

ESaTDOR

European Seas and Territorial Development, Opportunities and Risks

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MAIN REPORT



This report presents the final results of an Applied Research Project conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund.

The partnership behind the ESPON Programme consists of the EU Commission and the Member States of the EU27, plus Iceland, Liechtenstein, Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

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List of Abbreviations and Acronyms

ASP	Adriatic Sea Partnership
CAFF	Conservation of Arctic Flora and Fauna
CEC	Commission of the European Communities
CFP	Common Fisheries Policy
CIS	Commonwealth of Independent States
CPMR	Conference of Peripheral Maritime Regions
CSF	Common Strategic framework
DG	Directorate General
EEA	European Environment Agency
ECC	European Cruise Council
EEZ	Exclusive Economic Zones
ESPON	European Spatial Planning Observation Network
EU	European Union
GIS	Geographic Information System
GOOS	Global Ocean Observing Systems
GPS	Global Positioning System
GVA	Gross Value Added
ICZM	Integrated Coastal Zone Management
IMP	Integrated Maritime Policy
LA	Local Authority
LAU	Local Area Unit
MSFD	Marine Strategic Framework Directive
MSP	Marin Spatial Planning
NUTS	Nomenclature of Units of Territorial Space
SST	Sea Surface Temperatures
TEU	Twenty foot Equivalent Units
UN	United Nations
UNEP	United Nations Environment Programme
UNCLOS	United Nations Convention of the Laws of the Sea
VASAB	Vision and Strategies for the Baltic Sea Region
WFD	Water Framework Directive

Chapter 1: Introduction

The *Treaty of Lisbon*, which entered into force in 2009, added a new goal of territorial cohesion to the twin EU objectives of social and economic cohesion. The need to promote territorial cohesion, the potentials of a place based approach as advocated in the Barca Report (2009) has become of growing importance as Europe strives to achieve growth that addresses the many challenges the EU faces. These include recovery from the global economic crisis; structural reforms in the Euro zone; growing interdependencies between regions, both between EU member states and with emerging global economies; changing demographic and social contexts; environmental change (mitigating and adapting to climate change, protecting biodiversity and natural and cultural landscapes) and concern for energy security. Some of these challenges are longstanding in character, whilst with others the significance and implications for social, economic, environmental and territorial cohesion across the whole of the EU territory is promoting a re-appraisal, re-thinking and re-affirmation of the EU's strategic priorities.

'*Europe 2020*' (CEC2010a) the EU's economic growth strategy advocates smart, sustainable and inclusive growth as the key way forward. However, whilst the Fifth Cohesion Report '*Investing in Europe's Future*' (CEC 2010b), suggested that regional disparities were diminishing, it argued that if the goals of Europe were to be achieved then better co-ordination and integration between regional development and national policies was required.

This focus on territorial cohesion, was until relatively recently, almost exclusively geared towards the terrestrial environment. Much has been written about the need for horizontal and vertical integration of policy makers at all levels of governance, local, regional, national, cross border and transnational, and that there needs to be strong partnerships between public, private, and civil society. This led to the concept of spatial planning, and to a large extent this has been land focused (see, for example, ESPON project 2.3.2, *Governance of Territorial and Urban Policies*). In recent years there has been a renewed interest in the maritime or marine environment and recognition of the mutual interdependency between the land and sea. Initial concerns, at least in European terms focused on ensuring the environmental integrity of maritime ecosystems were maintained, preserved, protected and where necessary restored. Even more recently, there has been a growing realisation that the seas are becoming a context which can help governments realise their development aspirations. As Maria Damanaki, EU Commissioner for Maritime Affairs and Fisheries, in a speech to the European Parliament in December 2011, said:-

Governments are waking up to the fact that we have just about reached the limit of what can be squeezed from the 29% of the planet that is land. Therefore, it becomes clear that we need to look even more to the sea.

Hence there is a growing interest in the way that marine resources are managed and where appropriate, exploited. This has led to ongoing discussions and dispute about which nation state (or states) has jurisdiction over maritime resources and for some

countries it is increasingly significant that a greater proportion of the area under their sovereign jurisdiction is sea rather than land (for example Ireland, Portugal and the UK) (DG Mare 2010). This then begins to change the conceptualisation of “territorial” and the extent to which it should be focused not exclusively on land, but include both land and sea and their interactions and interdependencies.

Taking a slightly different perspective, land sea interactions are not just confined to those countries that have a maritime border, as land locked countries also often have important connections to the sea in terms of connectivity to the rest of the world and the shipping of goods and services, and by affecting the environment through discharge into the marine environment via rivers. From this perspective it is clear from Map 1 that the large sea basins of Europe and the populations contained within them have an impact on the regional seas into which they discharge. Managing these cross boundary and transnational environments requires co-operative and collaborative effort. The key point to note is that land sea interactions are critically important to territorial cohesion, although for coastal regions mutual interdependence will be of greater significance than inland regions.

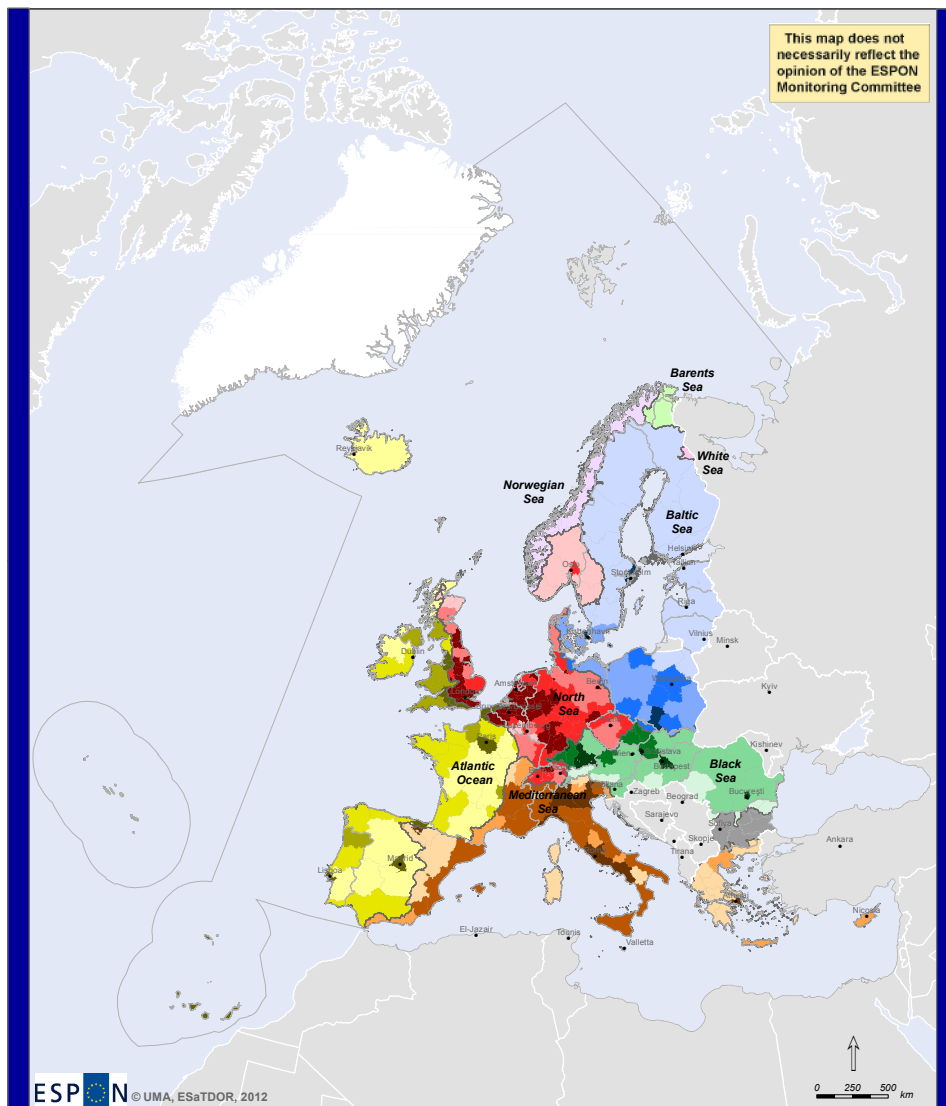
It was within this context that the EU’s Integrated Maritime Policy (IMP) was proposed in 2007 to “enhance the optimal development of all-sea related activities in a sustainable manner.” This sought a balance between harnessing the significant economic and social benefits that the sea can provide whilst ensuring that good environmental quality and integrity within Europe’s marine environment was maintained. This proposal recognised the need for greater integration between fragmented sectoral policies and frameworks of action that operate at a variety of different scales, from local to regional, national and transnational within EU space, regional seas and with countries beyond the EU and globally.

Hence there has been a growing call for an integrated approach to marine or maritime spatial planning (MSP) throughout the territories of the EU;

“Increased activity on Europe’s seas leads to competition between sectoral interests, such as shipping and maritime transport, offshore energy, ports development, fisheries and aquaculture and environmental concerns. Climate change, in particular the rise of sea levels, acidification, increasing water temperatures, and frequency of extreme weather events is likely to cause a shift in economic activities in maritime areas and to alter marine ecosystems. Maritime Spatial Planning (MSP) can play an important role in mitigation, by promoting the efficient use of maritime space and renewable energy, and in cost-efficient adaptation to the impact of climate change in maritime areas and coastal waters. MSP is a tool for improved decision-making. It provides a framework for arbitrating between competing human activities and managing their impact on the marine environment”

(Commission Communication, 2008, 2)

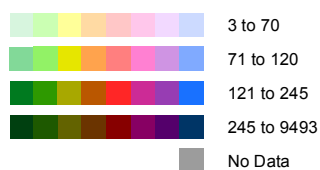
Population Density in Sea Basins



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Thematic data: Water catchments, UNEP; EUROSTAT, 2008.
Land boundaries: © EuroGeographics Association and ESRI; Regional level: NUTS2.
Sea boundaries: OSPAR Convention, EU Integrated Maritime Policy and EEZ.

Population density per NUTS2 within catchment (persons/km²)



Map 1 Population density (at NUTS2 level, 2009) within Europe's sea basins.

Whilst some progress has been made, in different country contexts (e.g. in England the Marine and Coastal Access Act 2009) and indeed within some regional seas (notably in the Baltic Sea), to deal with this agenda, a recent "*Progress Report on the EU's Integrated Maritime Policy*" (DG Maritime Affairs and Fisheries, 2010) has been published assessing developments since the IMP was first introduced. The report sets out key orientations for future development including:

- The enhancement of integrated maritime governance and cross-cutting policy tools;

- The implementation of sea basin strategies;
- The definition of the boundaries of maritime sustainability;
- The development of the international dimension of IMP, and
- A renewed focus on sustainable economic growth, employment and innovation.

MSP is being promoted by DG Mare (Commission Communication 2008), and a draft Directive of MSP and ICZM is forthcoming. This reflects a growing recognition of the significant inter-linkages between marine and terrestrial areas and that the opportunities and risks presented by the marine environment can have an important role in delivering the wider European goals of social, economic and territorial cohesion. This has led to recognition that maritime policy has an important role to play in cohesion policy.

Recent developments related to the EU's territorial agenda now make explicit reference to the marine environment as being integral to the territorial agenda of the EU. For example in the background document to the revised Territorial Agenda for the EU, recommendations included: the introduction of some form of regulatory mechanism similar to spatial planning to avoid random and excessive sea space allocation to some interests; the inclusion of sea space as an integral part of national, regional and local spatial policy; close alignment of maritime policy with territorial agendas, objectives and priorities; the integration of maritime space into relevant EU macro strategies; and developing EU maritime policy as a prominent part of cohesion policy (Drafting Team set up for the update of the Territorial State and Perspectives of the EU 2011).

This has led to the new *Territorial Agenda of the European Union 2020* that was agreed in Gödöllő, Hungary in May 2011. For the first time this EU document explicitly includes maritime considerations as part of the territorial agenda:

“Maritime activities are essential for territorial cohesion in Europe. Economic activities such as energy production and transport are increasing rapidly in European marine environments. There is a need to solve user conflicts and balance various interests by cooperation in maritime spatial planning. The Marine Strategy Framework Directive and EU Integrated Maritime Policy call for coordinated actions from Member States on maritime spatial planning. Such planning should be integrated into the existing planning systems to enable harmonious and sustainable development of a land-sea continuum.”

(Informal Ministerial Meeting of Ministers responsible for Spatial Planning and Territorial Development, 2011, paragraph 55).

Clearly the marine environment is increasingly being seen, at least from a European perspective, as offering some potential for growth, but that until recently there has been a disconnect in the way that the land and marine environments have been viewed. The land has been much researched and seen as a focus for territorial cohesion. The maritime focus has tended to be on the promotion and protection of ecosystems integrity. The interface between the land and the sea, perhaps with the exception of the activities in Integrated Coastal Zone Management (ICZM) has been largely ignored, although ICZM has been encouraged by the EU as a tool for the management of these interfacing land and sea environments.

In terms of future EU developments relating to territorial cohesion, the Common Strategic Framework (CSF) seeks to draw together a range of different European funding packages into an integrated pot for the 2014-2020 funding period to promote integrated investment priorities. In this context sea basins are identified explicitly as suitable arenas for policy investment. With Europe's regional seas, the Baltic is hailed as the regional sea where collaborative ventures between nation states, leading to integrated management are the most advanced. However, DG Mare is going beyond governance to explore support for growth in the maritime sector and contribute to the aims of *Europe 2020* through a "Blue Growth" strategy, which is thus defined as "*smart, sustainable and inclusive economic and employment growth from the oceans, seas and coasts*". Blue Growth aims to identify and tackle challenges (economic, environmental and social) affecting all sectors of the maritime economy, including those sectors which support maritime activity but may be based far inland. It focuses on existing, emerging and potential activities such as short-sea shipping, coastal tourism, offshore wind energy, desalination and use of marine resources in the pharmaceutical and cosmetics industries.

These ideas are being operationalised through sea basin approaches. An example is the Atlantic Strategy, whereby partners in the Atlantic will through the Atlantic Forum seek to influence and gain access to integrated structural fund resources as proposed through the CSF (CEC, 2011). By the end of 2013 the Forum will have created an Action Plan, which will be part funded through the CSF. It seems likely that other regional seas or sub-regional seas will follow this proposal with the Adriatic Sea now beginning to prepare its own macro-regional strategy.

The interactions between the land and sea, not just in the immediate interface of the coast are increasingly being recognised as being important spaces that need careful consideration. The intensity, nature and extent of sea use and these interactions with the land have created a complex web of governance arrangements at a variety of different scales (global, regional seas, European, bilateral and transnational, national, regional and local as well as sectoral depending on particular interests that want to use sea space). Clearly maritime considerations are increasingly linked to territorial cohesion agendas and therefore policies need to be framed in ways that relate to place-specific risks and opportunities.

Project Aims and Objectives

This research sits with the ESPON 2013 Applied Research Projects and is intended to contribute to the creation of European wide, comparable information and evidence on territorial potentials and challenges, focusing on opportunities for success for the development of regions and cities. The projects comprise thematically defined research, cross-thematic applied research and impact studies of EU policies. In this case ESaTDOR focuses particularly on land sea interactions within Europe's six regional seas and explores in an integrated manner territorial development opportunities and risks.

More particularly this research seeks to:

- Map the different types of sea use across Europe with the objective of creating a typology (or typologies) of different types of coastal/sea regions drawing upon existing ESPON terrestrial typologies as appropriate;
- Identify various development opportunities (and constraints) for different types of sea/coastal region;
- Explore best practice examples of terrestrial-marine and maritime governance to provide advice and guidance on how these critical assets can be efficiently, effectively and democratically managed; and
- Make policy recommendations and identify further areas for applied policy research designed to maximize the opportunities of and minimize the human impacts on the critical marine assets of Europe.

Based upon the aims and objectives outlined above and the emerging policy context for the marine environment as an important and integral part of the territorial agenda, our working hypothesis is;

That the marine environment is a critical yet undervalued component of the EU's, national, regional and local territorial space. Its associated risks and opportunities need to be better understood and more effectively managed in an integrated manner to ensure that these significant marine assets and resources can better contribute to broader European strategic goals.

Outline of the Methodology

This is the first time that ESPON has directed its attention in a major way to exploring the territorial development opportunities and risks associated with European seas. Our work on the project has highlighted the value of this type of research which is perhaps long overdue. However, it has also revealed a complexity of issues related to sea boundary definition, data access and compatibility, disaggregation of data between territorial and marine space and the difficulty in developing meaningful units of analysis for European marine space. These issues were highlighted in the Inception Report and key conclusions at this point included the need to adopt an exploratory approach and examine varying experience in relation to marine mapping and governance, both between the different European seas and across the different areas of thematic interest. In other words our approach to the research has been iterative, incremental and experimental.

