

Impacts of climate and land-use dynamics on endemic plant distributions in a Mediterranean island hotspot: The case of Evvia (Aegean, Greece)

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Abstract

Anthropogenic climate and land-use change pose major threats to island floras worldwide, yet few studies integrate these drivers in a single vulnerability assessment. Here, we examine the endemic flora of Evvia, the second largest Aegean island in Greece and an important biodiversity hotspot, as a model system to address how these disturbances may reshape biodiversity patterns. We used species distribution models integrating climate projections and dynamic land-use data to forecast potential range shifts, habitat fragmentation, and biodiversity patterns for 74 endemic taxa through 2100. Our findings reveal pronounced projected range contractions and increased habitat fragmentation for all studied taxa, with more severe impacts on single-island endemics. Current biodiversity hotspots, primarily located in mountainous regions, are expected to shift towards lowland areas, probably becoming extinction hotspots. Emerging hotspot analysis identified new biodiversity centres in lowland zones, while high-altitude areas showed sporadic hotspot patterns. Temporal beta diversity analysis indicated higher species turnover of distantly related taxa at higher elevations, with closely related species clustering at lower altitudes. This pattern suggests a homogenisation of plant communities in lowland areas. Assessment of protected area effectiveness revealed that while 94.6% of current biodiversity hotspots are within protected zones, this coverage is projected to decline by 2100. Our analysis identified conservation gaps, highlighting areas requiring urgent protection to preserve future biodiversity. Our study reveals valuable information regarding the vulnerability of island endemic floras to global change, offering a framework applicable to other insular systems. Our findings demonstrate that adaptive conservation strategies should account for projected biodiversity shifts and serve as a warning for other insular biodiversity hotspots, urging immediate actions to maintain the unique evolutionary heritage of islands

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