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SOME OBSERVATIONS ON THE STRUCTURE AND DISTRIBUTION OF GORGONIAN ASSEMBLAGES IN THE EASTERN MEDITERRANEAN SEA

ABSTRACT

Knowledge on distribution of coralligenous communities with gorgonian facies (Anthozoa: Gorgonacea) is still rather poor in the Eastern Mediterranean Sea. This is mainly due to their considerably deeper distribution than their Western basin counterparts. In the framework of “Nautilus” Project (2005-2008) several combined Submersible and ROV surveys were conducted to systematically locate gorgonian facies and visually assess their basic structure and distribution. Gorgonian assemblages were recorded from 10 study sites within a depth range of 30-120m. Shallow gorgonian assemblages were an exception, with most found at depths greater than 50m. In general, Eunicella cavolinii and Paramuricea clavata were found to be the most common species, while Leptogorgia sarmentosa, Eunicella singularis and Corallium rubrum were extremely rare findings. Considering the susceptibility of these habitats to various anthropogenic impacts, this is an important first attempt to map their spatial distribution and give a general description of their composition and present ecological state.

KEY-WORDS: coralligenous communities, visual assessment, fishing pressure

INTRODUCTION

Gorgonian corals (Anthozoa, Gorgonacea) are a typical facies of Mediterranean coralligenous communities (Peres & Picard, 1964), building up complex habitats of high ecological and aesthetic value (Boudouresque, 2004; Giaccone, 2007). Despite the increasing scientific concern on their ecological importance and conservation status, their presence and distribution in the Eastern Mediterranean basin is poorly studied (Ballesteros, 2003 but see Laborel, 1961; Chintiroglou *et al.*, 1989; Skoufas *et al.*, 2000). In the framework of the HCMR’s “Nautilus Project” (2005-2008), aiming at identifying biological and geological hot spots in the Greek Seas, several gorgonian assemblages were detected. This is a first systematic attempt to record their spatial and bathymetric distribution as well as to describe their basic composition and present ecological state.

MATERIALS AND METHODS

The survey was initially based on unofficial records (mainly from fishermen) mentioning the presence of “corals” at several coastal and offshore sites. In total, 22 submersible and Remotely Operated Vehicle (ROV) dives were conducted in depths between 30-250 m to verify these reports and identify which species they actually concerned. “Thetis” (Comex type REMORA 2000), a manned submersible equipped with an acrylic dome passenger area, allowed a general wide angle view of the benthic communities, while the use of ROV (DSSI Max Rover and Comex Super Achilles) permitted closer inspection for the identification of conspicuous species. Underwater vehicle positioning was determined using on board depth meters and a Trackpoint USBL positioning system coupled to the support vessel’s navigation computer and GPS (underwater position +/- 10 m). During all surveys, video footage and digital photographs were recorded and later analysed to identify species present that were not recognised or spotted in situ.

RESULTS

Dense facies of various gorgonian species were recorded at 10 sites of the Aegean, Ionian and Cretan Seas (Fig.1).

Eunicella cavolinii, Koch and *Paramuricea clavata*, Risso were found to be the most widespread species, in either monospecific or mixed gorgonian assemblages, at depths between 30-120 m (Fig. 2).

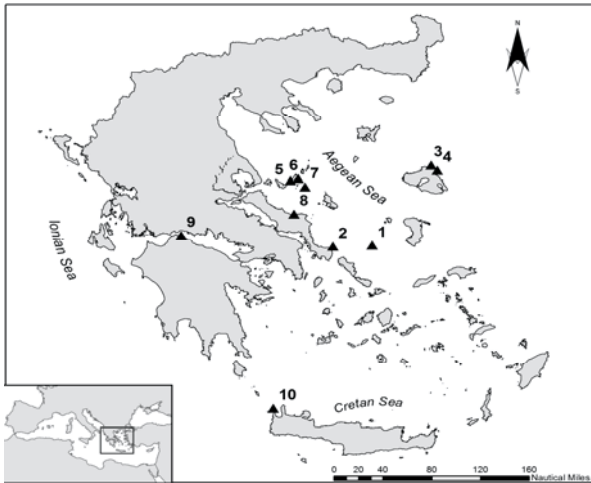


Fig.1: Map of Greece showing the location of the sites studied.

