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Terrestrial ecosystem range shifts in a changing climate – preliminary findings from a spatio-temporal comparison of mountain ranges from Turkey using LPJ-GUESS

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Turkey, also known as *Asia Minor*, comprising largely of the *Anatolian peninsula/plateau* is situated in a distinct spot, surrounded by marine basins on three sides and an inner sea, coastlines on the northern and southern parts of the country cut off from the inner plateau by high mountain ranges showcasing different micro-climatic settings. The area, a natural corridor between two continents, also harbors a heavy human footprint on its terrestrial vegetation cover, having been populated since the Paleolithic and harvested at capacity since the Neolithic. Yet, despite continuous anthropogenic influence, the diverse climatic variables coupled with striking differences in geomorphology, including soil diversity, still translate into visibly diverse regional vegetation patterns in the northern and southern coastal highlands of the country, with respect to altitude. Due to its special place at the juncture of three flora regions, the peninsula also boasts a large endemic plant diversity, at a striking 30%, the highest yet in all of Europe.

The mountain ranges on the coastal regions in the Anatolian plateau extend parallel to the coastline in the North and South in sets of quasi-parallel “lines”, and perpendicular in the West. This geomorphologic set-up coupled with the differentiating effect of the sea also contributes to the distribution of terrestrial vegetation.

In this study, terrestrial vegetation in selected patches located on different mountain ranges where the anthropogenic effects are minimal (Küre and Kaçkar Mountains from the Black Sea coast with diverse geomorphologies, both hosting national parks, and Amanos Mountains as well as select transects from the Western Taurus range) is simulated using a coupled dynamic vegetation model and an ecosystem simulator, LPJ-GUESS. The model is run with reanalysis data for the static phase, and with different global circulation model outputs to forecast the potential impacts of changes in climatic drivers, such as atmospheric carbon levels, temperature, and precipitation on the key forest species in Turkey.

Turkey’s terrestrial ecosystems under future RCP scenarios have not been modelled using high-resolution data before. The preliminary findings of our simulations show suggested changes in landcover for the region as a whole. One expected outcome, in the face of rising global

temperatures and aridity concerns for Turkey overall but for the Southwest in particular, is a general northerly, and in instances a north-easterly shift in key forest species with changes in forest cover and density. This study will also help us determine which climatic drivers will become more critical in the near future for the region from a terrestrial ecosystem perspective and in terms of ecological changes in real time. As Turkey still harbors remnants of old-growth forests, we strongly believe it is crucial and urgent to identify the climatic and anthropogenic challenges that lie ahead in their conservation and restoration.

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