THE FIRST MEDITERRANEAN SYMPOSIUM ON THE CORALLIGENOUS AND OTHER CALCAREOUS BIO-CONCRETIONS

January 2009
Tabarka - Tunisia

OCEANA

INDEX

I. DEEP-SEA CORALLIGENOUS BEDS OBSERVED WITH ROV ON FOUR SEAMOUNTS IN THE WESTERN MEDITERRANEAN

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Abstract

In 2006 and 2007, Oceana carried out several investigations on four Western Mediterranean seamounts, finding red algae bio-concretions down to 150-160 meters depth. The areas surveyed were the Ausias March seamount and the Emile Baudot seamount in the Mallorca Channel (Balearic Islands), the Chella Bank (Andalusia-Alboran Sea) and the Palos seamount (in front of Palos Cap, in Murcia). More than 40 hours of video material was collected with an ROV. Species known only to be in shallow waters, like carnivorous sponges (Asbestopluma hypogea), were found on small seamounts with peaks between 80 and 170 meters depth. Sponge aggregations were filmed on coralligenous beds and new data on the distribution of anthozoans (e.g., Paramuricea macrospina) was recorded. Nearly 300 species living on these bottoms were identified, giving new perspectives on their range and habitat dependence and preferences.

Key words: seamounts, coralligenous, bio-concretions, maërl, carnivorous sponge.

Introduction

Red calcareous algae have been widely studied in the shallow waters of the Western Mediterranean (Ballesteros, 2006), but there is very little information about their distribution and function in deep areas. Two main infralittoral and circalittoral ecosystems created by calcareous red algae have been mentioned: maërl and coralligenous beds (Pérès & Picard, 1964; Picard, 1965). These have been described as areas of high diversity and ecological importance (Bosence, 1983; Barberá et al., 2003), being two of the most productive ecosystems in temperate regions (Martin et al., 2007). Seamounts and smaller marine elevations are considered hotspots, "stepping stones" and zones with high biodiversity (Matthiessen et al. 2003; Butler at al. 2001; Morato & Pauly (eds), 2004). Those with shallow peaks are often found to be areas of high biological productivity (Rogers 1994), as in the four seamounts researched, with tops between 80 and 100 m. depth, where red algae can grow and develop.

Materials and methods

The research was carried out during from June to September of 2006 and 2007 onboard the Oceana "Ranger" catamaran, equipped with a HSB2-plus Raymarine digital sonar with a high-powered transducer, linked to software to create bathymetric maps. Nineteen dives were carried out on four marine seamounts (Fig.1). Transects were filmed by a camera with 750 lines of resolution, a F1.2 lens and a 1:12 zoom, attached to an ROV Phantom H2+2. The ROV provided real time data on its position, depth, course, day and time. All of the identifications were made visually.

Results

Two main red algae formations were registered: (i) maërl o rhodolith beds and (ii) coralligenous formations. Most of the rhodolith beds found on these mounds and seamounts reached down to 140-150 meters depth, although the most important ones were between 80 and 120 meters. The formations were especially common over the top of Ausias March, but could also be found on Emile Baudot and the Chella Bank; they were absent from the Palos seamount. Three forms of coralligenous beds were detected: (i) large bio-concretions, (ii) "cobbled" bio-concretions and (iii) thin sheets and small patches.

Although some smaller patches were found at 160-170 meters depth, large concretions were more common between 80 and 120 meters depth. Flat areas on the top of the seamounts showed the largest bio-concretions, normally formed by red calcareous algae of the genera *Lithophyllum*, *Mesophyllum* and *Neogoniolithon*, usually with other red algae, like *Peyssonnelia* spp. and the green algae *Palmophyllum crassum*. The most important ones were found on Ausias March and Chella Bank. Large bio-concretions forming round circles of around two meters in diameter and ten to 20 centimetres high were found on top of the Ausias March mound. These kinds of geometrical concretions were not found over the other seamounts. Coralligenous beds did not always form large bio-concretions but instead small, spotted blocks of some 10 to 30 centimetres in diameter fixed in the substratum. It was very often found as a transitory substratum between maërl and large coralligenous beds. They were very common on Ausias March and Emile Baudot. Patches of red algae were found on all of the seamounts. They were very common on the Palos mount, but were also the most common bio-concretion over the 120-130 meter range.

