A3.36 Communities of Mediterranean estuarine rock

Summary

This habitat consists of shallow subtidal rocky habitats which support faunal-dominated communities, with seaweed communities only poorly developed or absent. The variations presented by the biocenosis are linked to climatic conditions, mainly the very great seasonal differences in temperature and salinity.

Many studies conducted within this zone showed that combined impacts of urbanization, fisheries, aquaculture and sedimentation led to a shift in the associated species assemblages, and estuaries in the Mediterranean are especially prone to impacts such as coastal pollution, coastal zone development, fisheries, contamination of sediments and biota caused by anti-foulants and atmospheric inputs of hazardous compounds and episodic perturbations. Some legal provisions exist, but management measures aimed at this particular habitat conservation are not in place. Direct engagement of scientists and conservationists in the planning of the management process, analysis of social and economic costs and benefits of different management options, and involvement of diverse stakeholders will be essential to the successful implementation of conservation actions.

Synthesis

This habitat can be reliably assumed as patchy as the proportion of estuary areas in the Mediterranean is limited and it relates to only 70 medium to large rivers and streams that flow into the Mediterranean. The whole infralittoral zone is especially subject to human activities that increase mud transport from the coast (mainly untreated urban waste discharge, major construction works in the maritime field, and leaching from soil). Hypersedimentation may eliminate vulnerable facies, resulting in biotope homogenization and a consequent reduction of the associated biodiversity and the exploitable living resources. The combined effects of urbanization, fisheries, aquaculture and sedimentation are leading to a shift in associated assemblages.

There is a lack of quantiative data however expert opinion is that it is reasonable to presume that this habitat has suffered declines in both quantity and quality in the last 50 years. The pressures leading to such declines are predicted to continue therefore a continuing decline is likely. This habitat has therefore been assessed as Vulnerable for both the EU 28 and EU 28+.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	A1, C/D1	Vulnerable	A1, C/D1

Sub-habitat types that may require further examination

None.

Habitat Type

Code and name

A3.36 Communities of Mediterranean estuarine rock

No characteristic photograph currently available for this habitat.

Habitat description

This habitat is composed of intertidal and shallow subtidal rocky habitats which support faunal-dominated

communities, with seaweed communities only poorly developed or absent. The variations associated communities are linked to climatic conditions, mainly the very great seasonal differences in temperature and salinity, which in the summer is particularly warm salty water and in the winter very low temperatures and sometimes brackish water.

The habitat supports species that are able to withstand quick variations in environmental conditions such as salinity. Sudden influxes of salt water and drying up in the summer create recurrent disturbances that sometimes cause populations to disappear. In this case, recolonisation will always be very rapid. In the Adriatic the characteristic species of this association is the endemic brown alga Fucus virsoides.

Indicators of quality:

Standard biotic and abiotic indicators have been used to describe marine habitat quality. Both biotic and abiotic indicators have been used to describe marine habitat quality. These include the presence of particular species, water quality parameters, levels of exposure to a particular exposure as well as more integrated indices which describe habitat function and structure, such as trophic index, or successful stages of development in habitats that have a natural cycle of change over time.

There are no commonly agreed indicators of quality for this habitat, although particular parameters may be set in certain situations, e.g. protected features with Natura 2000 sites, where reference values may have been determined and applied on a location-specific basis.

Characteristic species:

Algae: *Fucus virsoides, Bangia* spp;

Cyanobacteria: *Rivularia polyotis*;

Crustaceans: *Lekanesphaera hookeri, Balanus* spp, *Sphaeroma serratum, Cyathura carinata, Monocorophium insidiosum, Gammarus aequicauda*;

Gastropods: *Patella coerulea;*

Bivalves: *Mytilus galloprovincialis*;

Cniadrians: *Actinia equina.*

Classification

EUNIS (v1405):

Level 4.

A sub-habitat of Mediterranean low energy infralittoral rock (A3.3) and Low energy littoral rock (A1.3).

