

MONITORING MEDITERRANEAN MARINE PROTECTED AREAS: A SET OF GUIDELINES TO SUPPORT THE DEVELOPMENT OF MANAGEMENT PLANS

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Abstract

With the aim to address some of the complex needs of Marine Protected Areas management, the results of the FP7-PEOPLE-2011-ITN "Monitoring Mediterranean Marine Protected Area" (MMMPA) project are synthesized in timely and original guidelines.

Keywords: Coastal management, Conservation, Marine parks, Monitoring, Mediterranean Sea

Introduction The pivotal role well managed Marine Protected Areas (MPAs) could play as key pilot areas to assess the environmental status of coastal environments is still far to be adequately recognised and exploited. The monitoring systems vary regarding the characteristics of the MPAs, who perform the measuring, where, when and how measures are made. They must be carefully designed and must include good baseline data, robust indicators and possibly control sites. In many cases, the financial resources to adequately structure and achieve the goals are not available. A priority is represented by the need to record changes in the ecology of the MPA, asking for the evaluation of the cascade effects of changes on the local communities. Considering the management discrepancy between the existing Mediterranean MPAs, it is urgent to converge upon concrete monitoring priorities. Indeed, one of the main issues faced by Mediterranean MPA managers relates to ensuring a continuous, long-term basic monitoring of specific indicators. The lack of standardized methodologies for the monitoring of Mediterranean MPAs transforms what should be an institutional task into a real practical challenge.

Material and methods The MMMPA project merged 'traditional' monitoring techniques with approaches from emerging interdisciplinary fields. Building upon this "contamination", the present guidelines can be grouped according to four main topics: habitat assessment, ecosystem functioning, genetic connectivity, and social sciences. Each guideline includes: 1. An introduction highlighting why managers should take the specific topic into account. 2. The methodologies that should be applied to implement the monitoring in the most cost-effective way. 3. A case study provided as an example. 4. General conclusions.

Results and Discussions The main outputs provided by the project are here provided. i) *Cystoseira* species should become a conservation priority in the future context of Mediterranean Sea management and guidelines suggest how to census marine algal forests and when to ask for habitat restoration [1]. ii) The detection of changes on sediment deliveries to a MPA is a "low cost" approach based on open access data, crucial for making effective coastal-land management decisions [2]. iii) The monitoring pressure and impacts from small scale and recreational fishing activity in Mediterranean marine protected areas is a generic framework for long-term monitoring that integrates powerful analysis and visualization, providing a holistic assessment and scientific advice towards ecosystem based fisheries management [3]. iv) A methodological framework for the implementation of monitoring measures for coralligenous assemblages has been delivered, with the aim to provide statistically sound data for management purposes. The method is based on existing standard monitoring assessment currently used in marine benthic habitats [4]. v) Biogeochemical transformations are the basis for the ecosystem functioning. Any alterations or perturbations of it will have cascading effects on the entire system. On the basis of biogeochemistry, the more important variables to be considered were described, to implement a monitoring system in lagoon habitats [5]. vi) Benthic ecosystems play a critical role in relation to the goods and services that marine and coastal ecosystems provide. Benthic macroinvertebrate communities have been proven to be reliable proxies to evaluate Ecological Quality Status of benthic ecosystems [6]. vii) High trophic level predators play an important functional role in marine ecosystems, ensuring the persistence of complex food webs that increase ecosystem resistance to human impacts. The methodologies to assess these dynamics are provided [7]. viii) The assessment and monitoring of species genetic connectivity in

the MPA context, can help the establishment of new MPAs and the monitoring of MPA effectiveness over time. The methodologies to monitor these relationships are provided [8]. ix) The social information gap hinders MPA managers' ability to make science-based decisions that include the human environment as well as the natural environment [9]. Early involvement and active participation of stakeholders is a prerequisite strategy that accrues numerous benefits to natural resource management [10]. A set of guidelines for social science research in MPAs is provided.

References

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