

Abstract

1. Mediterranean ecosystems are increasingly threatened by disturbances such as wildfires. These disturbances are expected to shift the selective pressures that determine trait-dependent community assembly. In addition, the stochasticity in species assembly may decrease because of the introduction of strong selection regimes or may increase because of random variation in recruitment. However, these changes in the selection profile and stochasticity in disturbed communities have seldom been evaluated.
2. We examined the relative roles of wildfire disturbance, local conditions and successional dynamics on the assembly of aquatic macroinvertebrate communities. We used the theory of community assembly by trait selection (CATS) to identify traits under selection and to estimate their dependence on wildfire disturbance and environmental gradients. We took advantage of a natural wildfire that partially burned a Mediterranean system of temporary ponds, which were surveyed before and after the wildfire, creating a natural before-after-control-impact design.
3. Before the wildfire, the burned and unburned ponds did not show differences in the selected traits. After the wildfire event, species with larger body sizes and scrapers were favoured in the burned ponds, while collectors and active dispersers were underrepresented. Nonetheless, local environmental conditions and successional dynamics had greater relevance in the selection of traits than the wildfire. This suggests that assembly mechanisms were largely determined by seasonal successional changes regardless of wildfire disturbance. Finally, the relevance of the analysed traits diminished during the hydroperiod, suggesting more stochastic assemblages and/or a replacement in the set of selected traits.
4. Despite the prominent role of seasonal succession over wildfire, this disturbance was associated with a change in the selection strength over specific traits related with feeding strategies and species life histories. Both hydroperiod and wildfire highlighted a strong role of trait-mediated processes (i.e. niche assembly). Therefore, the predicted increase in the frequency and intensity of wildfires is likely to result in community functional shifts. Furthermore, stochasticity was also important for community assembly, particularly from the middle towards the end of the hydroperiod. Our results evidenced the strong relevance of successional changes in trait-mediated assembly mechanisms and its interplay with wildfire disturbance in temporary pond communities.