

## Prioritizing Biodiversity Conservation Areas based on the Vulnerability and the Irreplaceability Framework in Mexico

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**Abstract :** Mexico is a megadiverse country and it has nearly halved its natural vegetation in the last century due to agricultural and livestock expansion. Impacts of land use cover change and climate change are unevenly distributed and spatial prioritization to minimize the affectations on biodiversity is crucial. Global and national efforts for prioritizing biodiversity conservation show that ~33% to 45% of Mexico should be protected. The width of these targets makes difficult to lead resources. We use a framework based on vulnerability and irreplaceability to prioritize conservation efforts in Mexico. Vulnerability considered exposure, sensitivity and adaptive capacity under two scenarios (business as usual, BAU based, on the SSP2 and RCP 4.5 and a Green scenario, based on the SSP1 and the RCP 2.6). Exposure to land use is the magnitude of change from natural vegetation to anthropogenic covers while exposure to climate change is the difference between current and future values for both scenarios. Sensitivity was considered as the number of endemic species of terrestrial vertebrates which are critically endangered and endangered. Adaptive capacity is used as the ration between the percentage of converted area (natural to anthropogenic) and the percentage of protected area at municipality level. The results suggest that by 2050, between 11.6 and 13.9% of Mexico show vulnerability  $\geq 50\%$ , and by 2070, between 12.0 and 14.8%, in the Green and BAU scenario, respectively. From an ecosystem perspective cloud forests, followed by tropical dry forests, natural grasslands and temperate forests will be the most vulnerable ( $\geq 50\%$ ). Amphibians are the most threatened vertebrates; 62% of the endemic amphibians are critically endangered or endangered while 39%, 12% and 9% of the mammals, birds, and reptiles, respectively. However, the distribution of these amphibians counts for only 3.3% of the country, while mammals, birds, and reptiles in these categories represent 10%, 16% and 29% of Mexico. There are 5 municipalities out of the 2,457 that Mexico has that represent 31% of the most vulnerable areas (70%). These municipalities account for 0.05% of Mexico. This multiscale approach can be used to address resources to conservation targets as ecosystems, municipalities or species considering land use cover change, climate change and biodiversity uniqueness.

**Keywords :** biodiversity, climate change, land use change, Mexico, vulnerability

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