# EEA activities related to the coastal atlases – assessments, ICZM evaluation and future plans

Andrus Meiner, EEA

EEA coastal atlases conference, 9-10 July 2008, Copenhagen

# Overview

- EEA activities
- Tools and indicators
- Vision of coastal/marine IS

# We need an integrated approach for our coasts and seas

- Vision of marine and coastal ecosystems
  - ecosystem-based management approach
  - implementation of ICZM, including adaptation to climate change
  - integrated monitoring and assessments

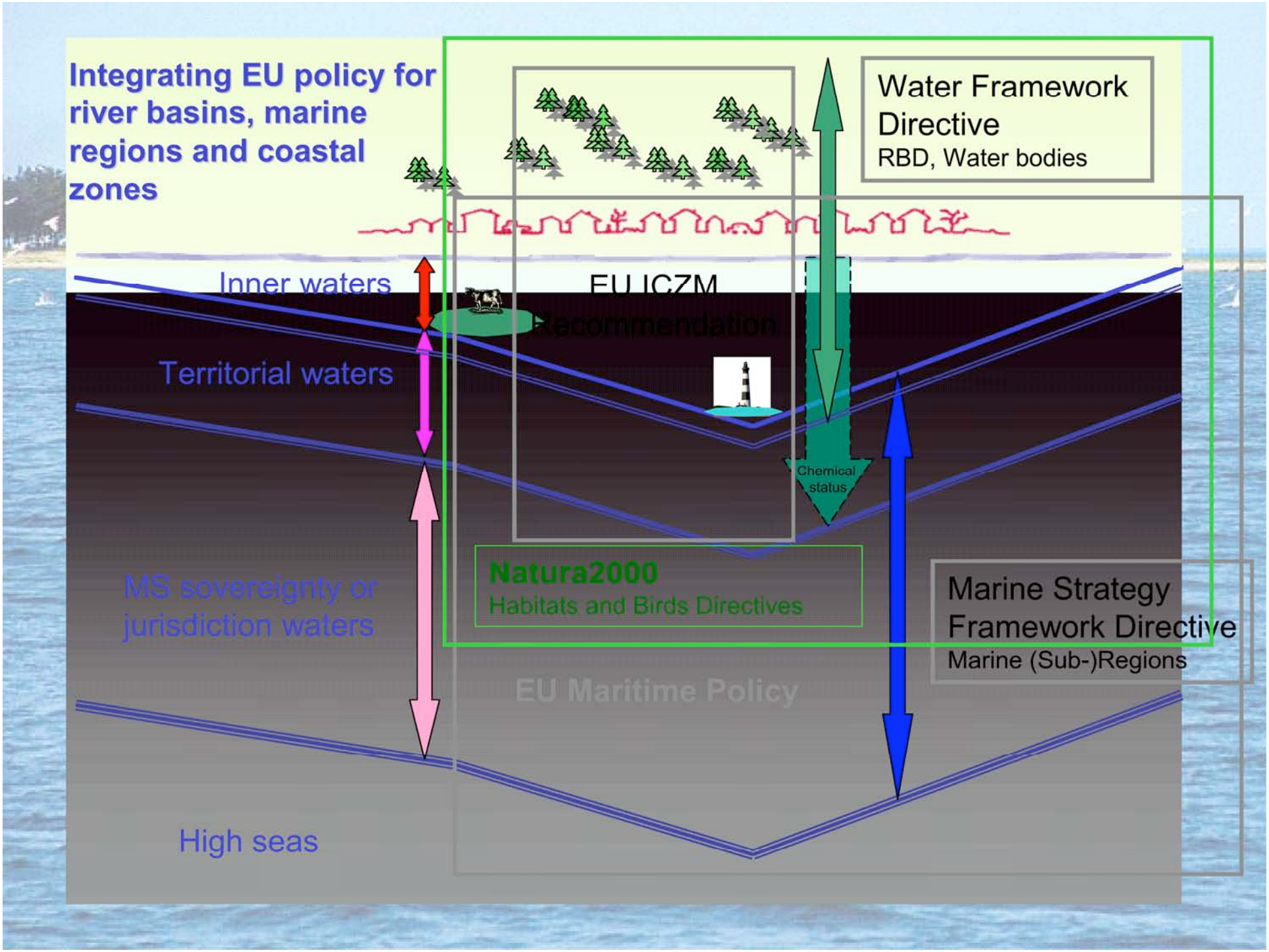
- Vision of common maritime space
  - holistic approach for development of all sea-related activities in a sustainable manner
  - better characterization of maritime areas and introducing maritime spatial planning

# What EEA is doing in relation to coasts and seas?

- **Integrated marine assessments**
- **Assessment of regional and territorial development of coastal areas**
- **Support to the European Commission in relation to**
  - Marine Strategy Framework Directive
  - Broad-scale seabed mapping and European Atlas of the Seas
  - Formation of European Marine Observation and Data Network (EMODNET)
  - Indicators and exchange of experiences and comparative analysis for ICZM
  - Water Information System for Europe (WISE)
  - SEBI2010 and Natura2000 network (e.g. marine and coastal)

# EEA approach for integrated spatial assessment of coastal zones

- Relevant to EU policies
- European focus
- Multi-scale nested approach
- Geospatial data assimilation
- Trend analysis / Accounting
- Environment as entry point
- Ecosystem approach
- Economic sector integration


Integrating EU policy for river basins, marine regions and coastal zones
Water Framework Directive
RBD, Water bodies
Inner waters
EU ICZM
Recommendation
Territorial waters
Chemical status
Natura2000
Habitats and Birds Directives
MS sovereignty or jurisdiction waters
Marine Strategy Framework Directive
Marine (Sub-)Regions
EU Maritime Policy
High seas

# Nested approach: multi-scale analysis

| Governance level | Typical data, spatial resolution |
|---|---|
| Global, pan-European<br>International agreements, global objectives | GlobCover<br>GlobCORINE (reclassified)<br>EuroGlobalMap<br>300 m |
| European market<br>National/regional government<br>Policy design and implementation guidelines, enforcement | GlobCORINE<br>CORINE Land Cover, EuroRegionalMap<br>GMES High resolution LC<br>100 m |
| Local<br>Action and policy implementation, monitoring | CORINE Land Cover,<br>GMES High resolution LC,<br>national sources<br>10 m |

