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Human footprint and climate disappearance in vulnerable ecoregions of protected areas

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Abstract

Ecoregions are distinct groups of natural communities and species. Currently, some ecoregions of the world are considered as vulnerable. Protected areas (PAs) can support the conservation of such vulnerable ecoregions. In this study, global PAs in different International Union for the Conservation of Nature (IUCN) management categories and their vulnerable ecoregions were studied, and human footprint and climate disappearance were assessed. The human footprint was found to drive the ecoregional vulnerability of PAs, which was high for vulnerable ecoregions in Europe, North America, and in smaller regions of Asia, Australia, New Zealand, and South America. These PAs included different biomes (excluding montane grasslands and shrublands) and affected IUCN PA management categories. Discrepancies may exist between observations and the present assignment of PAs to IUCN categories considering the extent of the human footprint; hence, these categories need to be re-evaluated based on human influence. The obtained results indicate that vulnerable ecoregions in forest, tundra, and mangrove biomes in PAs of eastern North America, Europe, south-eastern Asia, Australia, New Zealand, and the Pacific islands face high risks from climate disappearance. The ecoregional vulnerability of PAs to both human influence and climate change was high in temperate broadleaf and mixed forests in south-eastern Asia, Europe, Australia, and New Zealand. For global PAs, we propose that: 1) long-term monitoring should be conducted for changes in temperature and precipitation in vulnerable ecoregions such as forest, tundra, and mangrove biomes; and 2) human influence and climate change are integrated into adaptive strategies for the conservation of vulnerable PA ecoregions.

Keywords: biome, climate change, ecoregion, human influence, IUCN, nature reserves