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PROCEEDINGS OF 2nd MEDITERRANEAN SYMPOSIUM ON THE CONSERVATION OF CORALLIGENOUS AND OTHER CALCAREOUS BIO-CONCRETIONS

Portorož, Slovenia, 29-30 October 2014

ACTES DU 2ème SYMPOSIUM MÉDITERRANÉEN SUR LA CONSERVATION DU CORALLIGÈNE ET AUTRES BIO-CONCRÉTIONS

Portorož, Slovenie, 29-30 octobre 2014

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INSTITUTE OF THE REPUBLIC OF SLOVENIA FOR NATURE CONSERVATION

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ASSESSMENT OF CORALLIGENOUS ASSEMBLAGES STATUS IN THE LIGURIAN SEA

Abstract
The Action Plan for the conservation of coralligenous bio-constructions in the Mediterranean Sea requires widening of the inventories of sites and species, especially in deeper zones. Such data are of paramount importance and represent the baseline knowledge for the establishment of effective monitoring activities, that should be able to detect the possible effects of anthropic and natural threats. For this purpose, coralligenous assemblages in 10 sites along the Ligurian coasts were investigated by photographic and video sampling at three bathymetric ranges: 25-39, 40-70, 71-100 m. Epibenthic organisms were identified to the lowest possible taxonomical level and their abundance was estimated in terms of percent cover. Signs of injuries and diseases, as well as the presence of lost fishing lines and nets, were recorded.
Overall, 14 vegetal and 156 animal taxa were considered. Despite the assemblages were very heterogeneous, species composition varied according to geographical and bathymetrical gradients. In contrast to deep coralligenous assemblages, shallow assemblages showed higher abundance of bioconstructing species, suggesting more dynamic conditions. Deep-water assemblages revealed a higher coverage of sediment, greater signs of human impact, especially litter and lost nets and fishing lines. These results show that deep coralligenous assemblages are more vulnerable, suggesting the adoption of more stringent protective measures.

Key-words: Bioconstruction; Benthos; gorgonians; fishing gears

Introduction
Coralligenous outcrops are a formation including secondary hard bottoms resulted by the accumulation of biogenic carbonate by calcareous algae at dim light conditions and the biota inhabiting them (Sarà, 1969). It is a key ecosystem recognised at the European level (92/43/CE Habitat Directive 1992, habitat code 1170-14: Reefs, coralligenous assemblage). In the Mediterranean Sea, coralligenous assemblages (Perès & Picard, 1964; Sarà & Pulitzer-Finali, 1970) develop from 15–20 to 150– 200 m, both on rocky shores and on biodetritic beds, in relatively constant conditions of temperature, current and salinity, wherever irradiance is reduced between 2–3% and 0–0.5% of the surface irradiance (Garrabou & Ballesteros, 2000). Habitat conservation, threatened by anthropic activities and climatic changes, requires the monitoring of the changes occurring over time in populations and communities and the assessment of their viability and reaction towards natural or anthropic stresses. The building of datasets as a starting point for a spatial and temporal monitoring are necessary tools to attain this target. The monitoring of such habitats requires information not only related to the presence and abundance of species, but also about their health status, the presence of diseases and/or necrosis and direct signs of anthropic damage, in order to create a baseline to construct chronological series and face anthropic pressure and climate changes (Garrabou *et al.*, 1998, 2001).

The difficult accessibility of coralligenous habitat and the high heterogeneity of communities, but also the absence of standardised protocols (Ballesteros 2006; Zapata-Ramírez *et al.*, 2013) delay actual international measures of protection.
Here we have analysed by photographic and video sampling coralligenous assemblages in 10 sites along the Ligurian coasts at three bathymetric ranges: 25-39, 40-70, 71-100 m. Characterization of epibenthic assemblages, signs of injuries and diseases on gorgonians, as well as the presence of lost fishing lines and nets, have been recorded. Overall, 14 vegetal and 156 animal taxa have been considered.

Material and Methods
Ten sites along the Ligurian coasts (Fig.1) were investigated by scientific divers with photo and video sampling at three bathymetric ranges: 25-39, 40-70, 71-100 m. The analysis of the pictures allowed to characterize the epibenthic assemblages. Organisms were identified to the lowest taxonomical level and their abundance was estimated in terms of percent coverage. The analysis of the video allowed to detect signs of injuries and diseases, as well as the presence of lost fishing lines and nets. Sampling sites included both protected and unprotected areas.

