ESaTDOR
European Seas and Territorial Development, Opportunities and Risks

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Parts A and B:
Executive Summary and Main Report

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This report presents the draft 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.

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This basic report exists only in an electronic version.

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PART A

Executive Summary

Key Messages and Findings

As Europe seeks to emerge from the consequences of the economic crisis, the importance of territorial cohesion in supporting 'smart sustainable and inclusive growth' is becoming ever more apparent. However the rhetoric has for many years equated territorial cohesion with a terrestrial or land based agenda.

Recently there has been a growing realisation that the seas are also a context which can help governments realise their development aspirations. Aas 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.

However, increasing opportunities for human use of the sea are set alongside growing realisation of the complexity of land-sea interactions and an awareness of the risks that the new focus on marine areas pose to both ecological and human wellbeing. As a consequence, calls for more integrated forms of planning and governance that have long been a feature of terrestrial planning have begun to emerge for the sea. These perspectives emphasise the importance of governance arrangements that facilitate horizontal and vertical integration, particularly in cross border and transnational contexts, and also across the land-sea divide.

Within the marine environment, initial calls for action stemmed from growing concern that human activities were adversely affecting the maritime environment, and in turn threatening the ability of marine areas to support land based economic activity (eg OSPAR, HELCOM, Barcelona Convention etc). The EU has in recent years added to these efforts through its promotion of Integrated Coastal Zone Management (ICZM) and developments such as the Marine Strategy Framework Directive, which seeks to ensure 'good environmental status' of European seas. In addition, the EU's Integrated Maritime Policy and encouragement of maritime spatial planning have been influential in generating the search for more joined up approaches. However much still needs to be done to facilitate more integrated approaches to the territorial development of Europe's maritime regions.

in addition, European policy is making increasing reference to the marine environment as integral to the territorial agenda. The Territorial Agenda of the European Union 2020 agreed in Godollo, Hungary in May 2011 states:

> ‘Maritime activities are essential for territorial cohesion in Europe…… 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, para55).

Also, the Common Strategic Framework which seeks to develop place-based integrated funding packages for 2014-2020 emphasises regional seas as functional areas within which strategic investments can be made. In addition, DG Mare, through its Blue Growth Strategy, is drawing attention to the growth potential offered by the seas and oceans. Regional seas activities in the Baltic, Atlantic, North Sea and Adriatic and elsewhere are also developing. Maritime considerations are therefore increasingly being linked to territorial cohesion agendas.

This project, as part of the ESPON 2013 programme, lies within these broader maritime and territorial policy contexts. This is the first time that ESPON has explicitly looked to the seas as part of European space and not simply as an adjunct to the land or as a barrier to territorial development. ESaTDOR seeks to understand land and sea interactions as an integrated whole, and hence to explore territorial (broadly defined) development opportunities and risks for Europe’s maritime regions. As a project, it has been wide ranging, aiming to:

- Map 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 risks 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.

ESaTDOR has had to deal with a number of complex issues, including determining sea boundary definitions, data access and compatibility issues, disaggregation of data between territorial and marine space and the difficulty in developing meaningful units of analysis for European marine space. The approach has therefore been exploratory, experimental, incremental and iterative.

The research has followed a five step process

- Stage 1 was an **initial analysis and diagnostic phase** exploring what is already known about both the European seas and the thematic priorities of the research. This informed the production of more detailed briefs for Stage 2.
- Stage 2 was a period of intense **data collection**, involving collating existing data setsand conducting case studies of how various existing governance arrangements have been working in practice.

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

This research has broken new ground for ESPON in a number of ways. It is the first ESPON project to have focused on the European seas. It has sought to consider the marine environment not as a separate entity, but as a space which is inextricably linked to the land from the perspective of broader territorial cohesion. Land sea interactions have beenconsidered as a two-way and dynamic process, with the fortunes of marine and landward areas closely interwoven. Although linkages may be most apparent in coastal regions and inshore waters, it has also been recognised that interdependencies stretch far inland as well as across the oceans.

It has also been the first project to map the thematic priorities (economic activity, energy and pipelines and cables, transport and environment) across all the European seas , using a consistent and comparable approach, both within and between variables. Similarly, it has sought to identify the intensity of land-sea interactions, focusing on both opportunities and risks, in terms of economic activity on the land, environmental pressures on the sea and flows of goods people and services through the seas, within the constraints of data availability. It has been the first project to develop a tentative typology of land sea interactions based upon intensity of activity on the land and sea. Finally it has been the first ESPON initiative to consider the diverse, complex, often embryonic multi-level governance arrangements seeking to address competition in the use of maritime space.

The research has not unsurprisingly faced multiple challenges, not least in terms of the very broad scope of the project, so that issues have been identified but only partial solutions reached. Hence the findings and the research itself should be seen as preliminary and exploratory, rather than definitive and comprehensive. Particular problems have included identifying Europe-wide data which satisfied the following criteria:

- the terminology, definitions and requirements were as close as possible to existing European policy directives;
- the data could be assigned to specific European seas,
- data quality was good, complete and accurate and could be spatial referenced; and
- it could be replicated over space and time.

Once the availability and suitability of data had been appraised the next challenge was finding a mechanism which could enable the data to be mapped, especially within the marine context.

Much of the work was structured along two complementary dimensions undertaken in parallel and providing feedback and inspiration for the other. First there was a thematic dimension which included analysis of key sectoral or thematic perspectives (economic activity, energy and pipelines, transport and environment) as well as that

related to governance arrangements. Key aspects of the thematic work included: the identification of Europe-wide, available data which could provide a comparative picture of current conditions across maritime space; and identification of key thematic opportunities and risks for territorial development. The second dimension focused on the six regional seas in question (the European parts of the Arctic and Atlantic Oceans and theBaltic, North, , Mediterranean and Black Seas). This sought to examine current conditions in relation to the themes of the study, todistil the special attributes of each sea, and to investigate territorial development opportunities and risks. A third activity was mapping the data in an integrated and comparable manner, initially by creating a baseline of thematic information and then by exploring land sea interactions based around three considerations: economic activity (on land) environment (in the sea and largely coastal) and flows (through the sea of goods people and services). This provided the understanding for the development of a European maritime typology, scenarios for the future and policy options.

The key findings of ESaTDOR relate to a variety of themes and scales.

Data and mapping

The research has highlighted the inadequacies of data (particularly from a marine perspective) which can be used as a consistent evidence base to assist in territorial cohesion and integrated maritime policy development. There is a great deal of data being gathered by different organisations, but this is being done in different ways and much needs to be done to improve consistency and achieve better value for money in data collection and use. Furthermore, notwithstanding the complexities of the marine environment and inter-relationships between different elements which are not fully understood, there is a need to reach a better consensus about what is critically important and where efforts to achieve consistency would be best focused. Within the European seas covered by this project there are difficulties in this regard as the seas face different issues; also, some countries bordering the seas sit outside the EU and ESPON family and may have limited technical and financial resources for gathering data. To date, European or global funding has often been facilitating data gathering and this type of support is likely to be important in the future if improvements are to be made.

