REGIONE LIGURIA

L'Europe en Méditerranée
Europe in the Mediterranean

MAREMED

PROPOSAL
ON DATA AND
CARTOGRAPHIC TOOLS
May 2013

STANDARDISATION AND HARMONISATION OF A DATASET
THE COASTLINE
(DT03.13)

Abstract

As final activity of the pilot project the INSPIRE specification for the coastline dataset was put in practice. The partners verified how to standardise and harmonise the datasets already existing in their catalogue. Regione Liguria developed and published a coastline dataset INSPIRE compliant.

PART I

Coastline dataset harmonisation

As final activity for the pilot action we decided to work on a dataset according to the INSPIRE specifications. Our aim was to understand how heavy would be to undertake this task in terms of data processing.
We choose the *coastline* dataset, whom specification we discuss in the previous document.

According with the "Sea Regions" data specification each partner was asked to derive from its coastline a new dataset with a minimum data structure described as follows:

- geographicalName
- hydroId
- waterLevel (for the coastline is the high mean water level)
- shoreClassification
- shoreStability (void for the moment; we didn't think interesting or useful this characterization for the coastline at a regional level).

The following partners participated to this activity:
1. Regione Emilia Romagna
2. Regione Lazio
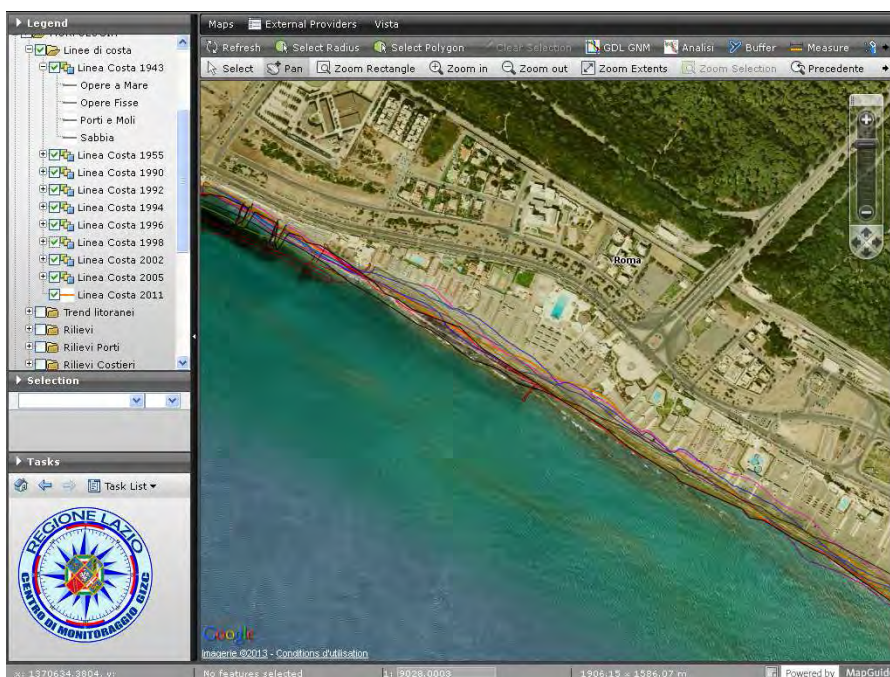3. Regione PACA
4. Regione Liguria.

1) Regione Emilia Romagna (RER) has an Information System on the sea and coast.
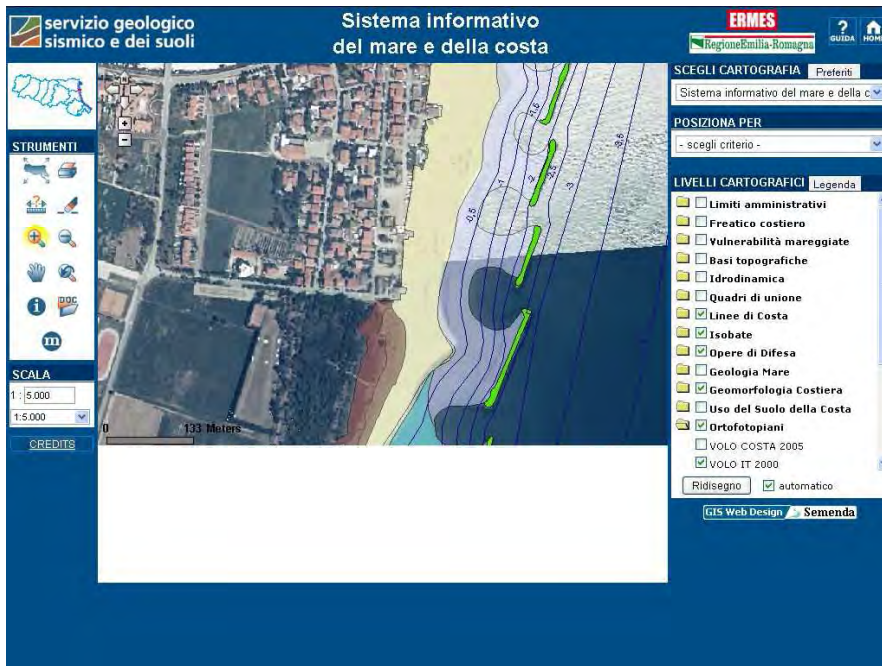
The correspondences between the attributes of coastline datasets and the SHORE SEGMENT attributes provided by INSPIRE are shown below

COD _FIS_CARATT	SHORE TYPE CLASSIFICATION VALUE
River mouth	*estuaryRiverMouth*
Harbour	*harbourLimits*
Rock armour	*artificialCoastline*
Seawall	*artificialCoastline*
Sandy beach	*sand*
armoured dune	*artificialCoastline*

2) Regione Lazio has a webgis platform where most of the coastal themes are available.

The Region has already a data structure substantially compliant with the INSPIRE specifications for the shorelines (see the relation scheme below):

Schema Relazionale

Comuni
- Montalto Di Castro
- Tarquinia
- ecc....