**Land and ecosystem accounting at 3 different interconnected scales**

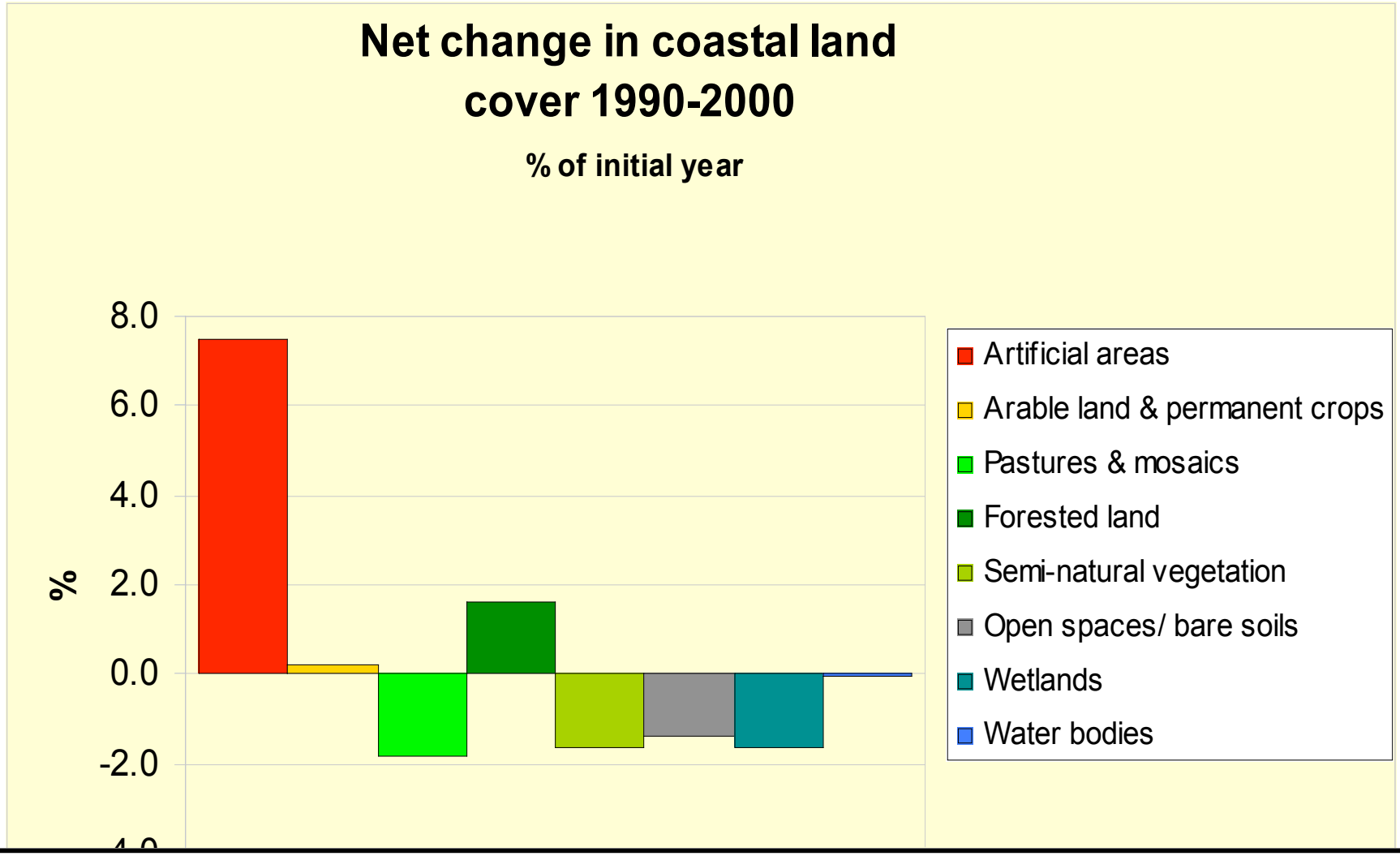
**grids-based statistics**

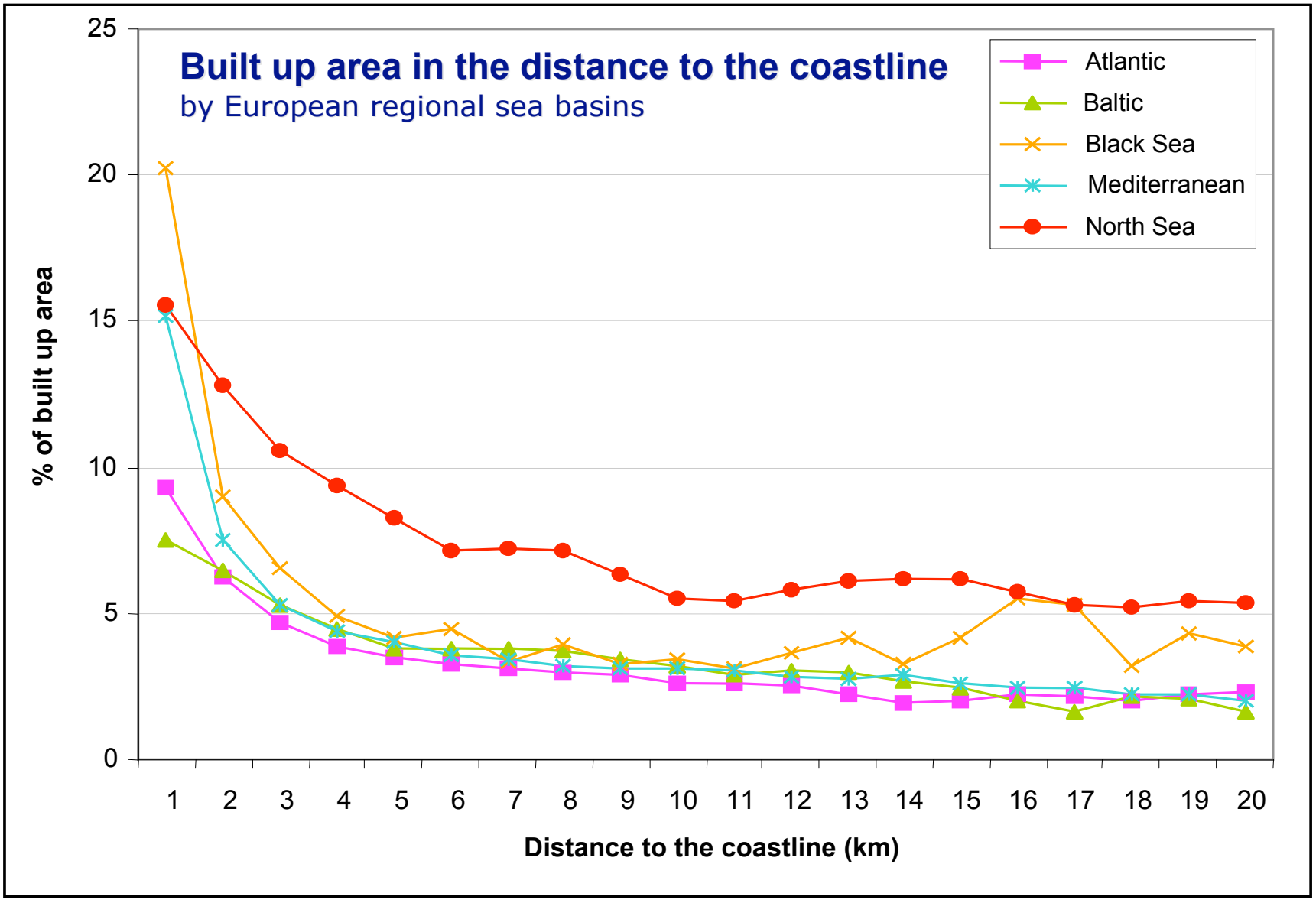
# Example: regional assessment of coasts


**Current use of coasts is not sustainable**

- ***Development of coastal zones***
- ***Services of the coastal zone***
- ***Climate change and need for adaptation***
- ***Policy responses***

# Land accounts: coastal zone




Built up area in the distance to the coastline
by European regional sea basins
Atlantic
Baltic
Black Sea
Mediterranean
North Sea
% of built up area
0
5
10
15
20
25
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Distance to the coastline (km)

# Main messages from EEA report

- Results of quantitative spatial analysis:
  Accelerated land take by built-up areas and infrastructure
- Economic intensification at the coastal zone:
  more space demanded by tourism infrastructure, ports, shipping, off-shore energy, aquaculture, sand extraction etc.
- Awareness raising:
  Coastal services degraded as a result of development and resource use
- Think global, act local:
  Climate change and need for adaptation

# European expert group and indicators

- To support implementation of the EU ICZM Recommendation, the Commission facilitates an **expert group**, which held its first meeting on 3 October 2002
- Set up by the expert group, the **working group on indicators and data** established 2 sets of indicators
  - one aimed to measure progress in ICZM (framework of 31 actions)
  - the other one measuring sustainability on the coast (set of 27 indicators)
- The **role of indicators** was to provide
  - Baseline fixation and facilitating comparison in ICZM
  - Structured approach for national stocktaking
- Communication from the Commission 7 June 2007: An **evaluation** of Integrated Coastal Zone Management (ICZM) in Europe

DEDUCE

Sustainable Development of European Coastal Zones

Partners

**Newsletters :**

News letter nr 1 (Winter 2006)

News letter nr 2 (Fall 2007)

News letter nr 3 (february 2007)

**Main output**

Final Conference ,Brussels, 1st June 2007

Indicators Guidelines

Objectives Partners Background Results - Products Events

**DEDUCE** (Développement durable des Côtes Européennes) is a transnational project concerning Integrated Coastal Zone Management (ICZM), co-financed by the European Commission and the participating regions, in the framework of Interreg IIIC South.

Its main objective is to evaluate the utility of indicators for optimal decision making on the coast, following the principles and criteria established by the EU Recommandation on ICZM.

Nine partners representing all decision-making levels (European, national, regional and local) are carrying out the project, which runs from October 2004 to June 2007.

