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Predicted impact of climate change on the distribution and habitat suitability of dwarf eelgrass (Zostera noltii)

Francisco Borges, Catarina Santos, Vanessa M. Lopes, Bernardo Duarte, José R. Paula, Tiago Repolho, Rui Rosa

MARE - Faculdade de Ciências da Universidade de Lisboa, Portugal

Abstract

Coastal environments are under severe threat from recent climate change. Despite increasingly recognized for being some of the most productive ecosystems and for their vast array of life-sustaining ecological services, recent studies show that these areas harbor some of the world's most threatened ecosystems. In fact, nearly half of salt marshes, 35% of mangroves, and 29% of the world's seagrass beds have disappeared in the past half century, and it is expected that the impacts of anthropogenic pressure and climate change will increase in the near future. Seagrass meadows are composed of marine flowering plants widely distributed across marine coastlines and estuarine environments. They form complex physical structures which are highly productive and support considerable biomass and a vast diversity of associated species. The eelgrass *Zostera noltii* is a common species in seagrass meadows along the eastern Atlantic Ocean and the Mediterranean Sea. It is known to be particularly vulnerable to climate change and anthropogenic pressure. The ability to predict the potential susceptibility of seagrass species to climate change is invaluable to the correct environmental management of these transitional areas in the mid to long term. Within this context, the present study modelled and analyzed the potential changes to the present and future distribution of *Z. noltii*. For this purpose, species distribution models were applied on occurrence data in conjunction with environmental predictors (i.e., sea surface temperature, salinity, current velocity, and sea level) to determine the present habitat suitability and species distribution, together with their potential change in the future (i.e., 2050, 2100) across four representative concentration pathway scenarios (CMIP5: RCP26, 45, 60, and 85). This species appears particularly vulnerable to climate change, with significant reductions in habitat suitability and changes to its distribution being predicted.

Keywords

Zostera noltii, Climate Change, Species Distribution Models, Seagrass