Provincia
- Viterbo
- Roma
- Latina

Classificazione Tipo Opera
- ➢ Difesa Longitudinale
- • Difesa Trasversale
- ➢ Difesa Mista
- • Opera Portuale
- • Foce Armata
- ➢ Ripascimento

Difesa Longitudinale
- • Barriera non aderente
- • Barriera aderente

Ambito Litoraneo
1. Tuscia
2. Tevere Nord
3. Tevere Sud
4. Pontino
5. Sisto-Portatore
6. Liri Nord
7. Isole

Scheda Costa
- ➢ ID
- ➢ Regione
- ➢ Provincia
- ➢ Comune
- ➢ Ambito Litoraneo
- ➢ Tipologia Costa
- ➢ Morfologia
- ➢ Retrocosta
- ➢ Materiale
- ➢ Prog1
- ➢ Prog2
- ➢ Note
- ➢ Data
- ➢ Aggiornamento
- ➢ INSPIRE

Codice Opera
- • IT12056035
- • Ecc.....

Ripascimento
- • Naturale
- • Libero
- • Protetto
- • Armato

Difesa Mista
- • Barriera soffolta e
- • Pennelli a T
- • Pennelli a L
- • Altro

Tipologia Costa
- • Naturale
- • Artificiale *
- • Protetta
- • Fittizia
- • Limiti Portuali

Artificiale   **Protetta**

Conformazione
- • Riflettente
- • Poco riflettente
- • Sversamento nat

Posizione L.M.M.
- • Emersa
- • Sommersa
- • Semi Sommersa
- • Mista

Morfologia
- • Alta (Falesia attiva)
- • Bassa
- • Foci armate
- • Estuario *

Scheda Opere
- ➢ Codice
- ➢ Classificazione–
- ➢ Conformazione
- ➢ Posizione L.m.m.
- ➢ Riferimento Interventi

DB -
- ➢ dati

Retrocosta
- • Antropizzato
- • Duna antropizzata
- • Duna e Bosco
- • Duna e Laguna
- • Scarpata
- • Falesia (morta)
- • Zona Agricola
- • Zona Industriale
- • Bosco
- • Spiaggia

Tipologia Materiale
- • Sabbia *
- • Ciottoli/Pietrisco *
- • Roccia *
- • Massi naturali
- • Massi artificiali
- • Cls/c.a.
- • Geotubi
- • Altro

- ➢ INSPIRE
- ➢ INSPIRE_Hid
- ➢ INSPIRE_Theme
- ➢ INSPIRE_Type
- ➢ INSPIRE_STC
- ➢ INSPIRE_WLV
- ➢ INSPIRE_SSV

Shore Stability Value
- • Stable
- • probableErosionTrend
- • ConfirmedErosionTrend
- • probableAccretionTrend
- • confirmedAccretionTrend
- • Unknow

Shore Type Classification
- • Estuary
- • Rock
- • Sand
- • TidalMarsh
- • narrowVegetisedShore
- • artificialCoastline
- • HarbourLimits
- • Gravel
- • Mud

(* INSPIRE COMPLIANT)

As can be seen, the Lazio Region is oriented to reserve a specific slot for INSPIRE Sea Regions DS items related to Shore Type Classification (Estuary, Rock, Sand, TidalMarsh, narrowVegetisedShore, artificialCoastline, HarbourLimits, Gravel, Mud) , although many items are equal to the already existent ones. That because the foreseen items in Sea Region DS concern different aspects (morphology, sedimentology, infrastructures, etc.) that the Region prefer to keep distinct.

3) Région Provence-Alpes-Côte d'Azur (PACA), as all French regional administration, didn't produce a coastline dataset, but has access to several datasets produced and owned by the SHOM (*Service Hydrographique et Océanographique de la Marine)* and by the IGN *(Institut Géographique National)* at different degrees of precision (from 1/25000 to 1/5000).
Recently PACA Region participated with SHOM and IGN to the national programme Litto3D which is aimed to realise a digital model of the coastal zone (a continuous strip of sea and land) with the LIDAR technology. The restitution of the survey is going to be finalized.
From this activity it will be possible to the Region to have a proprietary coastline that will be be INSPIRE compliant.

4) In Regione Liguria Territorial Information System there are several coastline datasets. They were derived:
- from the aerial photogrammetric surveys the Region carries on every 10 years for various purposes (mainly the building activity control)
- from the National Cartographic Portal, more recent (2009) but less detailed.
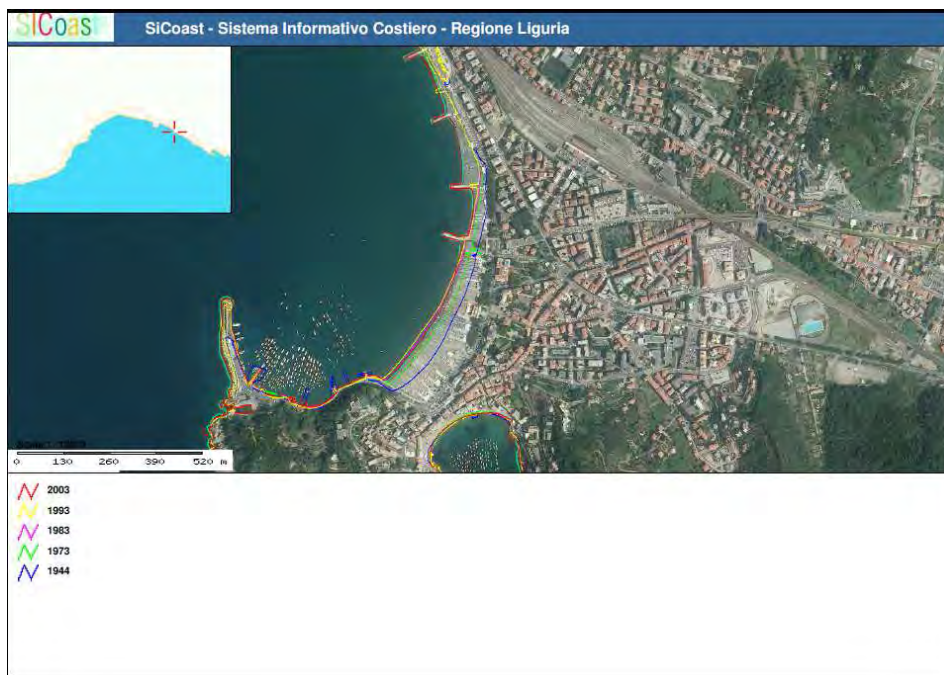
The 2003 coastline was chosen. The geometry was controlled and gaps filled.