The analytical approach followed a five step process (see Figure 1):

- Stage 1 was an **initial analysis and diagnostic phase** exploring what is already known about both the European seas, but also thematic priorities around which the research is focused. This will inform the production of more detailed briefs for the next stage.
- Stage 2 was a period of intense **data collection**, both in terms of collating existing data sets for the European seas, but also through case studies

providing an evaluation of how various existing governance arrangements have been working in practice.

- Stage 3 was a period of **synthesis** and reflection as the information is consolidated into digestible elements.
- Stage 4 considered future **prospects** and was a period of scenario building and testing, based on an understanding of the opportunities and challenges facing the European seas.
- Stage 5 involved the development of an **overview** including clear policy recommendations, and suggestions for further prioritisation of research.

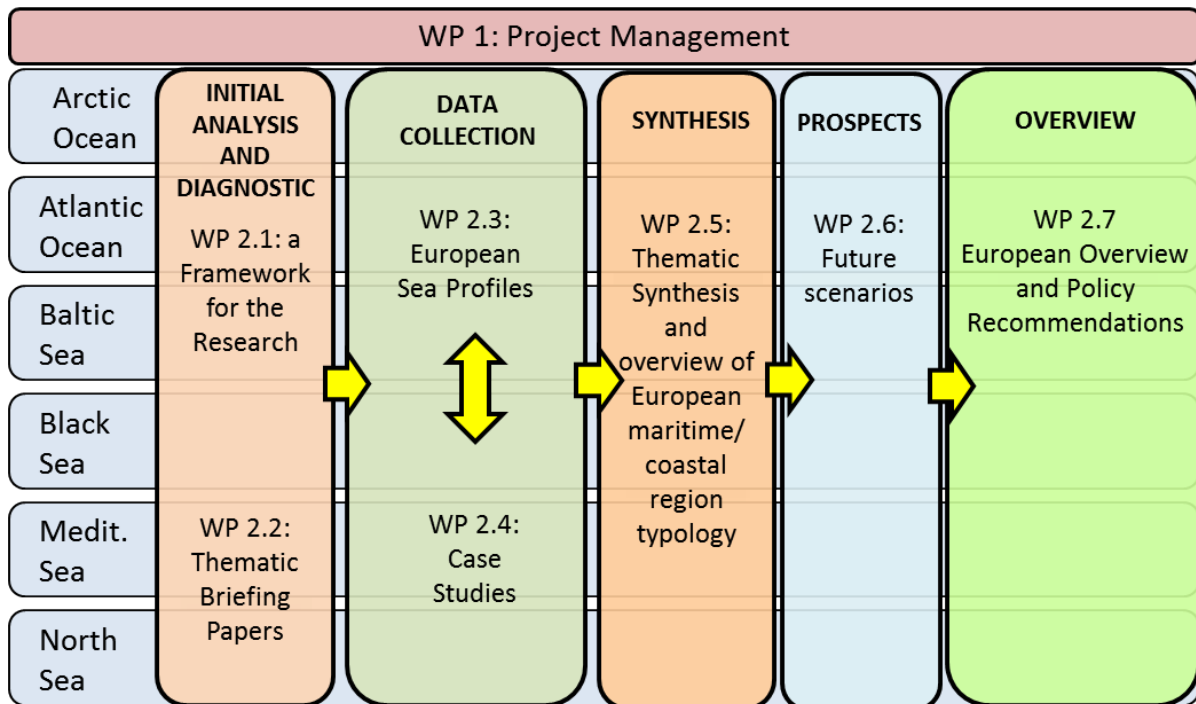


Figure 1 The analytical approach taken by ESaTDOR.

Whilst this framework suggests a sequential approach, development of policy recommendations and reflections on the importance of the European seas and Integrated Maritime Policy in meeting the *Territorial Agenda of the European Union 2020* was a key consideration throughout and informed the focus and approach at each stage. A more detailed description of the work packages can be found in the Scientific Report, and accompanying appendices.

Defining the Regional Seas

The research specifically and exclusively focused on six European seas (other maritime areas surrounding European territories have not been considered as they were explicitly excluded from the ESaTDOR project specification), and the first task was to define the boundaries of these regional seas for analytical purposes. One of the early findings from the research was that unlike on land where national boundaries are reasonably well defined and fixed, in a maritime environment there is a complexity of arrangements through which boundaries are defined, and definitions vary depending on which regime is being described. All nation states have declared territorial waters that can extend up to 12 nautical miles from the coast, and some

have declared exploitation rights based on either Exclusive Economic Zones (EEZ) (up to 200 miles from the shore) or the limits of the continental shelf, which have been declared under the provisions of the UN Convention on the Laws of the Sea (UNCLOS). In European policy terms the Marine Strategic Framework Directive (MSFD) has divided Europe's seas into three broad marine regions and nine sub-regions but excludes two regional seas, the Arctic and the Black Sea, as the focus is on seas which fall within the jurisdiction of the EU. Other boundaries such as those defined for the EU's Integrated Maritime Policy initiative, or related to the multilateral agreement of the OSPAR Convention do not align with MSFD boundaries, but reflect other thematic interests. Hence these examples illustrate the complexity of maritime boundaries and the potential difficulties of trying to apply one particular set of boundaries across all of the regional seas. Instead, the research has adopted a pragmatic approach. In most cases the definition of boundaries of regional seas has tried to take advantage of regional sea conventions such as OSPAR, HELCOM and the Barcelona and Black Sea Conventions. The agreed boundaries for each of the regional seas is shown in Map 2 and explained for each regional sea in the following paragraphs.

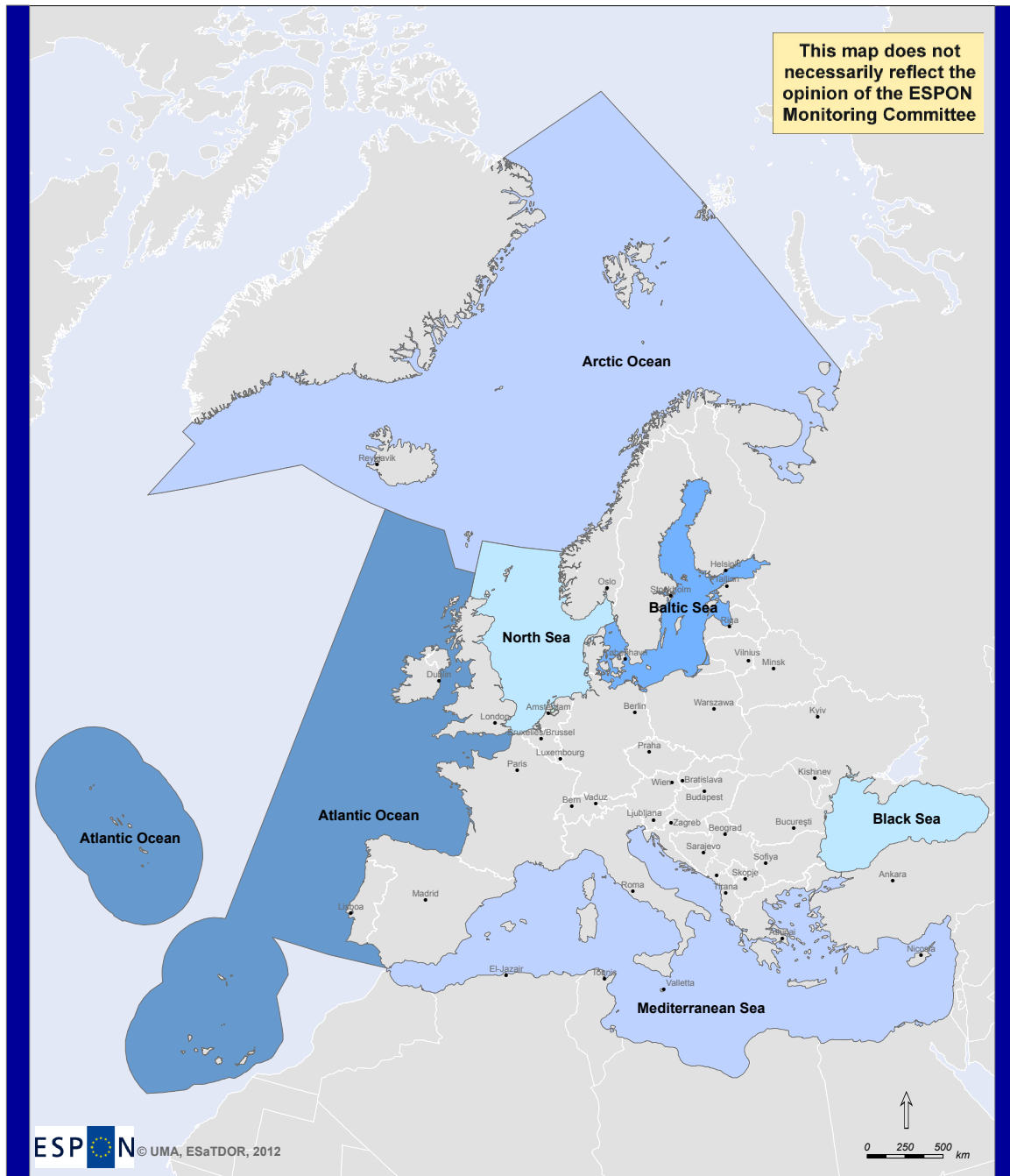
Arctic Sea Boundaries. The boundaries here are consistent with those for the OSPAR region 1: The Arctic Sea. By using OSPAR boundaries, Norway is bordered by only two regional seas (the Arctic and the North Sea), which will ease the data collection phase.

Atlantic Ocean Boundaries. OSPAR boundaries are used to delimit the northern edge of the Atlantic, and the boundaries between the North Sea, Arctic and Atlantic. The western edge of the Atlantic was defined by the western limits of the EU's Integrated Maritime Policy Areas, following a line of longitude at 18° W. In this instance it was decided to use IMP boundaries rather than extend the boundary further west to cover the entire OSPAR Wider Atlantic region as this covers a large area which, with the exception of Portugal's EEZ surrounding the Azores is beyond the jurisdiction of any European nation. The southern boundary of the Atlantic combines the southernmost extent of the OSPAR region with EEZs of the Canary Islands and Madeira. Between the UK and mainland Europe the eastern limits of the Atlantic are defined using the line between the English Channel and the North Sea. This coincides with the IMP boundary of the Celtic Seas and is appropriate given the Channel's importance in providing a strategic link between North West Europe with the Atlantic Ocean and the rest of the world.

Baltic Sea Boundaries. This is largely an enclosed sea and the key boundary concern relates to the area of transition between the Baltic and the North Sea. A line between the Skaggeak and Kattegat water bodies is adopted here, following the definitions adopted by HELCOM.

Black Sea Boundaries. The area covered by the Convention on the Protection of the Black Sea Against Pollution (Black Sea or Bucharest Convention) is suggested as the maritime region. This excludes the Sea of Azov to the north. This is controlled by Russian and Ukrainian authorities and is hence not part of ESPON space, and thus northern limit of the Black Sea is defined as the Kerch Strait. The Bosphorus Strait, which connects the Black Sea to the Mediterranean via the Sea of Marmara, defines the southern edge of the Black Sea.

Sea Boundaries




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Regional level: NUTSO
 Sea boundaries: OSPAR Convention, EU Integrated Maritime Policy and EEZ
 © EuroGeographics Association for administrative (land) boundaries

Map 2 Sea boundaries defined for the ESaTDOR project.

Mediterranean Sea Boundaries. The Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention), provides a basis for defining the western limit of the Mediterranean. However the Dardanelles Strait which, through the Sea of Marmara provides a link to the Black Sea, falls neither within the Barcelona or Black Sea Convention boundaries. In this case this space has been allocated as part of the Mediterranean maritime region.

North Sea Boundaries These boundaries have to a large degree been determined by the boundaries of its neighbouring maritime regions. To the north and west the Greater North Sea OSPAR boundaries separate this maritime region from the Arctic and the Atlantic. To the east HELCOM boundaries separate the North Sea from the Baltic and to the south the IMP boundary separating the English Channel from the North Sea completes the maritime extent of the North Sea region.

Report Structure

The above sets the context for the Final Report, which provides a synthesis of the work undertaken as part of this ESPON applied policy research project. Much of the detail is elaborated more fully in the Scientific Report and associated annexes (particularly in relation to the thematic priorities, regional seas profiles and the detailed case studies). Instead this report focuses on three stand-out scientific achievements of the project. We start by considering in more detail some of the methodological challenges associated with this exciting and extremely timely project, focusing particularly on data availability, mapping and mapping land sea interactions. Secondly we evaluate the existing multi-level transnational governance arrangements that have emerged in different European seas which seek to manage competition in the uses of different maritime spaces. Thirdly, this baseline description of different facets of the land sea interaction leads to a process of developing a typology of land sea interactions as a means of enabling a clearer understanding of the opportunities and risks facing Europe's regional seas and identifying alternative development scenarios. Together it is felt that these can facilitate visioning within which policy makers at various levels of governance and with varying sectoral interests can have informed discussions regarding future policy directions. The final sections identify key policy recommendations flowing from the project and future areas for research.

As was noted earlier there has been a sustained interest from researchers and policy makers on how to enhance territorial cohesion from a land or terrestrial perspective. Within the marine environment much research has focused on the resilience of ecosystems and by definition the implications of human activity on such systems, which in turn will have implications for human wellbeing. Exploring in more detail the interaction between land and sea and its importance for integrated territorial cohesion has only just begun. This research begins to 'step into the sea' and should not be seen as the answer, but the start of a journey.

Chapter 2: Data, Mapping and Issues in Developing the Typology

Data Collection Challenges

The ESaTDOR project is a first attempt by ESPON to map patterns of sea use and land-sea interactions for the purposes of analysing territorial development opportunities and thus has presented some new challenges for data collection and mapping. The approach has been based on the need to provide up to date and comprehensive quantitative data in order to map and analyse current patterns of land and sea use. This in turn should facilitate the identification of key land-sea interactions and assist in the construction of a maritime region typology. This has required a pragmatic and more experimental approach to be taken than may be the case in many other ESPON projects and therefore contributes to a new and innovative approach to mapping beyond ESPON's traditional boundaries of land-based territorial space. These first steps into mapping land-sea interactions provides an initial framework for developing further indicators and evidence gathering to support the territorial development of maritime regions.

The process of data collection and mapping has been informed by two main sources. Firstly, the INSPIRE Directive (Directive 2007/2/EC, establishing an Infrastructure for Spatial Information in the European Community), which aims to provide a common spatial data infrastructure, allowing for the harmonisation of datasets across the European Union. Where possible the ESaTDOR project has sought to collect and compile data in line with INSPIRE principles. In addition, the Annexes of the INSPIRE Directive provide a list of 34 spatial data themes which ESaTDOR has used as a starting point for listing the types of activities it would be desirable to collect information on in order to map sea uses and land-sea interactions.

The second source has been the knowledge of thematic experts within the ESaTDOR team who have been able to suggest additional topics relating to transport, the environment, economic use (the maritime economy) and energy, cables and pipelines where data should be collected. Using both the INSPIRE themes and expert knowledge, the ESaTDOR team have sought the best available datasets to represent these different topics.

Besides the usual problems associated with data collection for projects that are purely land based, such as coverage (inadequate geographical extent or in terms of missing values) and quality (age of dataset, spatial resolution, compatibility of different sources and existence of other data providing conflicting evidence) ESaTDOR has dealt with the additional complication of trying to map sea-based data where there is no standard spatial unit equivalent to NUTS or LAUs. Therefore a 10x10km grid for the seas has been developed, which is fully compatible with the grid of 1km for land used by ESPON. This has enabled sea-based data sets to be converted from their original formats to a more consistent and comparable grid format. The data collection and transformation process is described in more detail in

Chapter 3 of the Scientific Report. Figure 2 provides an example of the transformation of undersea cables (lines) to the new raster format.

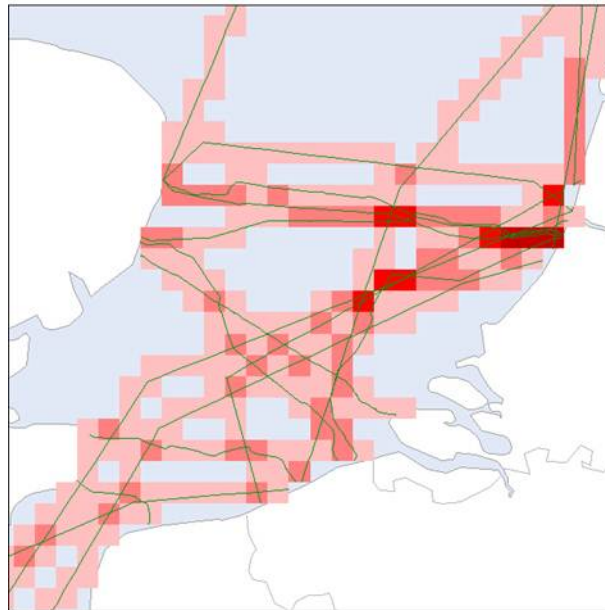


Figure 2 Conversion of undersea cable data to 10x10km grid squares.