Annex 1:

1130 Estuaries

MAES:

Marine - Marine inlets and transitional waters

MSFD:

Littoral rock & biogenic reef

Shallow sublittoral rock and biogenic reef

EUSeaMap:

Shallow photic rock or biogenic reef

Shallow aphotic rock or biogenic reef

IUCN:

9.10 Estuaries

Barcelona Convention (RAC/SPA)

III.1.1 Euryhaline and Eurythermal biocenoses

Does the habitat type present an outstanding example of typical characteristics of one or more biogeographic regions?

Unknown

Justification

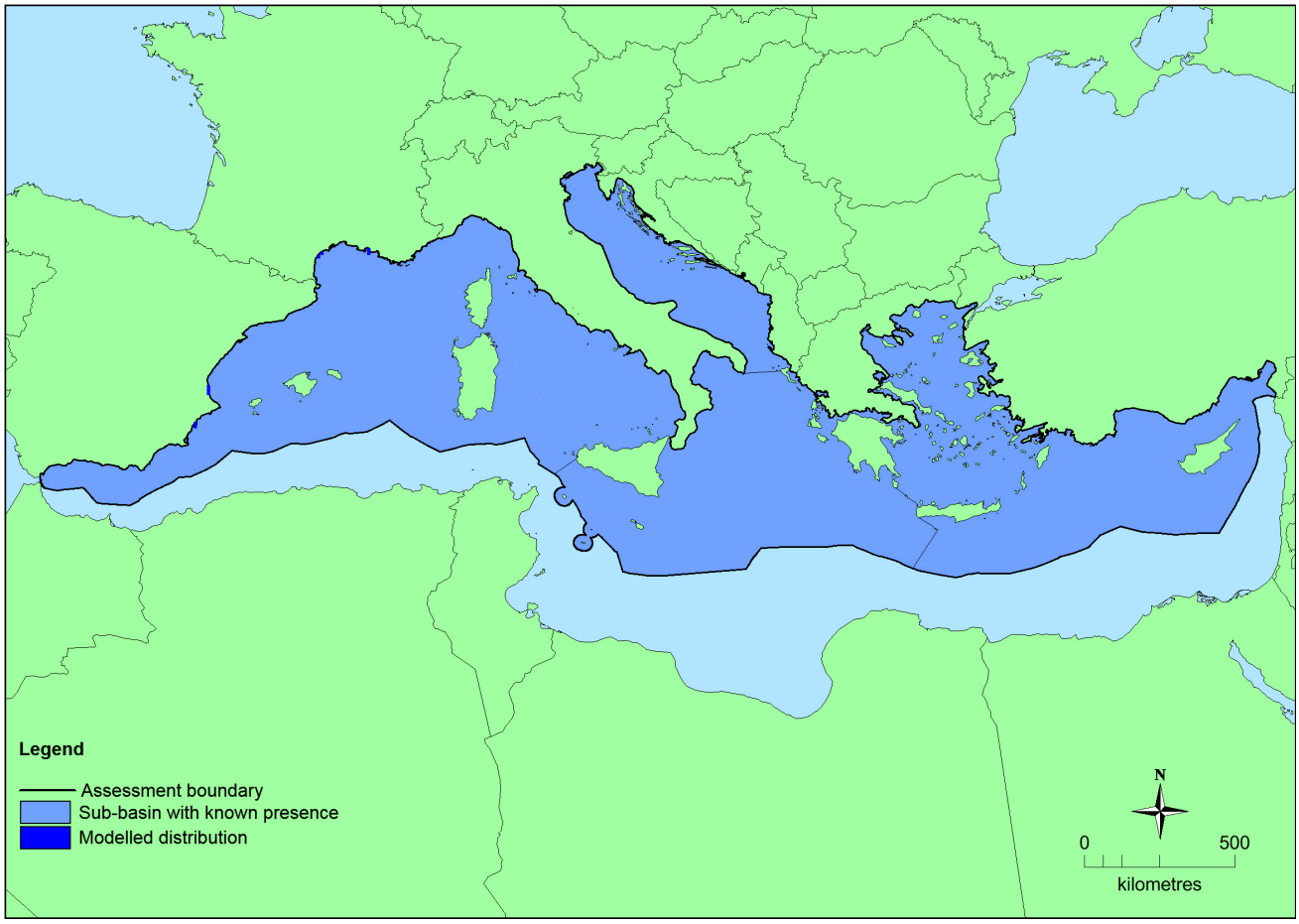
Geographic occurrence and trends

Region	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Mediterranean Sea	Adriatic Sea: Present Aegian-Levantine Sea: Present Ionian Sea and the Central Mediterranean Sea: Present Western Mediterranean Sea: Present	Unknown Km^2	Decreasing	Decreasing

Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28	60,721 Km^2	9	Unknown Km^2	This habitat is present in all the Mediterranean sub-basins. AOO figures are believed to be an underestimate.
EU 28+	60,721 Km^2	9	Unknown Km^2	This habitat is present in all the Mediterranean sub-basins. AOO figures are believedto be an underestimate.

Distribution map



There are insufficient data to provide a comprehensive and accurate map of the distribution of this habitat.This map has been generated using EMODnet data from modelled/surveyed records for the Mediterranean (and supplemented with expert opinion where applicable) (EMODnet 2010). EOO and AOO have been calculated on the available data presented in this map however these should be treated with caution as expert opinion is that this is not the full distribution of the habitat.

How much of the current distribution of the habitat type lies within the EU 28?

Unknown but present in both the EU 28 and EU 28+.

Trends in quantity

Around two thirds of the Mediterranean coastline is urbanized, with this fraction exceeding 75% in the regions with the most developed industries. Close to the shoreline this frequently involves the construction of artificial structures, mainly groynes and breakwaters, seawalls and jetties, along naturally low sediment shores such as those typically of estuaries. Historical as well as recent coastal development has also resulted in loss of estuarine habitat by impoundment and drainage in both small and large estuarine systems. Estuarine areas are not particularly common in the Mediterranean and the distribution of this habitat is patchy. Whilst there is a lack of information on trends in quanitity of this specific habitat within estuaries, expert opinion is that it is likely to have declined alongside loss of estuarine habtiat more generally.

