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# Biological invasion vulnerability assessment of terrestrial vertebrates

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## Abstract

Biological invasions threaten biodiversity but evaluating their impacts on a global scale remains a challenging task. One solution could be the use of biodiversity assessments which combine the exposure, sensitivity, and adaptive capacity of species to a threat for deriving their vulnerability. Although developed for global threats, vulnerability assessments have been almost exclusively applied to climate change. Here, we propose a framework for conducting biological invasion vulnerability assessments (BIVA), to identify zones of high exposure, high sensitivity, and thus high vulnerability to invasive alien species (IAS). We applied this framework to global terrestrial vertebrates by quantifying the current exposure and realized sensitivity of more than 1600 native birds, mammals, and reptiles to 304 IAS. We found a high proportion of terrestrial lands exposed (38%) and sensitive (94%) to biological invasions. Exposure was consistent between the three groups, with hotspots in North America, Western Europe, South Africa, India, Australia, and New Zealand. Sensitivity patterns were taxon-specific, with mainland coasts and islands as the main hotspots for birds and Australia for mammals and reptiles. By conducting an uncertainty assessment, we found that exposure had low data completeness compared to sensitivity, with entire regions of the world (e.g., Amazonia, most of Africa, Russia, and Central Asia) lacking information regarding the biological invasion threat. BIVAs are crucial in helping define conservation targets for mitigating biological invasions, but they must be interpreted in light of uncertainty related to global biodiversity data availability.

**Keywords:** alien species, birds, exposure, mammals, reptiles, sensitivity, threatened species

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