The research has also devised a mechanism for mapping sea use in a consistent and comparable manner by using 10X10 km grid squares as units that are broadly comparable. This seems a suitable level of resolution at the European scale, although a finer resolution might be appropriate at an individual sea level. This approach could be adopted as a European or even international standard. This is a key issue for making progress, as it has implications for data gathering, handling and management. These points complement arguments made by other researchers.

Whilst this project has provided useful insights into land-sea interactions across Europe,much of the available data, especially within the environmental context, focuses on clearly observable factors in the coastal zone and territorial waters. There is much less data available to establish the strength of the relationship of the land to more remote sea areas. It is possible that this relationship is no less significant but less direct or observable. Climate change is an example of where the impact on the seas is very significant, but the human factors influencing it are diffuse and difficult to

ascribe to particular land areas. This means that the land-sea interactions that we have examined have tended to focus on direct impacts, such as marine pollution which can be attributed to land based activities.

Thematic Findings

From a thematic perspective, one message is that early governance arrangements in most of the regional seas have originated from a concern about deteriorating environmental integrity caused by human activity. The arrangements have been established with a desire to repair this environmental damage. It is clear that good environmental status will have increasing importance so that opportunities for drawing on marine resources for territorial development can be better realised.

In other thematic areas, there is evidence that new and more intensive development pressures resulting from a growing realisation of the opportunities that maritime resources offer. For example, within the energy sector, traditional fossil fuel resources, notably in the North Sea, are declining, although new opportunities, especially in the Arctic, are opening up. The sea is also being seen as an important place for renewable opportunities. Also, there is widespread expectation, notwithstanding the current economic crisis, that shipping activities will increase with the need for new and additional ports infrastructure. In short, there is a felling that the maritime economy is changing, as traditional activities mature and eventually decline, whilst new activities reach the development phase. This will have spatially differentiated implications that as yet are poorly understood.

Regional Seas Findings

The regional seas of Europe each have their own defining characteristics, and associated with these are different risks and opportunities. All however are subject to greater human development pressures, although the specificities of these vary from sea to sea. Three of the regional seas are relatively enclosed and the quality of the marine environment is very much dependant on the intensity of land or human based activities spilling into the seas. Within such environments, there is little natural flushing of the system, so that land-based pollution might has long-term adverse consequences for other activities dependant on a good environmental quality. The Mediterranean can be characterised as being an intensively used sea dominated by tourism hotspots and important as a route for global shipping. The Arctic is the least intensively used sea, and in European terms can perhaps be described as a wilderness area; however there are growing fears that it is the least resilient sea, and that growing development opportunities for tourism, mineral exploitation and shipping might bring additional pressure to bear on a region already being adversely affected by climate change.

Typology Findings

The typology seeks to illustrate land-sea interactions in broad terms, as measured by the intensity of activities; this is shown by hot cold spots of activity (though this also partially reflects data availability). The typology suggests that it is difficult to prescribe a particular characteristic or label to individual seas, as there is considerable

variation within the regional seas as well as between them. The traditional European core or pentagon is predominant in this imagining, withthe English Channel and southern North Sea being characterised by the most intense maritime activity.

Governance Findings

Whilst there is a growing interest in maritime spatial planning and more integrated territorial development, one of the key issues is that effective governance arrangements are needed at all levels to address and reconcile differences of interest between traditional and new uses of the sea, and between environmental and development interests. The project has shown that the existing governance arrangements that deal with cross border and transnational issues within a maritime context are generally ad hoc, incremental and bespoke to meet the specific needs of particular issues or specific agendas. They are highly complex and often there is a lack of integration between institutions working in the same area, with overlapping or competing remits. Perhaps the most well established institutional arrangements dealing with integrated territorial development linking land and sea are found in the Baltic, although even here there are continuing integration and implementation issues.

Overall, this research highlights that the seas matter. They are spaces that offer development opportunities and should therefore be considered as integral to territorial development. However this brings with it challenges about how these development opportunities should be managed, because all activities carry risks and can lead to competition with other interests. There is a growing recognition that good governance is a key pre-requisite to managing these conflicting claims and to achieving integrated territorial development.

Options for Policy Development

It is clear that the marine environment is increasingly being recognised by many European coastal states as an integral part of their territorial space. The demands being placed on the marine environment are growing rapidly, and commercial exploitation of marine resources, combined with a need to protect environmental integrity, calls for more effective governance mechanisms (both in terms of structures and processes). Maritime spatial planning is increasingly regarded as an approach that will bring about integrated, both sectorally and spatially (across territories), policy responses to deal with competing uses for marine resources. However there are challenges in terms of how effectively terrestrial planning regimes will link with new maritime planning regimes. Furthermore given the broad nature of the project, our conclusion and recommendations are targeted at a variety of stakeholders at different levels (although often these should not be seen as being exclusively targeted towards a particular group). Our policy recommendations focus on technical issues associated with data and mapping, the role and scope of the EU

in facilitating integrated sectoral policy both within the marine environment and in relation to land sea interactions, and specific thematic priorities.

Data and mapping

The fragmented, inconsistent and incomplete data which is collected for a variety of different purposes makes the process of integrated and consistent marine planning problematic. Work is already going on at a European level to try and address such issues, especially through the INSPIRE Directive. However, some inconsistencies exist between what is expected here and the requirements of the Marine Spatial Framework Directive.

Recommendation 1. There should be a rational and consistent approach to the collection of data, particularly within a marine context to facilitate integrated spatial planning. As part of this process, there needs to be agreement about an appropriate spatial resolution that the data should be available at creating a marine equivalent of the NUTS regions on land. The use of grid squares enables a range of different data types to be consistently mapped across the regional seas. Furthermore inconsistencies of approach between European regimes, (e.g. MSFD and INSPIRE) should be resolved.

Recommendation 2. Data availability remains patchy and this should be addressed with agreement on: key information sets (for example, fisheries data, regarding the stocks and where they are caught and landed, is still problematic); collecting regional sea the data in a compatible manner; making critical data sets publically accessible (a particular challenge with marine data).

Recommendation 3. 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 of dependence of coastal communities on their links to the sea.

Integrated Governance

Whilst there is a growing recognition that in policy terms the marine environment is an important part of European space, which needs to be managed carefully in its own right, there is also a requirement the inter-linkages between land and sea are carefully managed so that the opportunities for and threats to territorial cohesion can be sensitively and sensibly managed. In order for this to happen integration between land and sea regimes and between different levels of governance need to be further developed.

Recommendation 4. There is a need to think much more carefully and creatively around the regimes for managing the marine environment and there integration with each other and land based planning jurisdictions. Many of the regimes that have developed organically over time to deal with specific issues are sectorally specific, often regionally or sub-regionally sea focused and generally weak both politically and financially. There is a need for better integration between sectoral groups with an

interest in the seas at a variety of scales. At a European scale integration of the marine into territorial cohesion agendas implies closer collaboration between DGs Environment Move, Energy and Regio for example). Experimentation is taking place and some good practice is emerging. A facilitating and enabling role by the EU through supporting and improving programmes through financial support and encouragement is likely to produce more meaningful results. The development of regional seas and sub-regional seas basin strategies are illustration of this approach.

