

A unique refugium from climate warming in the Levantine Basin, eastern Mediterranean Sea

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Abstract

The Levantine Basin is the easternmost and warmest sector of the Mediterranean Sea. The seawater temperature increases that occurred in the last few decades due to anthropogenic climate warming have pushed many native species beyond their tolerance to heat, causing large-scale population collapses and species eradications. In this doom scenario, a spark of hope is offered by the peculiar oceanographic conditions of south-western Cyprus, where coastal upwelling maintains a 100-km-long coastline 3 °C cooler than the rest of the Levantine basin in summer, when temperatures peak. This is thus an ideal candidate for a refugium from climate warming, that is, an area where native biodiversity retreats to, persists in and can potentially expand from under changing environmental conditions. In this project, we will provide evidence that this area is indeed a refugium by analyzing its oceanographic (temperature and upwelling patterns) and biological (persistence, abundance and diversity of native species, paucity of thermophilic non-indigenous species) features. Based on intense sampling of benthic assemblages in seagrass and rocky substrates, which host the greatest biodiversity in the Mediterranean Sea, and focusing on molluscs that are taxonomically and functionally diverse, we will describe current biodiversity patterns around the island and we will reconstruct the historical diversity from shelly death assemblages to quantify biodiversity loss. We will eventually test the hypothesis that the refugium has not undergone major native biodiversity loss and is home to more diverse assemblages than the warmest parts of the island. Our final aim is to offer a unique dataset to show the importance of the refugium to all stakeholders, in order to contribute to the effective protection of native biodiversity in the Mediterranean.