- Average current trend in quantity (extent)
  EU 28: Decreasing
  EU 28+: Decreasing
- Does the habitat type have a small natural range following regression?
  No
  Justification

The EOO of this habitat type exceeds 50,000 km^2.

- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  Yes
  Justification
  This habitat type is related to estuaries, which are very limited in the Mediterranean Sea.

Trends in quality

There have been significant historical as well as recent changes in the quality of sublittoral estuarine habitats because of a long history of human pressure in these areas. Many studies have shown that the combined impacts of urbanization, fisheries, aquaculture and sedimentation led to a shift in associated assemblages. There has also been contamination of estuarine sediments from herbicides and heavy metals. As all other analysis conducted in these zones showed that human activities had significant negative and combined impacts generally on the whole zone (all habitats types) and that severe degradation of river water quality and ecosystem is an ongoing process, it is reasonable to assume that the quality of this habitat has declined and is likely to continue declining.

- Average current trend in quality
  EU 28: Decreasing
  EU 28+: Decreasing

Pressures and threats

Significant anthropogenic pressures affecting estuaries are industrial waste water, urban sewage effluents, agriculture and farmland runoff. These activities cause an excess of nutrients, increase the organic matter loads and may promote the accumulation of dangerous pollutants in the sediment, such as heavy metals, toxic compounds and hydrocarbon substances. Coastal development has resulted in direct loss of habitat and alteration to the natural flow regime, for example through the construction of dams and water abstraction both of which have had a major affect on some estuaries by altering sediment transport, flushing and the stability of water column stratification.