INTERREG IIIC

ifen

Generalitat de Catalunya Departament de Medi Ambient i Habitatge

Ajuntament del Prat de Llobregat

AJUNTAMENT DE VILADECANS

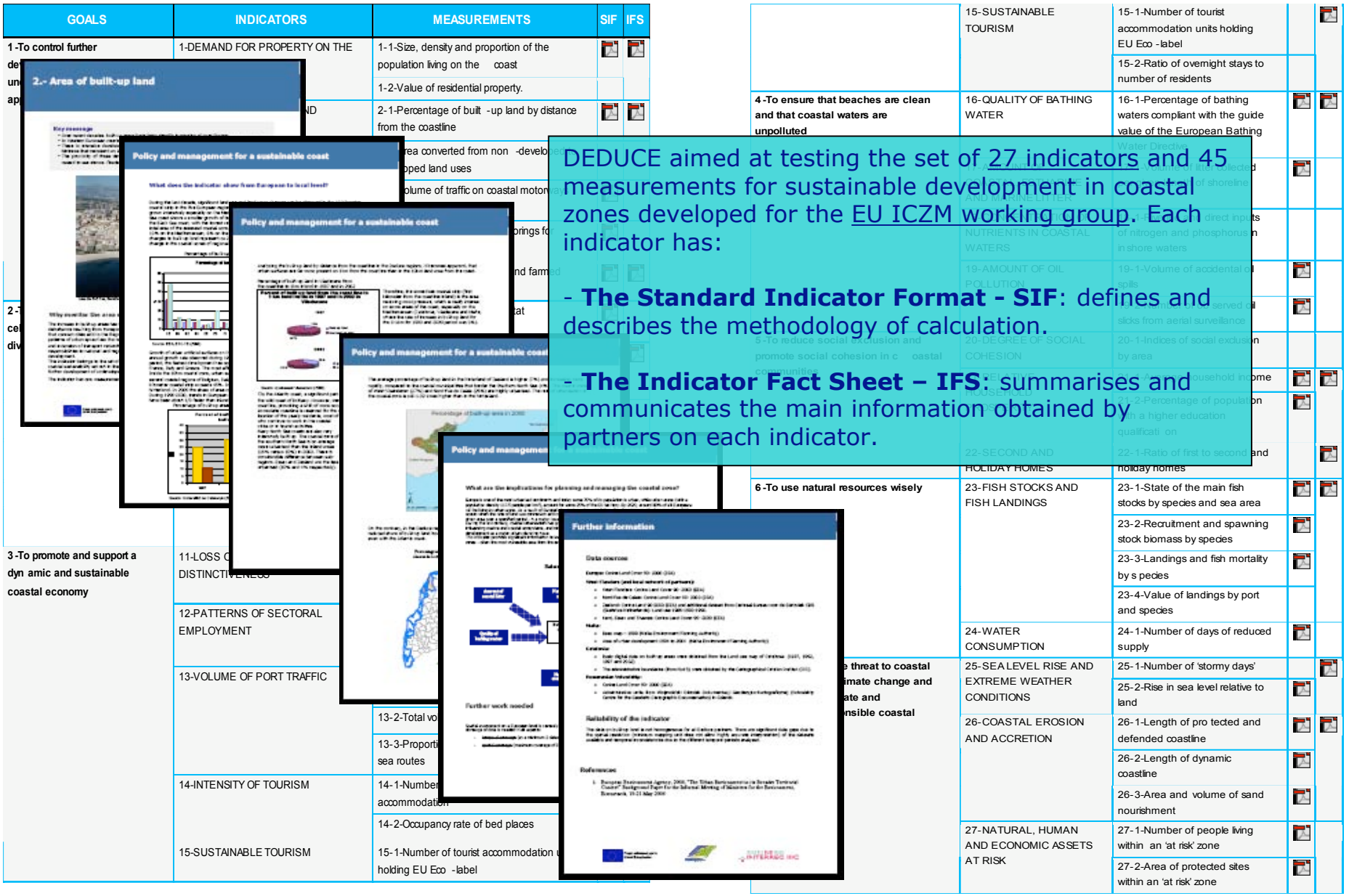
MEPA

West-Vlaanderen

VLIZ

DE KUST

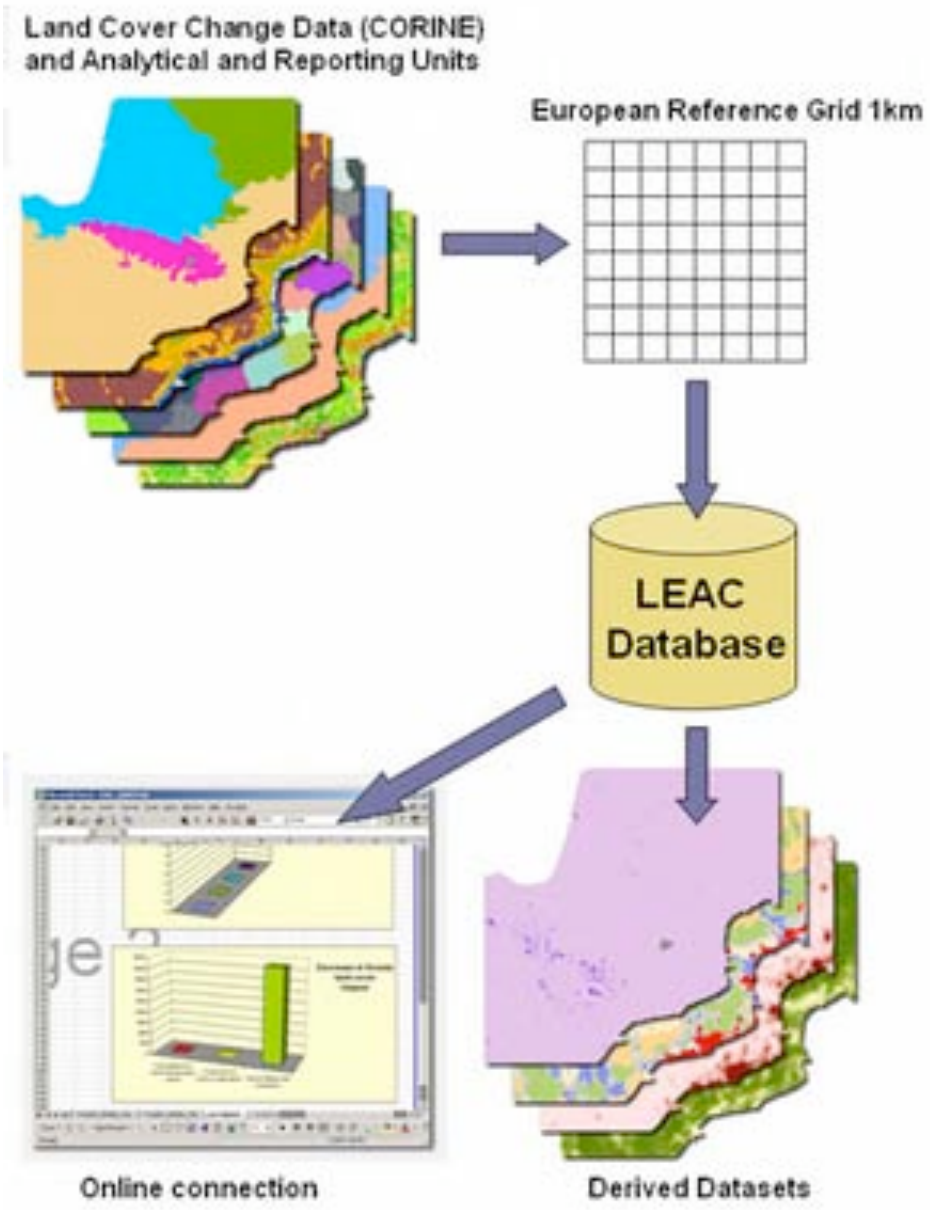
SAIL






http://www.deduce.eu

European Environment Agency




# Land and Ecosystem Accounting (LEAC)

- **Databases**

  The core data of the LEAC project have been structured in a relational database model in order to allow quick and easy analyses. These databases have been made publicly accessible through the Internet

- **LEAC map layers**

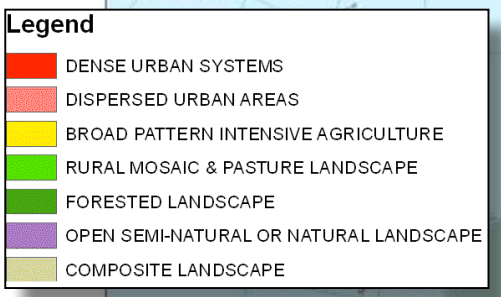
  From the LEAC database, various geographical layers have been derived such as land cover flows, Corilis, the green potential background layer and the dominant land-cover types

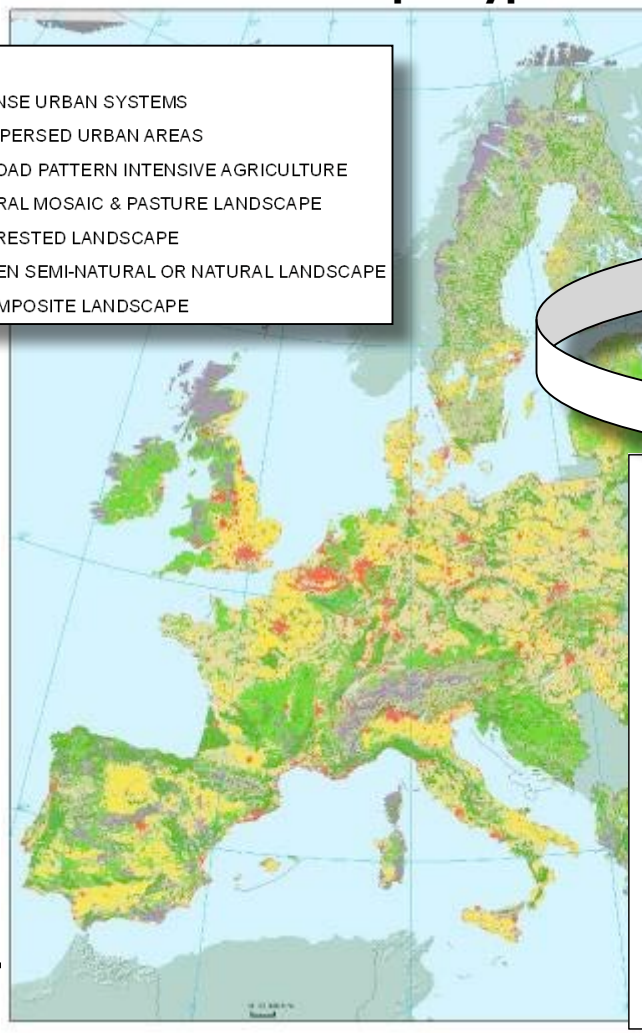
- **Interactive tools**

  Online Analytical Processing (OLAP cube) pivot applications and methodological guidebook

