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Spatial distribution pattern of pavetta crassipes under global change and its implications for conserving savannah

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Abstract

Among the most significant challenges to biodiversity worldwide is climate change. It has a considerable impact on ecosystem transformation and species distribution patterns. An understanding of the interactions between climate change, human pressures, and the spatial distribution of species is required to implement effective biodiversity conservation strategies. This study analyses the current and future distribution of Pavetta crassipes K. Schum. (Rubiaceae), a tropical species that is currently well-represented in Benin and provides important ecosystem services. The analysis is based on species distribution modelling (SDM) and combines presence data from field surveys and the Global Biodiversity Information Facility (GBIF) database with bioclimatic, edaphic, and anthropogenic variables. We estimated potential distributions using the MaxEnt algorithm under current and future climatic conditions (SSP2–4.5 and SSP5–8.5 scenarios up to 2050). The results suggest that the distribution of P. crassipes is associated with climatic gradients, particularly temperature during the warmest quarter (Bio10), as well as with soil characteristics, land use, and human interactions. While ecological niches show significant overlap between the Sudanian, Sudanian-Guinean, and Guinean zones, future projections suggest redistribution and fragmentation of suitable habitats. Notably, the Guinean subgroup is expected to contract significantly. Nevertheless, some areas, particularly those within protected areas and the mountain ranges of northern Benin, could retain favourable environmental suitability. These results underscore the necessity of adopting differentiated conservation strategies that integrate strengthened *in situ* conservation, targeted *ex situ* conservation actions, and the planning of functional ecological corridors to ensure the persistence of P. crassipes in Benin in the face of global changes.

Keywords: And ecological zoning, climate resilience, ecological compatibility, global change

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