

A spatial typology for European Seas

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EUROPEAN UNION

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Introduction

- Increasing human activities in European Seas,
- Increased considerations of the sea in European development and growth plans,
- Limited knowledge of the marine environment,
- Lack of single instrument for the management of European land and sea and their interactions in Europe,

→Increasing risks on the marine environment and on human livelihood,
→leading to potential conflicts of uses if no sustainable planning is envisaged

This presentation communicates the outcomes of the development of an integrative approach to spatially **account for and map the activities sustained by European seas to create European **marine spatial typologies**.**

Structure

- **Introduction**
- **Study area**
- **Approach**
 - **Selection of datasets,**
 - Data scoping,
 - Data gathering, and
 - Data checking
 - **Data integration,**
 - **Processing and analysis**
- **Main results**
 - **Thematic indicators,**
 - **Development of typologies**
- **Outlook and next steps**

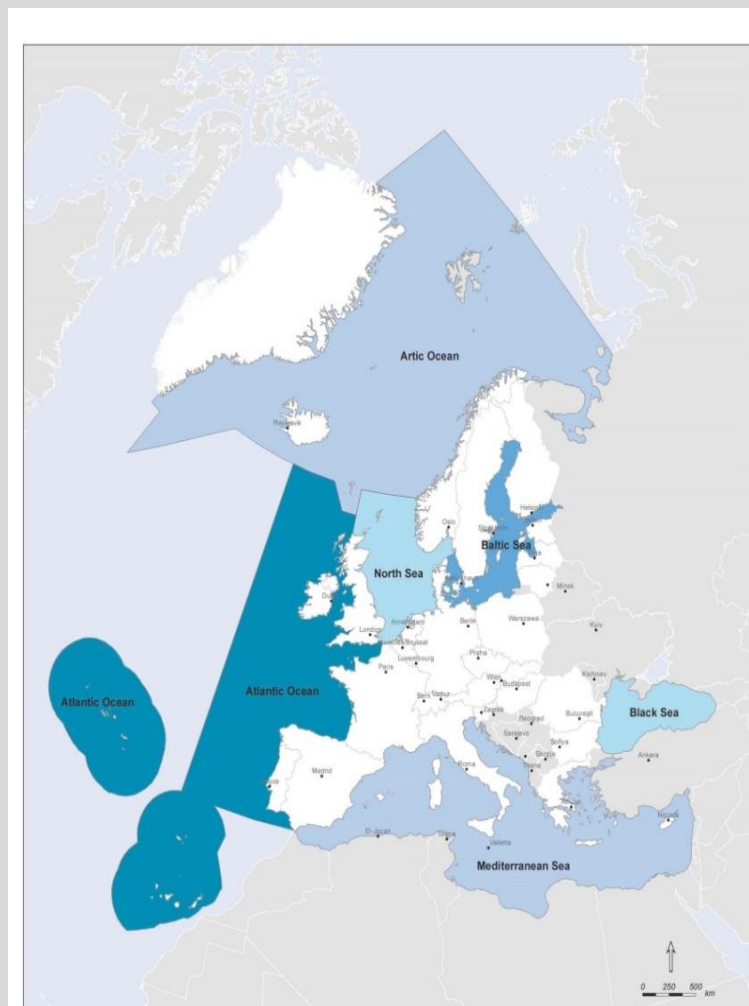
Study area

Six European seas:

the Arctic and Atlantic oceans, and the Baltic, Black, Mediterranean, and North Sea

Practical definition for the boundaries:

