

Charton, J. A. G., I. D. Williams, A. P. Ruzafa, M. Milazzo, R. Chemello, C. Marcos, M.-S. Kitsos, A. Koukouras and S. Riggio. 2000. Evaluating the ecological effects of Mediterranean marine protected areas: habitat, scale and the natural variability of ecosystems. *Environmental Conservation*, 27, pp 159-178.

Abstract:

The capability to detect and predict the responses of marine populations and communities to the establishment of marine protected areas (MPAs) depends on the ability to distinguish between the influences of management and natural variability due to the effects of factors other than protection. Thus, it is important to understand and quantify the magnitude and range of this natural variability at each scale of observation. Here we review the scale of responses of target populations and communities to protection within Mediterranean MPAs, against their 'normal' spatio-temporal heterogeneity, and compare those with documented cases from other temperate and tropical marine ecosystems. Additionally, we approach the problem of the relative importance of habitat structure, considered as a set of biological and physical elements of the seascape hierarchically arranged in space at multiple scales, to drive natural variability. We conclude that much more effort has to be made to characterize heterogeneity in relation to Mediterranean MPAs, and to quantify and explain relationships between target species and their habitats as sources of such variability. These studies should be based on sound sampling designs, which (1) generate long-term data sets, and would ideally (2) be based on a Mediterranean-wide comparison of a number of protected and unprotected localities, (3) be designed from a multi-scaled perspective, and (4) control for factors other than protection, in order to avoid their confounding effects. The need for appropriate spatial and temporal replication, nested designs and power analysis is advocated.