	Ausias March 38°44'N-001°48'E	Emile Baudot 38°42'N-002°20'E	Palos seamount 37°53'N-000°01'W	Chella Bank 36°31'N-002°51'W
Dives	3	4	6	6
Nautical miles	1.85	3.7	1,77	1.96
Area observed m²	5,140	10,278	4,917	5,445
Filming time	5h29m	9h40m	8h24m	14h57m

Fig.1 Summary of dives, time and areas observed with the ROV on the four seamounts

Some 300 species were identified. 150 of them were most commonly found in red algae bio-concretions, but none of them were exclusive from these beds. Two biological communities were widely distributed on bio-concretion beds: sponge aggregation (genera *Haliclona*, *Aplysina*, *Tedania*, *Axinella*, etc.) and fields of dead man´s fingers (*Alcyonium palmatum* and *Paralcyonium spinulosum*). Species like *Paramuricea clavata*, *P. macrospina*, *Anthias anthias*, *Muraena helena*, *Lappanella fasciata* and *Phycis phycis* were recorded mainly on coralligenous beds. The carnivorous sponge Asbestopluma hypogea was first found in deep areas, but not always connected to bio-concretions. The specimen found on Ausias March was on a coralligenous bio-concretion at 100 meters depth, but the one found in Chella Bank was at 167 meters in a rocky area on a small pinnacle beside the main summit. Some other protected species included in the annexes of BARCOM-SPAM were also found. For example, the elephant ear sponge (*Spongia agaricina*) was found on Emile Baudot and the triton snail (*Charonia lampas*) on Ausias March.

Discussion and conclusions

Maërl was mainly formed by rounded rodoliths, instead of the branched forms more common in shallower areas. Hydrodynamism and bathymetric distribution can determine morphology and maërl ramification (Bosence, 1983, Steller and Foster, 1995, Yabur-Pacheco and Riosmena-Rodríguez, 2007). Coralligenous concretions went from thin patches to large concretions -including circular geometric formations not yet described - many times looking like steps or visible different stages as it builds up. As Laborel (1961) affirms, morphology and interim structure could depend on depth, topography and algae species. Some concretions give an aspect of a cobbled seabed, likely due to the lack of fusion or coalescence between several patches of algae, as in the large bio-concretions. Although red algae bio-concretions were found in all of the areas researched, from the surface down to 160-170 meters depth, distribution of the communities had a spatial segregation.

Most of the species found associated with the coralligenous beds were also found in surrounding areas without red algae, including *Anthias anthias*, *Lappanella fasciata*, *Muraena helena* and *Phycis phycis*, although they were apparently less abundant, showing their preferences for irregular bottoms. Only a few species, like *Paramuricea clavata*, seem to be strongly related to these bio-concretions, although depth distribution is probably a more important factor. Sponge aggregations were more common on maërl and "cobbled" coralligenous beds, while dead man's finger colonies were more often found on "cobbled" coralligenous, large coralligenous and rocky areas. *Asbestopluma hypogea*, since it was discovered in 1995 (Vacelet & Boury-Esnault, 1996), was so far only recorded in shallow caves in France and Croatia. Although Bakran-Petricioli et al. (2007), mentioned the possibility, this is the first time this species has been found in deep areas, both in coralligenous beds and rocky bottoms.

Acknowledgments

This work would not be possible without the financial help from Fundación Biodiversidad and La Obra Social de "La Caixa".

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II SPECIES DISTRIBUTION FOR BIO-CONCRETIONS (MAËRL AND CORALLIGENOUS BEDS) AND OTHER ECOSYSTEMS NOT ASSOCIATED WITH RED ALGAE.