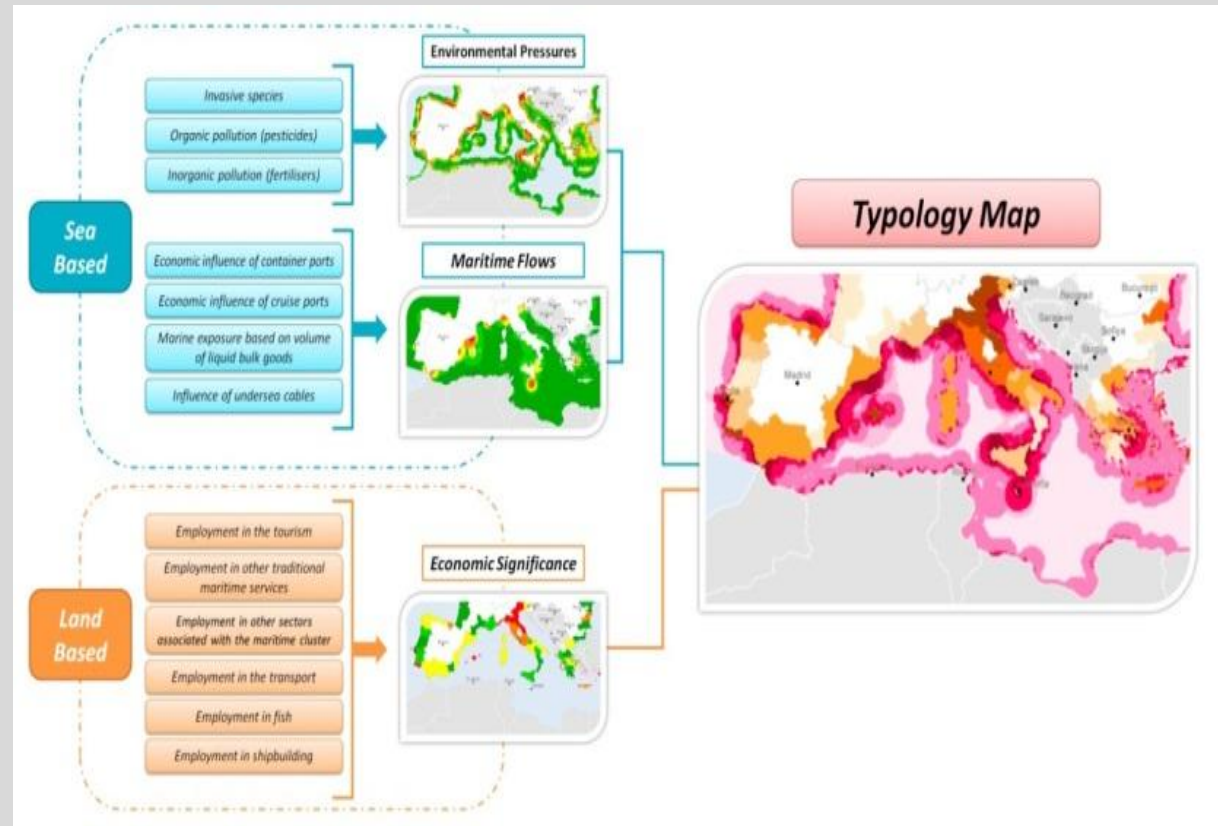
Regional sea Conventions namely the OSPAR convention, the Helsinki Commission (HELCOM), EU's Integrated Maritime Policy (IMP), the Black Sea or the Bucharest Convention, and the Barcelona Convention



Approach

Development of:

- Simple maps covering land and sea,
- Multi-thematic indicators on ,
- Sea typologies focusing on land-sea interactions



Selection of datasets

Scoping and gathering

GENERAL MAPS

Dataset/Map	RSP	Typology	Revised 17th April	Theme
Population Density at NUTS3	N	N	N/A	General
Population density in coastal regions	Y	N	N/A	General
Gross domestic product 2008 (GDP) (NUTS2)	Y	N	N/A	General
Ecoregions (ecosystem types)	Y	N	N/A	General
Population density across water catchment areas	Y	N	N/A	General

MARITIME ECONOMY

Dataset/Map	RSP	Typology	Revised 17th April	Theme
Transport Cluster 2009	Y	Y	Economic Significance	Econ
Tourism cluster 2009	Y	N	Economic Significance	Econ
Number of hotel beds/sq. km	Y	Y	N/A	Econ
Fishing cluster 2009	Y	Y	Economic Significance	Econ
Fishing catch by sea area	Y	Y	N/A	Econ
Shipbuilding cluster 2001	N	N	N/A	Econ
Shipbuilding cluster 2009	Y	Y	Economic Significance	Econ
Other trad. Maritime sectors 2009	Y	Y	Economic Significance	Econ
Other sectors associated with maritime cluster 2009	Y	Y	Economic Significance	Econ