In an iterative attempt to map land-sea interactions, a stepped approach has been taken, building upwards from single data sets to produce an overall synthesis of the data and a final maritime region typology map. These steps are as follows:

1. Selection of datasets

Under the guidance of the INSPIRE Directive and thematic experts, a number of individual data sets were collected to provide baseline information about the state of European sea use. In choosing datasets, the following criteria have been applied:

- A. *Geographical extent and scale*: to enable complete coverage of the ESPON space (meaning the land and sea regions defined by ESaTDOR) data sets had to be global or pan-European and sufficiently detailed, i.e. at a resolution below NUTS0 level wherever possible,
- B. *Spatial reference*: for data to be mapped, it was essential that the original data source came in a GIS-compatible format, and
- C. *Time series*: An additional desirable criterion for each dataset was the ability to show trends over an appropriate period of time (*quarterly*, *annually*, or longer periods) and consistently across the ESPON space.

2. Mapping of Individual data sets

Following the selection of individual datasets and quality control procedures, single data sets have been mapped at a pan-European and regional sea level. These “simple” maps include a range of land and sea based data in different formats, e.g. GDP at NUTS2 level, total volume of freight handled at ports (point data), shipping lanes, and increase in sea surface temperature (chlorophyll maps).

3. Composite Maps

In order to capture the cumulative effects of land-sea interactions, a more limited number of datasets were combined into three different groups (composite maps) representing characteristics to be captured within the maritime regions typology – economic significance, flows and environmental pressures, using the 10x10km grid system. For each composite map, data from individual layers was combined to produce one composite value from 1 to 5 according to the importance of an activity or environmental pressure. This information is classified by quintiles in five groups and given the following category names from lower to higher: *Very low, Low, Medium, High* and *Very high*.

4. Applying the typology

In this final stage, the composite maps for both land (economic significance) and sea (flows and environmental pressures) have been brought together in order to identify where land-sea interactions are at their most or least intense, i.e. “hot” and “cold” spots of activity. Here again, data sets are divided into quintiles (maintaining the original classification of land-based employment data and forming a unified sea-based data set for sea-based flows and environmental pressures).

In order to identify areas of greater or lower land-sea interaction, two separate maps of “hot” and “cold” spots were produced. For these maps the two highest or lowest quintiles for land and sea activity were shown respectively. These “hot” and “cold” maps were then used to identify what should be classified as the Core, Regional Hub, Transition, Rural and Wilderness areas within the regional seas.

Figure 3 summarises the mapping and typology development process. A schematic representation of these typology regions is shown in Map 3.

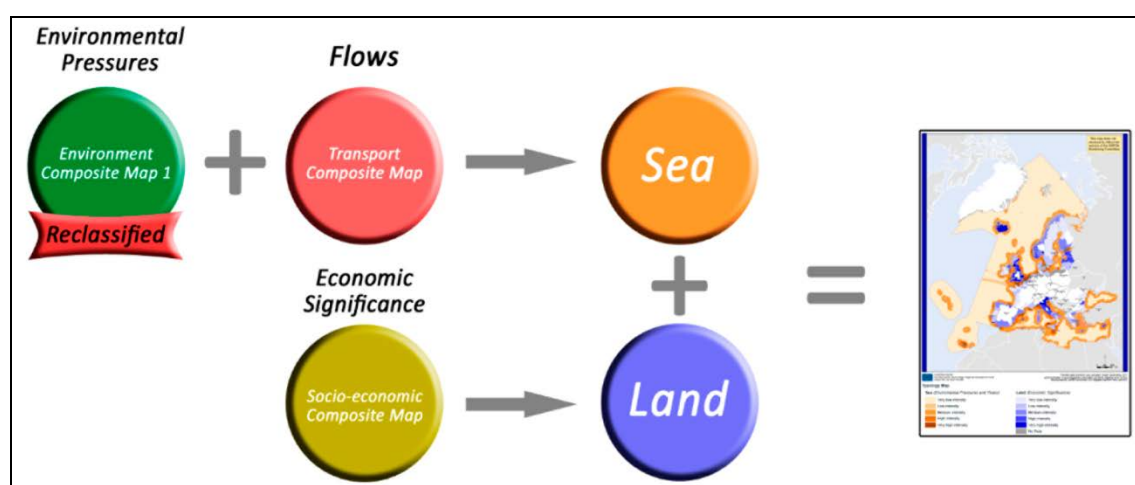
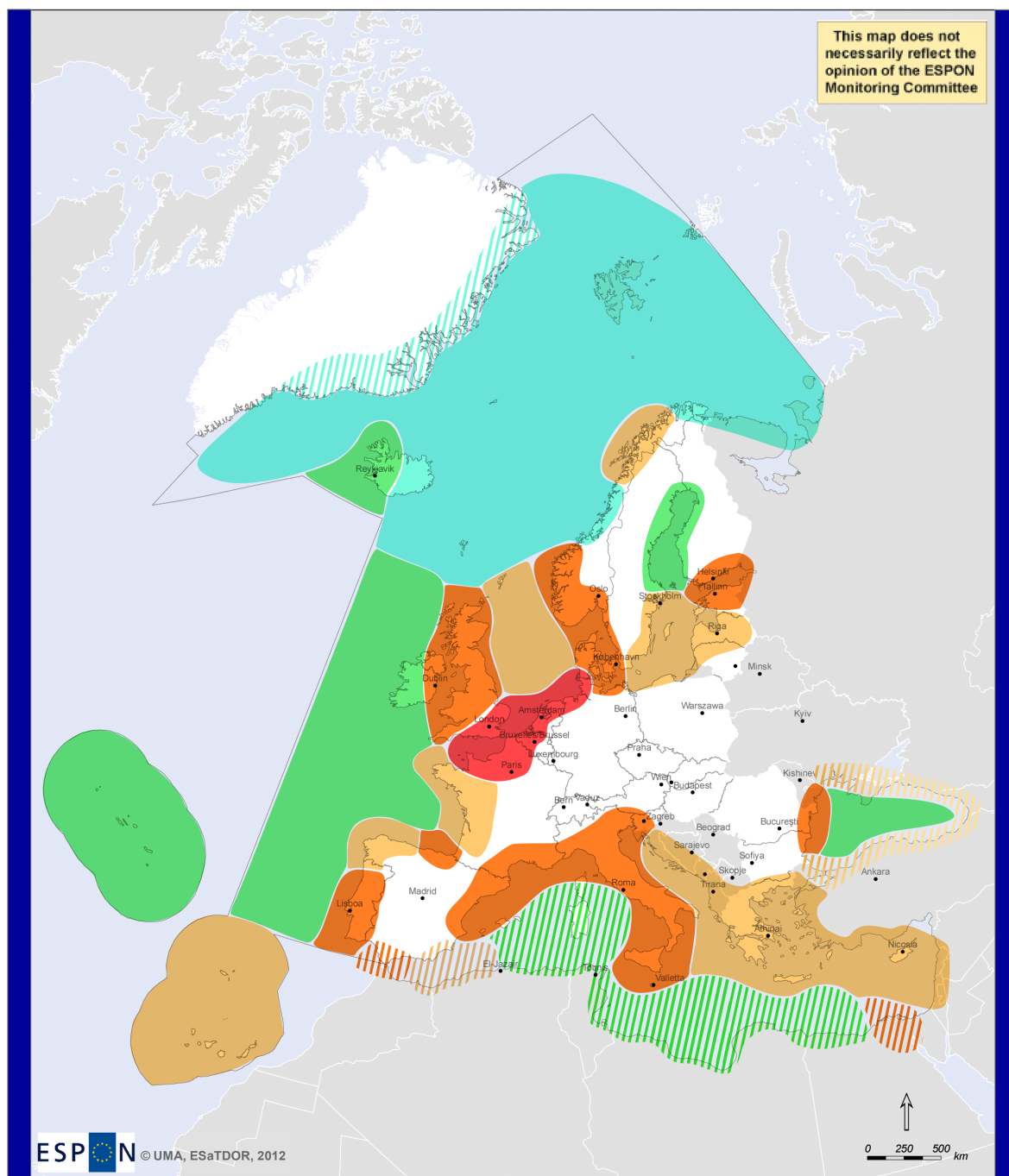


Figure 3 Summary of methodology for mapping and typology development.

Typology of European Maritime Regions




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Thematic data: Typology Map, Economic Significance and Environmental Pressures Composite Maps
 Land boundaries: © EuroGeographics Association and ESRI. Regional level: NUTS2.
 Sea boundaries: OSPAR Convention, EU Integrated Maritime Policy and EEZ.

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.

Map 3 A typology of European Maritime Regions (Schematic Map).

Interpreting the Typology

In the ESaTDOR Interim Report an initial review of existing typologies presented in the ESPON Typology Compilation Project was provided, assessing their suitability to be used as the basis for a maritime region typology. In this case it was found that land-based typologies were insufficient for capturing sea uses and land-sea interactions. In particular those typologies based on population densities were demonstrated to be inappropriate as the relationship between coastal populations and patterns of sea use is complex and unclear. This investigation demonstrated that a new maritime region typology was required. Following the development of a preliminary maritime region typology in the ESaTDOR Interim Report based on a qualitative assessment of the density of sea uses (see Interim Report and Chapter 10 of the Scientific Report for further details), the typology has now been refined to make use of a limited number of datasets for land and sea. These data sets can be layered to build up a more robust picture of land-sea interactions. This new typology is based on a more streamlined set of key characteristics, namely:

- Economic significance, using employment in different maritime and coastal activities to represent the value of activities which may have their origins in the sea (using marine assets such as fisheries) or on land,
- Flows – representing the movement of goods, services, information and people through sea areas,
- Environmental Pressures, representing the human impacts on the marine environment, for example through both sea and land based activities such as shipping or agriculture.

A summary of the characteristics associated with each type of region is shown in Table 1 below.

<i>Region/ Characteristic</i>	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
LAND-SEA INTERACTIONS	<i>Very high</i>	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Very Low</i>

Table 1 Characteristics of maritime regions developed for the typology

Chapter 3: Coastal and Marine Governance

Governance, particularly territorial governance has been explored extensively in another ESPON project (*ESPON 2.3.2 Governance of territorial and urban policies from EU to local level*) and there is neither the scope nor necessity to revisit this work here. Suffice to note, in contrast to government, governance is broad based, collaborative and cooperative in character which brings together the full range of dimensions of the state, with private and civil society. Whilst governance regimes on the land are relatively stable and well understood, they are constantly in a state of flux responding to different social, economic, environmental and ultimately political goals and agendas about whose or what priorities are given preference.

Within the marine environment there has recent and growing interest in terms of both how the marine environment can be protected from human interference, and increasingly desires that the assets of the marine environment might be more effectively and efficiently exploited. What is therefore emerging is a complex array of governance arrangements that can at best be described as relatively new, with a variety of different governance regimes being developed and promoted at a variety of different scales to address different issues. Some have generic application across the maritime environment whilst others have been developed to deal with particular regional seas issues and agendas. Some governance arrangements are international and multinational in nature and scope, some are bilateral and others are based on national concerns with an explicit understanding and requirement to cooperate with neighbouring national states. The need for more coherent and consistent governance of these resources is leading to the development of marine (or maritime) spatial planning, which is “an integrated, policy-based approach to the regulation, management and protection of the marine environment, including the allocation of space, that addresses the multiple, cumulative and potentially conflicting uses of the sea and thereby facilitates sustainable development” (MSPP Consortium, 2006, p.1).

Whilst, at least within a European context MSP has often been compared with spatial planning in a terrestrial context, there are a number of factors that make MSP much more complex:

1. Land use planning traditionally functions through one dimension (the surface of the land), whereas MSP must operate in three dimensions simultaneously, on and under the sea bed; in the water column and on the surface;
2. Land use planning is traditionally concerned with permanent and fixed structures whereas marine planning must accommodate both fixed and fluid structures and activities;
3. Perhaps most importantly are the diversity of legal rights that are created by and subject to, different legal and policy regimes; and
4. Finally the time dimension is also significant with patterns of environmental conditions and associated sea use varying significantly on a daily, monthly and seasonal basis, as well as over longer time cycles. (MARGb et al 2008).

Whilst spatial planning is largely applied to the terrestrial environment, MSP is being applied to the marine environment, Integrated Coastal Zone Management (ICZM) to coastal zone areas and more particularly the land sea interface. Hence across the regional seas are a complex set of overlapping governance arrangements in marine and coastal area which are highly place specific reflecting the particular combinations of local needs in combination with various international, regional seas, European, national regional and local customs and practices. This leads to one of the interesting debates as to whether the EU should seek to provide a more harmonised or common approach to the management of these issues and if so whether it a) has the competence to deal within these agendas and b) whether it should use more formalised processes such as directives or more informal guidance and funding to encourage best practice. This inevitably raises the questions of subsidiarity where the EU should only act *“if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States, either at central level or at regional and local level, but can rather, by reason of the scale or effects of the proposed action, be better achieved at Union level”* (Article 5 TEU1997) and proportionality where by the outcomes of a higher tier of governance should be too onerous on lower tiers of government (within the EU, national or regional).

The Complexity of Marine and Coastal Governance Arrangements

Governance arrangements for the management of maritime resources are live, evolving processes constantly adapting to changing technological, socio-economic and environmental conditions and political priorities. They operate at a variety of different spatial scales, often with competing, overlapping and conflicting objectives. This means that management of maritime resources, many of which are transnational in character are complex and rapidly changing. The following paragraphs briefly summarise the arrangements at a variety of different levels of governance.

Many of the international or global mechanisms to deal with seas use often predate or transcend EU actions and are related to the delineation of sea boundaries with respect to the allocations of resource exploitation; MSP and coastal zone management; seas economic use, protection of the marine environment; marine transport and sea energy systems. Perhaps the most prominent of these is the UN Convention on the Law of the Sea (UNCLOS) which provides the legal basis through which sovereign states can exercise partial sovereignty to the exploitation of living and non-living natural resources in the water column; seabed and subsoil. The negotiations of specific boundaries between nation states, requires detailed and often long term bilateral negotiations between states (see for example the Arctic Sea Barents Case Study and the Delimitation Treaty between Norway and Denmark/Greenland). It is also worth noting at this point that within the Mediterranean Sea there are many boundary disputes between countries in trying to define maritime boundaries with the Exclusive Economic zones (usually up to 200 nautical miles from the baseline) and defining the continental shelf has meant that sovereign claims often do not extend beyond the 12 or 24 miles of the territorial waters or the contiguous zone. Instead individual countries have designated particular zones usually for the protection and exploitation of a particular marine resource (e.g. the Fisheries Protection Zone in the Spanish part of the

Mediterranean Sea (Suarez, 2009)). Other international conventions are largely concerned with protecting the environment and biodiversity (e.g. Bonn Convention of Migratory species of Wild Animals, the Ramsar Convention which protects wetland areas and the UNEP Convention on Biodiversity) and often this is promoted by regulating or at least seeking to minimise the impact of ship related pollution incidents (e.g. the International Convention for the Prevention of Pollution from Ships (MARPOL), and the International Convention for the Control and Management of Ships Ballast Water & Sediments).

The next level of international or transnational activity that takes place occurs at the regional seas level. We have chosen this scale because many of the European regional seas in this project are not exclusively bordered by EU member states, member states of the ESPON space or potential accession countries, but also other states. Here multi-national agreements have been developed which deal with either regional sea issues (especially when the regional sea is enclosed) or specific thematic issues, where the institutional agreement operates across several regional seas (see for example OSPAR). In many of these cases the EU was not the driving force behind these partnerships, but certainly through financial support is having an impact in the way these partnerships are able to achieve their objectives in the various regional seas. In the case of the Northern Dimension, the EU as a partner is seeking to facilitate through dialogue and cooperation the sustainable development of northern Europe around the Arctic and includes the EU, Russian Federation, Iceland and Norway. Notable regional seas partnerships which have developed organically include the Baltic HELCOM and VASAB transnational institutional arrangements. In the Mediterranean the Barcelona Convention to protect the sea from pollution was originally ratified in 1978 and modified in 1995, in part promoted and funded by the UNEP, nevertheless the Commission Communications and financial inputs clearly indicate the importance of the regional sea and the need for synergistic action and constant dialogue between partner countries. In the Black Sea, the Convention on the Protection of the Black Sea Against Pollution (the Bucharest Convention) seeks to improve the quality of the Black Sea through pollution control and joint action in the case of incidents. It is worth noting that collaboration in the Danube Region, promoted by the EU and linked to Europe 2020, is important as it discharges into the Black Sea. The OSPAR Convention is also thematic in that its overarching objective is to protect the marine environment of the north east Atlantic. It works by persuading partners to take a particular course of action, but what is significant for this research, largely as an observation, is that it covers three of our regional seas (the Atlantic, Arctic and North Sea).

