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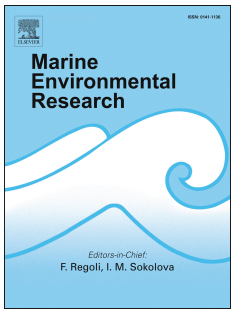

Multilevel assessments reveal spatially scaled landscape patterns driving coastal fish assemblages

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Multilevel assessments reveal spatially scaled landscape patterns driving coastal fish assemblages

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Abstract:

Ecological research, particularly in marine environments, tends to focus on single habitats and often single spatial scales, and thus not account for ecological processes operating at multiple spatial scales. Here we aim to explore how coastal fish assemblages are influenced by landscape patterns integrating multiple spatial scales, to assess the strength of these associations and to identify the most relevant spatial scales at which these associations occur. We use a multiscale approach through multilevel modelling to evaluate the association of landscape metrics with fish assemblages, at three nested spatial scales, in temperate coastal seascapes composed of seagrass meadows, sandy bottoms and rocky reefs. Landscape composition metrics, expressed as cover of vegetated habitats, significantly influenced fish assemblages at small (metres) and intermediate (hundred of metres) scales, while landscape configuration metrics did it at all three scales assessed (from metres to kilometres). Species richness was only influenced by small scale landscape patterns (cover of rocky reefs, positive association), whereas total abundance was associated with landscape patterns measured at small and intermediate scales, encompassing metrics associated with landscape composition (rocky reef cover, positive association), and those indicating landscape heterogeneity (negative association). Similarly, the abundances of different functional groups were influenced by metrics consistent with their mobility and their ecological and behavioural traits at all the spatial scales assessed. These results show how landscape patterns influence coastal fish assemblages, and particularly show that spatially scaled landscape patterns, measured in complex ecological systems as a whole, act simultaneously but not always equally on species assemblages.

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