Selection of datasets

Scoping and gathering

TRANSPORT

Dataset/Map	RSP	Typology	Revised 17th April	Theme
Total freight transport at port (total tonnes)	Y	Y	Flows	Transport
Freight transport per port by direction (2007)	Y	N	N/A	Transport
Freight transport per port (time series)	Y	N	N/A	Transport
Container transport per port in TEU (2007)	Y	Y	Flows	Transport
Container transport per port by direction	Y	N	N/A	Transport
Container transport per port in TEU (time series 07 to 09)	Y	N	N/A	Transport
Total Fuel products shipping at port (total tonnes)	Y	N	Flows	Transport
Maritime Lanes	Y	Y	Flows	Transport
Short Sea shipping - 2008	Y	N	N/A	Transport
Short Sea shipping - time series (03 to 09)	Y	N	N/A	Transport
Ferry Passengers per port (2007) and lines	Y	N	N/A	Transport
Ferry passengers per port (time series 03 to 08)	Y	N	N/A	Transport
Cruise Passengers per port (2008, start/end points)	Y	N	Flows	Transport
Cruise passengers per port - (time series 04 to 08)	Y	N	N/A	Transport
Cruise passengers on excursions (2008)	Y	N	N/A	Transport
Inland transport to closest port	Y	Y	Flows	Transport

Selection of datasets

Scoping and gathering

ENERGY AND UNDERSEA INFRASTRUCTURE

Dataset/Map	RSP	Typology	Revised 17th April	Theme
Oil and Gas Cluster	Y	Y	Economic Significance	Energy
Offshore wind farms	Y	Y	N/A	Energy
Undersea cable maps (capacity in Gb)	Y	N	N/A	Energy
Undersea cable maps (length)	Y	Y	Flows	Energy
Oil and gas platforms	Y	N	N/A	Energy
Offshore renewables potential	Y	N	N/A	Energy

ENVIRONMENT

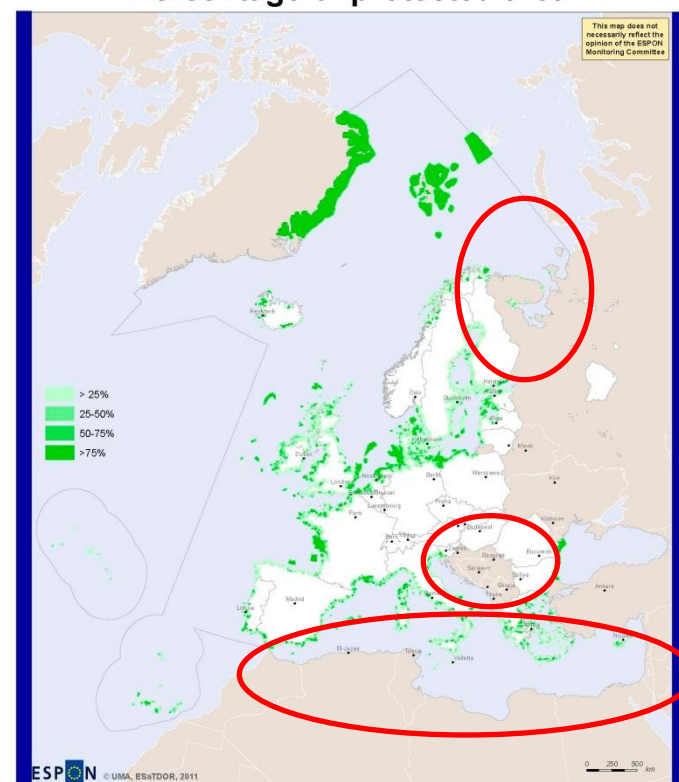
Dataset/Map	RSP	Typology	Revised 17th April	Theme
Sea Depth	Y	N	N/A	Envt
Sea surface temperature	Y	N	N/A	Envt
Increase in sea surface temperature	Y	N	N/A	Envt
Increase in UV ray intensity	N	N	N/A	Envt
Acidification	Y	N	N/A	Envt
Protected areas - Natura 2000/CAFF sites	Y	N	N/A	Envt
Protected areas - percentage of protected area	Y	N	N/A	Envt
Coastal erosion	Y	N	N/A	Envt
Invasive species through shipping	Y	Y	Environmental Pressure	Envt
Marine contaminants: Nutrient inputs	Y	Y	Environmental Pressure	Envt

Selection of datasets

Quality check

- **Data gaps:** typically neighbouring countries,
- **Partial information:** typically coastal information only, not covering the whole sea.
- **Lack of metadata,**
- **Incompetible resolution,**

Environment Protection of the marine/coastal environment - Percentage of protected area -



Protected Areas (Natura 2000, CAFF): derived from rasterized N2K and CAFF layer and overlaid with 10x10k-grid.