The tables in Chapter 8 of the Scientific Report provide a summary and synthesis of many of the governance arrangements at the regional seas level. In many cases the EU was not the body who initiated the action, but through its communications and funding mechanisms is encouraging better governance of the transnational and cross border environments.

At a European scale, governance arrangements for the exploitation and management and protection of maritime resources have also been emerging in an incremental manner and a number of broad areas of activity that have an impact on the seas can be identified:

First there are a range of what might be described as sectoral policies and initiatives, each with important maritime implications. Perhaps the most well-known of these relates to the Common Fisheries Policy (CFP), whereby the EU has exclusive competence in the conservation, management and exploitation of living aquatic resources. Similarly, the Birds and Habitats Directives are applicable to designated areas and specific species within both a terrestrial and marine context and draw their inspiration from international conventions e.g. Bern, Bonn and Ramsar Conventions.

Second there are a range of general process directives which are applicable both to land and sea. Of particular significance here are the directives relating to the environmental appraisal of proposed plans and projects. The Council Directive of 27th June 1985 on the assessment of certain public and private projects on the environment (85/337/EEC), the so called EIA Directive, requires that large scale development proposals should be subject to an environmental impact assessment procedure as part of the decision making process, to mitigate harmful environmental effects. More recently, the assessment process has been pushed up the policy hierarchy and Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (the SEA Directive) requires plans to be appraised for their environmental impacts. The Waste Framework Directive (Directive 2006/12/EC) also applies to both terrestrial and marine areas and seeks for example to eliminate the dumping of waste at sea.

Thirdly and more recently there has been a growing interest in marine spatial planning, but this was predated by European interest in the land sea interface with Integrated Coastal Zone Management (ICZM). The coastal zones of European countries and seas have been the focus of attention from an early stage. In 1973 the Council of Europe expressed concern for coastal environments in Europe and their “biological degradation and aesthetic disfigurement” (Tubbs, 1983, p.64). Participation in coastal management is strongly advocated and a recent report by COWI (2011) for DG Environment stresses the value of ICZM as a governance tool for more sustainable development of coastal areas, pointing out that “the perception of stakeholders is that ICZM provides for better governance, better understanding between stakeholders and authorities, better resource use and conflict resolution, better planning and management of the coastal zone and improvements to the coastal environment”. All ICZM documents urge the adoption of governance arrangements which are based on stakeholder involvement and participation and the improved coordination between coastal management and terrestrial planning. They include references to horizontal and vertical relationships with e.g. ESDP, the EU Sustainable Development Strategy, the 6th Environment Action Programme and regional sea conventions.

From 2007 onwards, particularly in the 2009 follow-up report to the EU ICZM recommendation, which speaks of “the emergence of the overarching Maritime Policy with tools such as maritime spatial planning”, IMP and MSP are regularly mentioned. In the Council Decision of December 2008, ICZM is considered “one component of the EU Integrated Maritime Policy”. Whilst maintaining a strong interest in the coast more recent EU pronouncements have proactively promoted broader marine spatial planning as either a formal (binding) or non-statutory (non-binding) form, operating within local, national or international jurisdictions. Most of the communications and recommendations are promoting and encouraging voluntary

action, although the Marine Strategy Framework Directive (2008/56/EC) which parallels the Water Framework Directive seeks to ensure that the marine environment has good environmental status by 2020. This is very much environmentally focused and as noted elsewhere, there is a growing interest in territorial cohesion which is increasingly recognizing the importance of marine and terrestrial space within the concept of territoriality. Various Directorates within the Commission are also showing increased interest in the potentials offered or threats to the maritime environment as part of the territorial agenda. This requires good integrated planning and management, and whilst many are advocating that the principles of best practice might resemble terrestrial or land use planning, the three dimensional context is more complex (Pritchard 1983; White, Mottershead and Harrison 1992; Blaesbjerg et al 2009), and further it envisions a regime disconnected from the land. Nevertheless the EU, through Regulation 1255/2011 is funding a programme “to foster the development and implementation of integrated governance of maritime and coastal affairs” including MSP and ICZM at a variety of different scales. This bears testimony to the recognition of and need for the range of policies and interests within the marine environment to be brought together.

Below the EU level various national governments are in parallel developing specific policies, instruments and approaches to the more integrated management of their maritime environments (see Chapter 8 of the Scientific Report) and this leads to an array of local partnerships and projects within the jurisdiction of national boundaries and in many cases operating as cross border or transnational partnerships. These are the focus of our more detailed, but selective case studies on governance (see below).

Whilst there is growing evidence that the planning and management of the seas is becoming increasingly important, it is clear that a multiplicity of governance arrangements can be observed in regional seas (treaties, councils, *fora*, commissions, partnerships, initiatives etc), which adopted varying membership models (official and unofficial, formal and informal, closed or open). Problems of cooperation exist even in the most tightly structured arrangements, with the proliferation of agencies in the same sea often leading to overlapping functions. Apart from the hard / soft law issue, an equally important dilemma is the option of an integrated, holistic and comprehensive approach covering all aspects of maritime affairs instead of a thematic, issue-specific approach. The first option seems to be gaining ground, certainly in the literature, but arrangements of the second type can probably show more tangible achievements. What is not disputed is the crucial role of transboundary cooperation, particularly in sea space planning.

Aspects of Good Governance within the Marine Environment

Good governance principles are always accepted as a solid foundation for effective maritime arrangements, but these are challenging within a marine environment because of the distinctions between global-international and regional-transnational let alone national and regional arrangements, but also between formal and (fairly) informal ones. Furthermore policies, programmes and institutional arrangements need to be judged not just on their own but also as cross-cutting perspectives to deal with multidimensional challenges, focussing on coherence and cooperation. The ESaTDOR project has identified a number of themes including:

- Openness based on consultation with a broad range of stakeholders (as a top down process) is required to reach a broad consensus for the direction of travel from the perspective of international or EU activities. This raises the questions of subsidiarity and proportionality, particularly in relation to EU legislation.
- Participation and civic engagement (as a bottom up process) is critical and within a marine environment linked to the behaviour of users, small businessmen, leisure entrepreneurs, fishermen, citizens and the like, with several insisting on parallel actions of information, awareness-raising and education;
- Cooperation and structure. Cooperation can be conceived as horizontal, vertical, diagonal, public-public, public-private, public-private-civil society etc. At the international level this is a prerequisite of good policy governance, but is also part of a political bargaining process, over issues which cannot be fully regulated in national and supra-national decision making in that they touch on individual grassroots decisions and actions.
- Coordination. Coordination is not identical to cooperation and does not follow automatically. It can be secured through rigorous command structures, but this may violate other governance principles and its effectiveness would be questionable. An interesting device is that of the adoption and diffusion of similar institutional arrangements. This “production of uniformity” in governance and administration processes is bound to secure coordination, simply by making certain that they all do things in a similar manner.
- Effectiveness. The explanation of the principle of effectiveness offered in the White Paper on European Governance is that “policies must be effective and timely, delivering what is needed on the basis of clear objectives, an evaluation of future impact and, where available, of past experience”. The choice of the right tools should be added.
- Coherence. Coherence and effectiveness of policy must be mutually reinforcing and supportive. Here the key problem, repeatedly stressed in EU documents, is cross-sectoral coherence.
- Efficiency, in contrast to effectiveness, concerns the final delivery of services.
- Inclusiveness. By and large, policies addressing the maritime environment stress the need for inclusiveness, i.e. the necessity not to ignore groups of stakeholders with an interest in its management and planning. In this sense this criterion has a lot in common with participation, although even if a policy is inclusive, participation is not necessarily achieved, often for cultural or political reasons.
- Sustainability. The strong interest in the protection of the marine environment, and the initial impetus to safeguard it, have endowed maritime policy with a sustainability flavour, which is evident in all EU documents reviewed, even to the detriment, it could be argued, of social sustainability.
- Transparency, accountability and decision making. Transparency and accountability are important governance criteria, which can be tested at a lower level, i.e., national or local. As far as decision making is concerned, clarity and equality are two essential ingredients. Clarity, as far as formal procedures are concerned, is fairly easy to ascertain. Equal access to

decision making is a much more complex issue, which may in fact affect clarity as well.

- Conflict resolution. International conventions provide for fixed processes of conflict resolution through arbitration and the courts. This is a major issue in maritime space, as we have already made clear, and the existence of such processes does not solve problems where practical political realities leave no alternative but negotiation and are hampered by procrastination. It may be argued that this is equally the case in land disputes and cross-border differences, but sea space is less regulated especially in certain regional seas, as in the Mediterranean, thus making forward planning more difficult. Even successful national initiatives in Europe lack an international perspective and consideration of impacts across national boundaries. National boundaries are not necessarily meaningful from an ecological perspective.

Hence there is an emerging complexity of governance arrangements being developed on a formal or informal basis as a result of formal international, European or national agreements which deal with specific or more generic maritime issues and agendas. There is an interest in a more integrated approach to managing these complex ecosystems, but differences in scale, focus and competences means that common or best practice models are difficult to determine. It is also clear that despite the emergence of an argument which broadens territorial beyond the terrestrial to include the marine, integrated territorial planning is still a long way off, perhaps with some experiments in ICZM at the coastal interface, although such activities are largely informal and non-statutory in character.

Coastal Governance in Practice

The purpose of the maritime governance case studies within the ESaTDOR project was to provide a more in depth assessment of the governance experience of different maritime and coastal regions. More specifically, case studies have been chosen on the basis that they are examples of transnational governance (either bilateral or multilateral arrangements) in order to investigate the following issues:

- Management of conflicts in relation to the uses of maritime space,
- The integration of terrestrial (land-based) and marine or maritime spatial planning, and
- The contribution that existing transnational governance arrangements can make to territorial cohesion.

In addition, the evaluation of governance arrangements in each of the case studies is intended to highlight examples of good practice in maritime governance, and provide evidence for further recommendations as to how governance arrangements in different maritime regions can be strengthened, through for example, Integrated Maritime Policy or the development of further transnational cooperation initiatives. For each sea region our initial aim was to select one governance arrangement that has been put in place to manage the maritime resources at a least the level of the sea itself, representing a more holistic approach to management, whilst the remainder of case studies should relate to transnational arrangements which are more sub-regional, sectoral or bilateral in terms of geographical or thematic

coverage. However, the final selection of case studies has resulted in a greater number of regional sea-wide case studies being undertaken. As governance arrangements in the Baltic Sea have been held up as exemplars of good practice transnational marine governance, an additional case study on the HELCOM-VASAB Joint Working Group on Marine Spatial Planning has also been included. The list of case studies is provided in Table 2 below.

The case studies were undertaken using a mixture of documentary reviews and interviews with a limited number of key stakeholders. A synthesis of the findings is provided in Chapter 9 of the Scientific Report and the individual case studies are included in Annexes 8-13. In total the research looked at 10 regional sea case studies and 9 sub-regional sea case studies.

Reflections from the Case Studies

The key characteristics and findings from the case studies can be found in Tables 3 and 4. The following paragraphs provide a brief narrative account of the generic findings.

A key issue in setting up governance arrangements is the choice between a regulatory framework making binding decisions, on one hand, and a soft law, non-binding arrangement, on the other. When a soft law model is preferred or imposed, this is accompanied by reliance for implementation on EU law, nation states and international conventions (e.g. UNCLOS), which provide the legal context and are frequently the trigger of partnerships and treaties. Regardless of the choice a balance has to be maintained between enforcement and mandatory recommendations on one hand and subsidiarity and consensus on the other. This remains an imperative, even when hard law regulations are available, as frameworks can be vulnerable to procrastination and reluctance of national and/or regional authorities to implement recommendations notwithstanding their binding character.

A multiplicity of governance arrangements can be observed in regional seas (treaties, councils, fora, commissions, partnerships, initiatives etc), which adopted varying membership models (official and unofficial, formal and informal, closed or open). Problems of cooperation exist even in the most tightly structured arrangements. The proliferation of agencies in the same sea often leads to overlapping functions. Situations of competing arrangements can be observed, even if this is not openly acknowledged, explained by the fact that particular countries take the initiative to gain political influence and prestige.

Apart from the hard / soft law issue, an equally important dilemma is the option of an integrated, holistic and comprehensive approach covering all aspects of maritime affairs instead of the option of a thematic, issue-specific approach. The first option seems to be gaining ground, certainly in the literature, but arrangements of the second type can probably show more tangible achievements. Besides, multi-level governance situations with a corresponding proliferation of actors and stakeholders have to tackle management problems of a different scale. Still, what is not disputed is the crucial role of transboundary cooperation, particularly in sea space planning.

	Arctic Ocean	Atlantic Ocean	Mediterranean Sea	North Sea		Baltic Sea	Black Sea
Regional Sea Case Study	Northern Dimension and Arctic Council	The Atlantic Arc Commission	Protocol on Integrated Coastal Zone Management in the Mediterranean	The OSPAR Commission	Regional Sea Case Study 1	Vision and Strategies for the Baltic Sea Region (VASAB)	The Black Sea Regional Energy Centre (and Black Sea Synergy)
Sub-Seas Case Study 1	Maritime Delimitation Treaty between Norway and Denmark	The British-Irish Council	Adriatic-Ionian Initiative (AII) and Adriatic Sea Partnership (ASP)	The Trilateral Wadden Sea Cooperation	Regional Sea Case Study 2	Helsinki Convention (HELCOM, Convention on the Protection of the Marine Environment of the Baltic Sea Area)	The Commission for the Protection of the Black Sea Against Pollution (Black Sea Commission)
Sub-Seas Case Study 2	Maritime Delimitation Treaty between Norway and Russia (Barents Treaty)	The Solway Firth Partnership	The MEDGovernance Partnership and Project	Flemish-Dutch cooperation on the Scheldt (Westerschelde) Estuary	Regional Sea Case Study 3	HELCOM-VASAB MSP (Marine Spatial Planning) Working Group	Black Sea Global Ocean Observing System
					Sub-Seas Case Study 1	Pomeranian Bight Initiative	

Table 2 ESaTDOR Case Studies

Difficulties also arise in situations of partnerships with EU and non-EU members, where symptoms appear of unequal readiness to take action and of poor traditions of cooperation. There is also a problem of communication between partners, due to different institutional systems and allegiances, professional backgrounds and financial shortages. In particular geographical regions there is a long history of political disputes and controversies and a tradition of non-cooperation. In others, the aim of interstate political cooperation is a distinctive driver for regional and sub-regional maritime cooperation. In such cases the lobbying role and influence of partnerships benefits from high-level support provided by powerful national or regional administrations. A reverse phenomenon is probably the pursuit of over-ambitious goals by partnerships which hope to evolve into geographically broader arrangements but may instead limit their practical effectiveness. Here the political, perhaps disguised, ambitions of particular partners may have a negative impact.

Good governance principles are always accepted as a solid foundation of effective maritime arrangements, including horizontal and vertical cooperation with international bodies, national, regional and local administrations, NGOs, business and research communities and other stakeholders. Equally positive is the contribution of transparency, neutrality, fairness, stakeholder participation, openness, genuine mutual exchange and maintenance of a stable climate of cooperation. The factors of local support and commitment, public perception and agency visibility are also critical.

The key substantive drivers of marine environmental protection, resource use (minerals, oil, wind energy etc), national and regional economic development and territorial cohesion dominate the scene of governance arrangements, but threats of pollution, flood, resource depletion (e.g. through overharvesting of stocks) etc. are also of importance. Maritime delimitation is an actual or potential driver, not only for resource exploitation but also for securing stability. In particular regions the goal of promoting sustainability of coastal communities ought to be mentioned. Conflicts between driving forces do naturally exist. The opposition of environmental concerns and economic business interests (oil, offshore wind farms, shipping, ports, fisheries) results in difficulties to take action.

There is a spreading realization of the importance of MSP, albeit applied in limited cases, as an instrument for maritime policy and attainment of all marine space-related goals, including those of the MSFD and ICZM. MSP is however being embraced more in national strategies than in regional sea cooperation, because of the availability of a uniform regulatory framework, an observation which takes us back to the issue of hard or soft law. The non-existent or problematic delimitation of maritime boundaries hinders joint marine policy and maritime planning. It is obvious that delimitation brings legal certainty and overcomes obstacles to resource exploitation, but is delayed by political disputes.

EU policy (maritime, marine environment, cohesion, sustainable development) and law has been a frequent inspiration and lever for the creation of sea governance arrangements, in which the EU is often a partner. Conventions and organizations of the United Nations are also a constant influence and driver. The mode of operation of the EU is sometimes criticized, in that it favours cooperation with, and support to,

member-states and places less emphasis on regional sea cooperation arrangements, in spite of the move it has made in that direction. It is significant that a tendency has been observed among national administrations, which are partners in a partnership but also EU members to turn to the EU for implementation and action, a development which weakens the partnership. In some sea regions with a large number of non-EU coastal states, confusion has been reported, arising out of overlapping regionally- or sectorally-oriented EU policies

The production, storage, dissemination, availability, accessibility and use of solid scientific information is everywhere a sound foundation of cooperation. Their absence creates serious problems. More effort is needed to produce databases and reliable maps of sea space with uniform specifications and data reliability. Hence, the importance of the function of scientific data collection, building data bases, monitoring biodiversity, ecosystems, climate change and pollution, is a function conducive to practical cooperation and well-informed policy-making.