# Mapping & analysing stocks and flows

**Dominant Landscape Types**



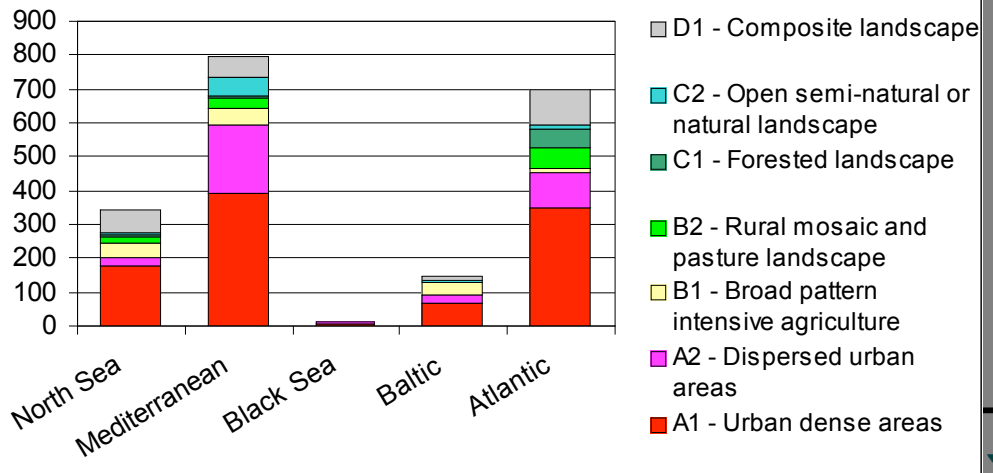



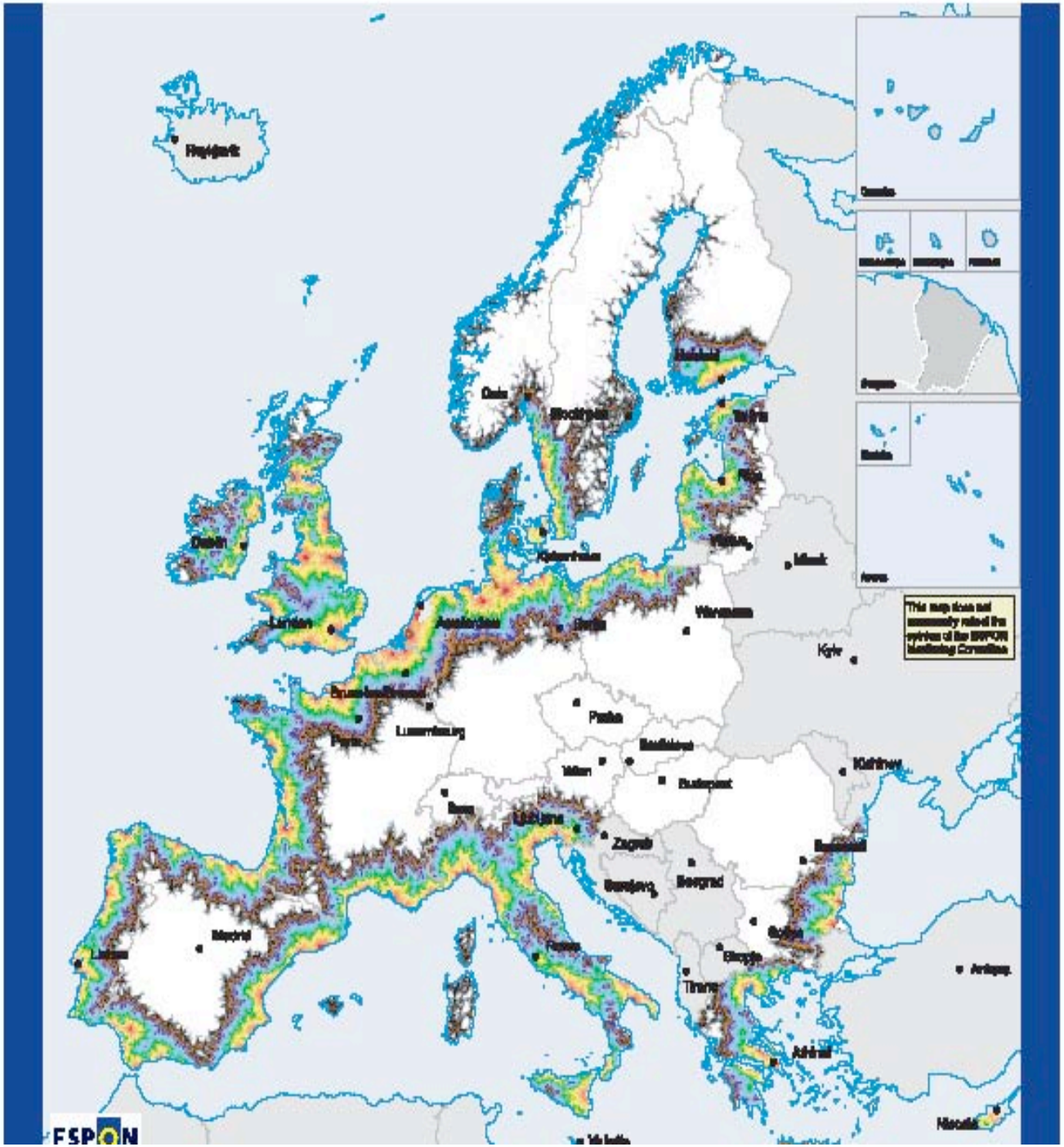
Data held on a standardised 1km x 1km Europe wide grid which enables construction of a different 'zonal accounts' including those for:

- Regions
- Biogeographical zones
- Mountain areas
- Coastal zones
- Major sea basins

e.g

**Sprawl of artificial areas 1990-2000 on Europen coasts, by dominant land cover types, km?**






## Connectivity to commercial seaports

**Connectivity**

- 0'- 10'
- 10'- 20'
- 20'- 30'
- 30'- 40'
- 40'- 50'
- 50'- 1h
- 1h'-1h10'
- 1h10'- 1h20'
- 1h20'- 1h30'
- 1h30'- 1h40'
- 1h40'- 1h50'
- 1h50'- 2h
- 2h'-2h10'
- 2h10'- 2h20'
- 2h20'- 2h30'
- 2h30'- 2h40'
- 2h40'- 2h50'
- 2h50'- 3h

No data available

The connectivity indicator measures the time needed to reach a commercial seaport by car, weighted by the capacity of the port considered, from 0,5 (minimum capacity) to 100 (maximum capacity) Million tons per year, diffused according to the speed of the road links into a grid covering all ESPON space by 2x2 km cells.