Since the dataset hasn't attributes, the coastline was crossed with the dataset "Characterisation of the coast" which describes the physical characters of the coast

In the next table the correspondences with the INSPIRE specification for the Shore type:

COD_CARATT_FIS	SHORE TYPE CLASSIFICATION VALUE
BATTIGIA ROCCIOSA	rock
CORSO D'ACQUA PRINCIPALE	estuaryRiverMouth
CORSO D'ACQUA SECONDARIO	estuaryRiverMouth
COSTA ALTA	rock
SCOGLIERA ARTIFICIALE	artificialCoastline
SPIAGGIA CIOTTOLOSA	gravel
SPIAGGIA SABBIOSA	sand
TERRAPIENO	artificialCoastline

In the table below the cross reference table for the attributes in italian and English:

NOME CAMPO	TIPO	OBBLIGATORIO
ID	AutoNumber	S
LIVELLO_MARE	Text (5)	N
CARATT_FIS	Text (200)	N
STABILITA	Text (200)	N
NOME_GEOGRAFICO	Text (200)	N
ID_CORSO_ACQUA	Text (50)	N

NOME CAMPO	TIPO	OBBLIGATORIO	NOTE
inspireId	STRING	S	
waterLevel	STRING	N	Valorizzato con il valore costante MLS
shoreClassification	ENUM	N	dominio: ShoreType Classification Value
shoreStability	ENUM	N	dominio: Shore Stability Value
geographicalName	STRING	N	
hydroId	STRING	N	

The field *Shorestability* is void.

The field *Hydroid* is filled in just for the main rivers, since the hydro network mapping is in development.

The database was firstly worked in Access, then transferred in Oracle.

Eventually the dataset with metadata and services was published on the regional webportals (Cartography, Geoportal and Opendata).
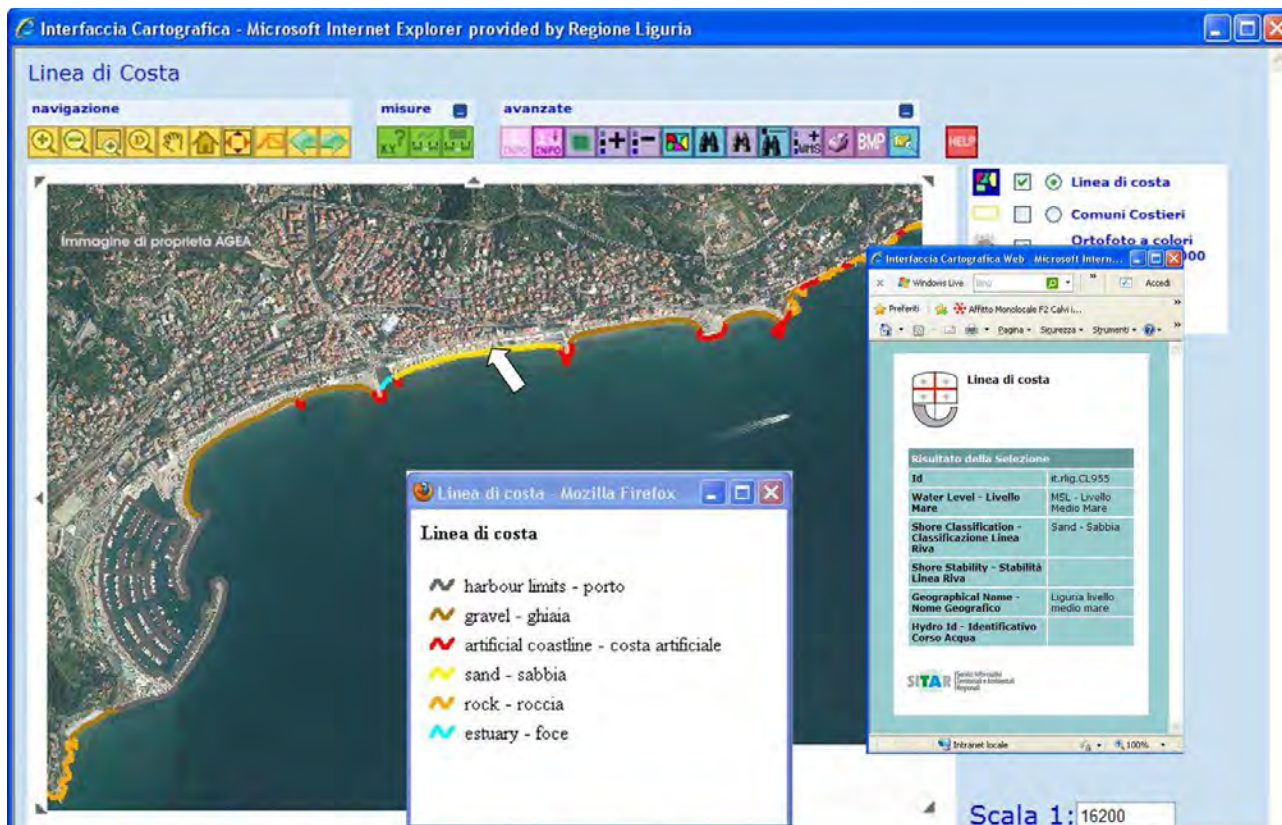
PART II
Suggestions for the coastline features integration