List of pressures and threats

Agriculture

Use of biocides, hormones and chemicals
Fertilisation

Urbanisation, residential and commercial development

Urbanised areas, human habitation
Industrial or commercial areas
Discharges

Biological resource use other than agriculture & forestry

Marine and Freshwater Aquaculture
Fishing and harvesting aquatic resources

Pollution

Pollution to surface waters (limnic, terrestrial, marine & brackish)
Marine water pollution
Soil pollution and solid waste (excluding discharges)

Conservation and management

This habitat occurs in some protected areas. Beneficial conservation measures include regulating discharges to improve water quality, managing fisheries, establishing protected areas, coastal zone planning including zoning of developments, and whole estuary management including regulation of water abstraction from the river system and other activities which affect the hydrological regime. Direct engagement of stakeholders in the planning of the management process, and analysis of social and economic costs and benefits of different management options will be essential to the successful implementation of conservation actions.

List of conservation and management needs

Measures related to wetland, freshwater and coastal habitats

Restoring/Improving water quality
Restoring coastal areas

Measures related to marine habitats

Restoring marine habitats

Measures related to spatial planning

Establish protected areas/sites
Legal protection of habitats and species

Measures related to hunting, taking and fishing and species management

Regulation/Management of fishery in marine and brackish systems

Measures related to urban areas, industry, energy and transport

Urban and industrial waste management

Conservation status

Annex 1

1130: MMED U2

When severely damaged, does the habitat retain the capacity to recover its typical character and functionality?

The capacity to recover once severely damaged of this habitat is unknown.

Effort required

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	>30 %	Unknown %	Unknown %	Unknown %
EU 28+	>30 %	Unknown %	Unknown %	Unknown %

The habitat is assessed as Vulnerable under Criterion A1 as it has probably suffered large declines in surface area (more than 30%) over the last 50 years, given the loss in quantity of estuarine habitats overall in the Mediterranean and because such trends are likely to continue over the next 50 years.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	>50,000 Km^2	Yes	Yes	Unknown	Unknown	Yes	Yes	Unknown	Unknown
EU 28+	>50,000 Km^2	Yes	Yes	Unknown	Unknown	Yes	Yes	Unknown	Unkwown

The habitat is assessed as Least Concern under criterion B1 as the EOO value largely exceeds the thresholds for a threatened category, although contining declines in spatial extent and quality, and threatening processes likely to cause continuing declines in the next 20 years are considered probable. There is some information on the AOO value and the number of locations but this is better categorised as unknown.This habitat has therefore been assessed as Least Concern under criteria B1a & B1b and Data Deficient for all other criteria for both the EU 28 and EU 28+.

Criterion C and D: Reduction in abiotic and/or biotic quality

Criteria C/D	C/D1		C/D2		C/D3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	>50 %	Intermediate %	Unknown %	Unknown %	Unknown %	Unknown %
EU 28+	>50 %	Intermediate %	Unknown %	Unknown %	Unknown %	Unknown %

Criterion C	C1		C2		C3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	Unknown %	Unknown %	Unknown %	Unknown %	Unknown %	Unknown %
EU 28+	Unknown %	Unknown %	Unknown %	Unknown %	Unknown %	Unknown %

Criterion D	D1		D2		D3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	Unknown %	Unknown%	Unknown %	Unknown%	Unknown %	Unknown%
EU 28+	Unknown %	Unknown%	Unknown %	Unknown%	Unknown %	Unknown%

The majority of estuaries in the Mediterranean are believed to have suffered some decline in both abiotic and biotic quality over the last 50 years, predominantly due to the effects coastal development, urbanisation, pollution and alteration of hydrographic conditions. The scale of this for the Mediterranean region is difficult to quantify, however expert opinion is that this is likely to amount to a substantial reduction represented by most likely an intermediate decline affecting more than 50% of the extent, but possibly a severe decline affecting more than 30% in both the EU 28 and EU 28+. This habitat has therefore been assessed as Vulnerable under criteria C/D1.

Criterion E: Quantitative analysis to evaluate risk of habitat collapse

Criterion E	Probability of collapse
EU 28	Unknown
EU 28+	Unknown

There is no quantitative analysis available to evaluate risk of habitat collapse. Therefore, the habitat is

assessed as Data Deficient under Criterion E.