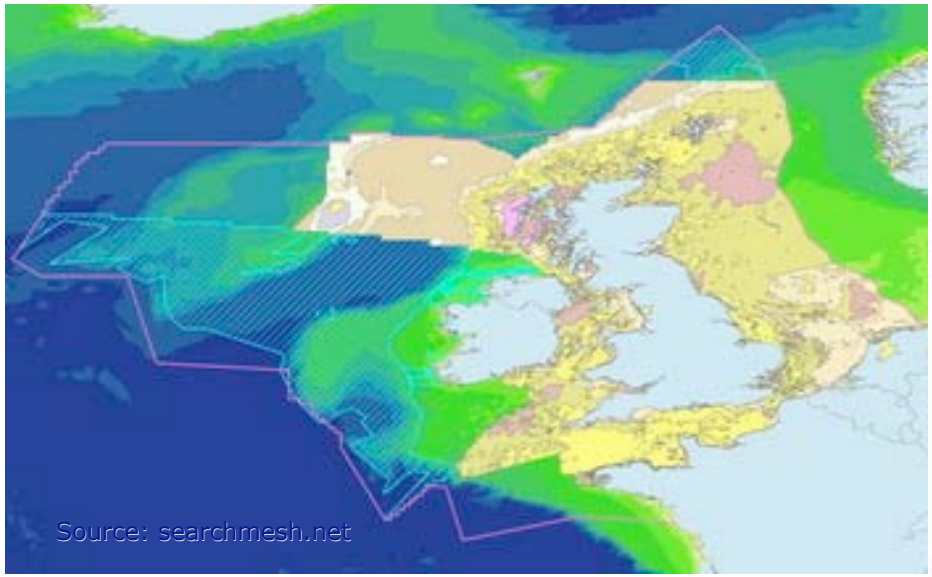

Origin of data: ASSEMBLING graph European Commission

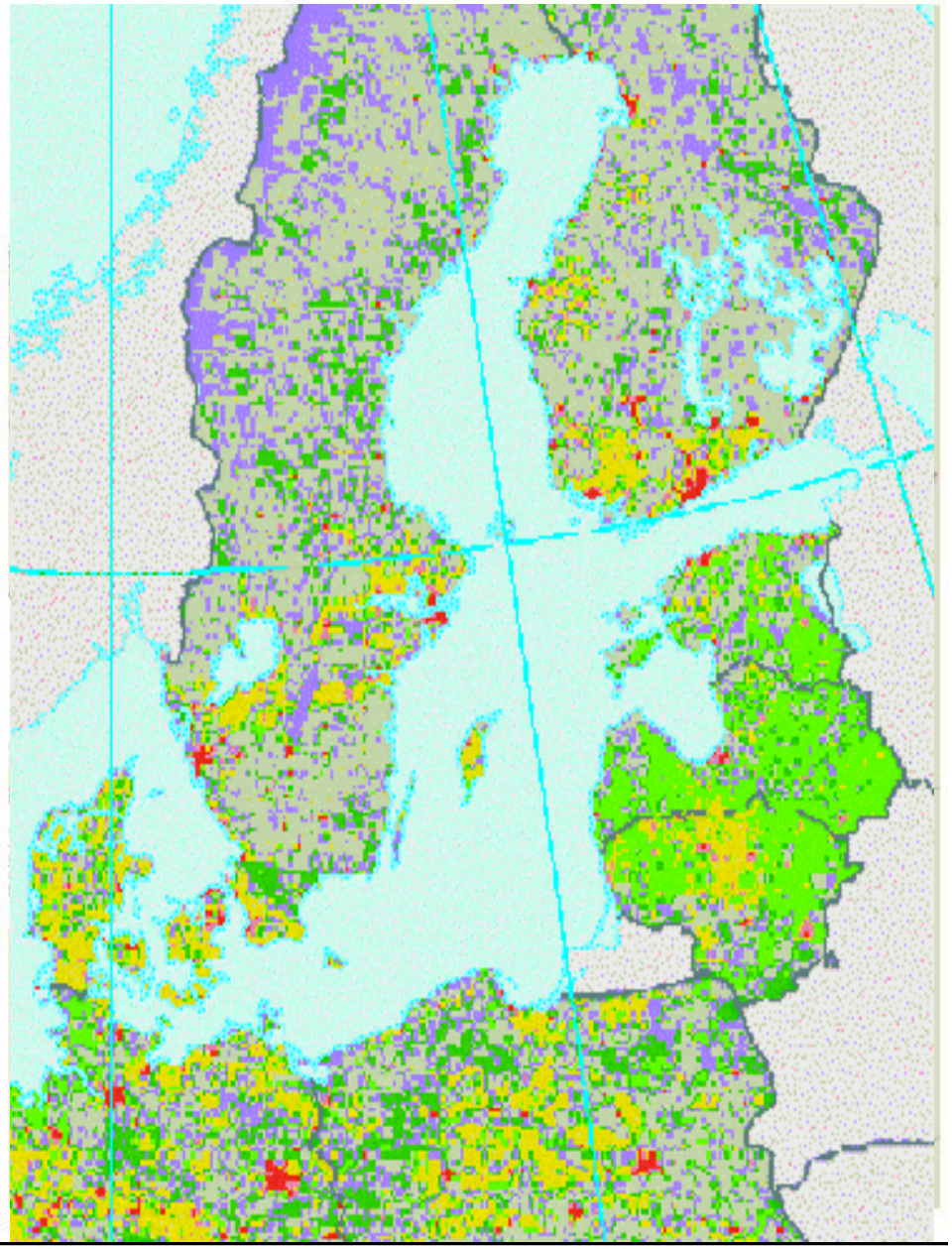
Cyprus: data for government controlled areas only.

**Source: ESPON database**

# Relevant examples from MESH and BALANCE projects

- Seabed map showing EUNIS habitat types
- Benthic marine landscapes → Dominant Landscape Types of the Seas?



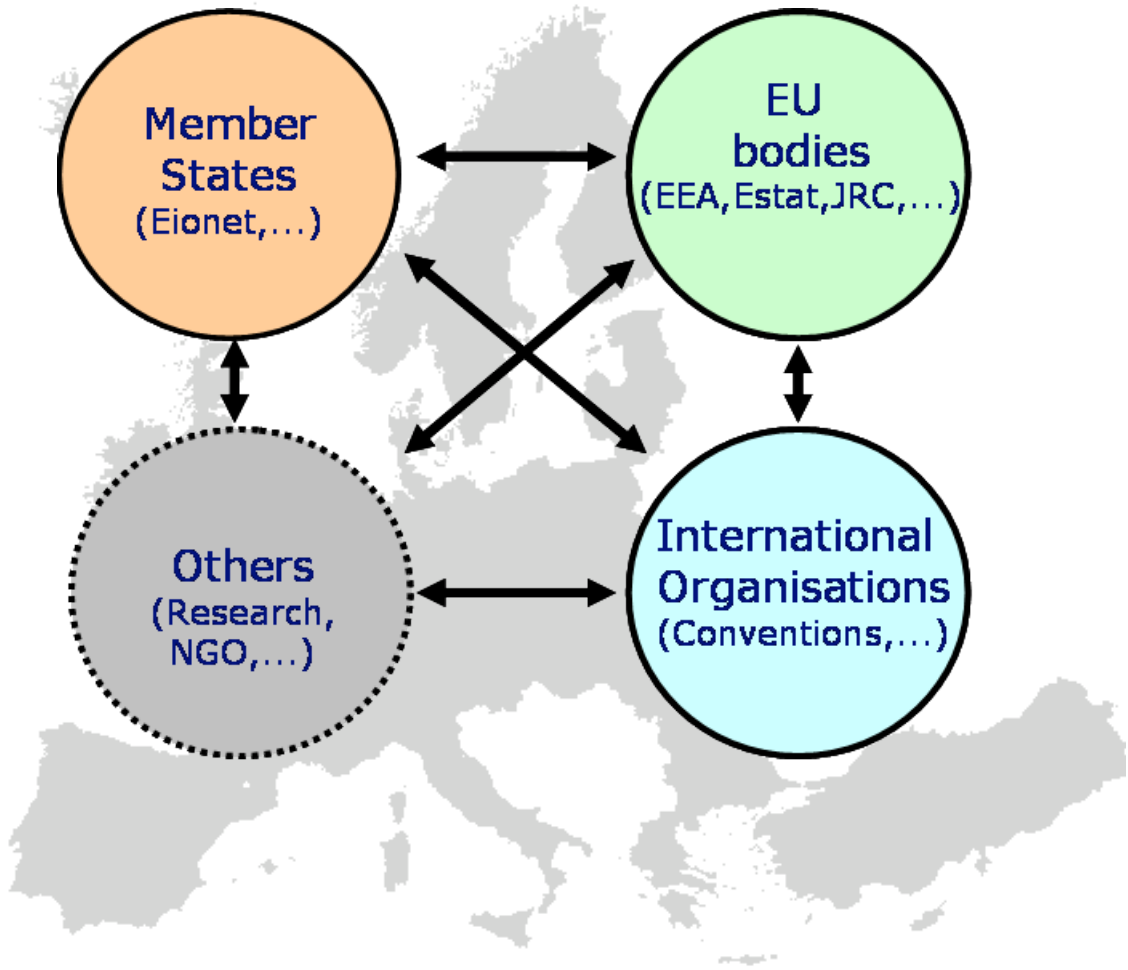
# **S**hared **E**nvironmental **I**nformation **S**ystem

## a framework for future

**Scope of SEIS**

- ✓ Improve
- ✓ Modernise
- ✓ Streamline

the present information systems



# In other words, SEIS is about...

## 1. Sharing

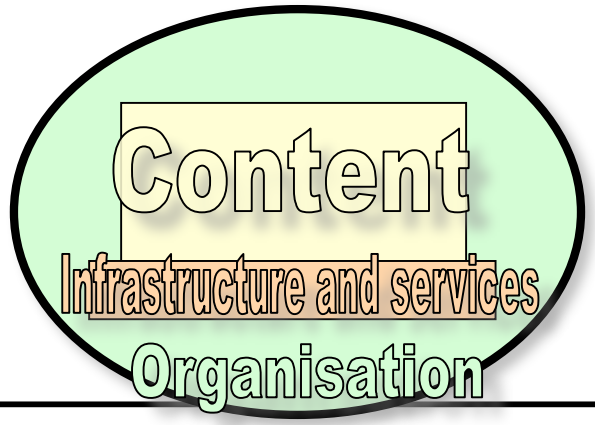
- Organisation (political commitment)
- Partnership (giving and taking)
- Networking (connecting)

## 2. Environmental Information

- Content (horizontal integration)
- Local to global (vertical integration)
- Real time
- Quality assurance