Thematic Priorities

Various sectors will continue to place demands on Europe's seas, and this in turn will intensify their use. The optimal development of sea related activities needs to be undertaken carefully using a precautionary approach. A clear theme that permeates all potential policy development is that restoring and maintaining environmental quality is a prerequisite for the full potential of the seas to be realised,.

Economic Activities Traditional maritime sectors are important for Europe and particularly some coastal communities. New maritime activities are likely to develop in the short to medium term and the emphasis needs to be on developing high quality, high value forms of employment, often associated with cluster and network development.

Recommendation 5. Further research is needed to investigate the relationship between coastal communities and the maritime economy, so that effective maritime cluster development can be facilitated and economies vulnerable to changing maritime economic circumstances can be carefully managed.

Energy Pipelines and Cables. With regard fossil fuels the importance of some traditional areas are likely to wane, although new prospects for exploration and exploitation are opening up. But the seas will remain an important source of energy as new renewable energy sources, wind, wave and tidal energy, develops. Meanwhile the seas are likely to be increasingly used as a conduit for energy supply between countries an across regions.

Recommendation 6. Careful consideration needs to be given to the effective planning and management of offshore energy activities as an integrated whole. This includes better access to information about the existing and potential offshore production methods and transnational grid and pipeline systems.

Transport remains a dominant sector within the European economy, although the disaggregation between the importance of land and sea based transport is difficult to ascertain. Innovation will be required to respond to changing global trends and to the requirements for transport to reduce its environmental impacts. Europe's transport sector is well geared to meeting these challenges.

Recommendation 7. For maritime transport to maintain its relative importance to Europe's economy, careful integrated planning will be needed to facilitate connectivity between Europe and the rest of the world, and within Europe and its regional seas.

Environment. There is a growing realisation that environmental quality sufficient to support a diverse marine ecosystem is critical for regional seas to realise their potential. Nevertheless there are some inconsistencies between European policy approaches making it difficult to achieve a consistent approach with regards to this important but complex dimension to the risks and opportunities for the seas.

Recommendation 8. There should be greater integration and internal consistency to measuring the quality of the marine environment between the INSPIRE and Marine Strategic Framework Directives and in the terminology used between the MSFD and the European Environment Agency.

Regional Seas

Whilst many of the regional seas are characterised by their distinctiveness and diversity, and the specific issues and policy recommendations are considered in more detail in the specific regional sea reports, there are a number of common themes which lead to generic recommendations.

Recommendation 9. There is a need to improve data collection and integration as a basis for better and more informed integrated land-sea research knowledge exchange and stakeholder capacity building.

Recommendation 10. Future research should focus on sustainable management and businesses practices to ensure that the uptake of territorial opportunities does not create unsustainable pressures on the environment.

Recommendation 11. Improved integrated governance at all scales needs to be effectively and efficiently promoted, with a particular emphasis placed on stakeholder and civic engagement.

Need for further analysis/research

This research represents the first time that ESPON has dipped its toes in the sea. The project has been very wide ranging in relation to the diversity of issues that it has tried to deal with. It should therefore be regarded as a scoping project rather than a definitive and final statement on a rapidly evolving, emerging and important European topic. There is considerable opportunity for further research which is both generic and specific, but which recognises and unravels the importance of land-sea integration for territorial cohesion. The suggested future research avenues are therefore indicative rather than exhaustive.

- Further research is required to develop a better understanding of the opportunities and risks for maritime communities. There is also a need to characterise maritime communities more distinctly, and to identify and quantify the significance of maritime links to the local economy. In other words how dependant, and hence vulnerable, might some communities be to fluctuations in the strength of land-sea interactions? For cluster

communities,the focus is on the opportunities that land sea interactions might offer. Other communities might be vulnerable to negative changes or risks associated with land-sea interactions, often associated with a diminution of local environmental quality.

- Whilst there is a perception that shipping activities are growign in importance, both long sea shipping connecting Europe to the rest of the world and short sea shipping within Europe, such growth is likely to demand new infrastructure. This new infrastructure will be located at the ports themselves, but also and just as critically, will require investment in the landward infrastructure which links the ports to their respective hinterlands. Exploring this land-sea interface further is a specific project worth of further investigation.

- With a growing interest in developing land-sea interactions, further research is required to identify the nature and form of different governance arrangements at a variety of different levels which might be best suited to dealing with these complex inter-relationships in an effective manner.

PART B

Chapter 1: Introduction

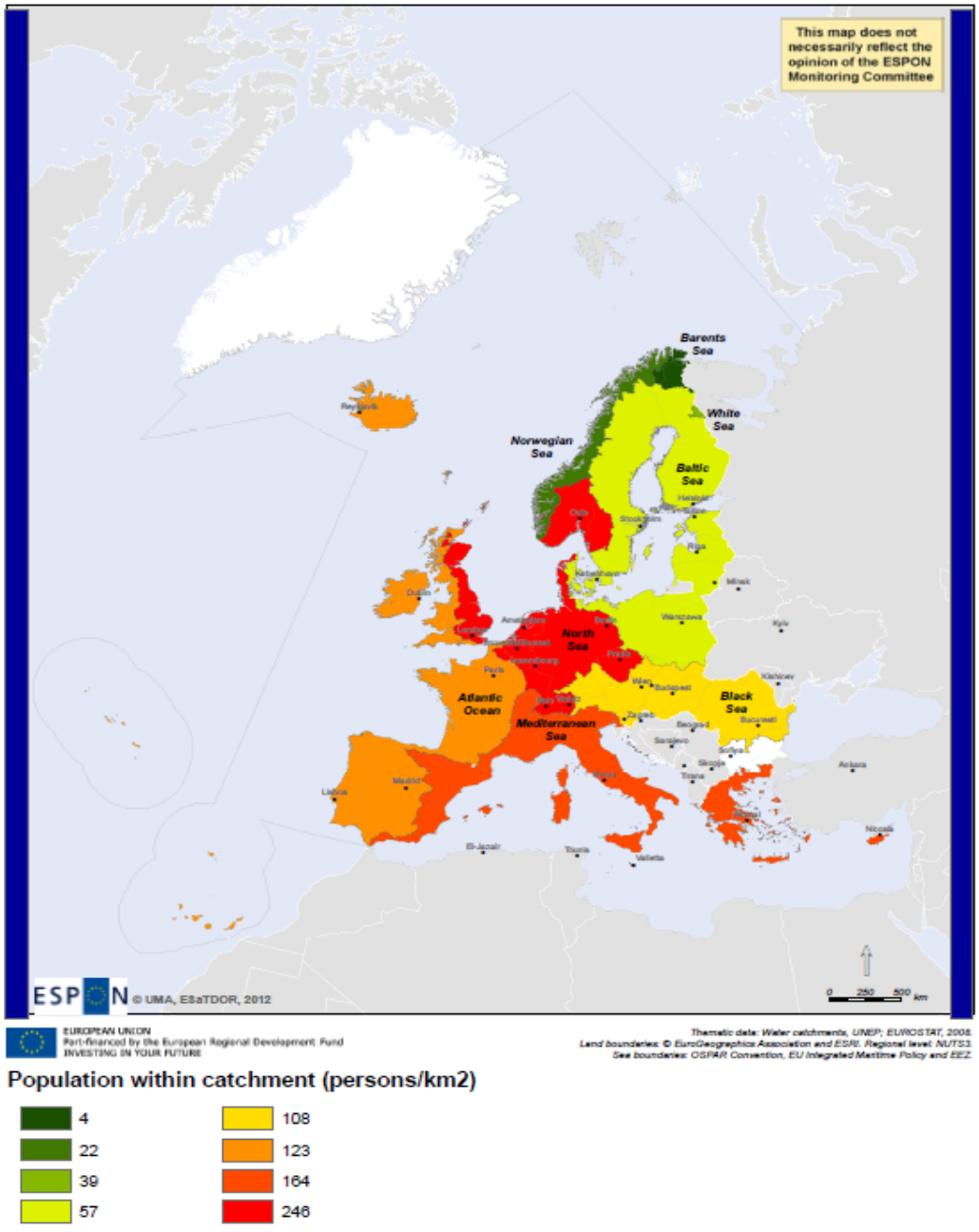
The *Treaty of Lisbon*, which entered into force in 2009, added a new goal of territorial cohesion to the twin EU objectives of social and economic cohesion. The need to promote for territorial cohesion, based around the potentials of a place based approach as advocated in the Barca Report (2009) has become of growing importance as Europe strives to achieve growth that addresses the many challenges the EU faces, including 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 nature and 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 EUs economic growth strategy advocates smart, sustainable and inclusive growth as the key direction of growth. However, whilst the Fifth Cohesion Report '*Investing in Europe's Future'* (CEC 2010b), suggested that regional disparities were diminishing, 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 (or land based) 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 has been very land based and land focused (see for example ESPON project 2.3.2, *Governance of Territorial and Urban Policies*). But in recent years there has been a renewed interest in the maritime or marine environment and how there is a mutual interdependency between the land and sea. Initial concerns, at least in European terms around the maritime environment were focused on ensuring the environmental integrity of these ecosystems were maintained, preserved, protected and where necessary restored. However, in more recent years there has been a growing realisation that the seas are becoming a context which 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.*