Regione Emilia Romagna coastline dataset has other attributes not considered in INSPIRE that should be considered:

Protection _type	SHORE TYPE PROTECTION VALUE
FITTIZIA	fictiveShore
PROTETTA	protectedShore
NATURALE	naturalShore

Fictive shore: it corresponds to river mouth, harbors, estuaries
Protected shore: where hard coastal defense dominate
Natural coast: no defense works
The classification was suggested by the "ATLANTE DELLE SPIAGGE ITALIANE" (APAT)

In addition to this, the RER suggested to develop the discussion on the attribute *Shore Stability Value,* which must be referred to another shoreline as reference
To assess the erosion trend RER proposes also to shift to an alternative classification based on shoreline change rate

EROSION_TREND	SHORE erosion intensity	Annual variation (meters)
stable	**stable**	± 2,5
strong erosion	***strongErosionTrend***	>5
moderateerosion	***moderateErosionTrend***	2,5-5
strongaccretion	***strongAccretionTrend***	>5
moderateaccretion	***moderateAccretionTrend***	2,5-5

The method of analysis is based on the application of the Digital Shoreline Analysis System (DSAS) from USGS:

- it computes rate-of-change statistics from multiple historic shoreline positions along transects regularly spaced
- It needs homogeneous mapping of shorelines
- two or more shoreline are necessary for analysis

In this way two more attributes are necessary, i.e. the year and the time interval of reference for the erosion analysis.

PROPOSAL
ON DATA AND CARTOGRAPHIC TOOLS
(DT02.12)

Abstract

The public data standardization and harmonisation process must follow the INSPIRE specifications. This document aims to deepen the knowledge of the state of the art of the specifications for the coastal themes in order to:

- achieve the goal of a standardisation INSPIRE compliant of some datasets among the MAREMED partners;
- verify, from the point of view of the Mediterranean regional administrations, the utility of the attributes given to a typical coastal data, as the coastline;
- facing with a lack of involvement of the Mediterranean regions in the coastal issues at EU level, be recognized as entities that build a manage datasets in the same way as others more involved, as national hydrographical and marine mapping agencies.

PART I
INSPIRE and a typical coastal data: Shoreline and Coastline

In the previous report on data and cartographic tools (DT01.12) we chose an information level interesting for the coastal management (coastline) as a pilot dataset to see which references there are at the level of data specification in INSPIRE

References on the shore and coastline can be found in some INSPIRE data specifications as **Elevation**, **Land cover** (both in Annex II) and **Hydrography** (Annex I), but the document that reference more specific the argument is the INSPIRE "Sea regions" data specification[1].

So far the last document is "D2.8.III.16_v3.0.0 INSPIRE Data Specification on *Sea regions – Draft Guidelines*" dated 2012/07/02 and available on the INSPIRE website.

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[1] "The INSPIRE Sea Regions theme describes what most people would refer to as "the sea" and "the coastline". The Sea Regions model allows for the concept of named seas e.g. "Black Sea" and shorelines e.g. "Italian coastline at mean high water". The model also provides a generic framework for describing subdivisions and aggregation of seas according to physical or chemical properties; for example, areas of sea according to their mean temperature, or areas with similar sediment characteristics. The Sea Regions theme also provides mechanisms to describe areas of sea bed or sea surface e.g. oil spills, or sea ice.
Importantly, the Sea Regions theme also provides common definitions for the shore/coastline at different tidal states." (from D2.8.III.16_v3.0.0, page VI)

In addition to the definition of "sea region"[2] (Mediterranean sea is an example of sea region) and other concepts this document provides a common definitions for shore/coastline at different tidal state.

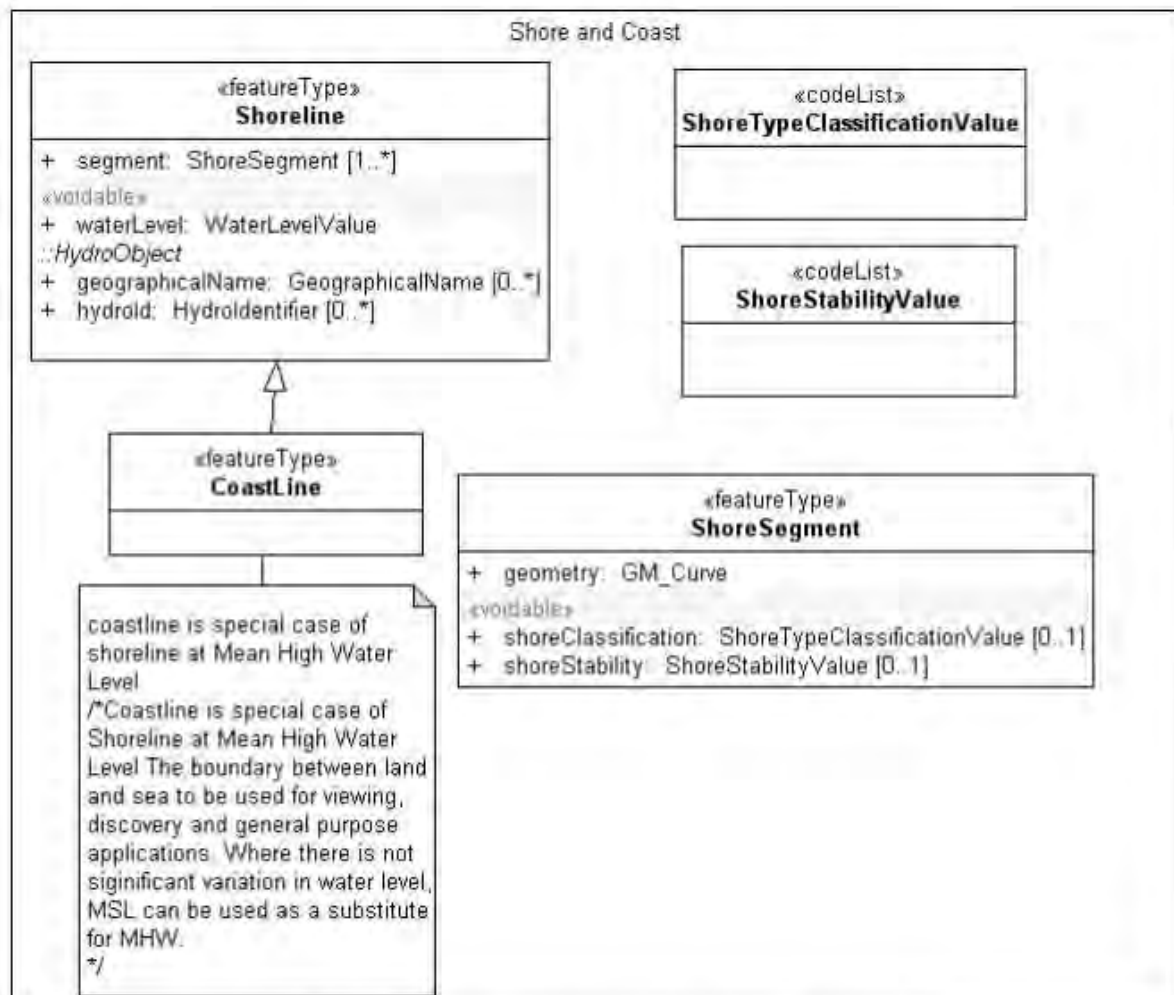Shore and Coast are defined in the following UML diagram:

Figure 6 Coastlines and Shorelines UML overview

According to the data specification each Shore/CoastLine ShoreSegment should have at least the following attributes:

- geographicalName: at regional scale e.g. "Liguria Mean Sea Level"
- hydroId: unique identifier
- waterLevel: see below for the case of Mediterranean Sea Region
- shoreTypeClassification: a value of 5.2.3.2 table
- shoreStability: a value of 5.2.3.3 table

In terms of data specification a strong relationship has been defined between Sea regions and Hydrography. Objects belonging to the various INSPIRE themes who share the attributes of the abstract spatial class HydroObject are shown in the following UML diagram (from INSPIRE data specification on Hydrography):

INSPIRE	Reference: INSPIRE_DataSpecification_HY_v3.0.1.pdf		
TWG-HY	INSPIRE Data Specification on *Hydrography*	2010-04-26	Page 13

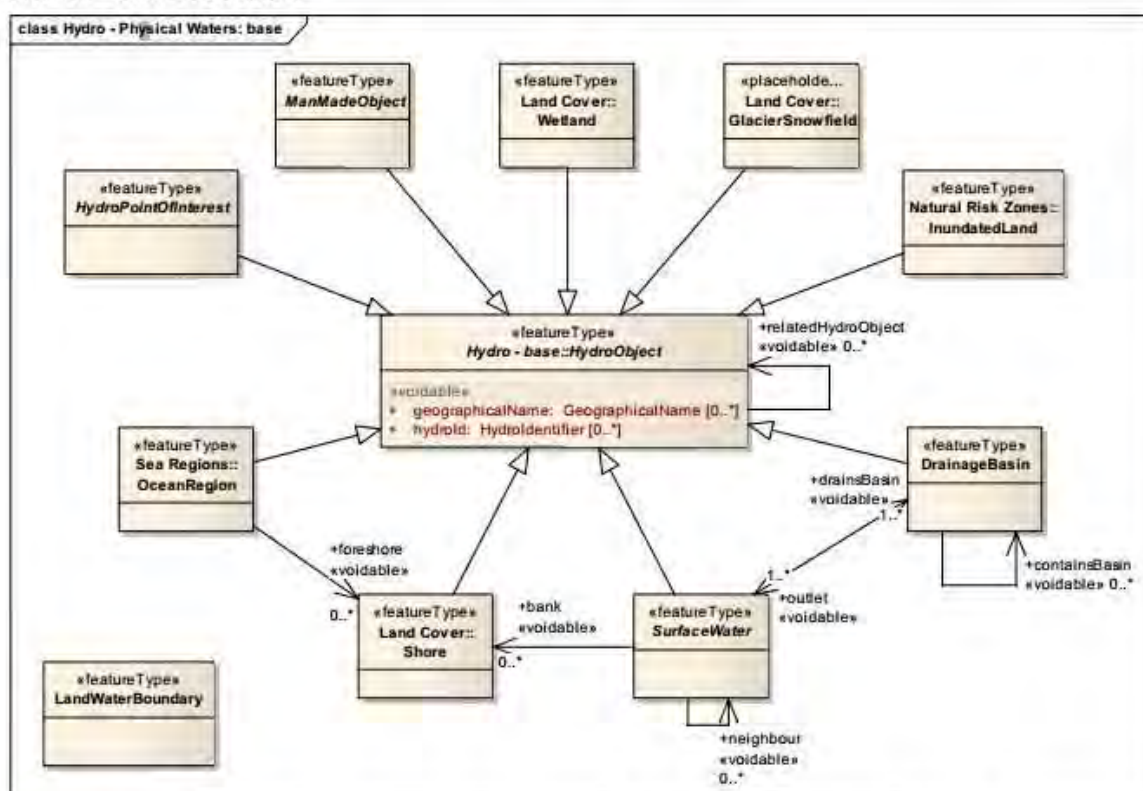### 5.3.1.2 UML Overview

Figure 6 – UML class diagram: Overview of the 'Hydro – Physical Waters' application schema

Inside the Sea Regions data specification, in addition to the attributes (*geographicalName*, *hydroId*) shared with other objects of the base class Hydro-Physical Waters, we have other two attributes provided for the type and stability of the coastline. In the following tables we have the list of values for *shoreTypeClassification* and *shoreStability* as defined inside the data specification document.