Species	Bioconcretions	Others
RODOPHICEA		
Kallymenia sp.	A	A
Lithophyllum cabiochae	A	A
Lithophyllum sp.	A-E-P-C	A-E-P-C
Mesophyllum sp.	A	A
Osmundaria volubilis	A	A
Neogoniolithon mamillosum	A-P-C	A-P-C
Peyssonnelia cf. *rosa-marina*	A	
Peyssonnelia sp.	E-P	A-P
Peyssonnelia squamaria	A	
Rodophicea n.i.	A-E-P-C	A-E-P-C
CLOROPHICEA		
Palmophyllum crassum	A	
Valonia macrophysa	A	A
FEOPHICEA		
Halopteris filicina	A	A
PORIFERA		
Adacia sp.	C	C
Agelas oroides	E	E
Aplysina aerophoba	A-E-C	C
Aplysina cavernicola	A-E	C
Asbestopluma hypogea	A	C
Asconema setubalense		C
Axinella damicornis	A	A
Axinella infundibuliformis	A-E	A-E
Axinella polypoides	A-E-C	A-E-C
Axinella sp.	E-P	E-P
Calyx nicaeensis	C	C
Chondrosia reniformis	A-E	A-E
Clathrina sp.	E	E-C
Demospongiae n.i.	A-E-C	A-E-P-C
Desmacydon sp.		C
Geodia sp.		P-C
Haliclona simulans	A	A-E
Haliclona sp.	A-C	A-C
Hexadella racovitzai	C	C
Hymedesmia paupertas	A-E-C	A-E-C
Myxilla sp.	A	A
Petrosia ficiformis	A	A
Phakellia sp.		E-P
Phakellia ventilabrum		E-C
Pleraplysilla spinifera	C	C
Sarcotragus sp.	E	E
*Spirastrella cunctatrix***	A	A
Spirastrella sp.	A	A-C
Spongia agaricina	A-E-C	A-E-C
Spongosorites sp.	E-P-C	E-P-C
Suberites domuncula	C	E-C
Sycon sp.		C
Tedania sp.	A	
Tethya sp.	E	E
CRUSTACEA		
Balssia gasti	C	
Calappa granulata		A-P-C
Calliostoma sp.	C	C
Caprelidae	C	
Cirripedia	C	
Dardanus sp.		E-P-C
Dromia personata	E	E
Galathea cf. *nexa*	A-P	A-P
Galathea strigosa	C	C
Inachus sp.	A	A
Liocarcinus depurator		A
Munida rugosa	E-P-C	E-P-C
Mysidacea		C
Natantia n.i.	A	A
Pagurus prideaux		A
Pagurus sp.		C
Palinurus elephas	E-P-C	E-P-C
Paromola cuvieri		E-C
Periclimenes cf. *scriptus*		E
Pseudoprotella phasma	C	
MOLLUSCA		C
Ananemia gorgonophila	E-C	C
Charonia lampas	A	A
Eledone cirrhosa		A-C
Erosaria spurca	E	E
*Fasciolaria lignaria**	E	E
Marionia blainvillea	A	A
Muricidae		C
Octopus vulgaris	C	C
Pteria hirundo	P-C	
*Pleurobranchaea meckeli**		C
Ranella olearia	E	E
*Scansia striata**		C
Sepia officinalis		C
Tritonidae n.i.	P	
BRIOZOA		
Briozoa n.i.	A-C	A-E-C
Crisia sp.	A-C	A-C
Hornera franticulata	P-C	P-C
Hornera sp.	E-C	E-C
Myriapora truncata	E	E
Sertella septentrionalis	E-P-C	E-P-C
Smittina cervicornis	A-C	A
BRACHIOPODA		
Gryphus vitreus		E
*Terebratulina rettusa**	A-E-C	A-E-C
FORAMINIFERA		
Miniacina miniacea	A-P-C	A-P-C
CNIDARIA		
Acanthogorgia hirsuta		E-C
Adamsia carcinopodos		A
Alcyonium palmatum	E-P-C	E-P-C
Amphianthus dohrni	A-C	
Antennella sp.	C	
Anthozoa n.i.	A-E-P-C	A-E-P-C
*Antipathes dichotoma**		C
*Arachnanthus oligopodus**		E-C
Bebryce mollis	C	E-C
Callogorgia verticillata	C	E-P-C
Caryophyllia ciathus	E-P-C	E-P-C
Caryophyllia smithi		C
Caryophyllia sp.	A-E	A-E-C
Cerianthus membranaceus	E-C	E-C
Clavularia carpediem		C
Corallium rubrum	C	C
Cotylorhiza tuberculata		C
Dendrophyllia cornigera	E-C	E-C
Dendrophyllia ramea	C	C
Diphasia nigra	C	C
Elisella paraplexauroides	C	C
Epizoanthus arenaceus		C
Epizoanthus sp.		A
Eudendrium sp.	C	C
Eunicella cavalini	C	C
Eunicella filiformis		C
Eunicella verrucosa	A-E-C	A-E-C
Funiculina quadrangularis		C
Guynidae		P
Hacelia attenuata	A-C	A-C
Hidrozoa n.i.	A-E-P-C	A-E-P-C
Holothuria forskali	A-E-C	A-E-C
Kophobelemnon stelliferum		C
Lafoea dumosa	C	C
Leiopathes glaberrima		E
Leptogorgia sarmentosa	C	C
Muriceides lepida		E-C
Nemertesia anteninna		C
Nemertesia racemosa		C
Nephtheidae	P	P