Figure 1.1 Europe's River Basins and linkage to Regional Seas.



Hence there is a growing interest in the way that the marine resources can be managed and where appropriate, exploited. This then leads to ongoing discussions and dispute about which nation state (or states) has jurisdictional competence over maritime resources. It is also evident that national governments are looking to take ownership and managerial responsibility for the new maritime environments. So for some countries a greater proportion of the area under their sovereign jurisdiction is sea rather than land based (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 rather the land sea 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 a mutual dependence on the sea in terms of providing connectivity to the rest of the world through 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 Figure 1.1 that the large river basins of Europe 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 a 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)

Whilst some progress has been made, in different country contexts (e.g. in England the Marine and Coastal Access Act) 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.

While MSP is being promoted by DG Mare (Commission Communication 2008), there is still uncertainty as to whether this will take the route of a formal instrument such as a Directive. But there is 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 and integral 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 recently 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 Godollo, 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, para55).

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. But 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, use of marine resources in the pharmaceutical and cosmetics industries.

These ideas are being operationalised through sea basin approaches. The first of these to be launched 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 regional seas and explores in an integrated manner the 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.*

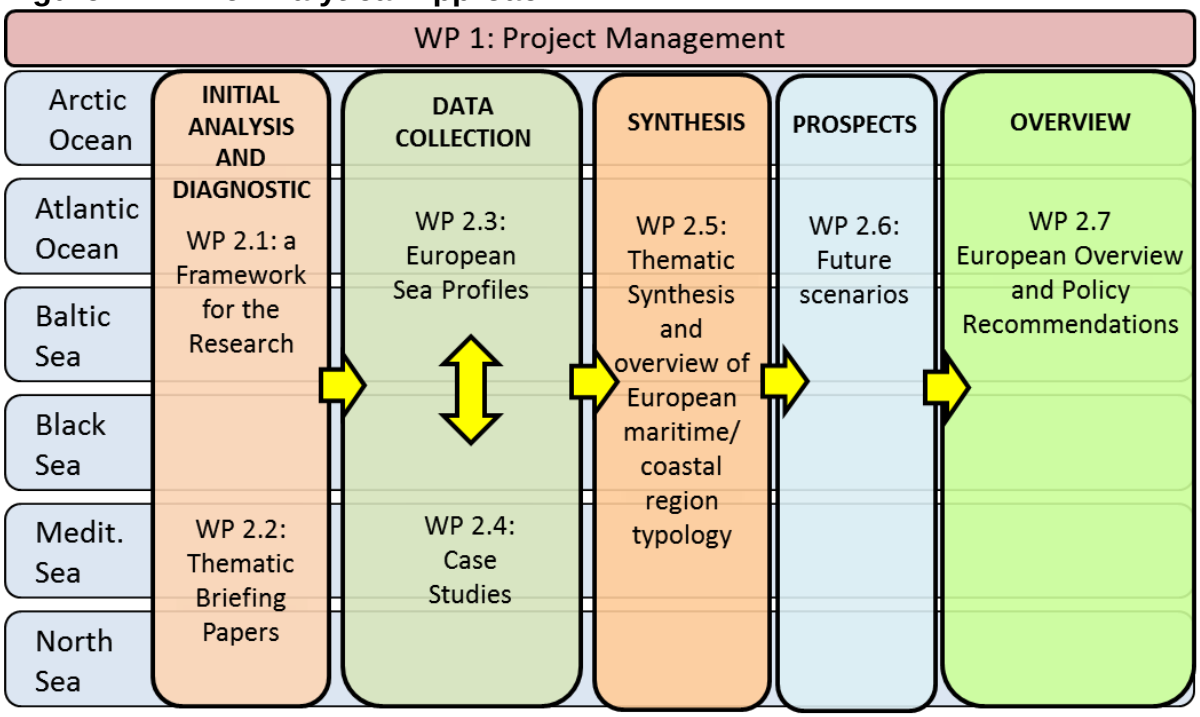
Outline of the Methodology

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 early 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 is iterative, incremental and experimental. The analytical approach follows a five step process (see Figure 1.2):

- Stage 1 is 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 is 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 is a period of **synthesis** and reflection as the information is consolidated into digestible elements.
- Stage 4 considers future **prospects** and is a period of scenario building and testing, based on an understanding of the opportunities and challenges facing the European seas.
- Stage 5 involves the development of an **overview** including clear policy recommendations, and suggestions for further prioritisation of research.

Figure 1.2: The Analytical Approach.



