CLIMATE FACTORS EXPLAIN BEE DIVERSITY IN THE AEGEAN ISLANDS

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Climate can be an important factor affecting species richness and shaping diversity patterns in islands (Whittaker & Fernández-Palacios, 2006; Pimm *et al*., 2014). Particularly, islands in higher latitudes experience significant climatic differentiation in relatively small area than those at lower latitudes where drier climatic conditions may prevail. These climatic variations may influence species diversity. Besides climate, a variety of ecological and geographical factors, such as habitat diversity and island area have been recognized to affect species diversity (Triantis *et al*., 2008; Hortal *et al*., 2009; Keil *et al*., 2012).

We consider two climatic and three eco-geographical variables, namely annual mean temperature, annual precipitation, island area, distance to nearest species source and the ratio of the area covered by phrygana vs. the remaining habitat types, as important factors in determining species diversity. The influence of these variables in species α-diversity (number of sampled species at each island) was assessed using generalized linear models. Furthermore, the relationship of these factors with β-diversity, expressed as overall compositional dissimilarity (Sørensen dissimilarity index, β_{sor}), was assessed by applying partial Mantel tests. The β_{sor} was partitioned into two separate components, reflecting two different phenomena, turnover (β_{sim}) and nestedness (β_{sne}), i.e. species replacement and richness differences respectively (Baselga, 2010, 2012).

In total we collected 440 species in 68 sites across eight islands of the Aegean Archipelago. Annual temperature, annual precipitation and island area had a significant effect on species richness, while the other variables (distance to nearest source and the ratio between the area covered by phrygana and the remaining habitat types) were either non-significant or excluded from the model based on AIC. Larger islands, which usually sustain higher number of species, may encounter diverse climatic differentiation, affecting the occurrence and distribution of species. The statistical significant effects found in this study emphasize the strong impact of climate factors, negative and positive effect of temperature and precipitation respectively, on species richness in our study islands. The β_{sor} was highly positively significantly correlated with temperature and negatively correlated with precipitation, whereas the β_{sim} was significantly positively associated with temperature and negatively associated with island area. The β_{sne} was positively correlated both with island area and the ratio of the area covered by phrygana with the remaining habitat types. The correlation of compositional dissimilarities (β_{sor}) with temperature and precipitation highlights the importance of climate in shaping β-diversity patterns. Our research revealed the importance of climate factors, especially temperature, in explaining both α and β-diversity. Variations in climate due to future potential climate change may negatively affect pollinators' diversity and their population sizes, causing increase threat to the services they provide (Potts *et al*., 2010). Thus, future research regarding the impact of climate change to pollinators' species richness and diversity patterns constitutes a matter of high concern and a subject that could provide useful information for conservation efforts.

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