

Publication

Environmental correlates of phylogenetic endemism in amphibians and the conservation of refugia in the Coastal Forests of Eastern Africa

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To quantify the spatial distribution of amphibian phylogenetic endemism (PE), an indicator of potential refugia, to test PE for correlations with current and historical environmental predictors, and to evaluate the effectiveness of current protected areas at conserving evolutionary history. Location Coastal Forests of Eastern Africa (CFEA) and the adjacent low-elevation Eastern Afromontane (EA). Methods We integrated new and existing spatial and phylogenetic data to map PE for almost the full amphibian assemblage (41 of 55 species), including 35 intraspecific lineages from several species and complexes showing high phylogeographic structure. Using spatial and non-spatial regressive models, we tested whether PE can be predicted by measures of Quaternary climate change, forest stability, topographic heterogeneity and current climate. PE results were intersected with the protected area network to evaluate current conservation effectiveness. Results We detect refugia in Tanzania and coastal Kenya previously identified as CFEA centres of endemism but also new areas (lowland Tanga region and Pangani river, Zaraninge forest, Mafia island, Matumbi hills). Results show that refugia for amphibians (high PE) are located in areas with long-term Quaternary climate stability and benign current climate (high precipitation of driest quarter, high annual precipitation), with climatically unstable areas demonstrating low PE. Conservation analyses revealed that ten PE hotspots account for over 25% of the total PE, but only small parts of these areas are under conservation protection. Main Conclusions Utilizing cryptic diversity from novel phylogeographic data and distribution modelling improves our understanding of endemism patterns, with climate stability being strongly correlated with the distribution of PE. Our analyses point towards high PE areas being refugia, which require an urgent need to consolidate protected areas within centres of endemism in this highly threatened biodiversity hotspot. Aims To quantify the spatial distribution of amphibian phylogenetic endemism (PE), an indicator of potential refugia, to test PE for correlations with current and historical environmental predictors, and to evaluate the effectiveness of current protected areas at conserving evolutionary history. Location Coastal Forests of Eastern Africa (CFEA) and the adjacent low-elevation Eastern Afromontane (EA). Methods We integrated new and existing spatial and phylogenetic data to map PE for almost the full amphibian assemblage (41 of 55 species), including 35 intraspecific lineages from several species and complexes showing high phylogeographic structure. Using spatial and non-spatial regressive models, we tested whether PE can be predicted by measures of Quaternary climate change, forest stability, topographic heterogeneity and current climate. PE results were intersected with the protected area network to evaluate current con-

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