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* will be a key consideration throughout and will inform 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

Whilst 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), the first task was to pragmatically define the boundaries of these regional seas for analytical purposes. One of the early findings from the research was that unlike on land national boundaries, at least within Europe, are reasonably well defined and fixed, in maritime environment there is a complex arrangements of the way that maritime boundaries are defined, and these 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 based on an ecosystems services approach. Such an approach excludes two regional seas, the Arctic and the Black Sea, and focuses on seas which loosely 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 disadvantages of trying to apply one particular set of boundaries across all of the regional seas. Instead, the research has adopted a pragmatic and iterative approach, and in most cases the definition of boundaries of regional seas has tried to take advantage of a variety of regional sea conventions such as OSPAR, HELCOM, the Barcelona and Black Sea Conventions, to try and make best use of the data that has already been collected by regional seas secretariats, although this brings with it challenges of consistency between regional seas. The agreed boundaries for each of the regional seas is shown in Figure 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 18^0 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 Skaggerak and Kattegat water bodies is adopted here, following the definitions adopted by HELCOM.

Figure 1.3: European Regional Sea Boundaries used in ESaTDOR

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 Bosporus Strait, which connects the Black Sea to the Mediterranean via the Sea of Marmara, defines the southern edge of the Black Sea.

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

This therefore 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 appendices. We start by considering in more detail some of the methodological challenges associated with this exciting, challenging, but extremely timely project, focusing particularly on data availability, mapping and mapping land sea interactions. The following section seeks to paint a picture of the current situation in terms of land sea interactions for both the thematic priorities (economic use; energy cables and pipelines; transport; coastal and marine environment and governance arrangements) but also from the perspective of each of the regional seas. This baseline description of different facets of the land sea interaction then leads to a process of trying to develop a baseline typology of land sea interactions as a means of developing a clearer understanding of the opportunities and risks facing Europe's regional seas under alternative development scenarios. This is not a mechanism of prediction, but rather an approach to 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 section seeks to synthesise the research, identify policy recommendations 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 the 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 the 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: Operationalising the Methodology

The approach to data collection for the ESaTDOR project has been based on two main elements:

1. The need to provide up to date and comprehensive quantitative data 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.
2. The need to address issues of governance and transnational cooperation in Europe's maritime regions, through a qualitative assessment of regional sea-wide and sub-regional case studies of marine and coastal governance.

Data Collection

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. This has required a pragmatic and more experimental approach to be taken than may be the case in many other ESPON projects. The processes undertaken by the ESaTDOR team 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.

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. The Interim report then set out a preliminary maritime region typology based on the density of sea uses, comprising of five different "types" of region – European Core, High Density, Medium Density, Rural and Wilderness, which would be determined by aggregating characteristics such as level of use, human footprint, maritime connections, land-sea interactions, environmental risk, environmental conditions and economic significance.

At this stage the typology was applied to the Atlantic Ocean and the Baltic Sea using a qualitative assessment of where different types of sea region such as European Core and wilderness might be applied. Since this testing phase the typology has been refined to make use of a limited number of datasets for land and sea which 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 below.

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

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.

Data Challenges

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. The definition of regional sea boundaries for the purposes of the ESaTDOR project (using a combination of Regional Sea Conventions, Exclusive Economic Zone and Integrated Maritime Policy Areas) provides a broad frame for data collection and organisation, however a sufficient scale for more detailed information (e.g. at the level of ports) was required. Therefore a 10x10km grid for the seas has been developed, which is fully compatible with the grid of 1km for land used by ESPON. Following this, data processing for sea-based datasets mainly consisted of the conversion between the original format of the data and the resulting grid format, regarding reference systems, projection and resolution. Figure 2.1 provides an example of the transformation of undersea cables (lines) to the new raster format.

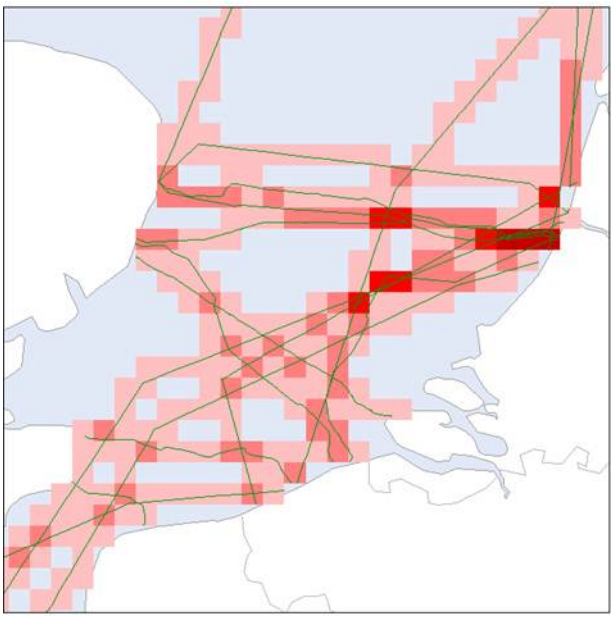


Fig 2.1: Conversion of undersea cable data to 10x10km grid squares

In this iterative attempt to map land-sea interactions, a three-step approach has been taken, building upwards from single data sets to produce on 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;
      - Provided at a resolution lower than national (NUTS0) level – enabling data to be more accurately attributed to specific regional sea areas. However, certain key datasets which were only available at national levels were not immediately excluded if they were particularly relevant to the project, e.g. short sea shipping data.
   B. *Spatial reference:* for data to be mapped, it was essential that the original data source came in a GIS-compatible format, i.e. using suitable spatial reference such as NUTS or GPS coordinates.
   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. employment and GDP at NUTS2 level, total volume of freight handled at ports (point data), shipping lanes, location and generating capacity of offshore wind farms, sea depth and increase in sea surface temperature (chloropleth 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 representing characteristics to be captured within the maritime regions typology – economic significance, flows and environmental pressures.

   In this instance individual datasets for flows and environmental pressures were converted into 10x10km raster format (where they were not already produced in this way). Data for ports was extrapolated outwards into the sea to produce a measure of “maritime influence” using the function:

   $$\mathbf{I_i = A \cdot \exp(-\beta \cdot d_i)}$$

   Where:
   A = Activity of the port (depends on the data set dealt with, e.g. total cargo, TEUs, passengers, tonnes of liquid bulk)
   β = a constant representing the decaying factor
   d = distance separating the port from the cell **i**

   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 the following category names are given from lower to higher: *Very low*, *Low*, *Medium*, *High* and *Very high.*

