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Addressing knowledge gaps in reptile conservation

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ABSTRACT

Reptiles are the most species-rich group of terrestrial vertebrates, yet we lack a comprehensive understanding of their extinction risk. Only 45% of described reptile species have been assessed by IUCN to date (4648 of 10,400 species); of these, 20% (945 species) are threatened with extinction, and 19% (867 species) are Data Deficient. The goal of this special issue is to improve our understanding of reptile conservation needs and extinction risk by (i) investigating patterns and drivers of extinction risk and data deficiency at a global scale; (ii) identifying and addressing taxonomic and regional gaps in our understanding of extinction risk and data deficiency; and (iii) drawing upon detailed case studies to highlight conservation approaches to mitigate extinction. By doing so, the special issue will guide future conservation efforts toward the taxa and regions in greatest need of assessment, and toward risks requiring immediate mitigation. We conclude with potential avenues for future research, including the need to address regional knowledge gaps, conduct macroecological and retrospective analyses of extinction risk, and implement targeted monitoring of conservation intervention outcomes.

1. Narrowing the taxonomic gap in extinction risk research

Our understanding of geographic patterns and drivers of extinction risk is largely derived from studies of birds, mammals, and to a lesser extent, amphibians. The IUCN Red List of Threatened Species has been instrumental in this regard, providing near complete coverage of birds and mammals, and of ~83% of all described amphibians (Meiri and Chapple, 2016). In contrast, our grasp on the conservation status of reptiles remains vastly incomplete. Reptiles represent a significant proportion of terrestrial biodiversity, and global declines have long been suspected (Gibbons et al., 2000; Huey et al., 2010; Reading et al., 2010); yet only 45% of the 10,400 recognized reptile species have been assessed by IUCN (Uetz and Hosek, 2015). Those species that have been assigned a Red List status have been primarily listed on the basis of geographical range size (Criterion B), due to insufficient data on population trends. This lag in our understanding of reptile extinction risk has meant that reptiles have largely been neglected by previous global conservation prioritizations.

Böhm et al. (2013) addressed this taxonomic gap by conducting the first global analysis of the conservation status of reptiles. However, this analysis only considered 1500 randomly selected species (14% of all species globally), 21% of which were classified as 'Data Deficient'. Nonetheless, this initial assessment has become highly influential (cited 213 times as of 12/07/2016, according to Google Scholar), increasing awareness of the plight of reptiles globally, and sparking new research into patterns and drivers of reptile extinction risk (e.g., Ducatez et al., 2014; Jenkins et al., 2014; Böhm et al., 2016a; Tingley et al., in press).

This special issue builds on the momentum created by these recent contributions, by bringing together 14 papers on reptile extinction risk ranging from local and regional studies to broad-scale, global analyses. In approaching potential contributors for the issue, we specifically targeted taxa and regions that contained disproportionate levels of threat and/or data deficiency (Fig. 1), as well as key threatening processes (e.g., invasive species, climate change, trade) and conservation interventions (e.g., translocation, reintroduction). As a result, the special issue addresses several shortcomings in our understanding of reptile extinction risk, namely: (i) the majority (~55%) of all described species have not been evaluated by IUCN (Meiri and Chapple, 2016); (ii) 19% of all assessed species are Data Deficient (IUCN, 2015); and (iii) assessment gaps, extinction risk, and data deficiency are greater in tropical regions (Fig. 1), and among particular taxa (e.g., Amphisbaenids) and natural-histories (e.g., fossorial species) (Böhm et al., 2013; Meiri and Chapple, 2016). It is our hope that the special issue will help narrow these gaps by identifying taxa and regions for which conservation assessment is urgently needed, and by highlighting new approaches to inform assessment and action.