Governance arrangements reviewed in this report make use of a broad range of instruments and methods to improve their output and effectiveness. They are summarized here in a short paragraph: Accessibility to multiple financial resources and co-financing; emphasis on inclusiveness and activation of all stakeholders including Local Authorities (LAs), NGOs, Civil Society organizations and academic and business communities; flexible coordination and learning-by-doing processes; combination of top-down and bottom-up approaches; cross-sectoral organization and structure; entering as partners in UN and EU project consortia; development of linkages with other political or governance structures; gradual expansion of their objectives, scope and remit; self-assessment criteria for monitoring progress as regards objective achievements; improvement of monitoring and information gathering and updating mechanisms; awareness-participation-training instruments; spatial and strategic plans, risk prevention plans and environmental assessment studies.

Classification of Case Studies – Main goals of governance arrangement									
Case studies	Dominant focus								
	Cooperation Participation	Environmental / Coastal protection	Pollution control and reduction	Economic development	Resource exploitation	Territorial cohesion- Regional dev.	Maritime Spatial Planning	Maritime boundary delimitation	Specific Econ. sectors – Monitoring Observation
Regional Sea Case Studies									
Arctic /N. Dimension - Arctic Council	+	+			+			+	
Atlantic /Atlantic Arc	+			+		+	+		
Baltic /VASAB	+					+	+		
Baltic /HELCOM	+	+	+						
Baltic /MSP Working Group	+						+		
Black Sea /Energy Centre			+	+					+
Black Sea/ Commission-Pollution	+	+	+						
Black Sea /GOOS		+		+					+
Med /ICZM Protocol	+	+				+			
North Sea/OSPAR	+	+	+						+
Sub-regional Sea Case Studies									
Arctic /Nor-Den Treaty					+			+	
Arctic /Nor-Rus Treaty					+			+	
Atlantic /British-Irish Council	+			+					
Atlantic /Solway Firth	+	+							
Baltic /Pomeranian Bight		+					+		
Med /Adriatic		+	+						
Med /MEDGovernance				+		+			
North Sea /Wadden Sea		+							
North Sea /Scheldt Estuary		+		+					

Table 3 Classification of Case Studies by Main goal of Governance Arrangement

Classification of Case Studies – Membership and formal character of governance arrangement							
Case studies	Members				Formal character		
	States	Regions and /or Local authorities	Various partners	States and regions	“Hard” formal arrangement / convention. Binding decisions.	“Soft” formal arrangement. Non-binding decisions.	Various forms of partnership. Non-binding decisions.
Regional Sea Case Studies							
Arctic /N. Dimension - Arctic Council	+					+	
Atlantic /Atlantic Arc				+		+	
Baltic /VASAB	+					+	
Baltic /HELCOM	+					+	
Baltic /MSP Working Group			+				+
Black Sea /Energy Centre			+			+	
Black Sea/ Commission-Pollution	+					+	
Black Sea /GOOS	+						+
Med /ICZM Protocol	+				+		
North Sea/OSPAR	+				+		
Sub-regional Sea Case Studies							
Arctic /Nor-Den Treaty	+				+		
Arctic /Nor-Rus Treaty	+				+		
Atlantic /Brit-Irish Council				+		+	
Atlantic /Solway Firth			+				+
Baltic /Pomeranian Bight			+				+
Med /Adriatic			+				+
Med /MEDGovernance		+					+
North Sea /Wadden Sea	+					+	
North Sea /Scheldt Estuary	+				+		

Table 4 Classification of Case Studies by Membership and Character of Governance Arrangement.

Chapter 4: Towards a Typology and Scenarios for Territorial Development

The third element of the project was the creation of a maritime region typology which reflects the relative intensity of land/sea interactions based around the key themes which were the focus of the work and through an analysis of key development opportunities and risks the formulation of scenarios for the future of Europe's maritime regions.

Maritime Region Typology

As explained in Chapter 2 and discussed in more detail in the accompanying Scientific Report, the typology has been created through layering a selection of European wide data sets related to key maritime characteristics, namely:

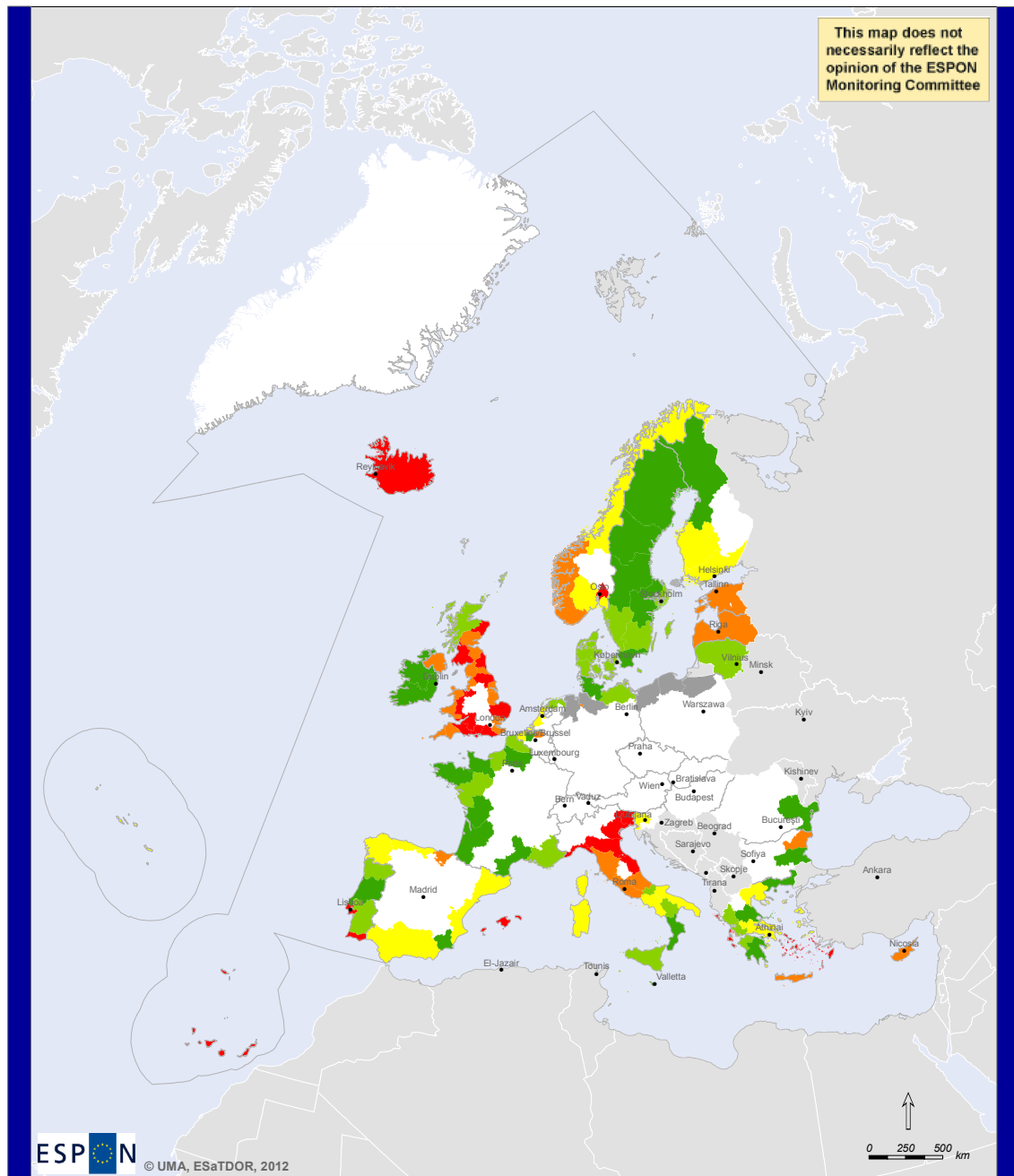
- Economic significance, using employment in different maritime and coastal activities to represent the value of activities which may have their origins in the sea (using marine assets such as fisheries) or on land,
- Flows – representing the movement of goods, services, information and people through sea areas,
- Environmental pressures, representing the human impacts on the marine environment, for example through both sea and land based activities such as shipping or agriculture.

The first step in the formulation of the typology was to integrate the selected data sets into three composite maps covering each of these characteristics. This provided a general spatial overview of the current economic, transport and environmental situation of Europe's maritime areas and helped to decipher the particular characteristics of different regions.

The Economic Significance composite map (Map 4), which focuses on the land, shows a high or very high percentage of total employment in maritime related industries in Iceland, Norway, Estonia and Latvia, the UK, parts of northern Spain, northern and central Italy, southern Portugal, and many European islands including the Canaries. These areas are where local economies appear to be most strongly related to their maritime setting. Interestingly, a slightly different pattern emerges if gross employment in maritime industries is considered. Here, for example the mega port regions of The Netherlands and Belgium stand out, however proportionally maritime industries are less significant in the overall make-up of employment in these densely populated and urbanised regions. In contrast the Flows composite map (Map 5) which focuses on activity on the sea, does show the Southern North Sea and Channel as the major focus for marine transport and cables in Europe, with other hotspots also evident around major ports in the Mediterranean, in the Baltic around the Danish Straights and Gulf of Finland and around the Canaries. The Environmental Pressure composite map (Map 6) also reflects the presence of major ports as these are focal points for invasive species and in addition it shows areas where land based organic and inorganic pollution associated with farming and industrial activity is at its most intense. Taken together these environmental pressures are most concentrated around the Atlantic, North Sea and Baltic

coastlines while other hotspots are evident along the northern shores of the Mediterranean and in the Black Sea.

Economic Significance




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Thematic data: Economic Significance Composite Map.
 Land boundaries: © EuroGeographics Association and ESRI. Regional level: NUTS2.
 Sea boundaries: OSPAR Convention, EU Integrated Maritime Policy and EEZ.

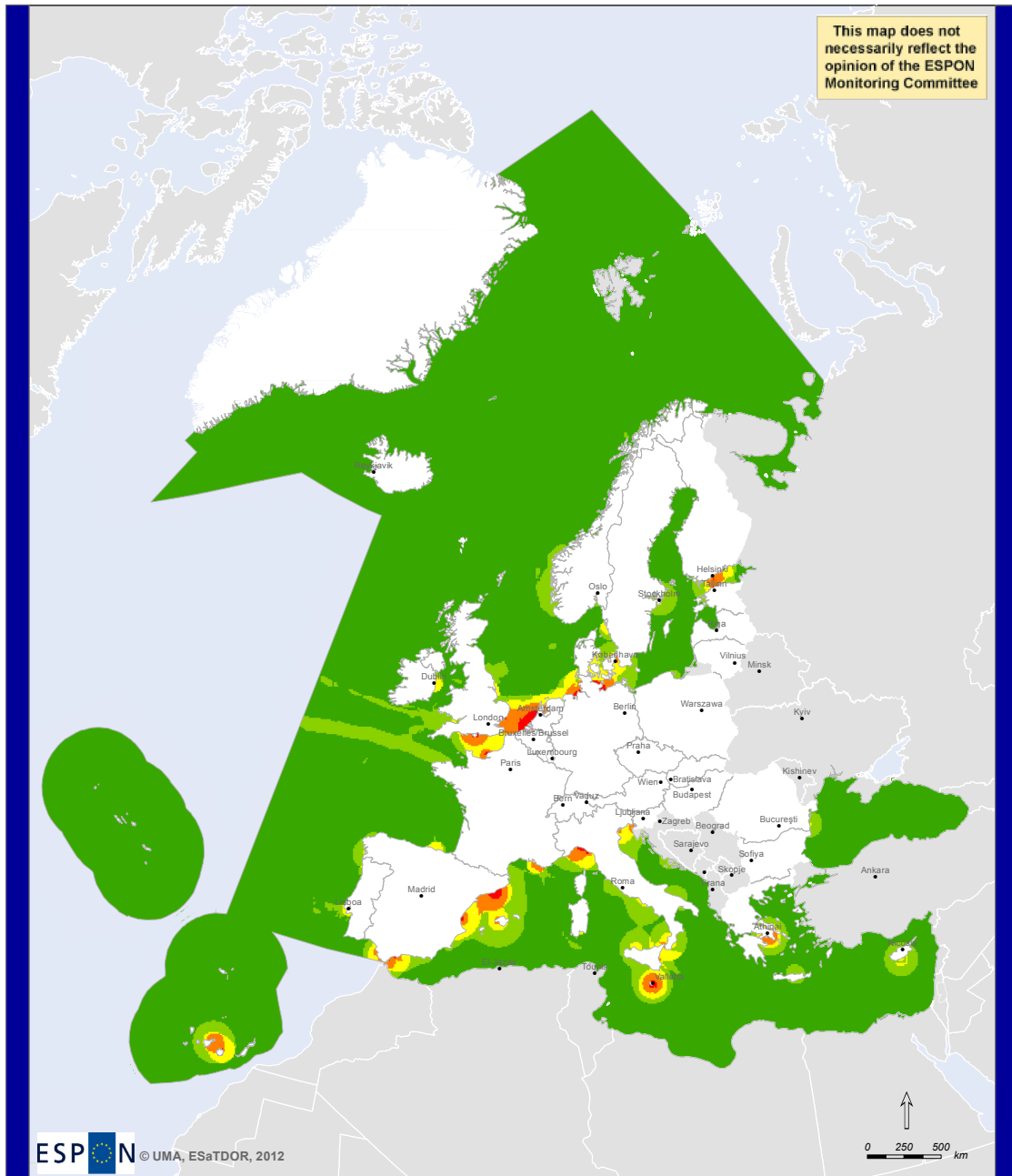
Total Maritime Employment Composite Map (percentage of total employment within each NUTS2 region)

- Very Low (5.42 - 15.52)
- Low (15.53 - 17.60)
- Medium (17.61 - 21.06)
- High (21.07 - 24.69)
- Very High (24.70 - 36.35)
- No data

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.

Map 4 Economic Significance composite map.






Maritime Flows




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Thematic data: Flows Composite Map.
 Land boundaries: © EuroGeographics Association and ESRI. Regional level: NUTS2.
 Sea boundaries: OSPAR Convention, EU Integrated Maritime Policy and EEZ.

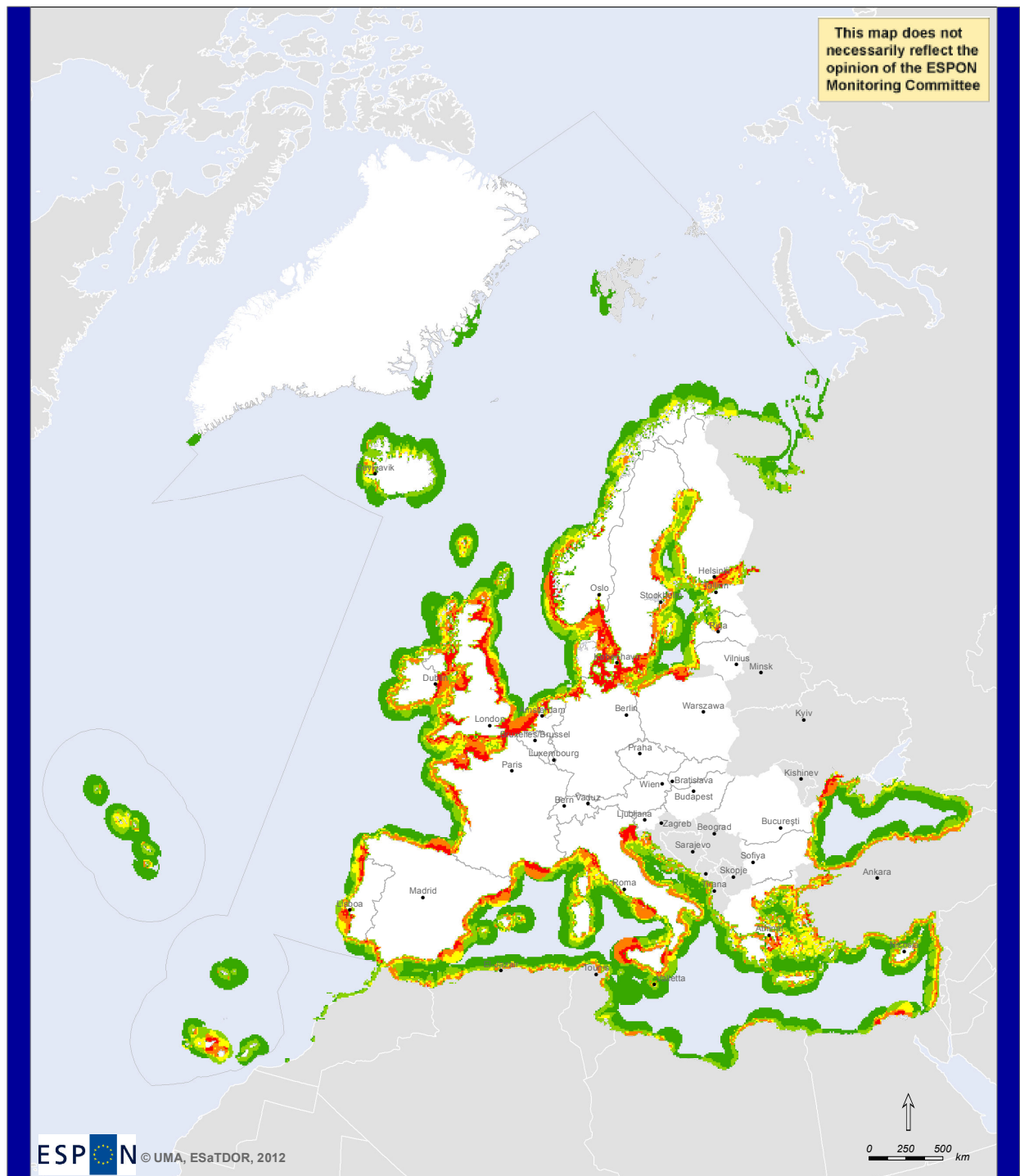
Flows Composite Map

-  Very Low
-  Low
-  Medium
-  High
-  Very High

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 ESaTDOR Scientific Report for more information.