5.2.3.2. Values of code list ShoreTypeClassificationValue

Value	Name	Definition	Description	Parent value
estuaryRiverMouth	estuary	Shore type is estuary/river mouth		
rock	rock	Shore type is rock		
sand	sand	Shore type is sand		
tidalMarsh	tidal marsh	Shore type is tidal marsh		
narrowVegetisedShore	narrow vegetised shore	Shore type is narrow vegetisedshore		
artificialCoastline	artificial coastline	Shore type is artifical		
harbourLimits	harbour limits	Shore type is harbour limits		
gravel	gravel	Shore type is gravel		
mud	mud	Shore type is mud		

5.2.3.3. Values of code list ShoreStabilityValue

Value	Name	Definition	Description	Parent value
stable	stable	Stretch of shore is stable		
probableErosionTrend	probable erosion trend	Stretch of shore is		
confirmedErosionTrend	confirmed erosion trend	Stretch of shore is confirmed to be eroding		
probableAccretionTrend	probable accretion trend	Stretch of shore is probably accreting		
confirmedAccretionTrend	confirmed accretion trend	Stretch of shore is confirmed to be accreting		
unknown	unknown	Stability of stretch of shore is unknown		

What has to be considered as value for *waterLevel* attribute is explained in the following scheme[3]:

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[3] LAT and HAT are the lowest and the highest astronomical tide, MHWS and MLWS the Mean high and low water springs, MHWN and MLWN the Mean high and low water neaps, MSL the Mean Sea Level.
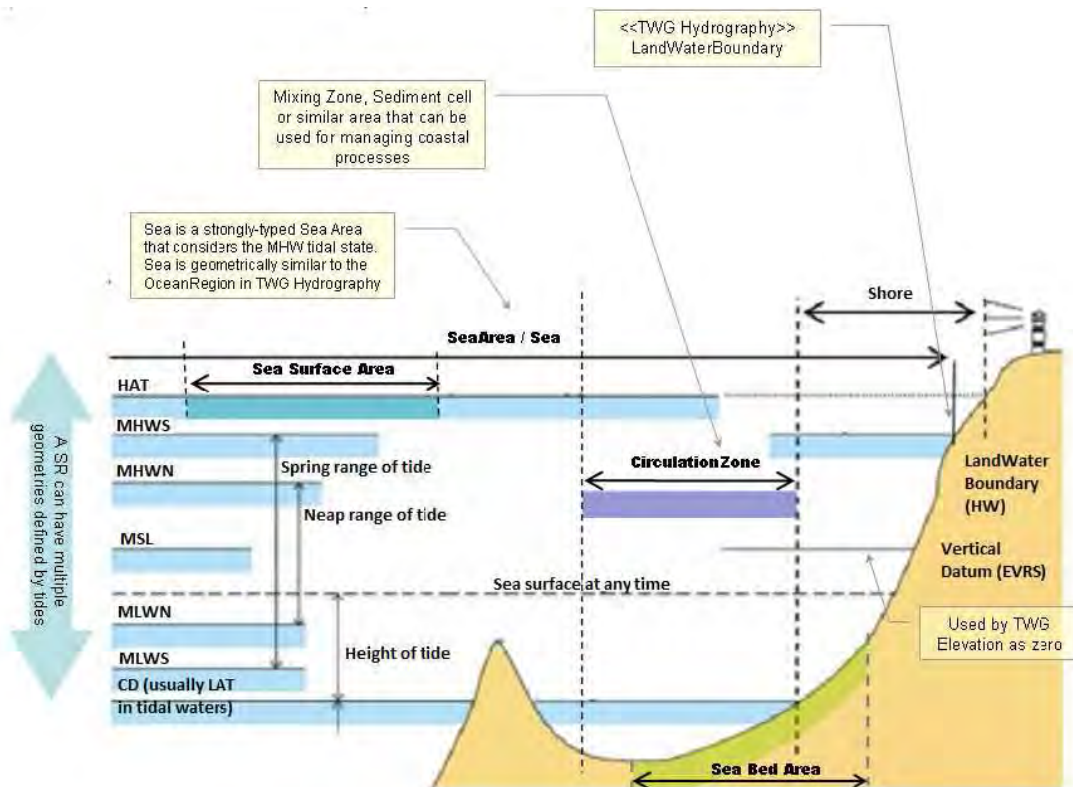
Figure 1 Sea Region types and extent for different tidal states (adapted from IHO H20)

Critical points

In the previous report we found that all the partners manage shoreline data. Most of them have historical series for the assessment of the dynamical trends of the coast.

First of all, as the coastline is defined as a *"the shoreline at Mean High Water. Where there is not siginificant variation in water level, MSL can be used as a substitute for MHW"*, we have to consider if in the data acquisition the tidal influence was taken in account or, from another point of view, the use we make of the shoreline can do without the tidal variation.

For the Mediterranean sea region we are maybe in the case where the change of sea level is not significant and any data acquisition can be considered as done at the Mean Sea Level (MSL)[4].
This will be consistent with the

> **Recommendation 20** Where an area has no appreciable tidal range then MSL can be used in alternative to MHW.

From this assertion the acquired data should be considered always as coastline (shoreline and coastline share the same *ShoreSegment*).

A)This should be a first agreement for the harmonization of our data.

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[4] this is the case of some regions, as Liguria, where the sea level variation due to the tide is negligible

A more critical aspects of the INSPIRE guidelines comes from the fact that specifications are redacted from a nautical more than a land management point of view.

For us to assess the data sources and the scales of data acquisition isn't important as much for its representation in a marine navigation charts but rather for the ICZM.

So the indicative scale and chart level from the following table should be checked carefully especially in case of coastline.