2. Summary of the special issue on reptile extinction risk

This special issue is organised under three broad themes, which we briefly summarise below: (i) global patterns and processes of extinction

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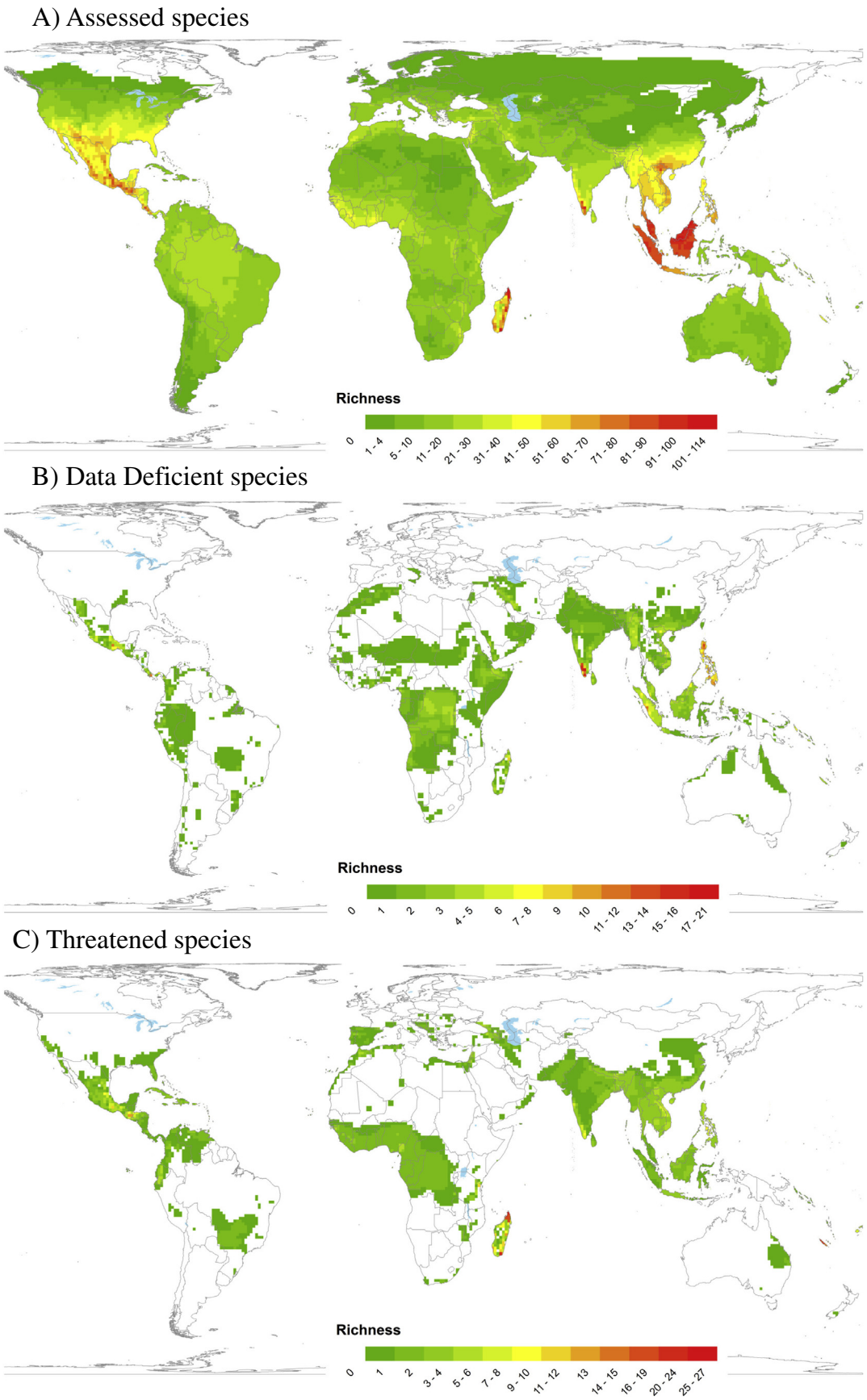

Fig. 1. Richness of reptile species assessed by IUCN (A), richness of Data Deficient reptile species (B), and richness of threatened (i.e., Vulnerable, Endangered, or Critically Endangered) reptile species (C).

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