Map 5 Flows composite map.






Environmental Pressures




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Thematic data: Environmental Pressures Composite Map.
 Land boundaries: © EuroGeographics Association and ESRI. Regional level: NUTS2.
 Sea boundaries: OSPAR Convention, EU Integrated Maritime Policy and EEZ.

Environmental Pressures Composite Map

-  Very Low
-  Low
-  Medium
-  High
-  Very High

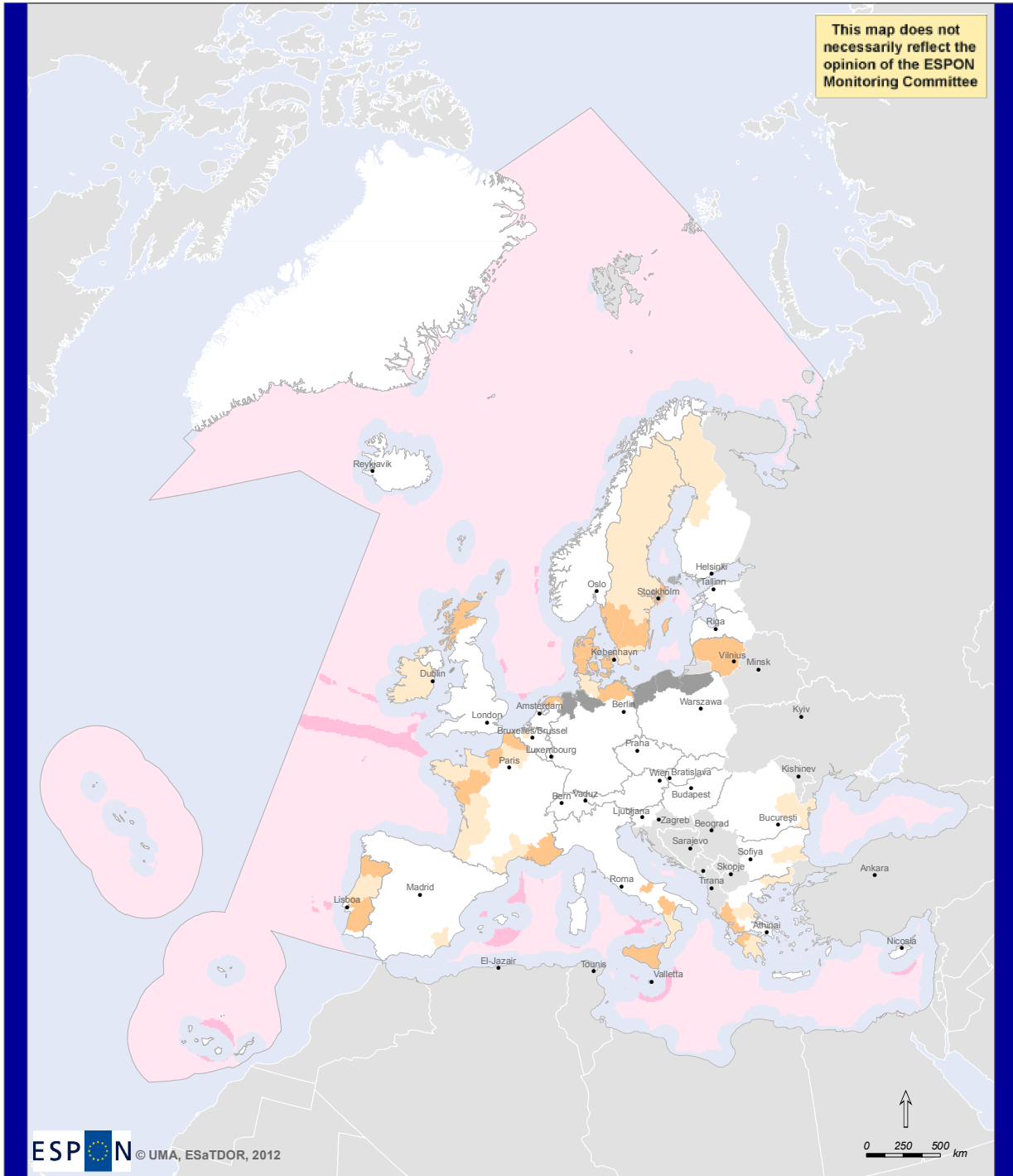
This map is based on three data sets: incidence of invasive species, organic pollution (pesticides) and inorganic pollution (fertilisers). See Chapter 7 of the Scientific Report for further details.

Map 6 Environmental Pressures composite map.

The second step in producing the typology was to draw the three composite pictures together in order to distinguish patterns in the current overall intensity of land sea interactions. Two separate maps were produced showing cold spots (Map 7) and hotspots (Map 8) and these were then used to identify which maritime regions should be classified as Core, Regional Hub, Transition, Rural and Wilderness areas. Map 3 shows the schematic outcome of the typology analysis. As may be expected it highlights the significance of the Channel and southern North Sea as the Core maritime region of Europe. This is where overall land sea interactions based on the data sets we examined are currently at their greatest. It reflects the concentration of population and economic activity in the London, Paris, Amsterdam axis, the presence of mega ports such as Rotterdam and the channelling of communication and trade routes between Europe and the rest of the world through this strategically important area. Beyond the Core the map shows a number of Regional Hubs which relate to significant spatial concentrations of strong land sea interactions. These are home to important maritime clusters and they are all transnational in character and in some cases also relate to more than one European sea. So for example the UK /Ireland and Northern France regional hub spans both the Atlantic and the North Sea, while the hub related to Norway, Sweden, Germany and Denmark spans the North and Baltic Seas. Beyond these hotspots lie Transition Areas where land sea interactions are still locally significant but where they are more dispersed in character, relating most frequently to smaller ports and tourist destinations. The eastern Mediterranean is the largest area defined in this way, but all European Seas have areas of this type. Much of the remaining maritime areas are classified as rural reflecting the increasingly low levels of human use. For the most part these are areas of sea, but areas such as the west coast of Ireland and Northern Ireland as well as the Azores and the coastal regions bordering the Gulf of Bothnia are also included in this designation. Only the Arctic still has areas that can be characterised as Wilderness at the present time.

The typology presented here is not a final product and should be regarded as a first step towards a better understanding of the current pattern of land sea interactions in Europe's maritime regions. While previous typologies have focussed either on the land or the sea, the ESaTDOR typology has sought to integrate land and sea perspectives. As the task has been to produce a European-wide typology we have been significantly constrained by the limitations of the data available to us and there is plenty of scope to refine and develop the typology as the quality of data improves over time. However with these limitations in mind it is felt that the typology is helpful in informing a more holistic perspective on what territorial development should encompass for Europe's maritime regions. Not only is there a need to bridge the land sea divide, but the typology highlights the importance of a transnational perspective for example in coordinating regional hubs. Similarly it emphasises that the regional seas themselves are not discrete units but highly interlinked and that planning for future territorial development would do well to take this into account.

"Cold Spots" of Land-Sea Interactions



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Thematic data: Typology Map.
Land boundaries: © EuroGeographics Association and ESRI. Regional level: NUTS2.
Sea boundaries: OSPAR Convention, EU Integrated Maritime Policy and EEZ.

Typology Map (coldspots)

Sea (Environmental Pressures and Flows)

- Very low intensity
- Low intensity

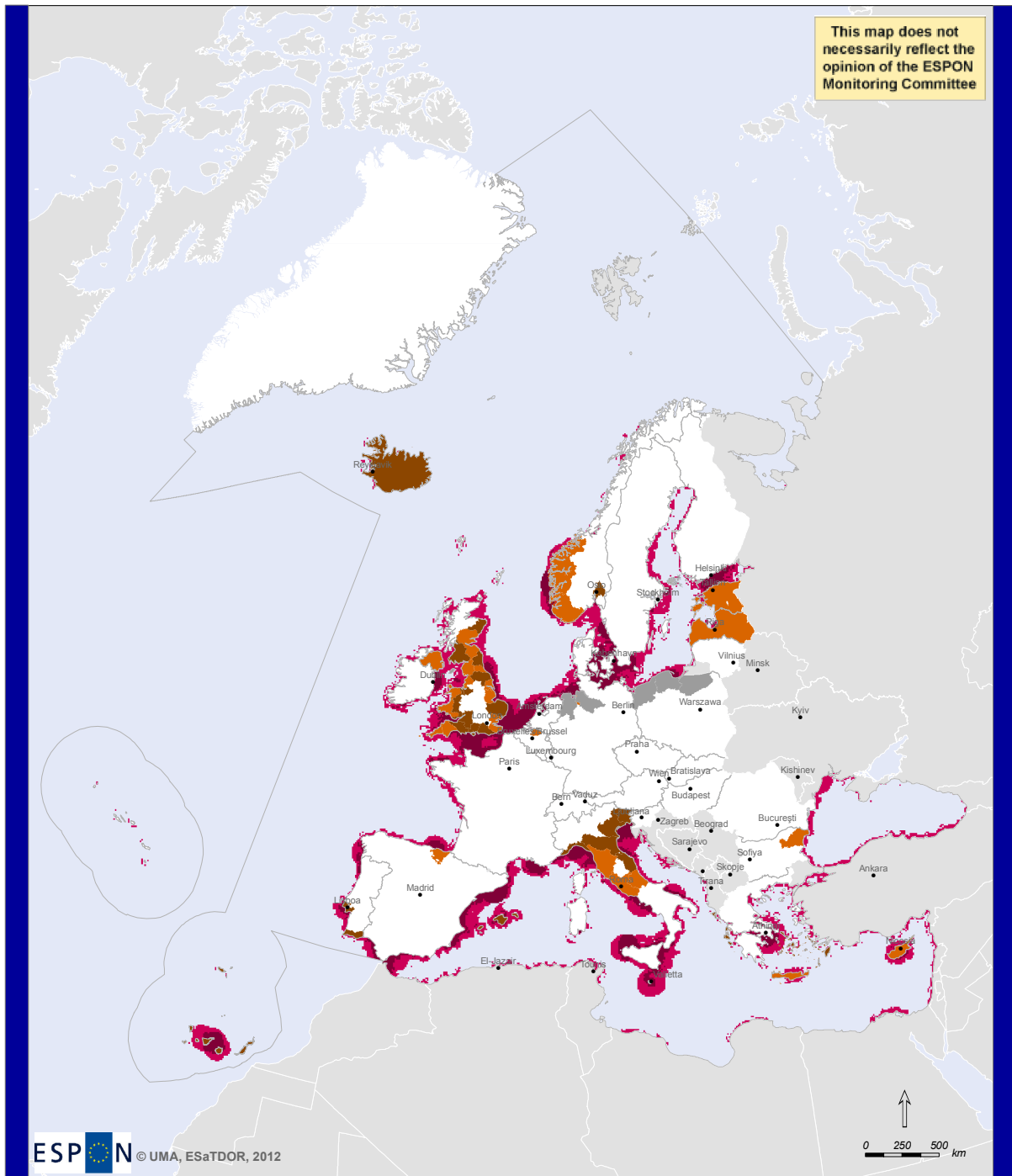
Land (Economic Significance)

- 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 resented 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).

Map 7 Cold spots (low intensity land-sea interactions).

"Hot Spots" of Land-Sea Interactions



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Thematic data: Typology Map.
Land boundaries: © EuroGeographics Association and ESRI. Regional level: NUTS2.
Sea boundaries: OSPAR Convention, EU Integrated Maritime Policy and EEZ.

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 resented 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).

Map 8 Hot spots (high intensity land-sea interactions).

Territorial Development Opportunities and Risks

As the title of our project suggests a key purpose of research drawing upon the mapping, governance and typology elements has been the identification of key territorial development opportunities and risks for Europe's maritime regions and we have explored these from three integrated and overlapping perspectives. First we explore opportunities and risks from a thematic perspective covering economic use, energy and cables, transport, and the environment. Second we explore opportunities and risks from the perspective of the European seas themselves to identify common and distinctive elements. In both cases we present an overview of the discussion which is developed in more detail in the Scientific Report and the focus here is upon identifying cross cutting themes and key messages that have helped inform the final step of scenario development.

Key Thematic Opportunities

Reviewing the outcomes of our thematic work a number of distinct territorial development opportunities emerge which relate to major global trends. For example, all thematic areas identify globalisation as a key development which offers important opportunities for Europe's maritime regions (see chapters 4-7 of the Scientific Report). Anticipated increases in global trade presents potential for the growth of ports and their associated maritime sectors as they provide important trade gateways to Europe. Similarly, Europe's strength as a coastal tourism destination means that it is well placed to respond to potential growth in global tourism. In a similar vein, Europe's maritime regions have a critical role to play in European responses to climate change, as they offer significant scope for renewable energy development and carbon capture and storage in exhausted oil and gas fields. Climate change also opens up the prospect of year round sea routes in the Arctic and the scope for development of Northern European ports as operators take advantage of shorter shipping routes for east west trade. Growing global populations and associated demand for resources means that attention is increasingly focused on the sea as a source of food and other resources including marine minerals. There is an important technological dimension here with opportunities for Europe's maritime regions to become global leaders in sustainable harvesting of marine resources, multifunctional marine development and new industries such as those associated with blue biotechnology. Interestingly, the prospect of improved transnational governance of Europe's seas is identified as enabling Europe to respond more effectively to energy security concerns creating opportunities for the development of transnational energy grids spanning marine areas.

Key Thematic Risks

The same global trends also pose risks to territorial development in Europe's maritime regions and suggest that a careful and imaginative response to these issues is required. For example, globalisation also offers the possibility of relocation of activities from Europe due to comparative competitive advantage elsewhere, combined with loss of specialist know-how. One potential consequence could be intensified global / inter-regional competition for tourists which may erode Europe's traditional strengths in this area. Similarly, although climate change presents

opportunities for Europe's maritime regions, these areas will be at the forefront of sea level rise and can be anticipated to suffer most from increased storminess and this situation may act as a deterrent to development in the most affected locations. There is also great uncertainty about the impact of rising temperatures on the health of marine ecosystems and deterioration is entirely possible which may adversely affect traditional maritime sectors such as fishing and tourism and limit the growth of new sectors such as blue biotechnology. Increased focus on the marine environment for natural resources and development more generally similarly poses threats to the ecological health of marine and coastal ecosystems. Without careful governance it is possible that maritime regions are left to face the adverse environmental consequences of unsustainable patterns of development that mainly benefit those living on non-coastal areas. The absence of integrated governance may also inhibit the ability of Europe's maritime regions to respond effectively to key opportunities. For example there may be a lack of interest in enhancing effective landward connections that enable ports to expand and develop their gateway function. Equally, lack of transnational cooperation and failure to reduce administrative burdens could hamper the growth of short sea shipping and the transshipment of freight goods from seas to terrestrial modes of transport.