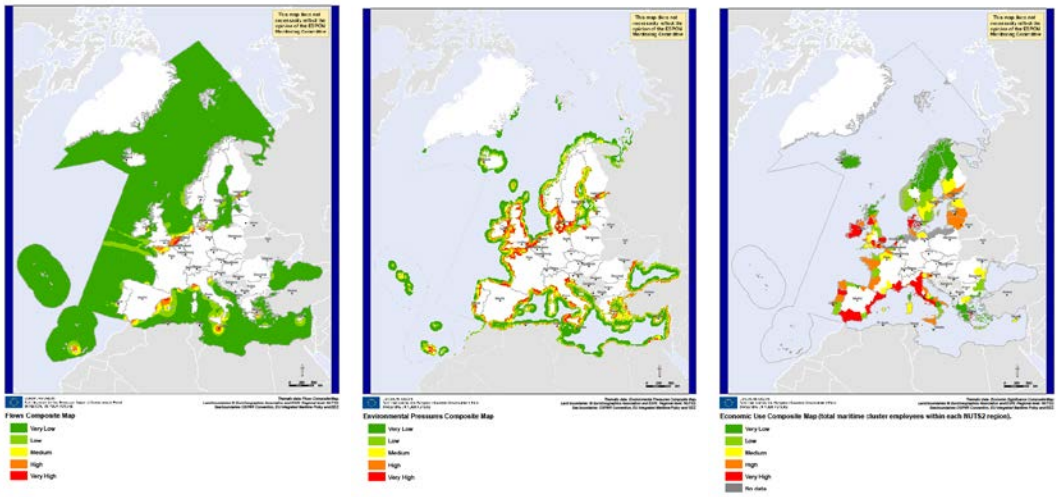
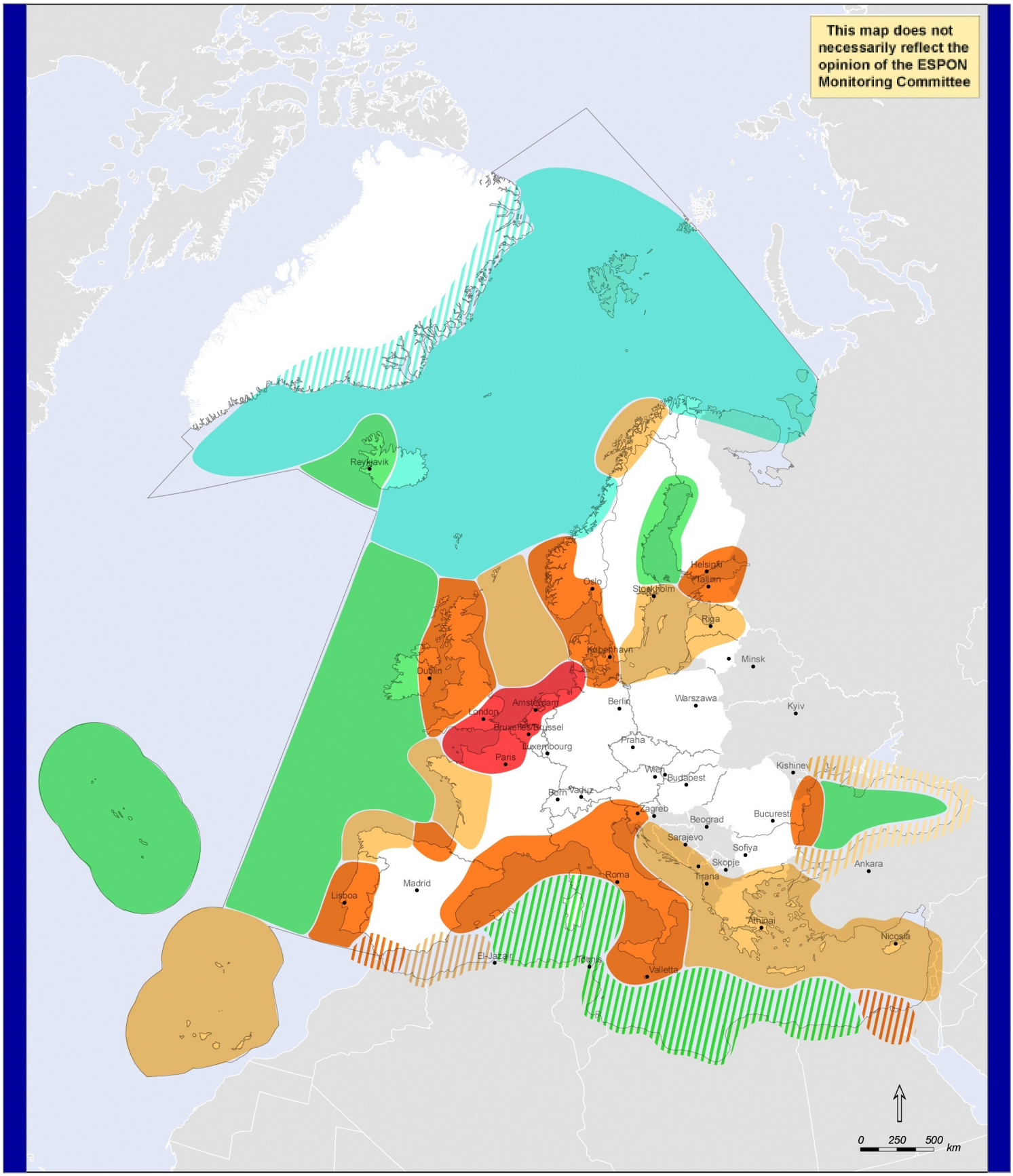


Figure 2.2: Composite maps for flows, environmental pressures and economic significance

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. For land based activities, data categorization is the same as in the original economic significance composite map (five classes based on quintiles). The union of data present in the Environmental Pressures and Flows composite maps shows the human impacts on and pressures suffered by the sea. The original five categories from the composite maps were converted to numbers from 1 to 5. Then the two layers were added and the values were classified into five groups with the new category names (*Very low*, *Low*, *Medium*, *High* and *Very high intensity*).

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. A schematic representation of these typology regions is shown in Map EU31:



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

EU31. Regions derived from typology map (schematic)

- European Core
- Regional Hub
- Transition
- Rural
- Wilderness
- Typology influenced by lack of data

Case Study Selection

The purpose of the maritime governance case studies within the ESaTDOR project is 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,
- 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 2.1 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.

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

Chapter 3 European Seas Current Situation

Introduction

This section of the report sets out the main results of the project related to the current situation in European Seas. It draws upon the series of more detailed accounts related to particular work packages that form part of the accompanying Scientific Report. In order to add value to this work, the focus here is upon highlighting the main messages that have emerged and where appropriate in providing a cross cutting overview. The chapter is divided into three parts. The first takes a thematic perspective and examines the main themes which have been the focus of the research – economic use, energy cables and pipelines, transport and environment. The second relates to the six European regional sea areas, the European parts of the Arctic and Atlantic Oceans and the Baltic, North, Mediterranean and Black Seas. The final section addresses issues of governance. In the case of the thematic and European seas parts, the discussion includes consideration of the findings derived from the selected European-wide thematic data sets that have been discussed previously. It is important to note therefore the picture presented is partial rather than comprehensive and that the limited focus of the discussion is most evident in relation to the environment.

Thematic Overview

Economic Use

Table 3.1 presents an overview of employment in maritime sectors in the NUTS2 regions bordering European seas. It reveals that the most important area of activity from an employment perspective is Tourism, which accounts for about two thirds of the employment in the maritime sectors. Transport, other traditional maritime sectors and other sectors connected with the maritime cluster account for 10, 10 and 8 per cent respectively. Oil and gas and shipbuilding count together for less than 2 per cent of maritime employment whereas the comparable figure for Fishing is around 4 per cent. Together, the maritime sectors as they are defined in this project contribute to one fifth of total employment in the NUTS2 regions bordering the European seas (EU27 + Norway and Island). It should be noted that there are close interactions between these different economic uses resulting in spatial and sectoral clustering of maritime industries.