Data integration

Sea-based data

Sea depth



Gross weight of goods handled in all ports

eurostat

View Table Select Data

Country level - Gross weight of goods handled in all ports

Last update: 20-12-2010

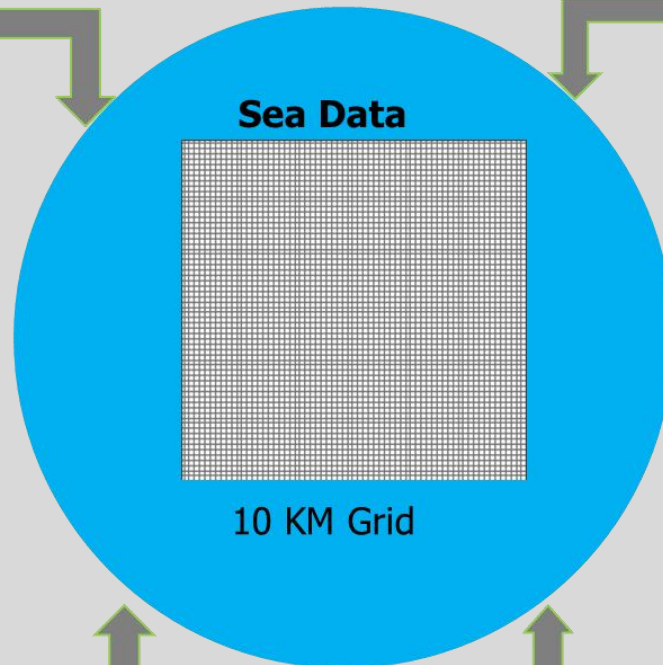
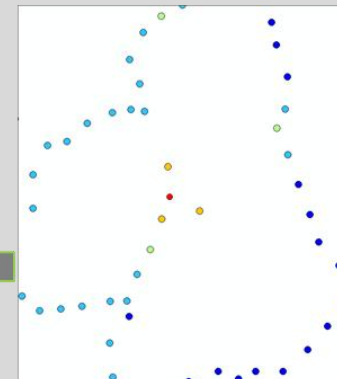
Table Description (xls)

TIME	2000	2001	2002	2003	2004	2005
REF_2005	-	-	-	-	-	-
European Union (27 ms)	-	-	-	-	-	6.9
European Union (25 ms)	-	-	-	-	-	7.0
European Union (23 ms)	-	-	-	-	-	8.1
Belgium	16.0	16.2	17.0	18.9	16.8	21.0
Bulgaria	-	-	-	2.0	2.4	2.7
Denmark	19.0	19.2	19.1	17.0	17.0	19.0
Germany	2.4	2.7	3.0	3.0	3.0	3.1
Netherlands	-	-	-	11.0	11.4	11.6
Poland	10.0	11.4	11.9	20.6	22.9	24.8
Greece	-	-	-	-	13.4	14.7
Spain	-	-	-	1.7	7.0	8.0
France	9.0	9.0	9.4	9.0	9.0	9.0
Italy	7.0	7.0	7.0	7.0	8.0	8.0
Ukraine	-	-	-	-	10.2	10.0
EU27	-	-	-	11.1	11.1	11.1

