A2.31 Communities of Mediterranean mediolittoral mud estuarine

Summary

This habitat occurs on estuarine shores of fine sediment, where littoral mud may form mudflats, especially in the shelter of the estuary where deposition of fine sediments is constant. Where the tidal currents are faster than flood tides, most sediments deposit to form a delta at the mouth of the estuary. The sediment is fine sand, muddy sands and mud according to the course of the river bed. There is a small tidal range in the Mediterranean and when parts of the estuary are cut off, either naturally or by human action, the salinity of the water may increase considerably. In the absence of the tide effect, the transition is rapid between the (freshwater) limnic environment and the marine environment so there is no gradient in the distribution of the fauna, which occurs patchily. This habitat is characterized by communities of polychaetes, bivalves and oligochaetes and is used as a feeding area by birds and by some fishes (grey mullet and eels).

Estuaries are particularly and directly subject to various human activities. Thus, this habitat is especially prone to impacts such as coastal pollution (urban, agricultural, industrial, fish-farming, etc.), coastal zone development (particularly urbanization and uncontrolled coastal infrastructures), construction of dams, drainage and abstraction schemes, contamination of sediments and biota, and episodic perturbations (i.e. sediment removal and illegal dumping). 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.

Synthesis

This habitat has a wide range in the Mediterranean being present in all the sub-basins. It is considered likely to have declined significantly in extent in the recent past due to coastal development and urbanisation as well as the damming of rivers which has altered the hydrographic conditions and particularly the erosion and accretion of deltas where this habitat occurs.

There is a lack of quantiative data however expert opinion is that this habitat has suffered a decline in quantity of around 50% in the last 50 years. The pressures leading to these changes are predicted to continue therefore a continuing decline is likely. This habitat has therefore been assessed as Endangered 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
Endangered	A1; A2a,b.	Endangered	A1; A2a,b.

Sub-habitat types that may require further examination

None.

Habitat Type

Code and name

A2.31 Communities of Mediterranean mediolittoral mud estuarine

No characteristic photographs of this habitat currently available.

Habitat description

In Mediterranean estuaries tidal amplitude is very weak and tidal currents, which generate vertical mixing of the water, are negligible. This favors vertical stratification of salinity with a counter current of saline water beneath the less dense river water.(salt wedge estuaries). The small tidal range (20-40cms) also means that large expanses of mediolittoral soft sediments along estuaries are rare, especially when compared to more northern latitudes in Europe.

This habitat is present on estuarine shores of soft substrates, generally under substantial freshwater influence, and may form a delta at the mouth of the estuary. It occurs in the mediolittoral and the upper part of the infralittoral where the sediment is fine sand, muddy sands and mud according to the course of the river bed. The banks are relatively stable, but the beds change with the violent winter flooding. The surface salinity is low (0.03 to 2.5 psu for the Rhône) whereas that of the deep layer, in contact with the benthic fauna, is much higher (16 to 21 psu for the Rhône). A marine salty patch typically lies underneath the fresh water of the river. Tides are weak and only cause minor changes in the water chemistry. The winds have a more marked influence on the position of the salty patch. When parts of the estuary or estuary lagoons are cut off, either naturally or by human action, the salinity of the water may increase considerably.

In the absence of the tide effect, the transition is rapid between the (freshwater) limnic environment and t he marine environment. Thus there is no gradient in the distribution of the fauna, which occurs patchily. This habitat is characterized by communities of polychaetes, bivalves and oligochaetes. The species present are typically have short cycles of development that permit rapid colonization. The habitat is used as a feeding area by birds and by some fishes (grey mullet and eels).

Indicators of quality:

Both biotic and abiotic indicators have been used to describe marine habitat quality. These include: the presence of characteristic species as well as those which are sensitive to the pressures the habitat may face; water quality parameters; levels of exposure to particular pressure, and more integrated indices which describe habitat structure and function, such as trophic index, or successional stages of development in habitats that have a natural cycle of change over time.

