Abstract

Aim The Mediterranean endemic seagrass species Posidonia oceanica (Linnaeus, 1813) Delile constitutes the most important marine biodiversity ecosystem of the Mediterranean Sea. During the past 50 years, 34% of the original meadows have been lost due to anthropogenic impact on the coastal areas and climate change. This research aims to predict the future vulnerability of P. oceanica under the Representative Concentration Pathways (RCP) for climate change and increasing anthropogenic activities.

Location Mediterranean Sea

Methods Environmental data was collected from Bio-ORACLE, EMODnet Bathymetry and a literature review to the environmental conditions between 12,000 years B.P. and 2050. For the timeslots 12,000 years B.P. to 2050, species distribution models were modelled with the maximum entropy software Maxent. The Patchiness Index (PI) and cover ratio have been analysed on a region-wide spatial scale with remote sensing to investigate meadows’ vulnerability to anthropogenic impact.

Results Under all RCPs a decline in habitat suitability was registered compared to the earliest modelled scenario of 12,000 years B.P. An increase in habitat loss has been modelled for stronger RCP scenarios. Low levels of patchiness and high meadow cover appear in natural areas, and anthropogenic pressures diminish the meadow cover and thereby spur a patchiness of the habitat structures.

Main conclusion In future decades, climate change and increasing anthropogenic activities in coastal areas will expose P. oceanica to stress with a risk for the local extinction of P. oceanica.

Keywords Posidonia oceanica, species distribution models, Maxent, habitat fragmentation, patchiness index, habitat cover, climate change, anthropogenic pressure