Sea Data Sea Boundaries



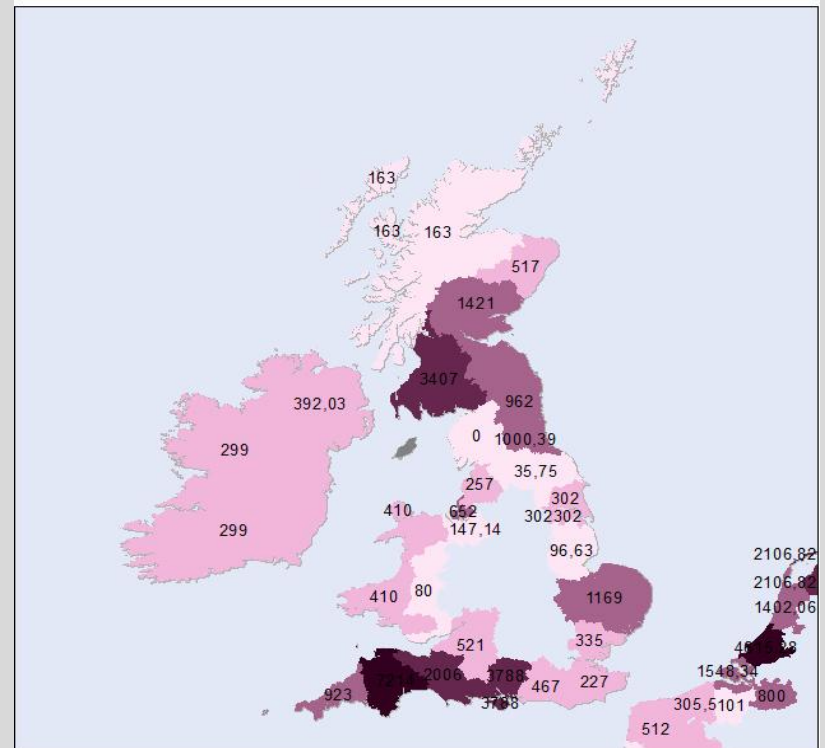
Sea Rise Level



Data integration

Land based data

- Administrative units (NUTS x),
- Defined regions (coastal regions)
- Alphanumerical statistics



Composite maps

Data processing and Analysis

- **Division method**

Quintiles

- **Weighting**

Based on expert's advise

i.e. equal weight basis for economical activities and environmental pressures, whereas different weight for transport thematic dataset

- **Categorisation**

Five (quantitative) ranges selected based on expert advise

Qualitative categories ranging from very low to very high according to the magnitude of pressure.

Typologies

Components

Characteristic	European Core	Regional Hub	Transition	Rural	Wilderness
Economic Significance	Greatest concentration of maritime employment/ high strategic economic importance	High maritime employment, significant economic importance	More localised concentrations of maritime employment/ more dependent upon a limited number of strategic industries	Low levels of maritime related employment, economy dominated by primary production and tourist sectors	Very low and intermittent levels of maritime employment, limited direct economic importance
Flows	Great international connectivity, global hinterland	Nationally significant and some international connections, European- scale hinterland	Nationally and regionally significant connections and hinterland	Limited connectivity, local/regional hinterland with some more significant sectors/seasonal extensions	Remote areas, limited connectivity. Very small local hinterland, some extensions
Environmental Pressures	High environmental pressure associated with human uses	Significant environmental pressures	Medium environmental pressures	Low environmental pressure	Limited environmental pressure

Main results – simple maps

33 multi-thematic maps

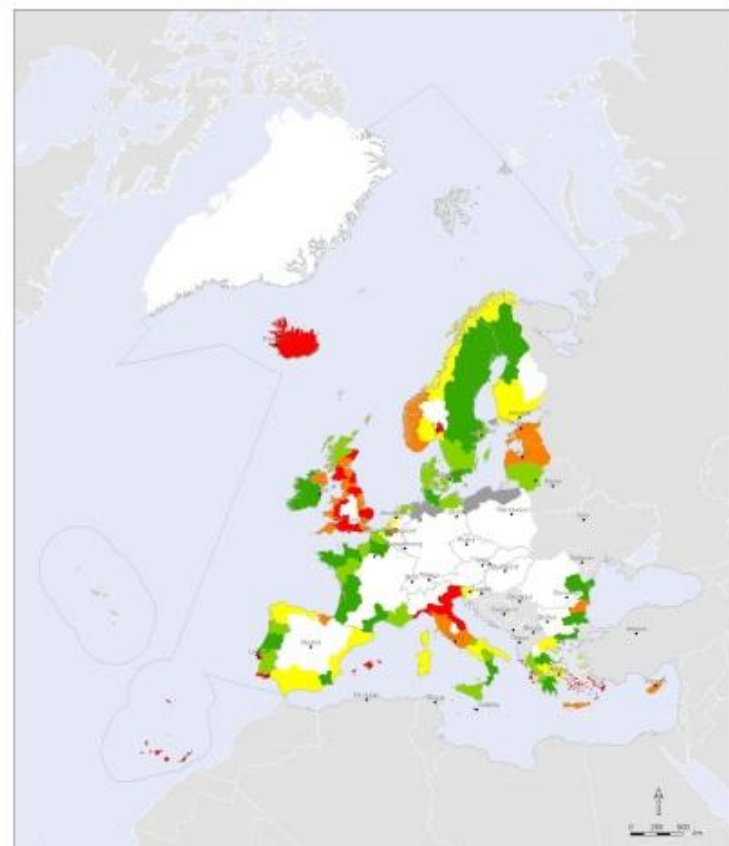
Theme	Maps produced
General context	Sea Depth
	Marine Ecoregions
	Population density in coastal areas 2008
	Population density per NUTS2 within water catchment areas
	Population density in water catchment areas
	GDP in coastal regions (national averages)
	GDP in coastal regions (coastal average)
The Maritime economy	Employment in the tourism sector
	Employment in other traditional maritime services
	Employment in other sectors associated with the maritime cluster
	Employment in the transport sector
	Employment in fish sector
	Employment in shipbuilding sector
	Number of hotel beds per square km
Energy and Undersea Infrastructure	Oil and gas platforms
	Employment in the Oil and Gas Sector
	Existing wind farm capacity
	Wave power potential
	Undersea cables (length)
	Undersea cables (capacity)
Environment	Protected areas
	Bathing sites
	Increase in sea surface temperature
	Organic inputs
	Inorganic inputs
	Invasive species
Transport	Economic influence of container ports
	Economic influence of cruise ports
	Marine exposure due to port influence based on port proximity/volume of cargo
	Marine exposure due to port influence based on port proximity/liquid energetic products
	Intensity of use/shipping lanes