Octocorallia n.i.	A-E-P-C	E-C
Paralcyonium spinulosum	E-P-C	E-C
Paramuricea clavata	E-P-C	E-P-C
Paramuricea macrospina	A-C	A-C
Parerythropodium coralloides	P-C	P-C
Pelagia noctiluca		E-C
Pennatula phosphorea		C
Pennatula rubra		C
Placogorgia sp.		C
Pteroides griseum		C
Rolandia rosea	C	C
Sertularella grayi	C	C
Salmissus albescens		C
Swiftia pallida	C	E-P-C
Veretillum cynomorium		C
Villogorgia bebrycoides		C
Viminella flagellum	C	E-P-C
Virgularia mirabilis		C
ECHINODERMATA		
Antedon mediterranea	A-E	A-E
Astropartus mediterraneus	C	C
Astropecten aranciacus		C
Astropecten irregularis		C
Brissus unicolor		A-C
Chaetaster longipes	A-E-P-C	A-E-P-C
Cidaris cidaris	C	E-C
Echinaster sepositus	A	A
Echinus acutus		C
Echinus melo	E-P-C	E-P-C
Holothuria sanctori	A	A
Holothuria tubulosa	A	A-E-C
Leptometra phalangium		E
Leptometra sp.		E
Leptosynapta sp.	A	A
Luidia ciliaris	A	A
Marthasterias glacialis	C	
Ophiothrix sp.	E-P-C	E-P-C
Spatangus purpureus		C
Stichopus regalis	A	A-C
Stylocidaris affinis		A-E
EQUIUROIDEA		
Bonellia viridis	A-E-C	A-E-C
ANNELIDA		
Filograna implexa	A-C	A-C
Hyalinoecia tubicola		A-E-P-C
Lanice conchilega		E-C
Megalomma vesiculosum		A
Myxicola infundibulum		C
Myxicola sp.		A
Polichaetes n.i.	A-E-P-C	A-E-P-C
Polydora sp.		C
Protula intestinalis	A	A
Protula sp.	A	A
Protula tubularia	C	C
Sabella pavonina	E-C	E-C
Serpula vermicularis	A-E-C	A-E-C
SIPHONOPHORA		
Velella velella		P
CTENOPHORA		
Leucothea multicornis		E
TUNICATA		
Ascidia mentula	E	E-C
Ciona intestinalis	C	C
Diazona violacea	E-P-C	E-P-C
*Didemnum commune**		C
Halocynthia papillosa	A	A
Didemnum sp.	A-P	A-P
Lissoclinum perforatum	C	C
Pyrosoma atlanticus		C
*Rophalaea neapolitana***		E
Salpa maxima		A-C
Styela clava		C
Tunicata n.i.	A-C	A-E-P-C
PISCES		
Acantholabrus palloni	E-P-C	E-P-C
Anguilla anguilla		C
Anthias anthias	A-E-P-C	A-E-P-C
Arnoglossus cf. *rueppelli**		E
Arnoglossus sp.		A
Arnoglossus thori		P
Aspitrigla cuculus		P-C
Aspitrigla obscura		C
Aulopus filamentosus	A-E-P	A-E-P-C
Blennius ocellaris		A
Callionymus sp.		A-C
Callyonimus lyra		A-C
Capros aper	A	A-E-C
Centracanthus cirrus		C
Cetorhinus maximus		P
Cinoglosidae		C
Conger conger	P-C	P-C
Coris julis	A-E-P-C	A-E-P-C
Crystallogobius linearis	A	A
Epinephelus caninus	P-C	P-C
Gadella maraldi		P
Gadiculus aregenteus		C
Gobius sp.	A	C
Helicolenus dactylopterus	E-P-C	E-P-C
Hexanxhus griseus		P
Labrus bimaculatus	E-C	E-C
Lappanella fasciata	E-P	E-P
Lepadogaster sp.		
Lepidorhombus whiffiagonis		P
Lophius sp.	C	P-C
Macroramphosus scolopax		A-C
Merluccius merluccius		A-P
Micromesistius poutassou		C
Mola mola	P	P
Mullus barbatus	A	A-C
Mullus surmuletus	A-P-C	A-P-C
Muraena helena	E-P-C	E-P-C
Ophisurus serpens		P-C
Pagellus bogaraveo		C
Pagellus erythrinus		C
Peristedion cataphractum		A-E
Phycis blennoides		C
Phycis phycis	E-P-C	E-P-C
Pisces n.i.	A-C	E-C
Pontinus kuhli	E	
*Scorpaena elongatus**	E	C
Scorpaena scrofa	A-E-P-C	A-E-P-C
Scyliorhinus canicula	A-C	A-C
Serranus cabrilla	A-E-P-C	A-E-P-C
Soleidae		C
Synchiropus phaeton		P
Thunnus thynnus		P
Torpedo marmorata	C	
Trachinus draco		A
Trachurus sp		A-C
Trichiurus lepturus		P
Trigla lucerna		E
Trigla lyra		E
Trigloporus lastoviza	A-E-C	A-E-C
Xiphias gladius		P
CETACEA		
Tursiops truncatus		E-C
Physeter macrocephalus		P
Stenella coeruleoalba		P
Globicephala melas		P-C
REPTILIA		
Caretta caretta		E-P-C