## 3. System

- Infrastructure
- e-Services



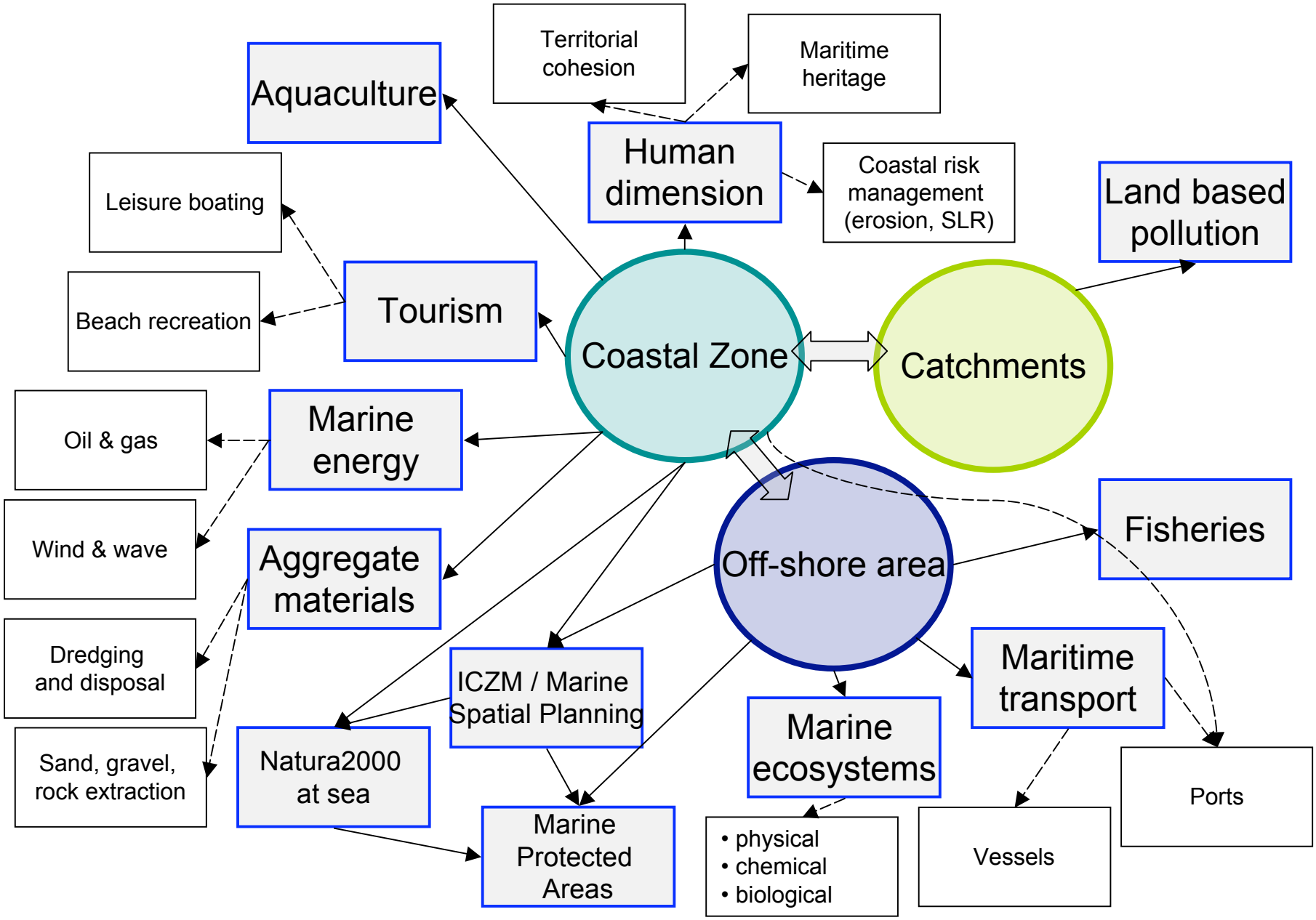
# EEA activities related to marine/coastal data, marine mapping and marine atlases

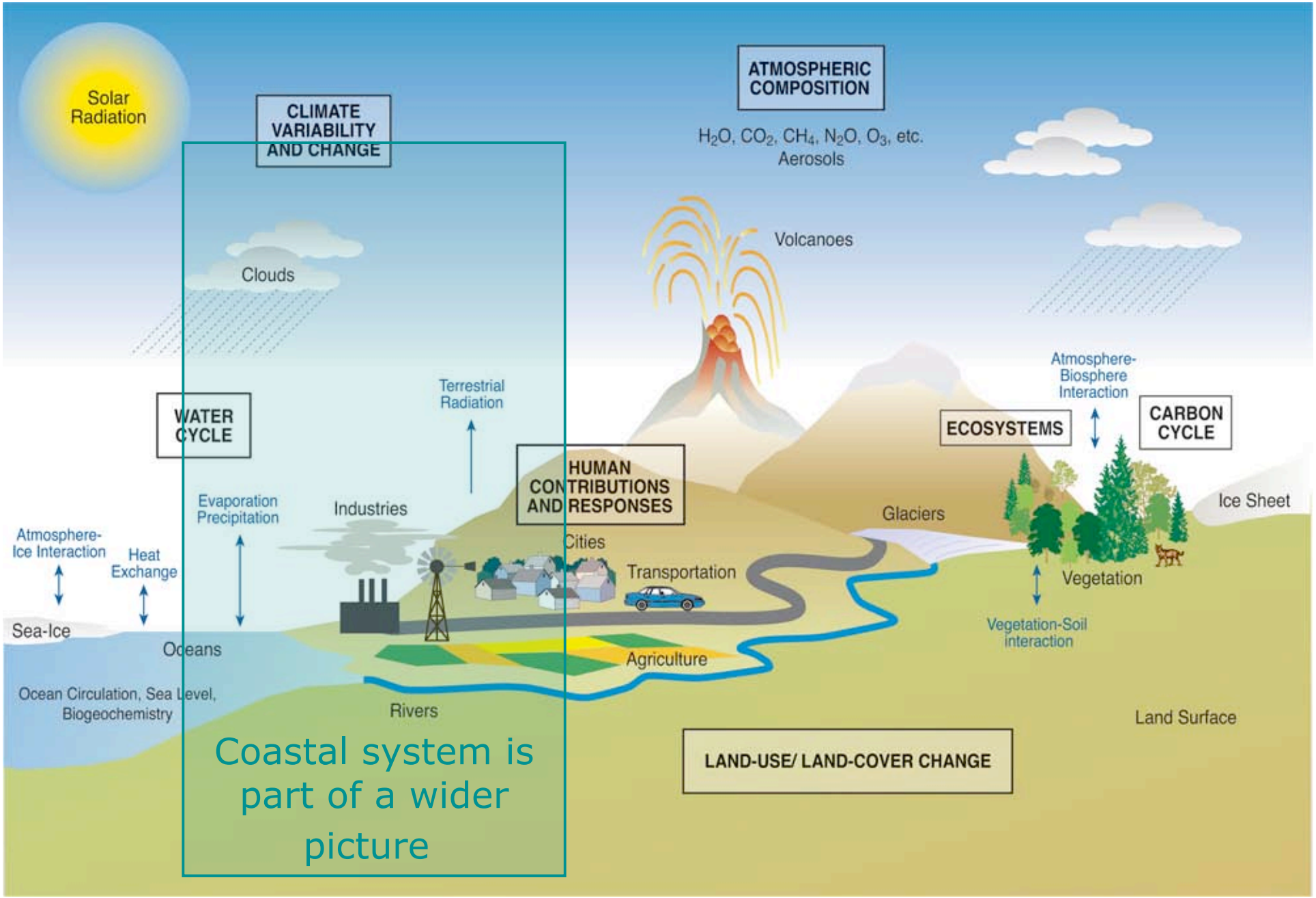
- **Water Information System for Europe (WISE)**
  - Concept paper on WISE-Marine
    - » preparing a visualization tool for the spatial mapping and EMODNET data/products
  - Marine environment indicator development
  - Pan-European 'Indicator convergence process' started under EMMA (European Marine Monitoring and Assessment WG)
    - » Indicator Scoping Report outlining improvements and additions
- **SEIS Environmental data centre for Land use**
  - Land and ecosystem accounting in coastal zones
  - Indicators and data for Integrated Coastal Zone Management
  - Identifying data needs for maritime space characterisation and Maritime Spatial Planning

# Vision of coastal/marine IS

Organisation, content, infrastructure

- Support to European Atlas of the Seas action of Maritime Policy Blue paper
  - shared national coastal/marine atlases
- Consolidation of existing data elements: ICZM indicators, Eurosion database, sea/bed zones/maps, marine indicators, GMES Marine Core Service
  - what coastal regions i.e. analytical/reporting units?
- Building interoperability – that data can be found, accessed and shared
  - metadata, search, discovery services

