of new species description remains constant and that 10% of assessed amphibian species will need reassessing each year if all species are to be reassessed within the desired 10 year period (we used the number of amphibian species described at the end of our data collection period).

3. Results

The description of new amphibian species has remained relatively constant over the last decade (Fig. 1), with a mean of 144 (128–172) species described per year (2004–15 inclusive). Further, in the year following the publication of the GAA, the rate of assessments for new species almost matched the rate of species description, and 73% of species described in 2005 were assessed within one year. However, post 2007, the assessment rate for newly described species declined, leading to an increasing disparity between species description and subsequent assessment (Fig. 1). Since 2004, only 786 of 1730 (45.4%) newly described species have been assessed; between 2013 and 2015 (inclusive) only 35 of the 441 (7.9%) species described in that period have been assessed; only one of the 99 (1.01%) species of amphibians described in 2016 has been assessed (Fig. 1). This has caused an accumulation of 1042 new species of amphibian, described since 2004, that have not been assessed. The mean lag-time between species description and Red List assessment for species described between 2004 and 2015 (for species that have been assessed) is 2.2 years with a mode of one year. There has been no significant change in lag-time year-on-year since the launch of the GAA (Spearman's Rank; $\rho_{10} = 0.06$, $p = 0.86$). Since 2004, the percentage of Not Evaluated amphibian diversity has increased from 0% (i.e. all then-known species assessed) to 13.8% in December 2016.

The great majority of assessments on the Red List for birds and mammals have been completed or updated within the last 10 years and are considered up-to-date (99–100% in both groups; IUCN, 2016). This compares to only 86.2% of the 7579 known amphibian species which have ever been assessed. 61.3% of all known amphibian species have either not been evaluated or if assessed, the assessments are more than ten years old (Fig. 1).

¹ GAA - Global Amphibian Assessment.

Download English Version:

<https://daneshyari.com/en/article/8847393>

Download Persian Version:

<https://daneshyari.com/article/8847393>

[Daneshyari.com](https://daneshyari.com)