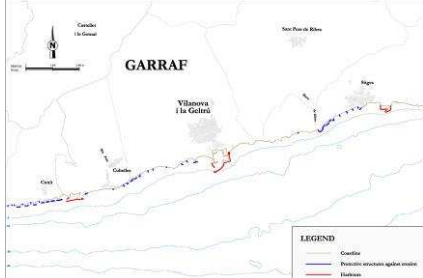
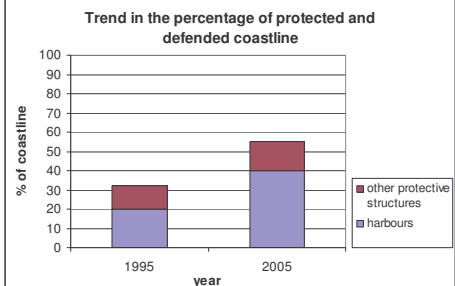


Indicator	
26	Coastal erosion and accretion
Measurement	
26.1	Length of protected and defended coastline
What should the measurement tell us?	
<p>The measurement features the existence of hard coastal defence works along the coast, which means coastal artificialisation (harbours and protective structures). This tells us about the efforts that each region has devoted to coastal defence work, regardless of whether those efforts have resulted in positive or negative responses to coastal erosion. A considerable amount of the European Union's coast is currently eroding despite the development of a wide range of measures to protect shorelines from eroding and flooding.</p> <p>Coastal artificialisation may be defined as the engineering of the waterfront by means of seawalls, dykes, breakwaters, jetties or any hard and rock-armoured structures, which are aimed at protecting the construction or other assets landwards from the coastline from the assault of the sea. Such structures modify coastal sediment transport patterns through 3 major processes:</p> <ul style="list-style-type: none"> • Trapping of sediment transported alongshore and a sediment deficit downdrift due to the fact that, contrary to "natural" coastlines, hard structures do not provide sediment for the alongshore drift, mainly by harbour and marina protection structures. • Incoming wave reflection by hard structures that hamper energy dissipation and augment turbulence resulting in increased cross-shore erosion. • Wave diffraction, which is the alteration of the wave crest direction due to the vicinity of seaward structures (such as jetties or breakwaters). <p>Experience has demonstrated that some of the measures adopted to avoid or minimise erosion have at the same time caused erosion problems in the surrounding areas.</p> <p>Together with the other measurements related to coastal erosion, this measurement will allow us to examine the need, utility and importance of the protection structures in the coastal zone in achieving the conservation purposes of the coastline. It will serve as an attempt to improve on local measures related to non-local causes of coastal erosion and to anticipate the impact of erosion management measures. This measurement has been introduced to distinguish between structures built with merely a protection function and structures built for other purposes rather than for protection against erosion but with a clear effect on coastal erosion (such as harbours).</p>	
Parameters	
(i)	Ratio of the artificialised coastline length (hard structures only, considering harbours and other protective structures separately) to the total coastline length

Coverage	
Spatial	Temporal
Entire coastline for the reference region. An appropriate reference scale would be 1:10.000 scale map but scales of up to 1:50.000 can be used if the first one is not available. The reference scale of the base maps must be the same for the measurements of artificialised coastline length and total coastal length.	Baseline measurement of around 1995 and 2005. If not available, consider the most recent measurement to make a picture of the state of the coast.
Data sources	
<p>National mapping agency/sources</p> <p>Administrations responsible for the environment or coastal management.</p> <p>CCE 90 and EUROSION.</p> <p>Bearing in mind the definition, which pre-supposes a resolution of at least 100m, the approaches to observing artificialisation are based either on aerial photography or on very precise cartography. The use of civil remote sensing for the fine assessment of these phenomena is hardly realistic.</p> <p>Source data have to be rigorously checked and corrected. Double control on the quality of the produced database should be currently ensured.</p>	
Methodology	
Steps	Products
1. Choose an adequate base map with the appropriate reference scale. Select all the coastline segments ⁽¹⁾ and combine them in order to obtain the summation of the total length ^(2, 3) .	Total coastline length of the reference region
2. Identify protected (or defended) coastline - all harbours and protective structures (seawalls, dykes, breakwaters, jetties or any hard and rock-armoured structures). Sample (collect) layers for the coastline segments that are considered as harbours and protective structures ^(2, 3) .	<u>Location and extent of protected and defended coastline, classified as harbours or as protective structures. Thematic Map.</u>
3. Add up the coastline lengths of harbours and of other protective structures ^(2, 3) .	A number that estimates the length of protected and defended coastline, classified as harbours or as protective structures.

4.	Divide the product of step 3 by the product of step 1 and multiply it by 100.	<u>Percentage length of protected and defended coastline (harbours and protective structures), as a proportion of the total coastline length (Graph 1).</u>
Presentation of the data		
Maps	Base map with the location and extent of protected and defended coastline in the country or reference region. This map will show the artificialisation trends along the coastline divided into 2 categories - harbours and protective structures.	
Graph 1	Bar chart showing the trend in coastal artificialisation - length of protected and defended coastline (harbours/other protective structures) as a percentage of the total coastline.	
Adding value to the data		
(i)	Length of not hard artificialised (natural and soft artificialised) coastline	
(ii)	Length of not hard artificialised (natural and soft artificialised) coastline per body of surface water ⁽⁴⁾	
Aggregation and disaggregation		
Harbours and other hard structures can be aggregated in a unique class (artificialised coastline) but it is recommended to distinguish between both since they differ in their primary function - the first one (harbours) are built for the confinement of water masses, apart from safety and navigation, whereas others have a strictly protective function against coastal erosion.		

Notes

- (1) The term “coastal segment” is used because it greatly depends on the coastline calculation method used and the size may vary in accordance with the techniques employed.
- (2) In measuring the length of the coastline, all artificial structures (harbours, dykes, etc) should be projected to the baseline and, as such, the part of the coastline covered by this projection should be counted as protected by artificial structures. It is very important that, the sum of artificialised coastline length plus non-artificialised coastline length, must equate to the total coastline length.

- (3) A linear coastal segment is considered to be artificialised (protected or defended) when one part or the whole of a zone 100 metres long to either side of the segment is or has recently been, subject to man-induced physical changes modifying the original physical condition (dwelling, infill, various facilities).
- (4) The Water Framework Directive 2000/60/EC defines the “Body of surface water”. This implies a discrete and significant element of surface water such as a lake, a reservoir, a stream, river or canal, part of a stream, river or canal, a transitional waterway or a **stretch of coastal water**. Therefore, the necessary implementation of the Directive divides the coast into stretches of uniform coastal water masses according to the criteria of Annex II of the Directive and the COAST guidance document.