Looking at how the number of employees in the maritime sectors is dispersed over the NUTS2 regions bordering the European seas, it is evident that maritime employment is very high in Denmark, Ireland, some regions in Italy (Veneto, Toscana, Emilia-Romagna, Lazio), in Spain (Andalucia, Catalunia, Comunidad Valenciana), Attiki in Greece; Portugal (Lisboa), France (Provence-Alpes-Cote d'Azur) and parts of the UK (Southern Scotland, East Anglia, the South East and the

Bristol/Bath area). It can be considered that interaction of the land on the sea is most intense in these regions.

Table 3.1 Employment in maritime sectors in the NUTS 2 regions bordering the European seas (EU27, Norway and Island)

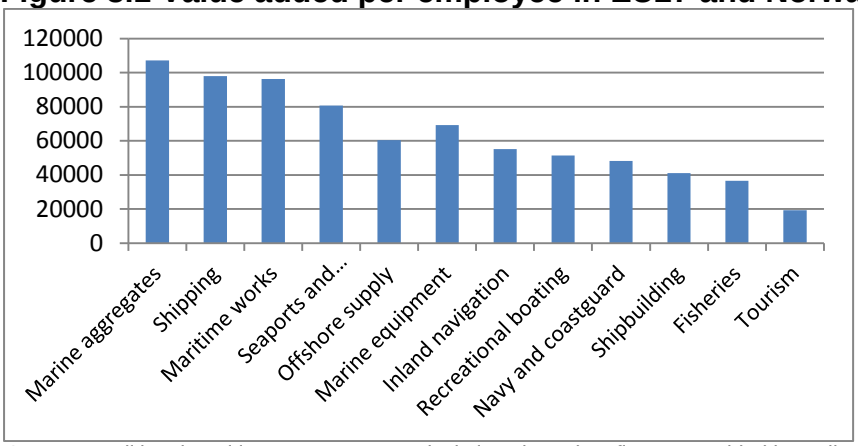
Sectors	Employment in the sector	Employment in the sector as percentage of total employment in all maritime sectors	Employment in the sector as percentage of total employment in NUTS2 regions bordering the European seas
Tourism	12 805 837	65,4	13,3
Transport	2 042 421	10,4	2,1
Other traditional maritime sectors	1 952 547	10,0	2,0
Other sectors connected with the maritime cluster	1 568 041	8,0	1,6
Fishing	856 535	4,4	0,9
Shipbuilding	284 836	1,5	0,3
Oil and gas	64 672	0,3	0,1
Sum	19 574 889	100	20,3

Source: Own calculations based on data from the European Cluster Observatory

High employment in maritime sectors tends to coincide with regions with a relatively large population and a different spatial pattern emerges if maritime employment as percentage of total employment in coastal regions is considered. This latter picture is a measure of the **significance** of the sea for landward economies. Here, it is apparent that economic use connected to the sea is especially significant in Iceland, Norway, most coastal regions in the UK, northern Italy and in the Canaries and many other small islands. These places include many areas of relatively low population.

It is also useful to consider maritime sectors in relation to their value and Figure 3.1 illustrates how some traditional maritime industries differ in terms of Gross Value Added per employee. It highlights for example the relatively low GVA of fishing and tourism, in contrast to shipping and marine aggregates. Looking at the European Seas as a whole a distinctive pattern emerges with maritime activities with relatively high value added tending to be located around the Arctic Ocean, the Baltic Sea and the North Sea, whereas activities with relatively low high value added per employee are to a higher degree located around the Atlantic Ocean, the Black Sea and the Mediterranean.

Figure 3.1 Value added per employee in EU27 and Norway 2005. Euro.



Source: Traditional maritime sectors: own calculations based on figures provided by Policy Research Corporation 13 November 2008–28 country reports; Fisheries and tourism: The Policy Research Corporation Report on results (http://ec.europa.eu./maritimeaffairs/pdf/clusters/report_results_en.pdf).

Energy Cables and Pipelines

By far the richest concentration of Europe's hydrocarbon reserves are located in geological strata under the seabed, especially in the North Sea, athough other reserves are to be found in other regional seas such as in the Irish, Black and Baltic Seas and the central Mediterranean. The growth of the sector has produced significant economic and employment benefits for the producing countries, with concentrations of oil and gas-related employment in certain coastal areas, such as in Scotland and Norway. However, levels of production are declining. Exploration for new reserves continues, and new reserves are being opened up, but not at a sufficient rate to compensate for the drop in production elsewhere. Moreover, newly discovered reserves are smaller, leading to a proportionally higher number of installations at sea. Small reserves are also being discovered in other sea areas, such as the southern Baltic, the eastern Mediterranean and the western Black Sea. The only major untapped hydrocarbon reserves in Europe are thought to lie in Arctic waters, now being made more accessible by retreat of the polar ice cap. Potentially a quarter of the world's undiscovered reserves are to be found in the ocean. Opening up these resources will however present significant environmental, technical and political challenges, and is not a visible focus of European energy policy.

Europe's seas hold major potential for the production of renewable energy, by means of wind, wave, current and tidal power. The *FP7 ORECCA* project has mapped the likely energy potential of wave, wind and tidal power. This shows that western coastal areas fully exposed to the Atlantic have the greatest capacity to develop wave power, followed by open areas in the North Sea and Mediterranean; however, enclosed sea areas have relatively little potential in this regard. Secondly, wind power is also highly variable in its distribution; north western Atlantic areas exposed to frequent weather fronts have the strongest average wind speeds, followed by other western Atlantic areas, the North Sea and southern Baltic. Overall, the Mediterranean and Black Sea have little potential for exploiting wind energy, though even here, localised pockets of high potential exist, such as in the Gulf of Lion to the south of France. Third, effective tidal power is restricted to channels and estuaries where ocean conditions and other physical factors favour strong tidal

surges. The UK's and northern French seas hold the greatest potential in this regard, with other localised opportunities such as in the Straits of Gibraltar and Messina.

Actual offshore wind array development to date centred on the southern North Sea, with an arc of wind arrays stretching down the eastern coast of England and up the Belgian, Dutch, German and Danish coasts. These include a number of large-scale schemes at various stages of planning, construction and operation, especially in south-east English waters, which will have a capacity approaching that of many conventional power stations. A second cluster is found in the Irish Sea, and a third, of smaller-scale schemes, in the south western Baltic; a couple of other minor schemes are found in outlying areas. Together, these arrays represent not only the vast bulk of Europe's total of marine renewable energy so far, but the largest concentration of marine renewables in the world. The actual distribution of wind arrays does not therefore reflect the areas of greatest physical potential, but is concentrated in areas that are technically, economically and politically most feasible.

Other marine renewables remain at a much earlier stage of development. France's La Rance tidal power station, completed in 1966, remains the only commercial scheme of its kind in Europe, whilst no wave energy schemes are operational beyond a trail stage. Research efforts are, nonetheless, ongoing; for example, the *Pelamis* wave energy convertor has been trialled in Scottish and Portuguese waters.