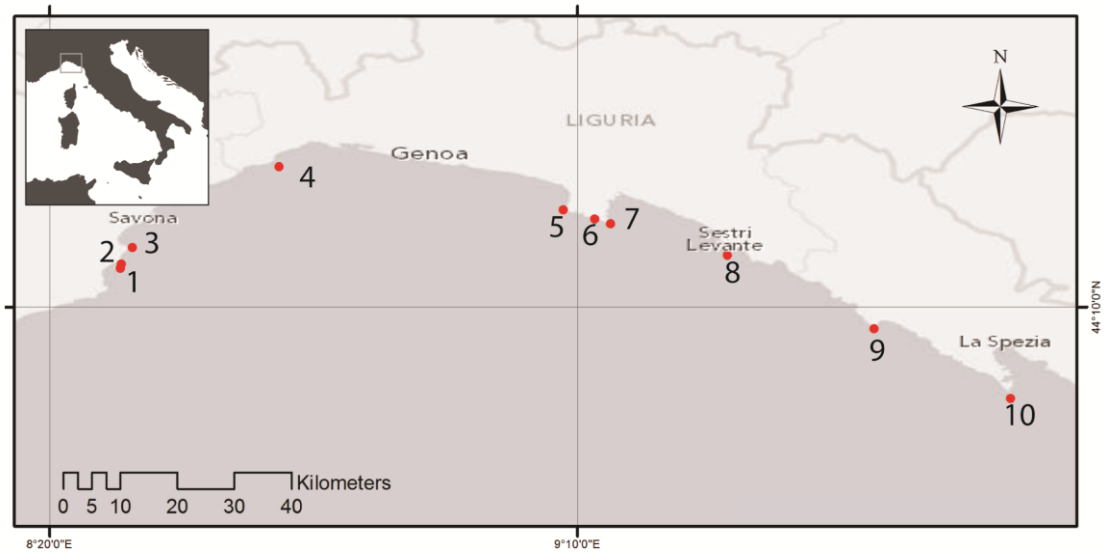

Fig. 1: Sites from where photos and videos have been recorded. 1.Maledetti (MAL), 2.Canaloni (CAN), 3.Ramoni (RAM), 4.Due Balconi (SDB), 5.Isuela (ISU), 6.Altare (ALT), 7.Punta del Faro (PTF), 8.Punta Manara (PMA), 9.Punta Mesco (PME), 10.Tinetto (TIN).

Photographic surveys had standard surfaces of 16 cm x 24 cm. In each site a minimum of 20 photographic samples were haphazardly collected, at a minimum distance of 50 cm from each other and close to the video-transects.
Video-transects have an horizontal length of 10 m and were replicated 4 times at each site (four transects per site). The diver, maintained a regular distance from the sea bed and performed the entire length of the transect at a constant speed, recording parallel to the bottom. A couple of laser pointers were fixed on the camera as a measure of reference. The coordinates of the start and end of each transect were recorded.
Cover percentage of sessile organisms was quantified by superimposing a grid of 400 cells (*i.e.* 0.25% each) using the free available photoQuad software (Trygonis & Sini, 2012). Slight differences among sampling areas, due to dark and blurred zone or portion covered by motile organisms, have been accounted by standardising to the total readable area

of each image (Ponti *et al.*, 2011). Similarity patterns were displayed by unconstrained ordination plots using the principal coordinate analysis (PCO, *i.e.* metric multidimensional scaling; Gower, 1966). Vectors superimposed on to the PCO plot represented the correlations of the abundances of the most relevant taxa with the PCO axes.

Results

The PCO analysis of sites and depth highlights that the assemblages are all different among them, with an evident separation between shallow and deep sites, and the intermediate assemblages dispersed inside these two main groups. The most typical species are encrusting coralline algae and *Flabellia petiolata* for shallow assemblages, and *Corallium rubrum* and several sponges were important in deep-water assemblages (Fig. 2).

