VISUAL CENSUS

Monitoring fish and invertebrate communities in the Professor Luiz Saldanha Marine Park.

BIOMARES
Program
Task start:
1999

INTRODUCTION

Marine protected areas have been increasingly promoted as tools for ecosystem-based marine space management, as they allow the implementation of protection measures - such as the restriction or even exclusion of human uses in some areas - with the aim of protecting marine communities and ecosystems.

In order to assess the success of protection measures for marine protected areas, it is important to distinguish between the effects that result from your protection measures and the effects that result from the different physical and ecological characteristics of the various areas. One way of doing this is through "before and after" comparisons, that is, collecting data before and after the implementation of the measures, thus allowing their comparison. The Professor Luiz Saldanha Marine Park is among the few marine protected areas for which this type of work has been done to assess the reserve effect. For this purpose, the response was assessed with respect to the abundance and biomass of species of commercial interest and without commercial interest, before and after the implementation of the park and inside and outside the "no-take" areas (Total Protection).

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OBJECTIVE

Monitoring of fish and commercial invertebrate communities in the rocky reefs of the Marine Park, through direct observation using scuba diving.

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METHODS

For visual census, 3 trained divers travel transects of 65 meters perpendicular to the coast line in 12 fixed stations along the Marine Park, which are characterized by their continuous habitat of rocky reefs (Figure 1). At each fixed station, transects are replicated 3 times. Each sampling campaign is carried out during spring and autumn, due to the known seasonal variability of coastal fish.

Divers collect information about: species, number and estimated total length for demersal fish (65x4m transect) and for high-value cryptobenthic and invertebrate organisms (65x1m transect). At each dive for visual census there is also:

   · The initial and final depth;
   · The duration of the dive;
   · Visibility (the minimum value of 5 m of visibility was established to carry out visual censuses).
   · The physical characteristics of each habitat - there are three transects with squares of 1 x 1 m, with a square every 10 m from the deepest to the most superficial areas of the transect. Each square is divided into 0.5 x 0.5 m areas, for which divers record the physical characteristics of the habitat in detail.

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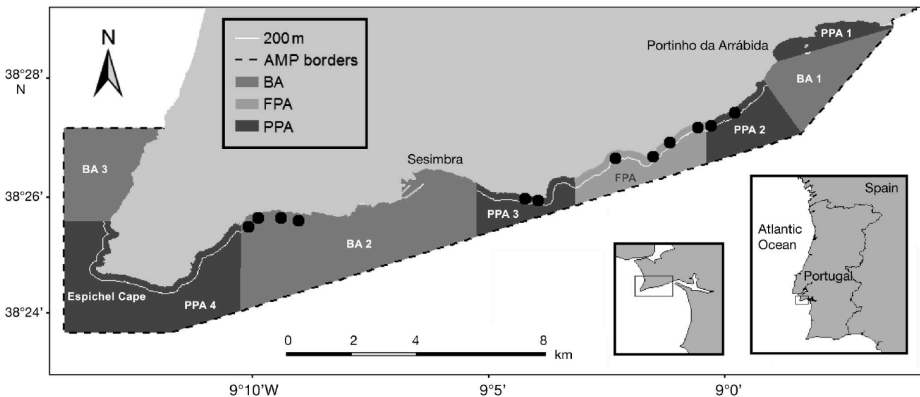No mar da Arrábida desde 2007
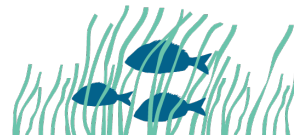
Fig. 1. Arrábida Marine Park zoning. FPA: fully protected area; PPA 1 to 4: partially protected areas; BA 1 to 3: buffer areas. ●: survey sites (outside of the reserve: 4 sites in BA2; inside the reserve: 4 sites in PPA2 and 3, and 4 sites in FPA)

Figure 1 **Places of study in the Marine Park (●)** Map representing the Marine Park and the different protection levels.

TASK PERIOD AND DURATION

The data referring to the "before" period were collected 10 years before there was an effective protection in Parque Marinho, that is, before 2009. Despite having been created in 1998, the Park's management plan was approved in 2005. This plan created different protection zones based on the natural values present in the Marine Park and included a transition phase for measures related to fisheries, with successive implementation of areas with different protection statuses until 2009. The visual censuses carried out after the final stage of the implementation of the management plan (2009) are considered the "after" period.

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MAIN RESULTS

Monitoring of fish and commercial invertebrate communities on rocky reefs through visual censuses shows that:

- **There is a greater density and even greater biomass of individuals of different species in the area of total protection.** The species observed are proportionally larger in the total protection zone compared to the complementary and partial protection areas, with the latter showing intermediate values. The total number of species registered was also higher in the areas of total and partial protection compared to complementary ones. These patterns are mostly due to species of high commercial interest and above the minimum catch size. On the contrary, the values of density and biomass for juveniles of commercial species and for non-commercial species were similar between different protection areas.

- **When comparing the period before and after the implementation of the marine park, there is a trend towards an increase in the density of commercial species and a decrease in non-commercial species.** Although a short period of time has elapsed since the full implementation of the Marine Park, these trends suggest that it is the organisms caught by fishing that appear to be benefiting most from the protection measures.
- **Different species respond differently to protection measures.** Among those that are responding positively are common sea bream and octopus, which are the most important commercial species for small coastal fishing. The auction discharges follow this pattern, which is observed in the visual censuses of fauna. Common sea bream has already increased in number and size within the total protection area and in the surrounding partial protection areas. For its part, the octopus migrates from deeper areas to coastal areas to reproduce and spend a few months a year, and even with this seasonal protection, it also appears to be benefiting from protection measures, as these probably increase the likelihood of individuals grow and reproduce (which is key to sustainability).

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