Main results – Composite maps

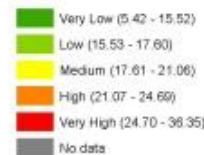
Thematic indicators

- Economic Significance (Land based)***

Shows the economic importance of coastal areas through mapping employment clusters in different maritime (and related) sectors such as shipbuilding, tourism, transport, fisheries and others.



Total Maritime Employment Composite Map (percentage of total employment within each NUTS2 region)



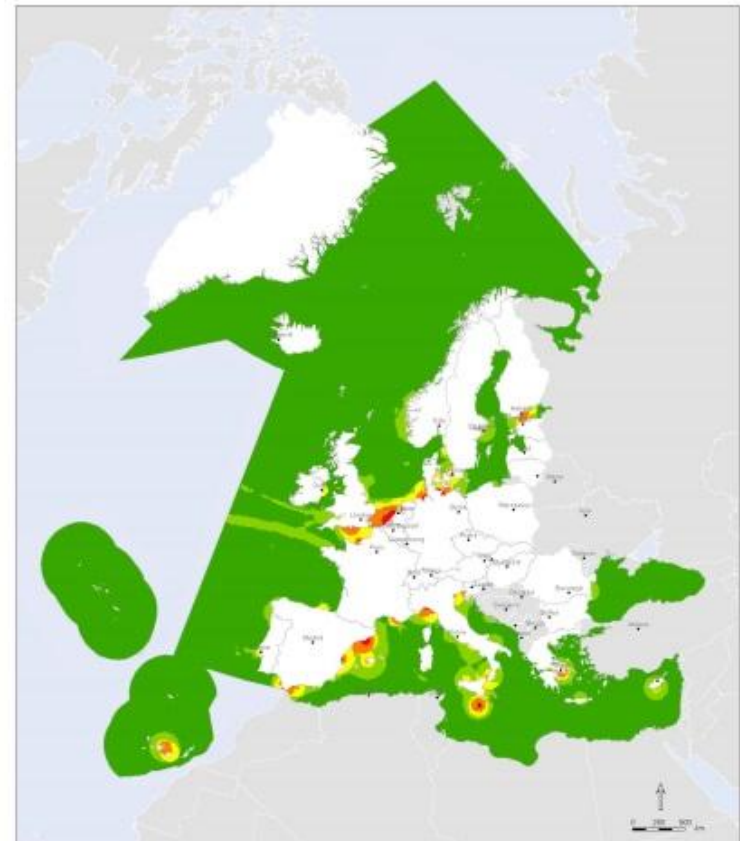
NOTE: This composite map consists of data from the European Cluster Observatory on persons employed in fisheries, shipbuilding, other traditional maritime sectors, sectors associated with the maritime cluster tourism and transport as a percentage of total employment within each NUTS2 region.

Thematic indicators - Composite maps

Thematic indicators

- Land/Sea Flows (sea based)***

capture the movement of goods (including container traffic, other freight, liquid energy products) and people across maritime regions.