Key European Sea Opportunities

Turning to the European Seas, an overview of the key territorial development opportunities that have been highlighted in the accompanying regional sea reports (see annexes to the Scientific Report). These reiterate many of the messages outlined above in the thematic discussion but instead of linking to key global trends pick out opportunities in relation to traditional and new areas of maritime activity and shows that the pattern of opportunities varies across European maritime space. In terms of traditional maritime sectors, all seas identify tourism as a potential growth area particularly associated with developing an all-year-round offer, tourism activities based around cultural and natural heritage, and an increasingly diversified cruise trade. Shipping and port development and associated activities are also pinpointed in line with anticipated growth in international trade and policy support for expansion of short sea shipping. In addition to continuing expansion of North Sea ports, it is envisaged that the Mediterranean and to a lesser extent the Atlantic could both play a greater European Gateway function, while new sea routes through the Arctic could present new port development opportunities in more northerly areas. Sustainable fishing and aquaculture are mentioned as areas meriting attention in the Atlantic and the North Sea. In the Arctic small scale fisheries associated with traditional communities may also be able to benefit from the extending ice free season. Energy related development including the expansion of transnational energy networks is also identified as significant in most sea areas. Growth in fossil fuel exploration is envisaged in the Arctic and renewable energy in various forms envisaged in many other areas most notably the Atlantic and North Sea where wind and wave and tidal power potential is greatest. Carbon capture and storage in exhausted oil and gas fields is mentioned in relation to the North Sea and the Baltic. In terms of other industries algae culture for the biotech industry and the longer term the potential of blue biotechnology & mining for mineral resources is highlighted particularly in the Atlantic and the Arctic. Governance is also picked out as a key opportunity in some sea areas. For example the scope for a strategic response to maritime development

opportunities through the development of the Atlantic Strategy is highlighted in the Atlantic, while the longstanding international collaboration related to environmental quality improvement in the Mediterranean is seen as setting the scene for further more wide ranging collaboration in the future. Similarly longstanding Baltic Sea collaboration it is suggested provides a very solid basis for operationalising integrated and coherent territorial development in the macro-region.

Key European Sea Risks

Conversely, European Seas face a series of risks to territorial development and many of these are very place specific in character. New and emerging points include, for example, much greater emphasis in the European Sea analysis on the potential conflicts and constraints that may be associated with increasing competition for maritime space. This is noted as a particular concern in the Atlantic, Baltic and North Sea where new fixed development in the sea in terms of wind farms is most intense. The overreliance of coastal communities on particular industries and their associated vulnerability in changing market and resource conditions is also new. It is mentioned in relation to tourism in the Mediterranean and oil and gas production in the North Sea. In terms of potential negative consequences of intensified use of the sea, all the sea areas report concerns about the ecological health of marine and coastal areas, but in many instances this is also linked strongly to negative impacts on fisheries and other potentially important future industries such as aquaculture and blue biotechnology. There is also an emphasis on the environmental and human consequences of the increased risk of accidents associated with growing sea use in the Arctic, Atlantic and the Baltic and the need to put in place appropriate emergency planning arrangements. Security concerns of a different sort feature in the discussion of climate change in the Mediterranean where it is felt that particularly in the southern states human pressure on the coastal zone may intensify and that there is the potential for increasing political instability and numbers of refugees in the region. Security is picked up in a different context again in the Arctic this time associated with global security concerns that might arise with increased demand for access to Arctic natural resources. This situation is heightened by unresolved sovereign state jurisdictions within the regional sea. Similar conflicts over maritime boundaries are highlighted in the Mediterranean where it is felt that these could act as a deterrent to more effective cooperation and progress in the effective management of the sea

Developing Scenarios for Europe's Maritime Regions

Drawing on the project's findings regarding the current state of maritime regions, the maritime region typology and the assessment of opportunities and risks, the next step was to consider how these might affect change in maritime regions under different scenarios in the period up to 2050. This aspect of the work was focussed around a scenario workshop, held in Amsterdam on 21st June 2012 which brought together a range of maritime interests (the public private and third sectors were all represented) from across the European Seas. In preparing for the workshop we were able to draw on understanding from two related areas of work that were current in the spring of 2012.

The first related to DG Mare's work on Blue Growth and in particular the Blue Growth Third Interim Report, "*Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts*". This report described the future growth potential of different maritime sectors based on a life cycle approach and it was felt that this provided a useful additional layer of understanding to our analysis of opportunities. Under this approach maritime sectors may be classified as being:

- at the **Pre-development** stage – in which the full potential of a product is still unclear. Much research and development is still required and commercial viability of a product may still need to be proven.
- **Growth**: (strong) economic growth and/or employment growth takes place, enabling smaller firms to enter the market. Prices of production are likely fall as economies of scale are realised.
- **Maturity**: economic activity remains stable at a high level. Market positions of main players are clear and competition is fierce.
- **In Decline**: economic activities are declining; no major innovations are being made. It is clear which players are dominating the market.

The Blue Growth Third Interim Report also set out an assessment of future challenges and drivers for change related to Europe's maritime regions and this was also thought to be helpful in setting the scene for scenario development.

The second related to the ET2050 ESPON Scenarios project which had just started in spring 2012. This explores the territorial development implications of 4 different scenarios for Europe, looking to 2050 as follows:

- A Europe of Flows;
- A Europe of Creative Cities;
- A Europe of Balanced Region; and
- A Europe of Self Sufficient Towns

Although these scenarios had been developed with a terrestrial focus, it was felt that there was merit in connecting to this work and exploring its value and implications in the context of maritime regions which cover both land and sea.

Scene-setting for the scenarios

Based on these various inputs and reflections from the Amsterdam workshop, the following scene setting information has informed the development of the final scenarios. Drawing on the Blue Growth Report (DG MARE, 2012, p7) Europe's maritime regions face a number of key challenges:-

Globalisation and competitiveness: In 2025, nearly 2/3 of the world's population will be living in Asia, which is likely to become the first producer and exporter of the world and which catches up or even overtakes the US and Europe in the area of research as well as industrial production; overall, the economic and financial crisis has weakened Europe's competitive position vis-à-vis third countries, notably those in Asia;

Global warming and climate change: Climate change is expected to continue unabated and radical changes in production and consumption will be required to keep global warming to acceptable levels. The economic and financial crisis is not helpful in addressing these challenges, and progress in the decarbonisation of the economy has slowed down;

Poverty and mobility: International migration will develop and, without an important inflow of immigrants, the European population would start to decrease as from 2012; a third of the world population is undernourished;

Increasing scarcity of natural resources and vulnerability of the planet: New geopolitics of energy are characterised by a relative balance of the strategic importance of the Middle East, Russia and the Caucasus; more than 50% of the major ore reserves are located in very poor countries; three billion people will be lacking water in 2025; and it is essential that Europe's efforts to slow down climate change are taken not only by Europe but especially by other powers;

Urbanisation and concentration in coastal regions: Today more than 41 % of the EU population lives in coastal regions. For the coming decades a further concentration of people in these regions is expected. This will increase the pressure on land, fresh water and other resources available in these zones and thus increase the need for integrated policies.

Demographic change: Ageing of Europe's population in general and in coastal areas in particular, which may be a driver for specific maritime economic activities.

In addition to these perspectives workshop participants felt that an additional factor needs to be considered:-

Implications of the Financial Crisis: The full effects of the global financial crisis, its consequences for the financial stability of European nation states - and the Euro itself - will have long term implications for governments trying to stimulate economic growth. It is unclear whether the current situation is a relatively temporary blip or indicative of a sustained downturn in economic wellbeing.

The workshop concluded that if these trends continue, they will lead to unprecedented tensions between the current methods of production and consumption and the future availability of non-renewable resources. These tensions are likely to focus on food, health, energy, raw materials, and water. Additional challenges will arise in the areas of trade, investment and Europe's industrial competitiveness, but also in leisure and urbanisation. A continuous search will remain for new energy sources to reduce the dependency on third countries and world regions.

Chapter 11 of the Scientific Report provide provides a fuller account of this analysis and Tables 49 to 51 provide a summary assessment of key opportunities and risks and future challenges and drivers for change in relation to Europe's marine environment, land/sea flows and coastal areas (the maritime economy).

The Scenarios

In preparation for the Amsterdam workshop four draft scenarios were produced for Europe's maritime regions based around the themes identified in the ET2050 ESPON project. However, at the workshop it was felt that these had too many overlapping dimensions and this potentially blurred consideration of alternative development paths and therefore reduced their value in promoting debate. It was concluded that it would be more helpful to present only two spatial scenarios which could present distinctly different examples of how the European territory might be structured in the future. These should aim to be radical and contentious as the purpose is not to predict a future but to envision different possibilities as a mechanism for framing an informed discussion, about what land sea interactions we want to promote and better understand the importance of these interactions for broader territorial cohesion.

Reflecting the outcomes of the workshop two scenarios are put forward (see Table 5). The first relates to a 'Europe of Flows' and envisions a future based around sustained global economic growth and independency and assumes a business as usual model, although the pace of recovery remains debatable. The second relates to a 'Europe of Self Sufficient Maritime Regions' and envisions a future of low or even negative growth where European regions increasingly look to shape their futures around their endogenous strengths and development if focused on securing self-sufficiency and long term sustainability.

These scenarios then provide the basis for a discussion of the future and Tables 6 and 7 explore their implications for Europe's marine environment, land/sea flows and coastal areas. It is beyond the role, scope and function of this project to suggest who or what interests should be preferred. These ultimately are political decisions, but what this emerging approach is beginning to bring into sharp focus is that the land and sea are inextricably linked, with decisions made for one environment having consequences for the other, and that integrated thinking should be the way forward.

A Europe of Maritime FLOWS

Under this scenario globalisation is a significant driver as Europe's maritime and inland connections are maximised with flows of goods and people increasing making use of the seas. The current global financial crisis is a relatively temporary phenomenon and soon trade links with the rest of the world become re-established and patterns of sustained growth are enjoyed. There is increasing emphasis on the development of long distance transport corridors linking European centres of production and consumption with neighbouring countries and the rest of the world. New global networks are opened up as the Arctic becomes increasingly more navigable over time due to climate change. Changes in the size of global shipping see greater concentration on a few large ports with associated increase in short sea shipping.

Alongside growing movements of goods and services, reinforcing the core, the use of the maritime environment for other forms of exploitation including energy, aggregates and fisheries intensifies. Planning and regulation becomes more relaxed and environmental costs are accepted more readily as a cost of maintaining Europe's position in an increasingly competitive global economy. Europe is seen as a peninsula connecting the global community through north south and east west axes (Henocque and Lafon, 2011).

The European core remains dominant and there is a high intensity of sea use as goods and services continue to flow into this area as a European gateway. Goods are then redistributed to other parts of the EU from this hub. For the core the seas have relatively little importance in maintaining European hegemony apart from this gateway function. New channels of global communication may open up new ports as transshipment points.

Henocque, Y., Lafon, X. 2011. *EU's Strategy on Maritime & Environmental Issues in the Four Seas: multilateral approaches in the Baltic, Black, Caspian & Mediterranean Seas*. EU4Seas Papers. www.eu4seas.eu

A Europe of Self-Sufficient Maritime Regions

In this more ecologically centred scenario the current financial crisis, at least for western economies is a long term attribute. Local public investment and governance works to stimulate local economic growth based on territories with distinct identities. Decarbonisation of the economy and moves towards greener energy are required, leading to slower growth. Local markets and production becomes more important. The maritime regions become more important points for short sea connectivity and they are better able to exploit locally derived benefits from the sea. Endogenous development and the empowerment of bottom up organisations promote greater local self-sufficiency. Due to climate change some coastal communities are more threatened whilst others are more resilient to environmental change. A pattern emerges where local sub-sea regional communities explore local potentials and opportunities and seek to capture more of the local maritime resources for the wellbeing of local communities, thereby creating a more diverse and differentiated, but more balanced Europe.

Table 5 Maritime region territorial development scenarios.

The Future of Europe's Maritime Regions – ESPON Territorial Development Scenario 1: a Europe of FLOWS
Europe's Marine Environment
Intensification of environmental risks in increasingly busy transport corridors and around port areas with notable increases in the Arctic and Mediterranean
Increasing risk of damage to sea bed and coastal habitats from growing network of pipelines and offshore energy development and associated landfall infrastructure
Increasing competition for marine space between traditional and new uses particularly in European core sea areas
Europe's Land/Sea Flows
Significant increase in long haul traffic initially focused around a few very large ports/transshipment hubs
Potential congestion in major established long haul port areas could create expansion opportunities in less congested areas
Potential expansion of smaller ports focused on short sea trade and serving national and regional markets subject to appropriate landward connections being provided.
Increasing cruise and leisure boating expanding beyond traditional locations
Increased formal and informal migration using the sea as a conduit
Rising incidence/potential for accidents resulting in rapid development of maritime monitoring and surveillance particularly in Arctic and Mediterranean
Role of seas for telecommunication cables declines with growth of satellite technology.
Expansion of oil/gas pipelines in Mediterranean Baltic and Black Seas and in green grid infrastructure along Europe's western seaboard.
Major expansion of Oil and gas exploration in the Arctic
Old oil and gas fields take on new roles as carbon storage facilities.
Europe's Coastal Areas
Major growth of logistics services around key transshipment points
Opportunities for adding value to imported/exported goods at transshipment points
Cluster development opportunities associated with new maritime activities
Major development of transnational multimodal networks across land / sea with ports as key nodal points

Table 6 Territorial development scenario 1: a Europe of FLOWS.

**The Future of Europe's Maritime Regions – ESPON Territorial Development
Scenario 2: a Europe of SELF-SUFFICIENT MARITIME REGIONS**

Europe's Marine Environment

Marine environment rediscovered as key factor in local attractiveness of coastal cities due to climate, rich natural resources and new marine employment and investment opportunities producing a mixed pattern of marine exploitation and care.

Increasing focus on sustainable use of marine resources to meet local resource needs e.g. small scale aquaculture, fisheries etc.

Decreasing environmental damage associated with reducing long distance maritime traffic in some areas.

Introduction of higher environmental standards on flows (pollution, transport) from inland areas and areas outside the EU.

Europe's Land/Sea Flows

Development of sea basins and sub-sea areas as cohesive regions with strong maritime transport connections - benefitting those areas with strong regional identity and success dependent on extent of regional/transnational cooperation.

Focus on regional self sufficiency in energy and exploitation of diverse marine energy sources and associated infrastructure

Expansion of smaller port and short sea shipping and growing role for inland waterways as sustainable transport routes.

Greater protection of local energy resources for local communities and growing opposition to multi-national development interests in sea areas.

Europe's Coastal Areas

Development of coastal cities combines imaginative celebration of maritime cultural heritage and research and development associated with a new economy focused on 'Blue Growth' sectors which exploit city region strengths and create localised centres of excellence in maritime skills development.

Cooperation/differentiation/ specialisation between ports /coastal towns and cities within regional sea basins.

Small scale localised development responding to local and regional markets favouring small coastal towns and success less dependent on physical (as opposed to digital) connectivity with the wider world.

Growth of small scale industry responding to the distinctive maritime character. Favouring of coastal areas of good environmental quality and extending requirements for new and more dispersed public sector policy delivery.

Some coastal areas of poor environmental quality may decline without public intervention related to regeneration and environmental improvement; others may improve in environmental quality as human pressure decreases.

Table 7 Territorial development scenario 2: a Europe of SELF-SUFFICIENT MARITIME REGIONS.

Chapter 5: Policy Recommendations

Taken together the preliminary insights and improved understanding provided by the above findings of the ESaTDOR project highlights key potentials for policy development at a strategic scale. Given the initial hypothesis of the project, that

“the marine environment is a critical yet undervalued component of the EU’s, national, regional and local territorial space. Its associated risks and opportunities need to be better understood and more effectively managed in an integrated manner to ensure that these significant marine assets and resources can better contribute to broader European strategic goals”,

a series of policy recommendations are therefore set out. These recommendations first take into consideration the findings of the project for issues of territorial development and governance, in particular focusing on Blue Growth policy and integrated Maritime Spatial Planning as important tools for promoting territorial development based on marine and coastal activities. Secondly, the recommendations pick up some of the major outcomes of this research in terms of developing a maritime region typology and scenarios and how they can be used to inform future policy debates and spatial planning activities. Finally, the recommendations offer some practical advice with regards to data collection and mapping that can assist in improving the territorial evidence base for maritime policy and spatial planning which are relevant to a broad spectrum of stakeholders, but have particular relevance for the ESPON community as it begins to consider the “territorial” as encompassing terrestrial and marine space.

Promoting Good Governance

Recommendation 1: Maritime spatial planning needs continuing support and promotion at both EU and national level to ensure that states maximise the opportunities presented by Blue Growth in a way that is consistent with the ambitions of the Marine Strategy Framework Directive whilst contributing to the territorial cohesion objectives of the *Territorial Agenda of the European Union 2020*.

The ESaTDOR project supports the hypothesis set out at the start of the project. Despite the statement in the EU’ Territorial Agenda 2020 that ‘maritime activities are essential for territorial cohesion in Europe’ and that Maritime Spatial Planning ‘should be integrated into the existing planning systems to enable harmonious and sustainable development of a land-sea continuum’, the project has revealed that this process is still at an early stage. While there are many efforts being made to improve understanding of maritime resources and their value (for example at the EU level through the European Atlas of the Seas and DG Mare’s Blue Growth reports), much still needs to be done to integrate efforts more effectively to underpin the development of maritime spatial planning at a national level and in macro-regional strategies for sea basins. The project has revealed extensive experimentation with transnational governance arrangements for maritime regions, but in all European seas it is evident that integrated

management both across national boundaries and the land sea divide could be strengthened. Progress in this area will be key and continuing support, promotion and capacity building for maritime spatial planning and associated developments in governance are needed.