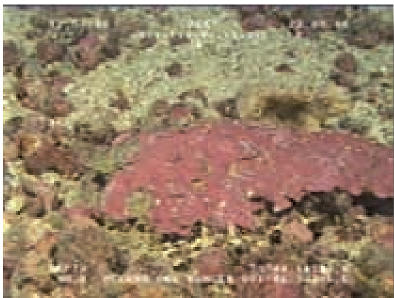
III. IMAGES FROM ROV DIVES ON THE SEAMOUNTS IN THE STUDY (DIFFERENT STAGES OF CORALLIGENOUS CONCRETIONS AND SPECIES FOUND ON THE SEAMOUNTS RESEARCHED)

Steps of different stages of coralligenous concretions found on the seamounts researched

maërl o rhodoliths bed

"cobbled" bio-concretions

rhodoliths-cobbled

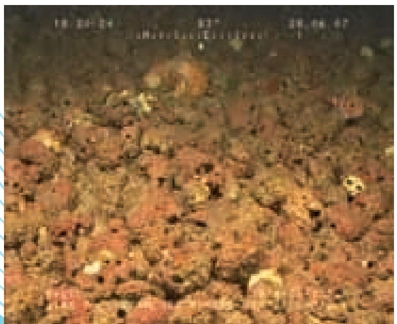


thin sheets

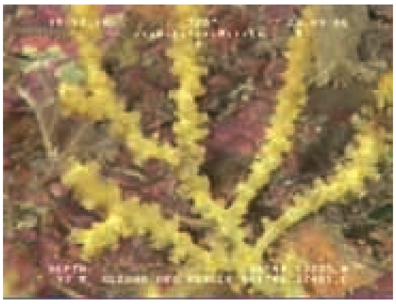
transition from cobbled to large bio-concretion

large bio-concretion

Rhodoliths bed at 146 m of depth in Emile Baudot seamount.



Species recorded in deep areas of Ausias March seamount

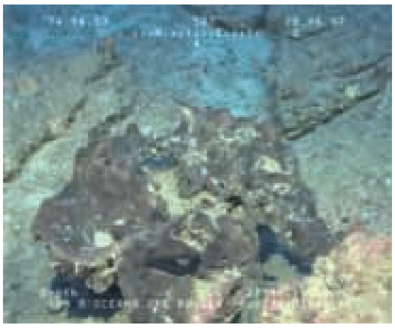


anthozoans *Paramuricea macrospina*

carnivorous sponge
Asbestopluma hypogea

Protected species included in the annexes of BARCOM-SPAM recorded on the seamounts

triton snail (*Charonia lampas*)
in Ausias March



Elephant ear sponge (*Spongia agaricina*)
in Emile Baudot

Species widely distributed on bio-concretions bed found on the four seamounts researched