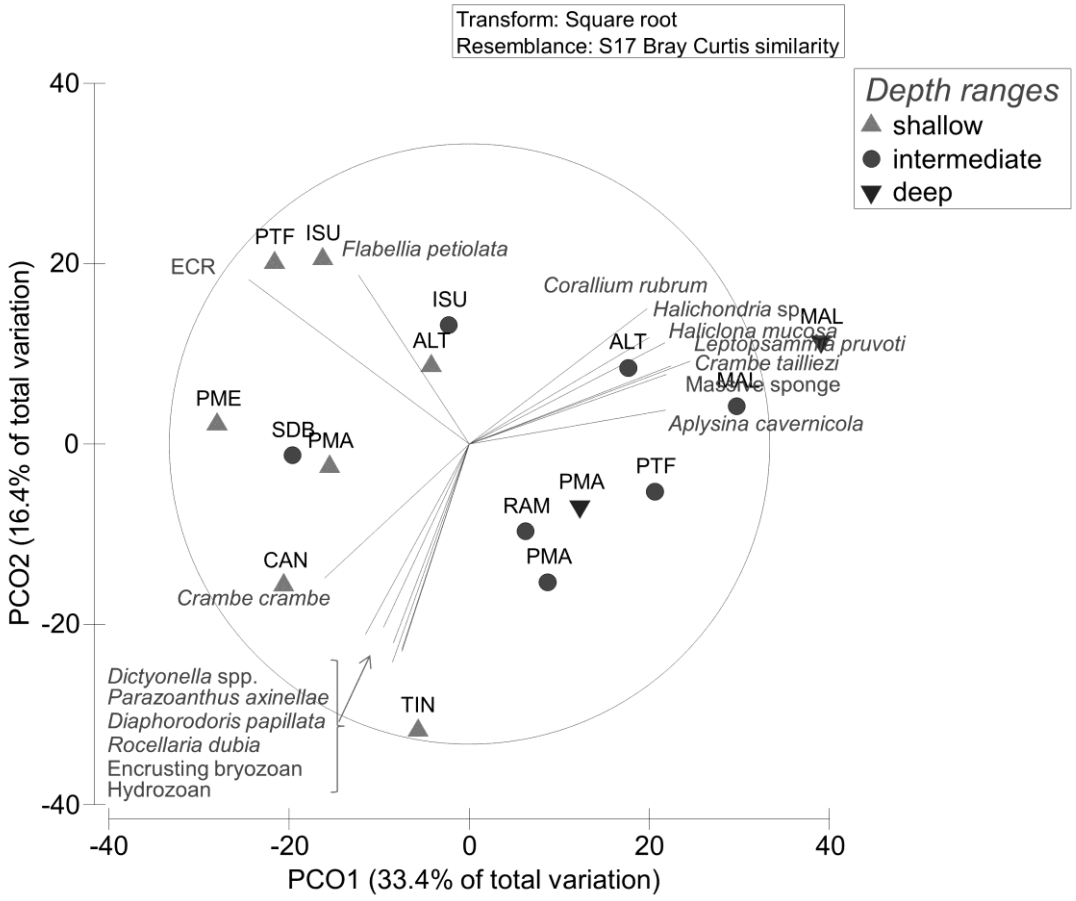

Fig. 2: PCO (Principal Coordinate Analysis) regarding the percent coverage data, transformed with square root and applying the Bray Curtis index of similarity and superimposed vectors (>0.65). Symbols represent the three considered depth ranges (shallow = 25-39 m, intermediate = 40-70 m, deep = 71-100 m) while the letters indicate the studied sites (ALT = Altare, CAN = Canalone, RAM = I Ramoni, ISU = Isuela, MAL = Maledetti, TIN = Palmaria-Tinetto, PTF = Punta del Faro, PMA = Punta Manara, PME = Punta Mesco, SDB = Secca dei Due Balconi).

Damaged gorgonian colonies were recorded at all the considered sites. The highest level of damage was recorded on *Paramuricea clavata* at Punta Mesco (40%), Altare (30%) and Manara (20%) at intermediate depths. All the other sites showed a percentage of damaged colonies around 7-9%.

In general, the lost gears were found preferentially in the intermediate and deep bathymetric range. Regarding fishing lines the sites most affected were the Maledetti,

Due Balconi and Punta Manara. Results shows that sites in protected areas were less impacted from fishing gears. Anyway, in the MPA of Portofino the greater impact was documented at Punta del Faro (Fig. 3).