Flows Composite Map



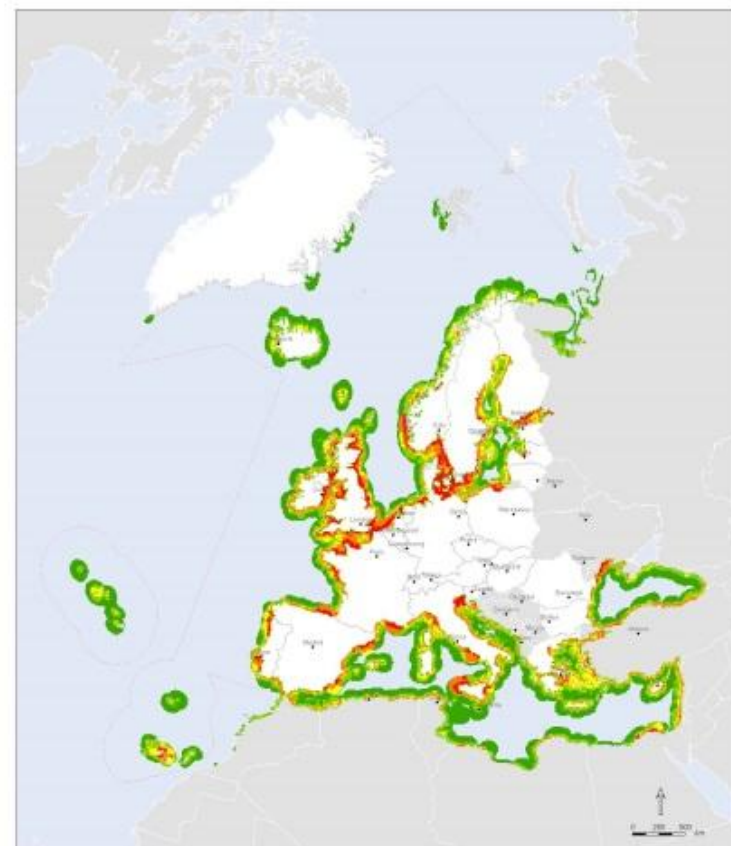
Thematic indicator 46: Land/Sea Flows Composite Map
Land/Sea Flows Composite Map
Data: Eurostat, 2007; Regional Data, 2007
Data: Eurostat, 2007; Regional Data, 2007

This map is based on four data sets: economic influence of container ports, economic influence of cruise ports, marine exposure based on volume of liquid bulk goods and influence of undersea cables. See Chapter 5 of the ESPON Scientific Report for more information.

Thematic indicators – Composite maps

- ***Environmental Pressures (coastal)***

Cover data related to the state of the marine environment and attempts to capture natural changes and human impacts such change in sea surface temperature, organic pollution, incidents of invasive species introduced through shipping etc.



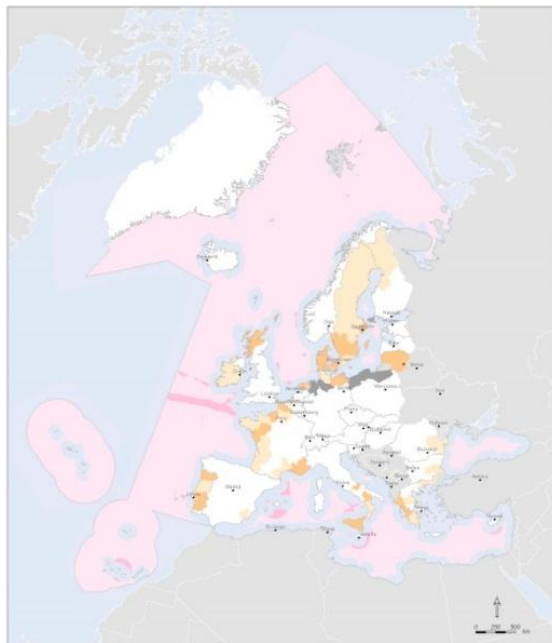
Environmental Pressures Composite Map



This map is based on three data sets: incidence of invasive species, organic pollution (pesticides) and inorganic pollution (fertilisers). See Chapter 7 of the Scientific Report for further details.