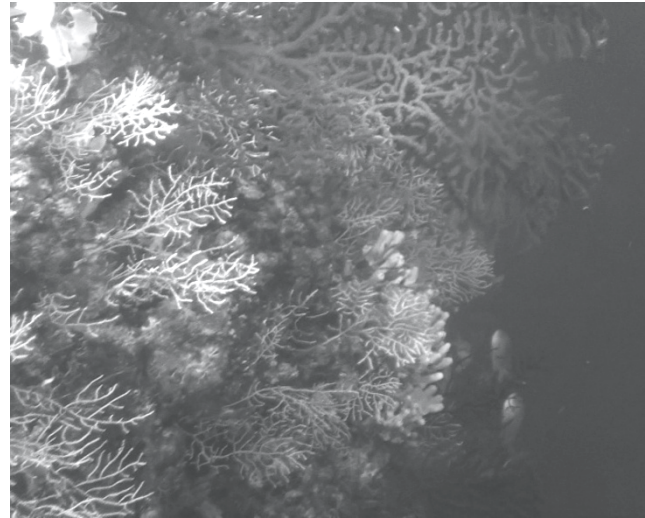


Fig. 2. Typical aspect of a rocky cliff at Site 7, with *E. cavolinii* and *P. clavata* facies.

Eunicella singularis, Esper and the red coral *Corallium rubrum*, Linnaeus, were detected only once (Aegean Sea, Site 3 and 8 respectively) in rather low abundances. *Leptogorgia sarmentosa*, Esper, was the rarest encounter, with only one specimen found throughout the study area (Ionian Sea, Site 9). Tab. 1 summarizes sites surveyed, gorgonian species present and their vertical distribution. Due to the inherent restrictions of rapid visual assessment studies, only dominant and conspicuous species were identified down to the lowest taxonomic level. All sites surveyed presented the typical aspect of Mediterranean coralligenous communities, with abundant sciaphilic red algae (mainly Corallinales and Peyssonneliaceae) and sponges (*Axinella* sp., *Aplysina* sp., *Agelas oroides*). Other common invertebrates were the Bryozoans *Pentapora fascialis*, *Smittina cervicornis* and *Sertella septentrionalis*, the Echinoderms *Peltaster placenta*, *Centrostephanus longispinus* and *Antedon mediterranea*, and the Anthozoans *Leptopsammia pruvoti*, *Gerardia savaglia*, *Parazoanthus axinellae* and *Parerythropodium coralloides*. Only fish species of minor or no commercial value were abundant (mainly *Anthias anthias*, *Serranus cabrilla*, *Coris julis*, *Scorpaena* sp. and *Muraena helena*). No conspicuous alien species were observed.

Tab 1. Sites with Gorgonian Assemblages, Structural Species and recorded depth range.

Diving Sites	Structural Species	Depth range (m)
Site 1 (Kalogeri isl., Aegean Sea)	<i>E. cavolinii</i>	50-120
Site 2 (S. Evia, Aegean Sea)	<i>E. cavolinii</i> , <i>P. clavata</i>	42-80
Site 3 (N. Lesbos, Aegean Sea)	<i>E. cavolinii</i> , <i>E. singularis</i> , <i>P. clavata</i>	45-50
Site 4 (N. Lesbos, Aegean Sea)	<i>P. clavata</i>	44-50
Site 5 (N. Sporades, Aegean Sea)	<i>E. cavolinii</i>	48-68
Site 6 (N. Sporades, Aegean Sea)	<i>E. cavolinii</i> , <i>P. clavata</i>	40-80
Site 7 (N. Sporades, Aegean Sea)	<i>E. cavolinii</i> , <i>P. clavata</i>	34-65
Site 8 (E. Evia, Aegean Sea)	<i>E. cavolinii</i> , <i>P. clavata</i> , <i>C. rubrum</i>	60-65
Site 9 (Lambiri coast, Ionian Sea)	<i>E. cavolinii</i> , <i>L. sarmentosa</i>	30-60
Site 10 (Gramvoussa isl., Cretan Sea)	<i>P. clavata</i>	85-105

Frequent findings of ghost nets and long lines indicated artisanal and recreational fishing activities at almost all sites inspected. However, gorgonian assemblages were generally found to be in good ecological condition, with minor partial necrosis or other signs of stress. A major exception to this pattern was observed at Site 5, where direct fishing impacts were detected. Here, the relative absence of fragile calcareous species (e.g. *Pentapora fascialis*, *Filograna implexa*), dominance of massive and encrusting forms (mainly sponges and red algae) and scattered presence of small *E. cavolinii* colonies, exhibited irrefutable signs of degradation. Moreover, ghost nets and long lines were ubiquitous, causing coenenchyme loss when in direct contact with gorgonian parts.