Indices developed to assess the ecological status of coastal waters, including estuaries, according to the Water Framework Directive, include physical indicators, water quality indicators and measures of benthic diversity, species richness and abundance. The latter group, which is particularly relevant to benthic habitats, includes a Benthic Quality Index, an Infaunal Trophic Index, a Marine Biotic index based on ecological groups, and the Benthic Opportunistic Polychaetes/Amphipods Index.

Species typical of environments with high organic loads such as *Capitella capitata, Heteromastus filiformis* and *Polydora* spp. may be potential indicators of degraded quality. Indicators used within the Water Framework Directive may also be applied for estuarine habitats as a whole.

Characteristic species:

These include polychaetes: *Armandia cirrosa, Capitella capitata, Hediste diversicolor, Heteromastus filiformis, Hydroides dianthus, Malacoceros fuliginosus, Naineris laevigata, Nephtys hombergii, Protoaricia oerstedii;* bivalves*: Abra alba, Abra ovata, Cerastoderma glaucum;* gastropods*: Ecrobia ventrosa, Loripes lucinalis, Mytilaster minimus, Ruditapes decussatus;* larval stages of arthropod *Chironomus* spp.; crustaceans*: Corophium insiduosum, Corophium volutator, Iphinoe serrata, Abludomelita aculeata, Microdeutopus gryllotalpa.*

Classification

EUNIS (v1405):

Level 4. A sub-habitat of Littoral mud (A2.3).

Annex 1:

1130 Estuaries

MAES:

Marine - Marine inlets and transitional waters

MSFD:

Littoral sediment

EUSeaMap:

Not mapped.

IUCN:

9.10 Estuaries

Barcelona convention.

II.1.1 Biocenosis of muddy sands and muds

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

No

Justification

Estuarine mud habitats are not characteristic of the Mediterranean as they are not particularly common mediolittoral habitats.

