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Current and Potential Spatial Distribution of Pollinators in Bolivia Influenced by Land-Use and Climate Change

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Abstract

Animal pollination represents a key regulating ecosystem service, involved in wild plant reproduction and responsible for more than 35 % of world crop production. Recently, an increasing decline of pollinators has been evidenced. Although, global changes such as land-use and climate are known to have important impacts on pollinator communities, clear relationships between these drivers and pollinator loss remain little investigated. The present study aims to determine the effect of land-use and climate change on current and potential spatial distribution of pollinators in Bolivia. To do this, species distribution modelling and two scenarios based on projections suggested by the Fifth IPCC Assessment report for the year 2050 and 2080 were applied. The following data was combined in MaxEnt software package: a) presence-only records corresponding to three groups of pollinators (bees and wasp, butterflies and hummingbirds) obtained from open access databases such as Predicts project, GBIF and published papers; b) environmental variables derived from remote sensing techniques: temperature, precipitation, and land-use cover. In general, the results show that the actual status of pollinators in Bolivia is threatened by land-use and climate conditions, especially in eastern regions, where extensive land-use (agro-industrial activities and deforestation) and increase in temperatures have been observed. According to the analysis, there is a reduction of the geographic range of pollinators, although differences in response among groups are detected. Bees and wasps seems to be less susceptible to climate change in comparison to butterflies and hummingbirds. Under future scenarios 2050 and 2080, a moderate to extensive shift of pollinators range was observed, mainly in hummingbirds whose habitat might be reduced enormously as result of change in suitable environmental conditions. Here, we show how species distribution modelling could be applied as a useful tool to support decisions on pollinator conservation, particularly during the decision-making process.

Keywords: Climate, land use change, pollinators, species distribution modelling, tropical region