Overall assessment "Balance sheet" for EU 28 and EU 28+

	A1	A2a	A2b	A3	B1	B2	B3	C/D1	C/D2	C/D3	C1	C2	C3	D1	D2	D3	E
EU28	VU	DD	DD	DD	LC	DD	DD	VU	DD	DD	DD	DD	DD	DD	VU	DD	DD
EU28+	VU	DD	DD	DD	LC	DD	DD	VU	DD	DD	DD	DD	DD	DD	VU	DD	DD

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	A1, C/D1	Vulnerable	A1, C/D1

Confidence in the assessment
Low (mainly based on uncertain or indirect information, inferred and suspected data values, and/or limited expert knowledge)

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Date of assessment
12/01/2016

Date of review
04/04/2016

References

Airoldi, L. and Beck, M.W. 2007. Loss, status and trends for coastal marine habitats of Europe. *Oceanography and Marine Biology: An Annual Review* 45: 345-405.

Albertelli, G., Covazzi-Harriague, A., Danovaro, R., Fabiano, M., Fraschetti, S. and Pusceddu, A. 1999. Differential responses of bacteria, meiofauna and macrofauna in a shelf area (Ligurian Sea, NW Mediterranean): role of food availability. *Journal of Sea Research* 42: 11-26.

Bakran Petricioli, T. 2007. *Marine habitats-Manual for mapping and monitoring.* State Institute for Nature Protection. 60 pp.

Bellan, G., Bourcier, M., Salen-Picard, C., Arnoux, A. and Casserley, S. 1999. Benthic ecosystem changes associated with wastewater treatment at Marseille: Implications for the protection and restoration of the Mediterranean Coastal Shelf Ecosystems. *Water Environment Research* 71(4): 483-493.

Blum, W.E.H. 2009. Reviewing land use and security linkages in the Mediterranean region. In: *Water scarcity, land degradation and desertification in the Mediterranean region.* Rubio, J., Safriel, U., Daussa, R., Blum, W. and Pedrazzini, F. (Eds.). Springer, Dordrecht, the Netherlands. pp 101-117.

Bombace, G. 2001. Influence of climatic changes on stocks, fish species and marine ecosystems in the Mediterranean sea. *Archivio di Oceanografia e Limnologia* 22: 67-72.

Bressan, G., Chemello, R., Gravina M.F., Gambi, M.C., Peirano, A., Cocito, S., Rosso, A. and Tursi, A. 2009. *Other bioconcretions.* In: *Other types bioconstructions.* Relini, G. (Ed.). Friuli Museum of Natural History, Udine, Italy. pp 90-114.

Cencini, C. 1998. Physical processes and human activities in the evolution of the Po delta, Italy. *Journal of Coastal Research* 14: 774-793.

Delo, E.A. and Ockenden, M.C. 1992. *Estuarine Muds Manual.* HR Wallingford Report, SR 309. 64 p.

Dolenec, T., Lojen, S., Kniewald, G., Dolenec, M. and Rogan, N. 2007. Nitrogen stable isotope composition as a tracer of fish farming in invertebrates *Aplysina aerophoba*, *Balanus perforatus* and *Anemonia sulcata* in central Adriatic. *Aquaculture* 262: 237-249.

Dounas, C.G. and Koukouras, A.S. 1992. Circalittoral macrobenthic assemblages of Strymonikos Gulf (North Aegean Sea). P.S.Z.N.I. *Marine Ecology* 13(2): 85-99.

EEA. 2006a. *The Changing Faces of Europe's Coastal Areas.* EEA Report 6/2006. OPOCE, Luxembourg.

EEA. 2006b. *Priority Issues in the Mediterranean Environment.* EEA Report 4/2006. OPOCE, Luxembourg.

EEA/UNEP. 1999. *State and pressures of the marine and coastal Mediterranean environment.* European Environment Agency, Copenhagen.