DISCUSSION AND CONCLUSIONS

Very little is known about coralligenous ecosystems and much less about gorgonian assemblages in the Eastern Mediterranean basin. According to Ballesteros (2003), this may be related to the greater depth where they develop in this area and to the lack of traditional marine research institutes. Our findings seem to support the former hypothesis. Indeed, although shallow (<20m) facies of gorgonians have occasionally been reported in Greece (e.g. Skoufas *et al.*, 2000; Salomidi *et al.*, 2006), they seem to be exceptions: out of the ten sites investigated here, gorgonians were found shallower than 40m at only two of them, and at rather sparse densities. The mean distribution depth was 60 m for *Paramuricea clavata* and 59 m for *Eunicella cavolinii*. Such depths (which are beyond normal scientific SCUBA diving limits), render *in situ* studies even more difficult and expensive to undertake than normal, since the use of state-of-the-art technology is requisite. The deeper distribution of coralligenous assemblages has naturally restricted direct human access so recreational scuba diving seems not to pose a serious threat, as has been frequently the case elsewhere (review by Ballesteros, 2003). Artisanal and recreational fishing impacts were detected during this study, although other potential threats (turbidity by nearby trawlers, pollution, climatic changes) are, as yet, unknown. The effect of red coral exploitation on the viability of its populations is largely unassessed. To date, the “out of sight, out of mind” rule has applied to these invaluable ecosystems. There is an increasing awareness of their presence, importance and sensitivity to anthropogenic impacts (UNEP, 2007) which needs to lead to suitable legislation to ensure sustainable management, both within National and International frameworks.

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REFERENCES

- BALLESTEROS E. (2003) - The coralligenous in the Mediterranean Sea: Definition of the coralligenous assemblage in the Mediterranean, its main builders, its richness and key role in benthic ecology as well as its threats. Project for the preparation of a Strategic Action Plan for the Conservation of the Biodiversity in the Mediterranean Region (SAP BIO). UNEP-MAP-RAC/SPA: 87pp.
- BOUDOURESQUE C.F. (2004) - Marine biodiversity in the Mediterranean: status of species, populations and communities. *Sci. Rep. Port-Cros Natl. Park* 20: 97-146.
- CHINTIROGLOU H., DOUNAS C. & KOUKOURAS A. (1989) - The presence of *Corallium rubrum* (Linnaeus, 1758) in the eastern Mediterranean Sea. *Mitteilungen aus dem Zoologischen Museum Berlin* 65: 145– 149.
- GIACCONE G. (2007) - Coralligenous assemblage as underwater seascape: distribution off Italian coasts. *Biol. Mar. Medit.* 14 (2): 124-141.
- LABOREL J. (1961) - Le concretionnement algal "coralligène" et son importance géomorphologique en Méditerranée. *Recueil Travaux Station Marine d'Endoume* 23: 37-60.
- PERES J.M. & PICARD J. (1964) - Nouveau manuel de bionomie de la mer Méditerranée. *Recl. Trav. Stn. Mar. Endoume* 31: 5-137
- SALOMIDI M., ISSARIS Y. & PANCUCCHI-PAPADOPOULOU M.A. (2006) - Marine Protected Areas as a tool for Coastal Management: a feasibility study in a biodiversity hot-spot (SW Corinthian Gulf, Greece). *Proceedings of the 8th Pan-Hellenic Symp. of Ocean. & Fish.*, Thessaloniki, May 2006: 6 pp

- SKOUFAS G., POULICEK M., CHINTIROGLOU C.C. (2000) - Growth variation of *Eunicella singularis* (Esper, 1794) (Gorgonacea, Anthozoa) *Belg. J. Zool.* 130: 125-128.
- UNEP (2007) Draft Action Plan on Protecting the Coralligenous and other Calcareous Bio-Concretions in the Mediterranean. *Report of the SPA/RAC Focal Points meeting*. Palermo, Italy, 6-9 June 2007. UNEP(DEPI)/MED WG.308/14: 18 pp.