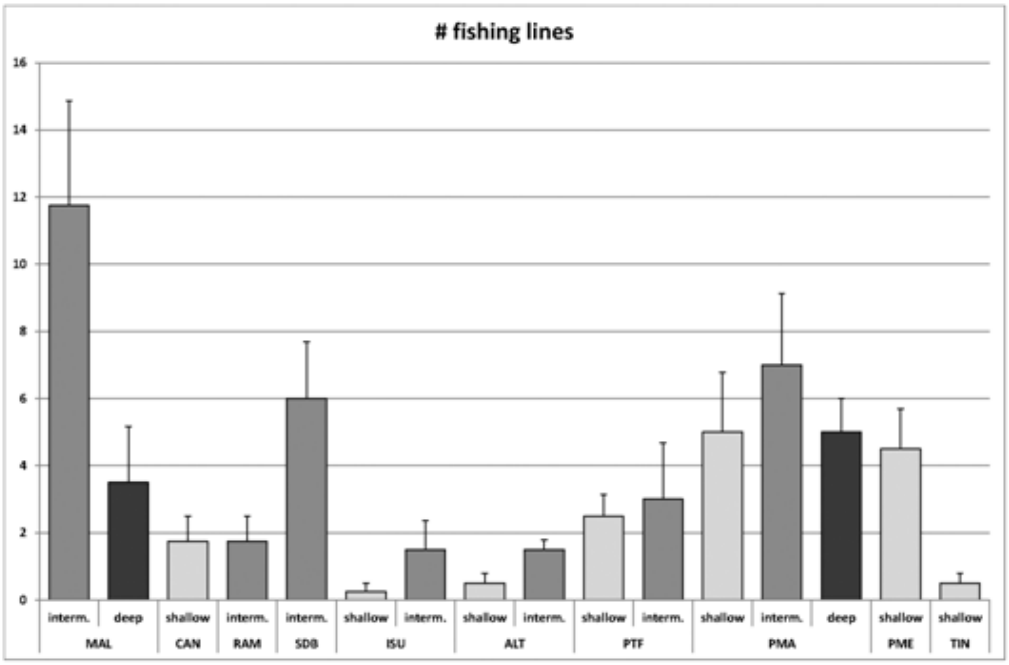

Fig. 3: Average number of lost fishing lines for each video-transect in the different sites and at the different bathymetric ranges.

Lost fishing nets were recorded mainly at Maledetti, Due Balconi and Punta Manara (Fig. 4).

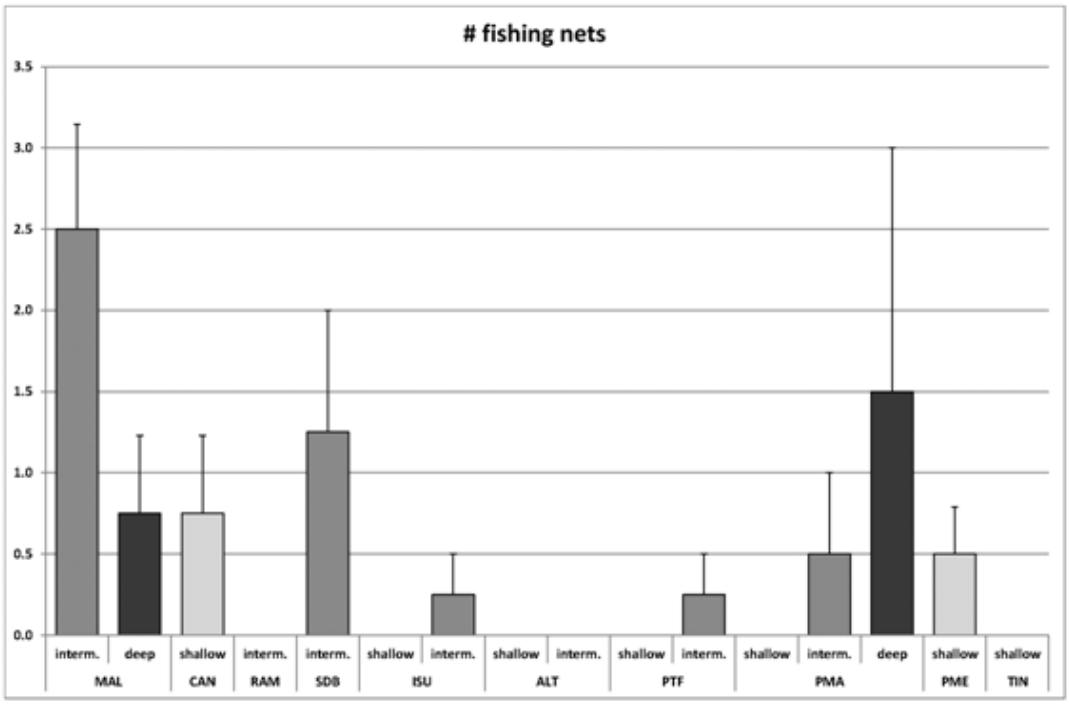

Fig. 4: Average number of lost nets for each videotransect in the different sites and at the different bathymetric ranges.

Conclusions

Despite the assemblages being very heterogeneous, species composition varied according to geographical and bathymetrical gradients. Shallow coralligenous assemblages were well separated from deep coralligenous assemblages. The shallow ones showed higher abundance of bioconstructing species, suggesting more active processes related to coralligenous growth. Deep-water assemblages revealed a higher coverage of sediments, greater signs of human impact, especially litter and lost nets and fishing lines. These results suggest that deep coralligenous assemblages is less dynamic and consequently more vulnerable, asking for the adoption of more effective measures of protection, especially regarding the impact due to fishing gears. The data on the abundance of lines and nets clearly show that the protective effect triggered by the presence of a Protected Area is well detected but it is not enough to reduce this type of impact.

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