Falace, A., Alongi, G., Cormaci, M., Furnari, G., Curiel, D., Cecere, E. and Petrocelli, A. 2010. Changes in the benthic algae along the Adriatic Sea in the last three decades. *Chemical Ecology* 26: 77-90.

Gabrié, C., Lagabrielle, E., Bissery, C., Crochelet, E., Meola, B., Webster, C., Claudet, J., Chassanite, A., Marinesque, S., Robert, P., Goutx, M. and Quod, C. 2012*. The Status of Marine Protected Areas in the Mediterranean Sea*. MedPAN & RAC/SPA (Ed.). MedPAN Collection. 256 pp.

Gilbert, F., Bonin, P. and Stora, G. 1995. Effect of bioturbation on denitrification in a marine sediment from the West Mediterranean littoral. *Hydrobiologia* 304(1): 49-58.

Jeftic, L., Bernhard, M., Demetropulous, A., Fernex, F., Gabrielides, G. P., Gasparovic, F., Halim, Y., Orhon, D. and Saliba, L.J. 1990. *State of the Marine Environment in the Mediterranean Region.* UNEP Regional Seas Reports and Studies 132/1990 and MAP Technical Reports Series 28/1989. Athens.

MEPA. 2012. *MSFD Initial Assessment: Benthic Habitats.* MEPA. 86 pp.

Micu, D. and Micu, S. 2004. *A new type of macrozoobenthic community from the rocky bottoms of the Black Sea*. In: *International Workshop on the Black Sea Benthos,* Öztürk, B., Mokievsky, V.O. and Topaloğlu, B. (Eds.). 18-23 April 2004 Istanbul, Turkey. TÜDAV publication no. 20. 244 pp.

Salen-Picard, C., Bellan, G. Bellansantini, D., Arlhac, D. and Marquet, R., 1997. Long-term changes in a benthic community of a Mediterranean gulf (Gulf of Fos). *Oceanologica Acta* 20(1): 299-310.

Salomidi, M., Katsanevakis, S., Damalas, D., Mifsud, R., Todorova, V., Pipitone, C., Fernandez, T.V., Mirto, S., Galparsoro, I., Pascual, M., Borja, A., Rabaut, M. and Braeckman, U. 2010. *Catalogue of European seabed biotopes.* Report of Deliverable 1.2 of MESMA project to the European Commission.

Salomidi, M., Katsanevakis, S., Borja, A., Braeckman, U., Damalas, D., Galparsoro, I., Mifsud, R., Mirto, S., Pascual, M., Pipitone, C., Rabaut, M., Todorova, V., Vassilopoulou, V. and Vega Fernández, T. 2012. Assessment of goods and services, vulnerability, and conservation status of European seabed biotopes: a stepping stone towards ecosystem-based marine spatial management. *Mediterranean Marine Science* 13: 49-88.

Simboura, N. and Zenetos, A. 2002. Benthic indicators to use in ecological quality classification of Mediterranean soft bottoms marine ecosystems, including a new biotic index. *Mediterranean Marine*

Science 3/2: 77-111.

UNEP. 2006. *Classification of benthic marine Habitat types for the Mediterranean Region.* UNEP (OCA)/MED WG 149/5 Rev. 1

UNEP/MAP. 2003. *Concept Paper on Mediterranean Marine Pollution Indicators*. (UNEP(DEC)/MED WG.231/17)

UNEP/MAP/PAP. 2001. White Paper: *Coastal Zone Management in the Mediterranean.* Priority Actions Programme, Split.

UNEP/MAP. 2012a. *Initial integrated assessment of the Mediterranean Sea: Fulfilling step 3 of the ecosystem approach process.* United Nations Environment Programme, Mediterranean Action Plan, Barcelona Convention, Athens.

UNEP/MAP. 2012b. *State of the Mediterranean Marine and Coastal Environment.* United Nations Environment Programme, Mediterranean Action Plan, Barcelona Convention, Athens.