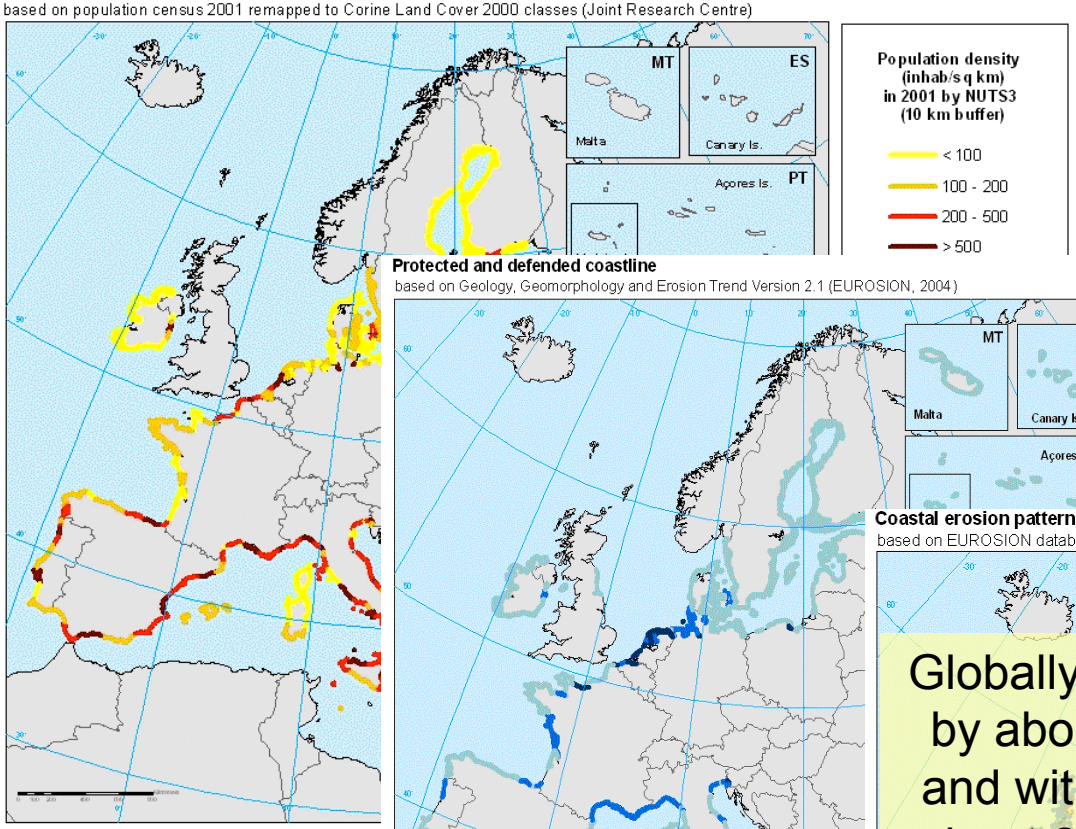

Territorial cohesion
Maritime heritage
Aquaculture
Human dimension
Coastal risk management (erosion, SLR)
Leisure boating
Land based pollution
Tourism
Beach recreation
Coastal Zone
Catchments
Oil & gas
Marine energy
Wind & wave
Aggregate materials
Off-shore area
Fisheries
Dredging and disposal
ICZM / Marine Spatial Planning
Maritime transport
Marine ecosystems
Sand, gravel, rock extraction
Natura2000 at sea
Ports
Marine Protected Areas
• physical
• chemical
• biological
Vessels


Solar Radiation
CLIMATE VARIABILITY AND CHANGE
ATMOSPHERIC COMPOSITION
$H_2O$, $CO_2$, $CH_4$, $N_2O$, $O_3$, etc.
Aerosols
Volcanoes
Clouds
Terrestrial Radiation
WATER CYCLE
HUMAN CONTRIBUTIONS AND RESPONSES
Atmosphere-Biosphere Interaction
ECOSYSTEMS
CARBON CYCLE
Evaporation Precipitation
Industries
Cities
Glaciers
Ice Sheet
Atmosphere-Ice Interaction
Heat Exchange
Transportation
Vegetation
Sea-Ice
Oceans
Agriculture
Vegetation-Soil interaction
Ocean Circulation, Sea Level, Biogeochemistry
Rivers
Land Surface
LAND-USE/ LAND-COVER CHANGE
Coastal system is part of a wider picture

# Integrated approach to analysis of coastal systems

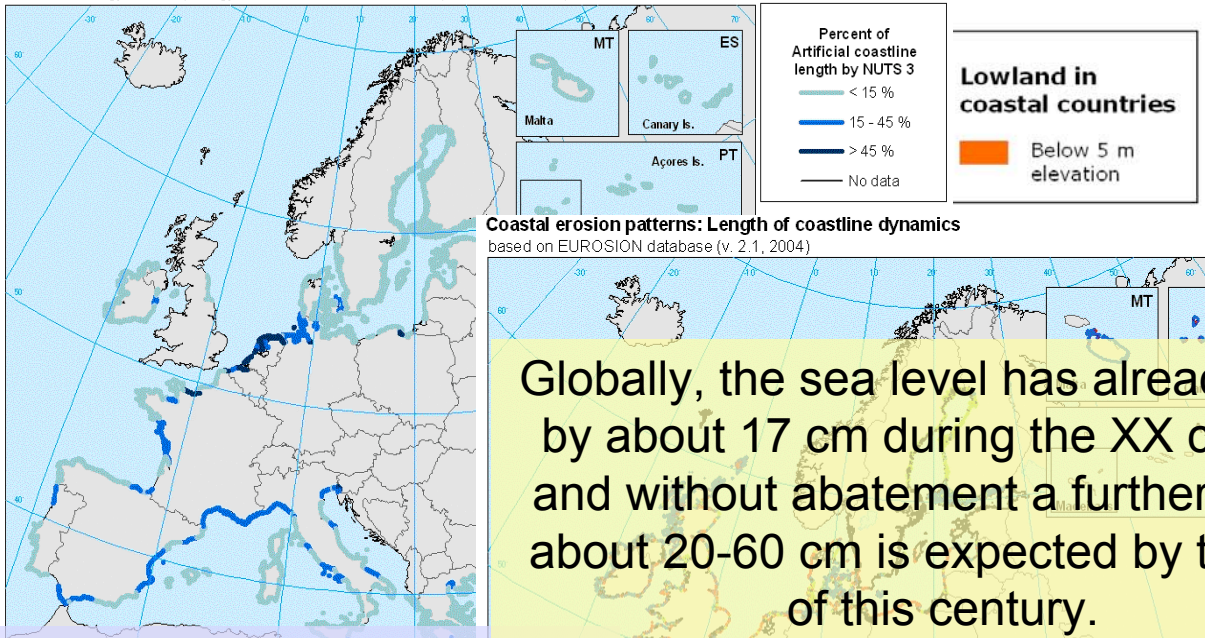
**Population density in 10 km coastal buffer**

based on population census 2001 remapped to Corine Land Cover 2000 classes (Joint Research Centre)



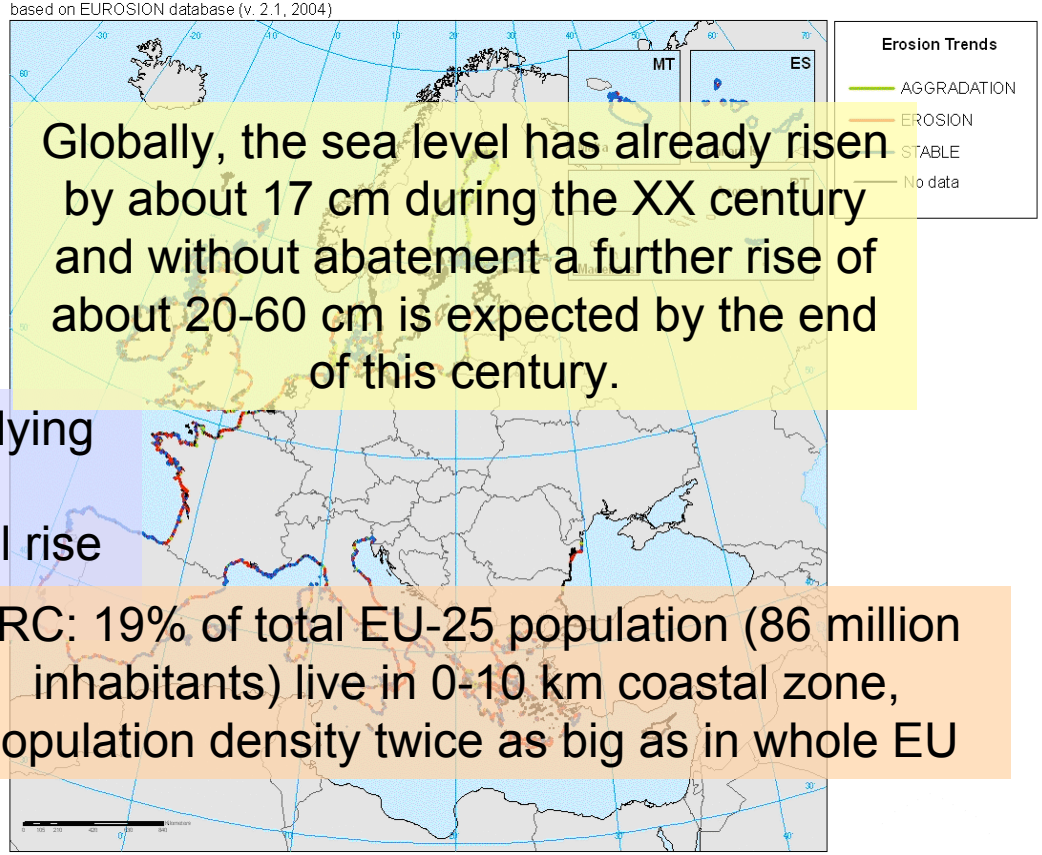

**Protected and defended coastline**

based on Geology, Geomorphology and Erosion Trend Version 2.1 (EUROSION, 2004)