Typologies

Cold spots – hotspots – derived regions



Typology Map (coldspots)

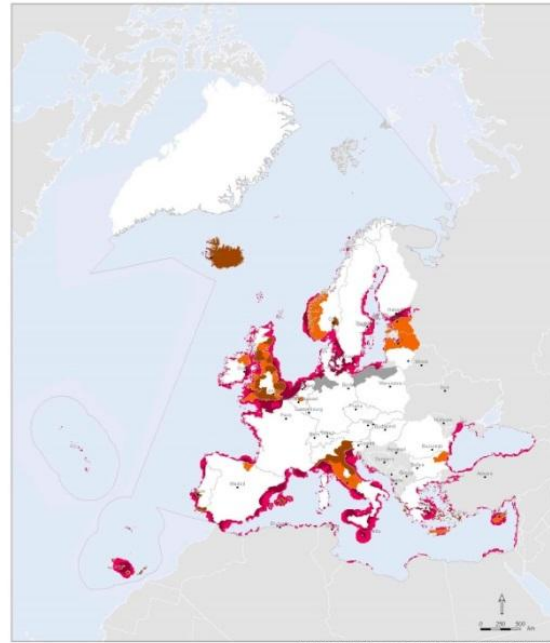
Sea (Environmental Pressures and Flows)

Very low intensity
Low intensity

Land (Economic Significance)

Very low intensity
Low intensity
No Data

This map shows where land-sea interactions are at their least intense in Europe's seas. The effect of the sea on the land is measured in terms of economic significance (employment in maritime sectors) and the effects of anthropogenic activities on the sea are represented by environmental pressures (pollution from pesticides and fertilisers, incidence of invasive species introduced by shipping) and flows (of goods, including container traffic and liquid energetic products, people, from cruise ships and information, from telecommunications cables).



Typology Map (hotspots)

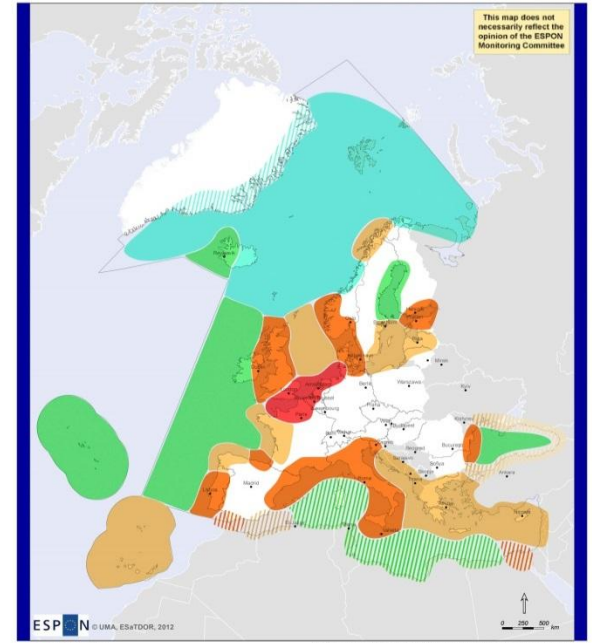
Sea (Environmental Pressures and Flows)

High intensity
Very high intensity

Land (Economic Significance)

High intensity
Very high intensity
No Data

This map shows where land-sea interactions are at their most intense in Europe's seas. The effect of the sea on the land is measured in terms of economic significance (employment in maritime sectors) and the effects of anthropogenic activities on the sea are represented by environmental pressures (pollution from pesticides and fertilisers, incidence of invasive species introduced by shipping) and flows (of goods, including container traffic and liquid energetic products, people, from cruise ships and information, from telecommunications cables).



Regions derived from typology map

European Core

Regional Hub

Transition

Rural

Wilderness

Typology influenced by lack of data

This schematic typology map shows how Europe's coastal and maritime regions may be classified based on the intensity of land-sea interactions (economic activities, flows of goods, people and information and environmental pressures). These interactions are greatest in the European Core and at their lowest in the Wilderness.

Outlook

This research:

- developed a first of its kind approach able to support the management of land and sea and their interactions at European scale focusing on both opportunities and risks,
- endorses more complex and place sensitive approaches supporting integrated maritime spatial planning,
- was tested at the EU-wide Seas proving to be a valid support tool to land-sea spatial planning, and
- provides a basis for analyzing land-sea indications supporting management mechanisms to foster territorial cohesion and development.

Next steps

- land-sea interactions are dynamic and careful consideration needs to be given in thinking about the policy implications.
- information that focuses specifically on the land-sea interactions is lacking and needs to be considered, and
- further research is needed to consider the common spatial units of analysis for European territorial space linking and Land Sea.
- Further development of the typology is needed by adding new datasets and extending geographical coverage to inland areas within ESPON space and to neighboring countries.

Thank you for your attention!

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