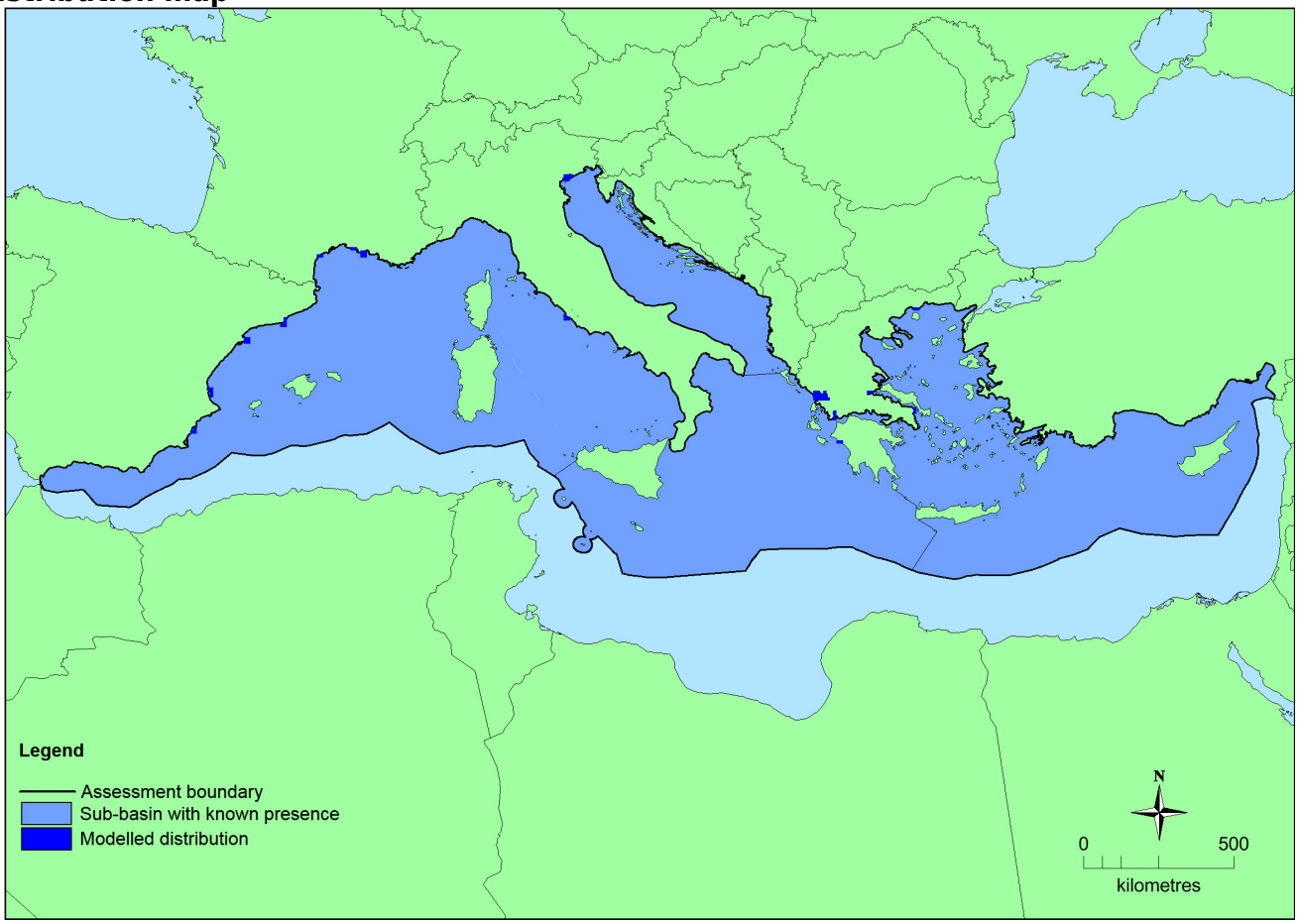
Geographic occurrence and trends

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	1,271,537 Km^2	54	Unknown Km^2	EOO and AOO have been calculated on the available data. Although this data set is known to be incomplete the figures exceed the thresholds for threatened status.
EU 28+	1,271,537 Km^2	54	Unknown Km^2	EOO and AOO have been calculated on the available data. Although this data set is known to be incomplete the figures exceed the thresholds for threatened status.

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?

This habitat is present in both the EU 28 and EU 28+. The percentage in each is unknown although the majority is likely to be within the EU 28 because of the distribution of estuaries in the western and eastern Mediterranean.

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. In some regions, the growth of cities, tourism and industry mean that up to 90% of the coastline has been developed. Detailed mapping of coastal habitats along some sections of coast have also provide information on quantity. One example is along the Catalonia coast (Spain) where infralittoral estuarine muddy sands and mediolittoral muddy sands were the dominant habitats along 53 km out of 1110 km of coastline.

Historical as well as recent coastal development has resulted in loss of estuarine habitat by impoundment and drainage in both small and large estuarine systems. S'Albufera-Alcudia Bay on the island of Mallorca, for example, has been affected by
human activities since the second half of the 19th century when drainage programme was instituted, whilst the estuarine environment of the Ebro, particuarly around the delta has changed very significantly since the beginning of the 16th century.

Deltas are naturally dynamic features subject to accretion and erosion over both short and long time scales. Their low-lying terrain makes them suitable for construction of dwellings, arable land, freshwater resources and easy access to the sea so they have also been subject to considerable human-induced change. There are numerous examples of human intervention having a negative impact on this habitat. In the case of the Ebro delta, it is possible to trace its evolution from 2000 BC and show how the position and size of the delta has altered in response to sediment deposition, erosion, floods, the construction of dams and drainage schemes. Effects on smaller deltaic areas which support this habitat are also plentiful. In Greece, for example the construction of dams, along the rivers Axios and Aliakmon and an extensive irrigation network over the Thessaloniki Plain has resulted in a dramatic reduction in sediment supply to the deltaic coastal plain in the inner Thermaikos Gulf in the NW Aegean Sea since the mid-1950s.

Damming has had a major affect. For some southern European rivers (e.g. Ebro, Douro, Urumea, Rhone), the annual volume of sediment discharge represents less than 10% of their level of 1950; for the Ebro this is even less than 5%. This results in a considerable sediment deficit at the river mouth, and subsequent erosion downstream as illustrated in Ebro delta, Playa Gross, Petite Camargue (Rhone delta) and Vagueira.