Dendrophyllia cornigera

Diazona violacea

Palinurus elephas, Paralcyonium spinulosum
and unknown *nephteida*

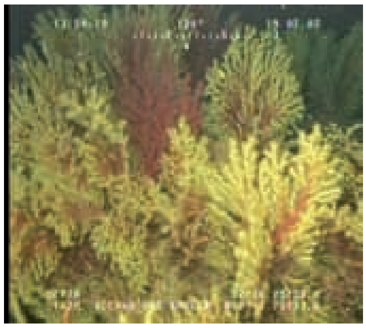
Astropartus mediterraneus

Capros aper and *Pteroides griseum*

Phycis phycis

Callogorgia verticillata

Sponge not identified



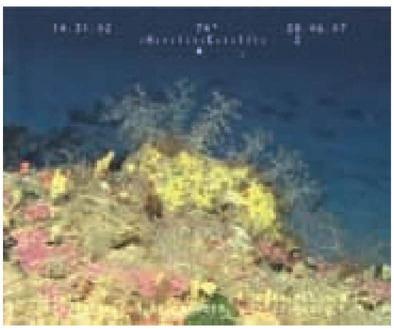
Paramuricea clavata

Luida ciliaris

Muraena helena in *Paramuricea clavata* garden

Aplysina aerophoba

Eunicella verrucosa

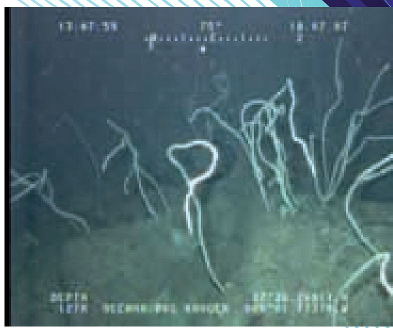


Paralcyonium spinulosum

Sponge field on maërl

Echinus melo

Calappa granulata



Viminella flagellum

Scorpaena sp.

Alcyonium palmatum

IV. MAIN THREATS AND PROPOSALS FOR THE PROTECTION OF CORALLIGENOUS BEDS IN THE MEDITERRANEAN SEA

During OCEANA's investigations large amounts of debris, lost or abandoned fishing gear and trawl marks were seen on the sea floor. Marine communities with high ecological value such as the red algae concretions are faced with numerous threats, especially when the constructing species have slow growth rates and are very long-lived. Some coralligenous concretions have been dated back to 8,000 years[1] and some rhodoliths can reach 100 years old[2].

It is known that different fishing techniques cause severe damage to the marine bottom. Both maërl and coralligenous beds are highly vulnerable to anthropogenic alterations. The use of trawls or dredges in fishing grounds can bring about irreparable damages, due to direct impacts on the coralligenous concretions and to resuspension of sediments that cause turbidity in the water and burial of the organisms. In some maërl communities destroyed by fishing, there are no recovery signs until some years later[3].

In the Mediterranean Sea there are large amounts of debris, coming both from the earth and from recreational and commercial fishing boats. Fishing gear, plastics and other non-identified objects were found in many of the sampled areas.

Many boats anchor without any kind of control in all types of sea beds. In particular, frequent diving activities in areas of high ecological value can bring about serious damage from repeated anchoring in coralligenous zones.

It has been verified that a wide variety of coralligenous species is strongly affected by contamination, causing a loss of biological diversity[4]. The effect on constructing species is especially serious, as bad water quality can increase the number of organisms that erode red algae concretions[5].

The introduction of exotic species into European ecosystems is one of the most worrisome threats for many marine communities. One of the invasive species that represents the greatest danger for coralligenous beds is *Womersleyella (Polysiphonia) setacea*, since it grows abundantly and reduces the amount of light that reaches the constructing algae[6] and diminishes biodiversity in this community[7]. Other invasive species that can affect the growth and development of this habitat are *Lophocladia lallemandii*, *Asparagopsis taxiformis* and *Caulerpa taxifolia*.