10.1 Data sources and Scales

IHO Chart Level	Indicative Scale	Inspire Hierachy	Inspire Example
Overview (International)	1:2.000,000	1	World
General (International)	1:1,000,000	1	European
Coastal (International)	1:300,000	2	Regional Sea (Mediterranean, Baltic)
Sub-Coastal (International)	1:150,000	3	Sub-regional Sea (Adriatic. Bay of Biscay)
Approach	1:50,000	4	Local Area (Bay of Naples)
Harbour	1:10,000	4	Local harbour area
Berthing	1:3,000	n/a	n/a

The expected content of the data sets at these different scales is given in the following sections:

10.1.1   Level 1 European Scale (~1:1,000,000)
Mandatory Items
Sea to hierarchy level 2
Coastline to hierarchy level 2
Marine Administrative Zone

> Recommendation 1   The aim is to establish a single dataset for each Level 1 sea. Given this aim, MS should agree responsibilities for establishing level 2 datasets that can be integrated to

10.1.2   Level 2/3   Regional Scale (~1:300,000)
Mandatory Items
Sea to level hierarchy 3
Coastline to level hierarchy 3
Marine Administrative Zone

Optional Items
SeaAreas
Marine Circulation Zones
Marine iso-line
Marine layers

10.1.3   Level 4 Local Scale (~1:50,000, ~1:10,000)
Mandatory Items
Sea to level hierarchy 4
Coastline to level hierarchy 4
SeaAreas to level hierarchy 4 (MHWS, MLWS, HAT, LAT)
Marine Administrative Zone

Optional Items
Shoreline (MHWS, MLWS, HAT, LAT expected)
Inter-tidal area
Marine layers
Marine Circulation Zones
Marine iso-line

For the coastline dataset, in some areas of the Mediterranean sea, the dimension of the beaches and coastal areas are so limited that even small changes in the coastline due to erosion can cause the disappearance of the resource (e.g. the Liguria coast or Côte d'Azur .. .).

In this context, the scale of acquisition of this data at the Administrative Regional level must necessarily be detailed in a range from 1:2000 to 1:5000, a detail greater than that proposed in the previous table.

B) It seems rather clear that, for our purposes, the "Local scale" is barely enough

A puzzling feature of the specifications for the coastline is the *ShoreStabilityValue .* The reference for this attribute (see the map below) is CORINE coastal erosion atlas.

SEAREGION – Shoreline.ShoreStability

(Symbology from Corine Coastal Erosion Study)
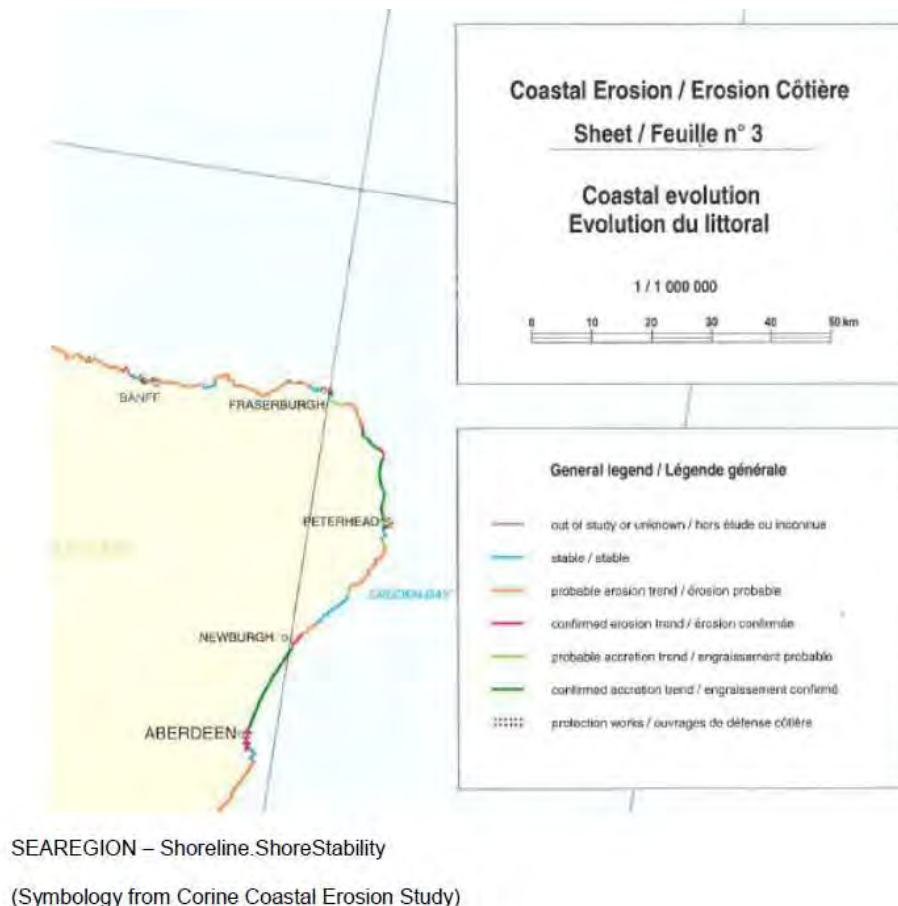
As for the updating, the guidelines say that

10.3.2   Morphodynamics and Coastal Erosion
The SeaRegion specification does not require updating to take account of short term morphodynamics such as those occurring as a result of storm events. In areas of significant long term coastal erosion it would be good practice to provide updates to the dataset at a local scale on a bi-annual basis, but this is not mandated. A qualitiaitve shoreline erosion or accretion trend can be included as an attribute to a Shoreline feature.

While people can agree on the timing of the data acquisition, to integrate the erosion in the coastline attribute could be a tough task. The erosion/ accretion issue seems to be a more important feature that deserve a deepening development.

It's not by chance that the last recommendation of the Guidelines says:

Recommendation 21   Coastal erosion is a European consideration. It needs to be determined how coastal erosion (natural risk zone) links to the Sea Regions specification and how the actual dynamics of coastal erosion are documented.

As a matter of fact it seems to exist a gap between a value *Shorestability* as considered in the Sea regions specifications at a very large scale and the values of a *HazardArea* as described in "D2.8.III.12 INSPIRE Data Specification on Natural Risk Zones – Draft Guidelines" (latest version 30 April 2012), where the coastal erosion issues are not considered but in the code list **RiskOrHazardCategory** for the storm surge.