The urbanization of the Mediterranean coast is predicted to continue at a rate of around 10-20% for most Mediterranean countries. The current trend for this habitat is therefore one of decreasing quantity.

- 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
  This habitat does not have a small natural range as the EOO exceeds 50,000 km^2.
- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  No
  Justification
  Estuarine habitats are intrinsically restricted however this habitat does not have a small natural range as the EOO is greater than 50,000 km^2.

Trends in quality

Trends in quality can be difficult to determine as there are local variations linked to the topography which causes a differential distribution of the various types of sediment. There have however been significant

changes associated with human activity, most dramatically where there has been total loss of this habitat through drainage, impoundment and loss of sediment supply.

Pollution has also been an issue with significant concentrations of some herbicides reported in the areas of the Ebro delta on the Eastern Coast of Spain, the Rhone delta in the South of France, the River Po, Italy/the Northern Adriatic Sea, the Thermaikos and Amvrakikos Gulfs in Greece although of a historical nature.

- 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, drainage channels and water abstraction 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

Transportation and service corridors

Roads, paths and railroads
Shipping lanes, ports, marine constructions
  Port areas
  Shipping lanes
  Marine constructions

Urbanisation, residential and commercial development

Urbanised areas, human habitation
Industrial or commercial areas
Discharges

Pollution

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

Natural System modifications

Human induced changes in hydraulic conditions

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/Improving the hydrological regime

Measures related to marine habitats

Restoring marine habitats

Measures related to spatial planning

Other spatial measures
Establish protected areas/sites

Measures related to urban areas, industry, energy and transport

Urban and industrial waste management
Specific management of traffic and energy transport systems
Managing marine traffic

Conservation status

Annex 1:

1130: MMED U2

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

Unknown. Some of the associated species are able to recolonise rapidly, however where land claim has taken place, recovery will not be possible.

Effort required

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	>50 %	>50 %	>50 %	Unknown %
EU 28+	>50 %	>50 %	>50 %	Unknown %

Expert opinion is that the area of mediolittoral estuarine habitats in the Mediterranean is considered likely to have declined significantly in the recent past. These declines are associated with coastal development and urbanisation as well as damming of rivers which altered the hydrographic conditions, in particular water flow and sediment transport. Such losses have been documented in some but not all situations. These pressures and trends are predicted to continue.

Although quantitative data are lacking expert opinion is that it is reasonable to presume that this habitat has suffered large declines in surface area of more than 50% over the last 50 years given the loss of mediolittoral habitats and the particular pressure on estuarine environments. No estimate has

been made of historical declines although these are known to have occurred. This habitat has therefore been assessed as Endangered under criteria A1 and A2 for both the EU 28 and EU 28+.

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	No	>50	Yes	Yes	No	No
EU 28+	>50,000 Km^2	Yes	Yes	No	>50	Yes	Yes	No	No

This habitat has a large natural range and patchy distribution in the Eastern and Western Mediterranean. It is considered likely to have a continuing decline in quantity, however as EOO >50,000km^2 and AOO >50, this exceeds the thresholds for a threatened category on the basis of restricted geographic distribution. The distribution of the habitat is such that the identified threats are unlikely to affect all localities at once. This habitat has therefore been assessed as Least Concern under criteria B 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	Unknown %	Unknown %	Unknown %	Unknown %	Unknown %	Unknown %
EU 28+	Unknown %	Unknown %	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%

There is insufficient information to quantify any trends in quality of this habitat although a decline is believed to have taken place associated with loss of habitat and degraded water quality. This habitat has therefore been assessed as Data Deficient under criteria C/D.

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 estimate the probability of collapse of this habitat type. It is therefore 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	EN	EN	EN	DD	LC	LC	LC	DD	DD	DD	DD	LC	DD	DD	DD	DD	DD
EU28+	EN	EN	EN	DD	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Endangered	A1; A2a,b.	Endangered	A1; A2a,b.

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

Assessors
A. Soldo.

Contributors
S. Gubbay & N. Sanders.

Reviewers
M. García Criado and M del Mar Oterio.

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