Another serious threat for these ecosystems is climate change, as changes in sea temperatures can affect calcification rates of the algae. Similarly, diverse mortality episodes[8] of suspension-feeding animals in hundreds of kilometres of coralligenous beds in the Mediterranean Sea has been related to high temperatures that were reached in these waters over long periods of time[9].

Oceana proposes the following measures, which must be applied urgently, to protect coralligenous beds and end their current decline:

Regulation and control of the threats

Industrial and recreational fishing, the presence of debris, sport diving, uncontrolled anchoring by boats, deterioration in water quality by land, coastal and high seas-based activities, and an increasing abundance of invasive species are the main causes of coralligenous bed decline and loss in the Mediterranean Sea. These activities must be controlled to eliminate the severe impact they have on these ecosystems.

Mapping and investigation of the existing communities

Data on the location, extension and distribution of habitats are necessary to study the ecological and geomorphological processes that occur, as well as the degree of alteration that these habitats have suffered due to the impacts of human activities. The European Commission and Mediterranean countries acknowledge that there is a generalized lack of scientific data and suitable resources to realise the necessary scientific work.

Mediterranean countries must avoid the deterioration and alteration of habitats which can have an appreciable effect on certain species. Given the lack of habitat and species data, the process of selecting coastal and marine protected areas has been prevented.

A study of the state of these vulnerable habitats is necessary to elaborate effective solutions to stop their deterioration.

One of the main goals of mapping coralligenous bottoms is to identify their location and extension. This enables the application of both existing legislation and new measures for their conservation.

Application and improvement of effective legislation

Lithothamnion corallioides and *Phymatolithon calcareum* are included in Annex V of the EU Habitats Directive concerning species whose collection and exploitation in nature can be a management object. Red algaes *Goniolithon byssoides*, *Lithophyllum lichenoide*, *Ptilophora mediterranea* and *Schimmelmannia shousboei* are included in Annex II of the Protocol concerning Specially Protected Areas[10]. Some cnidarians, such as *Corallium rubrum*, are also included in this Protocol as well as the Bern Convention[11], along with different sponges and other organisms typical of this community. Even so, these classifications are insufficient for the protection of these habitats when they are not effectively fulfilled and corresponding sanctions from infractions are not applied.

In the case of the EU, the lack of protection for certain sea beds is one of the most important deficiencies in the Habitats Directive (92/43/CEE). Its Annexes pose problems for the declaration of marine habitats. In them, coralligenous beds are not considered high-priority habitats, nor are any of their characteristic anthozoans. Although these formations are indirectly considered under the habitat definition of "1170 Reefs" in Annex I, revision and improvement of this and other definitions are necessary to guarantee effective protection of these marine communities.

In addition, coralligenous beds should not have to withstand the damage brought about by different fishing techniques such as the bottom trawling, since their use is prohibited on coralligenous and maërl bottoms according to the COUNCIL REGULATION (21 1967/2006 EC) of December 2006 concerning management measures of the sustainable exploitation of fishery resources in the Mediterranean Sea.

Declaration of Marine Protected Areas

Red algae concretions might be the most complex and diverse communities of the Mediterranean Sea. One way or another they are related to a great number of vulnerable habitats and represent great biological interest. The coralligenous bed is a collection of habitats strongly associated with gorgonian gardens, sponge fields and aggregations, caves and grottos, etc.
Various species that are characteristic of coralligenous formations, such as red and yellow gorgonians, suffer serious damage due to frequent underwater dives in certain areas[12].

Some species that live in association with coralligenous beds are considered threatened or endangered in the Mediterranean Sea[13], including the algaes *Chondrymenia lobata*, *Halarachnion ligulatum*, *Halymenia trigona*, *Platoma cyclocolpa*, *Nemastoma dichotomum*, *Ptilophora mediterranean*, *Schizymenia dubyi* and *Laminaria rodriguezii*, as well as some molluscs like the date mussel (*Lithophaga lithophaga*), echinoderms like the long-spined sea urchin (*Centrostephanus longispinus*), and fish such as *Sciaena umbra* and *Umbrina cirrhosa*[14].

Therefore, there is an urgent necessity to establish measures through the designation of new protected areas for benthic communities of interest that are threatened, like coralligenous and maërl bottoms, among others. By creating Marine Protected Areas wherever coralligenous formations occur, they would protect directly these and their associated habitats, and indirectly the large numbers of species that depend on them.

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