Value	Name	Definition	Description	Parent value
stormSurge	Storm surge	Water pushed from the sea onto the land caused by an atmospheric disruption such as a hurricane or a rapid change in atmospheric pressure.	Although a storm surge is a kind of flood, it is usually considered as a separated class.	meteorological Climatological

MAREMED partners have developed interesting experiences in the fields both of the coastal dynamics and risk/hazard/vulnerability mapping in coastal area that can be useful to apply in defining coastline attributes as well as the coastal zone at flooding risk.

C) There is the need to define INSPIRE coastline attributes at a regional scale

PART II
INSPIRE and the integrated coastal zone management

Coastal data are spread in the INSPIRE Annexes.
Some years ago the Coastal and Marine Union - EUCC published a report on the INSPIRE Data themes with special reference of the coastal managers needs[5].

The themes were grouped in three tables, according to the importance in the application in the coastal zone; for our purposes it could be sufficient to show the first table:

Table 1

INSPIRE Data Themes considered to be of direct application to coastal information needs

Annex I
Hydrography - Hydrographic elements, <u>including marine areas</u> and all other water bodies and items related to them, including river basins and sub-basins.
Protected sites - Area designated or managed within a framework of international, Community and Member States' legislation to achieve <u>specific conservation objectives</u>. *[Many protected sites exist in the near-shore marine environment.]*

Annex II
Elevation - Digital elevation models for land, ice and ocean surface. Includes terrestrial elevation, <u>bathymetry</u> and <u>shoreline</u>.

Annex III
Area management/restriction/regulation zones and reporting units - Areas managed, regulated or used for reporting at international, European, national, regional and local levels. Includes dumping sites, restricted areas around drinking water sources, nitrate-vulnerable zones, <u>regulated fairways at sea</u> or large inland waters, <u>areas for the dumping of waste</u>, noise restriction zones, prospecting and mining permit areas, river basin districts, relevant reporting units and <u>coastal zone management areas</u>. *[Many waste dumping areas are located offshore, river basin districts often extend into near-shore coastal waters, etc.]*
Agricultural and <u>aquaculture</u> facilities - Farming equipment and production facilities (including irrigation systems, greenhouses and stables). *[Near-shore and off-shore aquaculture facilities will almost certainly have far different data needs (features, location grids, etc.) than on-shore farming.]*
Environmental monitoring facilities - Location and operation of environmental monitoring facilities includes observation and measurement of emissions, of the state of environmental media and of other ecosystem parameters (biodiversity, ecological conditions of vegetation, etc.) by or on behalf of public authorities. *[Coastal environmental monitoring is the focus of numerous actions at the EU level.]*
Natural risk zones - Vulnerable areas characterised according to natural hazards (all atmospheric, hydrologic, seismic, volcanic and wildfire phenomena that, because of their location, severity, and frequency, have the potential to seriously affect society), e.g. <u>floods</u>, landslides and subsidence, avalanches, forest fires, earthquakes, volcanic eruptions. *[Coastal flood plains are an obvious 'risk zone' for which various combinations of data are needed for planning, monitoring and mitigation, e.g. DTMs, bathymetry, meteorological models, etc.].*
Oceanographic geographical features - Physical conditions of oceans (currents, salinity, wave heights, etc.). *[These are especially important in the coastal zone, which is the main geographical location at which they have a direct impact on human populations!]*
Sea regions - Physical conditions of seas and saline water bodies divided into regions and sub-regions with common characteristics. *[All seas have shorelines!]*
Energy resources - Energy resources including hydrocarbons, hydropower, bio-energy, solar, wind, etc., where relevant including depth/height information on the extent of the resource. *[What about the current plan to build thousands of off-shore wind farms?]*
Mineral resources - Mineral resources including metal ores, industrial minerals, etc., where relevant including depth/height information on the extent of the resource. *[Mineral abstraction is another off-shore process that has can have serious negative impact on coastal regions.]*

Maybe not everybody will consider the list exhaustive but certainly these are among the themes we have especially to work on in the future if we want to harmonize our datasets.
Since the specifications for the Annex II and III are still at a draft stage it could be useful to have the occasion to verify our data and our needs.

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[5] www.eucc.nl/en/inspire

The threat, as we saw for the coastline data specification, is to work a lot to harmonized data with scarce or no utility for our day-to-day institutional duties.

To be involved as a Spatial Data Interest Community (SDIC)[6] could be a way to be more represented and a logical development for MAREMED partners.

Beyond SeaRegions, **Area Management/Restriction/regulation zones and reporting units** and **Natural risk zones** seem to be the more challenging themes to be defined to support the integrated coastal zone management.

PART II
CONCLUSION
Harmonization

Accepting the proposals from the data specification in terms of data structure, the first stage of harmonization should provide that each partner would derive from its coastline dataset a dataset with a minimum data structure as described above.

As the *ShoreStability* attribute has the problems we saw above, our activity could be concentrated to derive from the data in our possession the characterization (ShoreTypeClassification) of the coastline according to the INSPIRE specifications. Since this attribute has very schematic values (see map below), the activity could be feasible in the MAREMED budget limits.

SEAREGION – Shoreline.ShoreTypeClassification

(Symbology from Corine Coastal Erosion Study)

The critical points we highlighted in some specifications referred to the coastal data could be the starting point of a future partnership as a Spatial Data Interest Community.

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[6] in the INSPIRE programme a "Spatial Data Interest Communities (SDICs) bundle the human expertise of users, producers and transformers of spatial information, technical competence, financial resources and policies, with an interest to better use these resources for spatial data management and the development and operation of spatial information services.(…). SDICs are best placed to know what spatial data is required in implementing different environmental tasks, ranging from local, regional, and national to Pan-European applications. Role: The involvement of stakeholders can be one or more of the following: keep informed, review INSPIRE deliverables, propose experts, submit reference material, and/or test draft specifications."