Recommendation 2: At a European scale, there should be greater recognition of the importance of marine space within EU activities and greater integration of sectoral policies with maritime dimensions. Close collaboration between DGs Environment, Mare, Move, Energy and Regio (for example) should be encouraged.

The EU has already taken a leading role in promoting maritime spatial planning. The development of macro-regional strategies for the Baltic and Atlantic are good examples of where the EU has highlighted the significance of maritime assets and has adopted integrated and collaborative working across different directorates. Opportunities to extend this mode of working to other aspects of the EU's activities and in other regional sea areas should be explored.

Recommendation 3: There is a need for continuing efforts to develop effective transnational working in support of maritime spatial planning at different spatial scales.

Many of the existing maritime governance regimes reviewed by the ESaTDOR project have developed organically over time to deal with particular issues or sectoral interests, and may be regionally or sub-regionally focused. They tend to be relatively weak, lack formal powers and have insufficient finance to ensure that progress is maintained. The case studies also demonstrate that informal (non-binding) governance can be as effective as formal (legally binding) governance arrangements. In many areas an evolutionary process is evident and some good practice is emerging which reflects growing recognition of the need to address trans-boundary maritime planning issues at different spatial scales. The EU has an important role to play in encouraging and facilitating the development of effective maritime governance both in national and transnational space.

Recommendation 4: National governments should develop integrated maritime planning arrangements that ensure consistent planning across the land sea continuum in both national and transnational space that takes account of the strength of land-sea interactions.

With some exceptions, especially in Germany where the Länder have planning responsibilities that encompass land and marine areas, planning arrangements for the land and sea tend to be distinct with only a very small area of overlap. Efforts will be needed to ensure more effective integration of maritime policies across the land sea divide. At the present time ICZM activity is often land orientated and focused towards environmental concerns and is generally poorly positioned to take on an integrative role. The scope for a complementary relationship between maritime (or marine) and terrestrial planning and ICZM should be established.

Recommendation 5: The typology of maritime regions developed in this project could be used as a spatial tool for understanding land-sea interactions and informing integrated maritime policy development at a range of different scales.

A key output from the ESaTDOR project has been the development of a Maritime Region Typology which illustrates the strength of land sea interactions and spatial variations across European maritime space, taking account of maritime related economic activity, maritime related flows and environmental pressures. The five types of maritime regions have distinct identities that can be used to inform policy makers and consequently may benefit from different types of policy intervention.

Possible options for developing policy responses for the different maritime regions identified in the typology could include the following:

- The CORE area should be the focus of the next integrated sea basin strategy. Some of this core region is already included within the proposed Atlantic Strategy, however to maximise opportunities for integration, a North Sea basin strategy should follow swiftly.
- Regional HUBS have potential capacity to benefit from many areas of economic activity identified in DG Mare's Blue Growth work. They demonstrate an established diversity of maritime activity and are well placed to take up new opportunities, release pressure on the European Core and strengthen their relative position.
- TRANSITION areas have a more narrowly defined maritime economy and need to identify their key maritime features/strengths and how they can be developed in sustainable way. In addition, opportunities for new maritime activities should be explored.
- In order to protect the characteristics of the valuable but vulnerable ecosystems of RURAL and WILDERNESS areas, environmental protection policies remain predominant, with strong precautionary principles being applied to economic development proposals.

Recommendation 6: Transnational programmes (e.g. INTERREG) should make use of the typology, maritime scenarios and regional sea reports produced by ESaTDOR in developing their future activities.

In addition to the maritime region typology, the outputs of the ESaTDOR project include the development of maritime scenarios and a series of regional sea reports covering each of the 6 European seas. Taken together this material could provide a considerable source of maritime information to assist policy makers in the development of the next round of EU transnational programmes and stakeholders are encouraged to view not only the final project report but also the extensive Scientific Report which contains full details of the project's findings.

More Consistent Data Collection and Mapping of Maritime Resources is Required

Recommendation 7: The EU should develop a common framework for the collection of maritime data to facilitate harmonisation and consistency of spatial data across maritime regions.

Valuable data collection is already taking place on a regional basis. However, consistent data specification and definition of key terms is needed to apply this information in a useful manner across Europe's maritime space. In addition to regional variations, our research has revealed inconsistencies in the language and definitions for environmental pressures and impacts used by the Marine Strategy Framework Directive and INSPIRE Directives and the European Environment Agency. These inconsistencies should be resolved in order to facilitate interoperability between these different sources of data and provide a clear basis for the future collection of maritime spatial data.

Recommendation 8: The scope of maritime data collection should be broadened thematically, spatially and beyond the current ESPON boundaries to develop a more comprehensive understanding of land-sea interactions.

There are significant thematic gaps in publicly available data (e.g. fisheries and the disaggregation of areas caught and where fish are landed, short sea shipping information below NUTS0 level and the disaggregation between offshore/onshore energy production). There is also a variation in the quality and availability of data spatially. A particular gap relates to environmental data beyond coastal waters; here data is more scarce and often relies on modeling from limited samples. Gaps also exist in relation to maritime data for non EU countries that share regional seas, highlighting a key area where cooperation on data collection could be beneficial. Identifying and attempting to fill these gaps should be considered as part of the Marine Knowledge 2020 programme.

Recommendation 9: Existing maritime data sources should be made more widely accessible.

Our research revealed a number of sources of privately held data and also where use of data required payment. One significant example related to data on oil and gas installations and it is recommended that efforts should be made as part of the Marine Knowledge 2020 programme to bring these into the public domain.

Recommendation 10: In order to facilitate more consistent approaches to mapping land-sea interactions, the 10x10km grid square framework used in this project should be adopted as a marine equivalent to the NUTS units used on land.

A major challenge faced by the project was the absence of an established system for defining comparable sea units in order to provide reliable and

informative multi-thematic maps. Existing definitions such as EEZs, marine regions for the MSFD and EU Integrated Maritime Policy do not always correspond, being focused on political jurisdiction, ecosystem functions or thematic interests such as transport and relate to different sized geographical areas. In order to address this problem ESaTDOR has devised the 10x10km grid square framework for mapping marine data across comparable spatial units which can then be overlain with political boundaries as needed for policy development purposes. Again it is proposed that formalisation of this approach should be considered as part of the Marine Knowledge 2020 programme and future development of the INSPIRE Directive.

Chapter 6. The Need for Further Analysis/Research

This research is the first time ESPON has dipped its toes in the sea. The project has been very wide ranging in terms of the diversity of issues that it has tried to deal with across a broad range of dimensions. It should therefore be seen as a scoping project rather than a definitive and final statement on a rapidly evolving, emerging and important European topic. The policy recommendations outlined in the previous chapter should therefore be seen as initial rather than definitive and there are plenty of opportunities for further research which is both generic and specific, in order to more clearly unravel the importance of land sea integration for territorial cohesion. This final section seeks to stimulate discussion and debate by providing food for thought related to key issues and also to identify clear areas where further research is needed.

Governance

The governance case studies focused on transnational activities within specific seas. Many of these arrangements are relatively informal, having developed from a need to address particular sectoral issues or opportunities. Hence although the issues they address are significant, they tend to be relatively narrow in scope, rather than broad and integrative. In addition, many of these arrangements are still relatively embryonic. However, the case studies do point to the growth of the concept of marine / maritime spatial planning (MSP) as an integrative approach to managing the multiple demands on marine space and resources. MSP has the potential to draw upon land-use and spatial planning experience. However, this needs to be carefully adapted to the marine environment, which, as noted above, is a much more complex and dynamic setting. So as these new governance arrangements develop, a series of questions and opportunities arise.

ESaTDOR is based upon the concept of territorial cohesion and the role of the marine space within this agenda. However, we are witnessing the emergence of separate territorial regimes for land and sea. How these are to be effectively integrated is yet to be resolved. MSP regimes are generally developing at a national level, particularly where coastal states have largely agreed EEZs. There is a need, therefore, to encourage the development of systems of MSP that integrate maritime strategies with those emerging for terrestrial space within those nations. There is also the potential to develop transnational strategies covering both land and sea, especially as co-operation with neighbouring countries is so vital within a marine context. This leads on to questions as to what should the most appropriate governance arrangements for the effective management of regional seas, given the mutual interdependence of land sea interactions for nations bordering a given sea. For example the Danube Strategy should have positive benefits for the quality of the Black Sea.

Finally, there is the question as to whether the EU should play a more formal role in facilitating these interactions, or whether the more informal approach currently being used is preferable in that this encourages locally specific experimentation. These remain unanswered questions. If the tradition of

spatial planning on land are followed, which one of diversity and distinctiveness across Europe, MSP will also reflect historical, cultural political and locally specific differences. What may emerge is therefore a complex set of multi-level governance arrangements. So many marine governance arrangements have developed out of a desire to restore or at least prevent the further deterioration of the marine environment. More emphasis is now being placed on exploitation of maritime assets, but with recognition that a good quality status is critical to maintaining the economic and social wellbeing of maritime communities. More work will be required to identify the numbers and scope of governance activities in the sea and appraising the characteristics that make them more resilient.

Governance - Further Research

- The maritime governance case studies considered during the ESaTDOR project revealed a spectrum of governance styles in terms of relative formality and level and extent of stakeholder engagement. The appropriateness of different governance styles in different contexts seems to merit further investigation to identify best practice and inform future development in this area.

Typology/Scenarios

ESaTDOR has begun to set out baseline conditions as a means of thinking more creatively about future development scenarios. The maritime region typology provides a basis for this as it enables the visualization of land-sea interactions and highlights specific regions where different types of policy intervention could be targeted. In conjunction with the typology, spatial scenarios provide a useful tool for stimulating debate about future developments and the policies that could be put in place to achieve desired outcomes. A key finding from the scenarios workshop in this project was that scenarios should be limited in number and focus on highly contrasting visions of the future rather than scenarios which are only incrementally different. Such an approach was judged to encourage more innovative and imaginative thinking.

In addition it was highlighted that one of the key drivers for change is the way in which Europe responds to the global economic crisis, and more particularly the financial challenges within the Euro zone. It is noted that many of our baseline maps rely upon data that relates to situations as the crisis was only just starting. More work needs to be undertaken to explore the spatial implications of the global economic and the European financial crises, in order to examine the resilience of maritime regions to change.

ESPON has stepped into the sea for the first time. This project was enormously wide ranging in its scope and expectations. The research has illustrated how important land-sea interactions are for territorial cohesion. MSP is an emerging activity which will encourage much further work on the implications of marine space for wider territorial agendas. Enormous and challenging questions still remain about the quantity, quality, availability,

consistency and comparability of data across European maritime space; the need for appropriate integrative multi-level maritime governance arrangements; and about our understanding of which interests are being served (and which are being compromised) by the new demands we are placing on our maritime resources. As this broader concept of territoriality gains momentum, ESPON will need to integrate this dimension fully into its future programmes.

Typology/Scenarios - Further Research

- Further development of the typology could include adding new datasets and extending geographical coverage to all inland areas within ESPON space and to neighbour countries.
- DG Mare's Blue Growth report has identified a number of "hot spots" based on maritime clusters. These could be compared to the "hot spots" identified by ESaTDOR in order to determine additional maritime regions with the greatest potential for growth, or those maritime regions where declining environmental conditions may suggest limits to growth.
- Within this ESPON project, notwithstanding the limitations of data availability, a typology has been created which shows the current picture of land-sea interactions in Europe's seas. Attempting to show how these patterns may change under different scenarios could form the basis of further investigation, providing powerful images to stimulate debates around future maritime policy.

Data and Mapping

One of the main challenges this research faced was in terms of identifying suitable data sets that were available in a consistent manner across all of the European regional seas. This is also an issue for other (land based) ESPON projects which have been challenged by the availability of data, its consistency across ESPON space and the scale at which it is available. However, obtaining suitable data for this project proved to be much more problematic, especially regarding sea-based issues, for a number of reasons.

Firstly, there are no administrative units established for sea space equivalent to land-based data units (NUTS), and therefore there is no established practice of gathering data relating to such units. Data that is available is therefore of a highly inconsistent nature, relating to different spatial scales, a range of political and administrative boundaries, and is of highly variable coverage. Secondly, some of the data that is available, particularly at a national scale, does not allow disaggregation between information for land and sea (e.g. for energy production), or between different seas (where a nation borders more than one regional sea). Third, data quality was sometimes questionable, as it was partial or appeared to be contradictory compared with other data sets (this was particularly an issue with environmental data) making interpretation very problematic. For instance, one

of the key risks factors for environmental integrity was the number of shipping accidents, and although most regional seas reported that the number of incidents was on the decline, there was no mechanism of verifying this on a European seas basis. Fourthly, some data proved not to be publicly available, especially that related to energy production. Finally the quality and quantity of data tends to declines with distance from the shoreline; hence better data exists on land and the coastal zone rather than the open seas. Much time was therefore spent identifying whether key data sets could be used or not. The pragmatic outcome was that this project relied upon the best available data with the greatest possible coverage for the study area. However, it is recognised that significant data gaps remained, with consequences for the following stages of the project.

Once suitable data sets had been identified, the second challenge related to mapping the information in a meaningful way, particularly for the marine environment itself. As noted above, on land, the Nomenclature of Units of Territorial Space (NUTS), notwithstanding their limitations, provides a framework of broadly comparable units for mapping purposes throughout Europe. Within the marine environment no such system exists. The ESaTDOR project therefore had to develop its own framework of spatial units for mapping purposes beyond the shoreline. After considering various options, we decided upon a grid-square system, and chose 10x10 km grid squares as the most suitable for the data available and geographical coverage in question. However, the original data varies considerably in character, including point source, area-based polygons, modeled and extrapolated data. An additional challenge was therefore to convert data into a suitable form for geo-referencing into the 10x10 km grid squares and calculate an intensity of activity within each square. This proved to be time-consuming, but possible.

An important conclusion of the project is that a consistent grid square approach to the mapping of marine data does allow different attributes to be compared, and also combined into the composite maps, for example. The actual spatial resolution could be revisited; for instance, 1x1km or 100X100 km grid squares would equally be possible, depending on the type of data that was being used, leading to differences in the way that indicators might be seen within European Sea.

We have suggested that a system of this kind could be used as the basis for Marine Units of Territorial Space (MUTS), analogous to the terrestrial NUTS, providing an opportunity for effectively mapping different data sets within a spatial unit. There is scope to further explore this approach, to identify the relative advantages and disadvantages of mapping maritime assets at a variety of different scales of resolution. A further aspect of including the maritime environment in mapping would be to give thought has to be given to the different physical conditions of the sea compared to the land. The most important difference is the three-dimensional nature of marine space, and the way in which this space is already being used by different human activities. For example, shipping uses the surface, fishing uses the water column, cables lie on the seabed and mineral exploitation takes place under the seabed. Moreover, these activities may take place in the same location. It is difficult to capture this complexity in conventional two-dimensional maps. Also, physical conditions are intrinsically more dynamic than on land. For instance,

currents transport substances, such as sediments and pollutants, over long distances, and human activities are also typically more mobile. Again, movement of this kind is not easily represented on maps which tend to illustrate static conditions. So there is a need to develop new forms of representing marine space and activities. Consideration should be given to more responsive forms of mapping, such as overlay maps and time-sequence maps.

Attention should also be given to the way in which the national jurisdiction of coastal states is being extended beyond the coastline, with the development of international law, especially under the United Nations Convention on the Law of the Sea. It is now accepted that states have complete sovereignty over their internal waters (including estuaries, bays and island waters) and territorial waters (12 nautical miles from the internal water baseline, or to the median line with a neighbouring state). They may also claim rights of exploitation over much more extensive exclusive economic zones (EEZ), out to a maximum of 200 nautical miles from the baseline, and possibly over further continental shelf waters. Agreements have been reached for the boundaries of EEZs throughout most of European waters (with the main exception of most of the Mediterranean). National jurisdiction is being extended over the majority of European seas, allowing stronger management and use of marine resources. Consideration could therefore be given to widening the remit of ESPON to cover the territorial implications of this extension of national jurisdiction. For example, internal and territorial waters could be incorporated into mapping exercises where relevant, and possibly also EEZs.

There are a number of global and EU funded projects and initiatives for the collation and synthesis of coastal and marine data with overlapping aims (e.g. GMES, SEIS, EMODnet, WISE-water, WISE-marine, INSPIRE etc.). Can these projects be brought together under one spatial data manager? We welcome the aspirations of the Marine Knowledge 2020 Green Paper (CEC, 2012), which has also noted the challenges we have faced and seeks to develop a more coordinated and integrated approach.

Data and Mapping - Further Research:

- Data collection focuses mainly on land or sea based attributes, but there is a paucity of data or information which focuses specifically on the land-sea interactions; these are assumed but largely unproven. For example, the degree to which coastal communities are dependent on their links to adjacent seas and the potential for them to benefit from growing maritime sectors could be investigated in more depth.

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