**Coastal erosion patterns: Length of coastline dynamics**

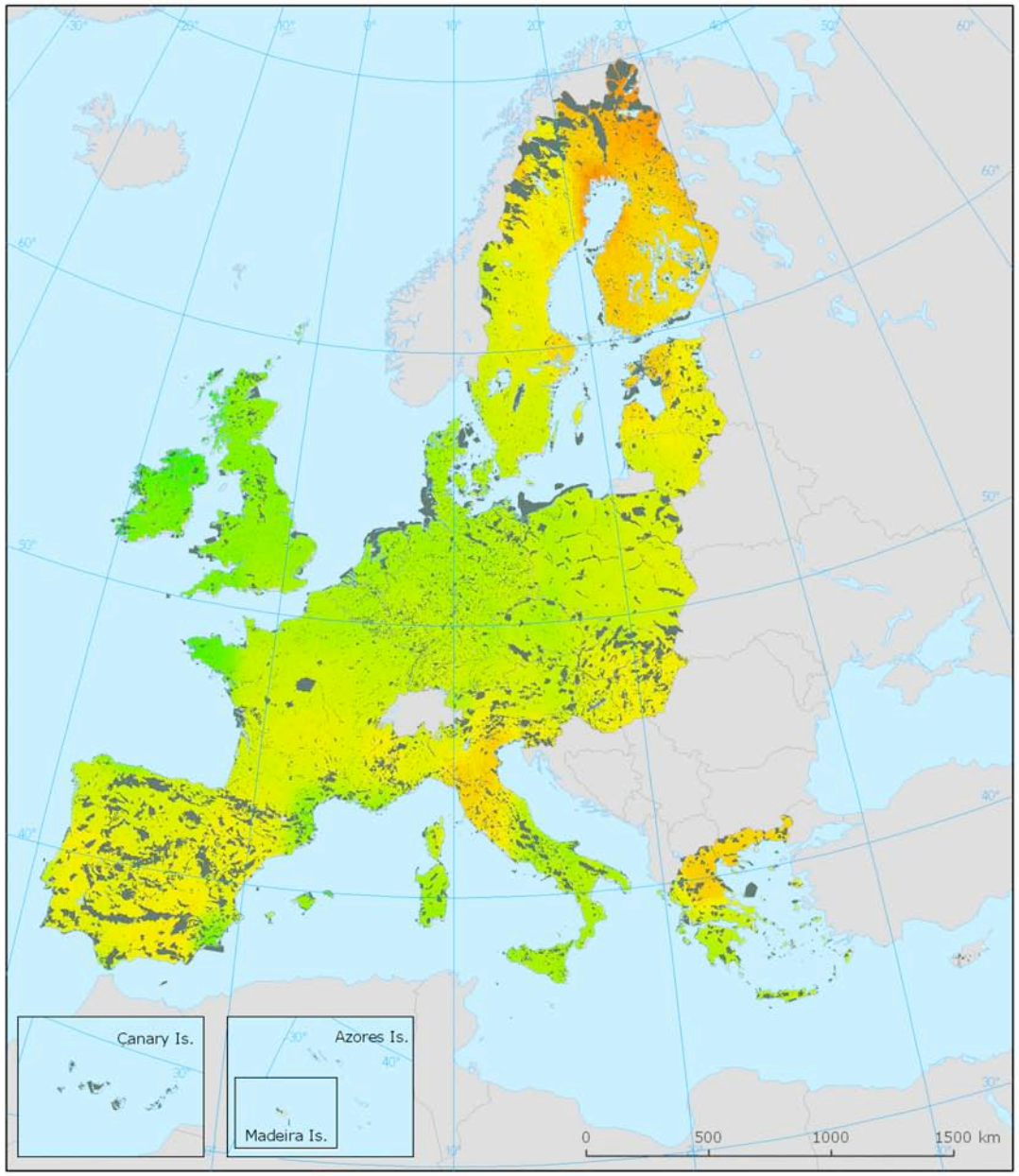
based on EUROSION database (v. 2.1, 2004)




Globally, the sea level has already risen by about 17 cm during the XX century and without abatement a further rise of about 20-60 cm is expected by the end of this century.

EEA: 12% of all EU coastal zones is lying below 5 m elevation and are potentially vulnerable for sea level rise and related inundations.

JRC: 19% of total EU-25 population (86 million inhabitants) live in 0-10 km coastal zone, population density twice as big as in whole EU



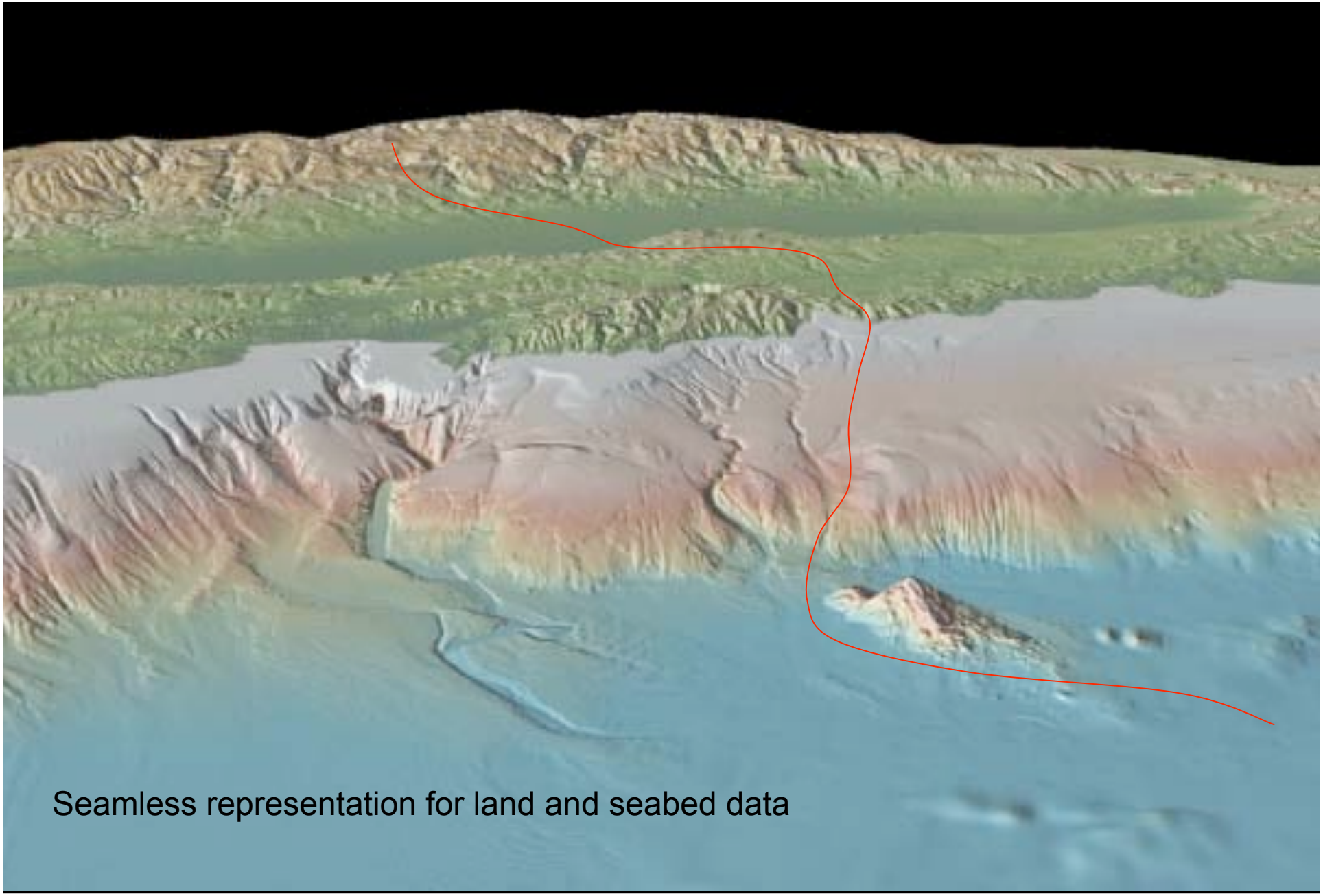

**Natura 2000 sites and Projected changes in mean annual temperature (2051-2080 vs 1961-1990) in EU25**

Temperature change
5.5 °C
0.5 °C
Natura 2000 site
Outside data coverage
Country border

Note: Only Natura 2000 areas but no temperature data in Cyprus

Linking spatial data sets with spatially distributed modelling results

**PROJECTION:**
**HadCM3 model;**
**emissions scenario B2**




Source: C Net News.com
Credit: GeoMapAppVG/Lamont-Doherty Earth Observatory of Columbia University

# Technology existing today allows web-based analysis based on user interaction

Objective of interoperable coastal atlases IS:

- → Provide possibility to access, view, download data
- → Aim at interactive, accessible and simply usable geo-processing tools that enable people to create new information

# Vision of coastal/marine IS

## User functionality

**Display**

- Metadata
- Viewing data
  - Exploring
  - Zoom in/out
  - Pan
  - Switch themes
  - Analytical units
- Comparison of different data sets
- Change detection

**Geoprocessing**

- Map overlay
- Statistics generation

**Data download**

- Multiple file formats
- Resolution & scale options
- Partial download
  - Tiles
  - Layers (for multilayered datasets)
  - Coastal regions
  - Other regions

Interactive interface, search, multilingualism …



# Thank you!

"Integration is the key to a sustainable future."

[2007 Environment Policy Review, COM(2008) 409 final ]