Three marine network systems are to be found in Europe's seas, all interlinking with terrestrial systems. Firstly, electricity cables which include underwater sections of predominantly terrestrial grid systems (such as between the Danish islands, or Sweden and Finland) and cables connecting offshore sources of electricity supply, ie. wind arrays, to terrestrial grid systems. The policy framework suggests that there is scope for this network to be developed considerably and plans for a European Supergrid are being developed. The second marine network, also energy-related, is that of pipelines carrying oil and gas. By far the greatest concentration of these is associated with the North Sea oil and gas fields but a smaller number of pipelines is found other regional seas such as in the southern Baltic, the western Black Sea, the Adriatic and the Bay of Biscay. Expansion is taking place of these networks including new links between Denmark and Poland and increasing gas pipeline capacity from North Africa to Europe, crossing the Mediterranean Sea. The third marine network is that of telecommunications cables, carrying mostly telephone and internet traffic. The most important route remains that across the Atlantic to North America, with the greatest concentration of cables in the Celtic Sea. The other main intercontinental routes are through the Mediterranean to the Middle East, southern Asia and the Far East, and down the Atlantic around Africa to head across the Indian Ocean. These principal routes are added to by branches, such as from France to the Mediterranean route, and more localised links between European countries, such as across the Baltic and around the Atlantic Arc.

The capture and long-term storage of carbon dioxide is a significant aspect of EU energy policy, and the possibility of making use of geological strata under the sea bed for this purpose is currently being explored (eg. *FP7 MUSTANG*) and pilot projects are underway, including the *Sleipner* facility in the Norwegian section of the North Sea. Saline aquifers and depleted oil and gas fields have the best potential in

this regard. In Europe, the North Sea holds the greatest prospect in terms of available exhausted oil and gas fields. Moreover, it is conceivable that decommissioned pipelines could be used in a reverse direction, for transferring carbon dioxide for storage in these sites.

Transport

Europe (EU/EEA) has the world's largest shipping fleet, representing 41.6% of the world's vessels (measured in GT) directly employing some 300,000 seafarers on board merchant vessels and another three million in related jobs. Around 90% of the European Union's trade with third countries passes through European ports. Traffic intensity in the Mediterranean accounts for 30% of total World maritime traffic, while the Atlantic and the North Sea contain some of the busiest shipping routes in the world. In addition to freight approximately half the shipping activity in the Greater North Sea consists of ferries and roll-on/rolloff vessels on fixed routes. The Baltic Sea is also heavily trafficked and the Black Sea has strategic links with the Caspian and with the Mediterranean via the Bosporus, where crossings are naturally limited in terms of frequency of passage and size of ships. 40% of the total port traffic in Europe is concentrated in the four largest ports; all in the Northern range (Rotterdam, Antwerp, Hamburg and Bremen).

In recent years the polar ice pack has thinned allowing for increased navigation in the Arctic Ocean. Even with an upgraded Panama Channel, the Far East – Europe route through Suez is still shorter but, with an increased global temperature the Arctic Sea route could become navigable for significant periods of the year in the long term, with shortened travel distances for Japanese and Korean ports and for some Chinese ports.

Today, 40% of intra-European freight is carried by short sea shipping and EU policies supports growth in this area as part of efforts to develop more sustainable transport modes. The "motorways of the sea" program is the set of key sea routes between EU Member States which combined with other modes of transport aim to provide regular, high-quality services offering an effective alternative to transporting goods only by road. The Atlantic forms the Western Europe section of the EU's Motorways of the Sea transport corridors. The Commission has begun to implement the Motorways of the Sea concept in the Black Sea, closely linked to the TRACECA (TRAnsport Corridor Europe-Caucasus-Asia) programme. In the Mediterranean, short sea shipping is important between Spain and Italy, in the Adriatic and Ionic seas, as well as between the northern Mediterranean rim and the Maghreb.

According to the European Cruise Council (ECC), the European cruise industry continues to increase its share of the growing global cruise market with 25.2 million passengers visiting a European port in 2010; 5.2 million passengers joined their cruise in Europe in the same year with the industry generating €35.2 billion of goods and services and providing almost 300,000 jobs. The Port of Barcelona is the largest European port in terms of cruise passengers, with around 2.3 million per year, followed by Civitavecchia (Italy), Palma de Mallorca (1.5 million passengers, Spain) and Venice. Copenhagen, St. Petersburg, Tallinn, Stockholm and Helsinki are most visited ports in the Baltic. Southampton and Lisbon are key cruise ports in the Atlantic and here, and in the North Sea a range of smaller ports feature on cruise

itineraries. Significant increases in cruise ships in the Arctic Sea, a majority not purpose-built for Arctic waters, have been observed in the summer season.

The greatest concentration of tanker traffic associated with oil and gas is around the North Sea and Norwegian Coasts close to major oil and gas fields. In the Black Sea area, the trade and transport of strategic Oil and Gas supplies is central. Exports of crude oil from Black Sea ports averaging at over 100 million tonnes a year are expected to continue to rise, resulting in continued seaborne transit via the Bosporus and increased use of eastern Mediterranean ports linked to new pipelines intended to bypass the Bosporus. In the Baltic, oil transportation in the eastern part (Gulf of Finland) is important due to the export of Russian oil. 380,000 ship calls have been counted in the year 2008. Gas and oil traffic flows in the Mediterranean are mainly south-north direction. Traffic tends to intensify under the pressure of the Turkish economy, the countries of Central Europe and the CIS, and Gulf countries.

With growing maritime traffic, ensuring adequate shipping infrastructure is important to prevent bottlenecks in the future, and seek port efficiency and productivity. At present infrastructure provision and the greatest degree of connectivity is concentrated in the traditional “core” of Europe, i.e. southeast England, the Netherlands, Belgium, Luxembourg, eastern France and western parts of Germany. In contracts areas that may be disadvantaged due to high travel costs to reach nearest ports, include the west of Scotland, central parts of Sweden and the Balkan States. There is a general lack of marine infrastructure in the Arctic, except for areas along the Norwegian coast and northwest Russia, compared with other marine regions of the world with high concentrations of ship traffic. Except in limited areas of the Arctic, there is a lack of emergency response capacity for saving lives and for pollution mitigation. There are serious limitations to radio and satellite communications and few systems to monitor and control the movement of ships in ice covered waters. Improvements in the maritime infrastructure in the Atlantic and Mediterranean will be needed if they are to meet demands for maritime transport and increase their share in the maritime sector. This includes supporting rail projects intended to enlarge port hinterlands.

Environment

Europe’s regional seas have suffered severe environmental degradation due to human pressure. These pressures relate to many of the marine and coastal activities which have been discussed above (e.g. fisheries, mariculture, coastal development, coastal defence, shipping, and offshore energy winning), but also derive from activities in the seas’ catchments (notably agriculture, industry and urbanisation). Declining environmental quality has prompted a diversity of measures and policies at a range of spatial scales. For example the European Community has enacted a number of directives addressing environmental quality in general, and water and marine quality in particular. Examples include the Birds and Habitats Directive, the Nitrates Directive, Urban Wastewater Treatment Directive, the Water Framework Directive (WFD, 2000/60/EC) and the recent Marine Strategy Framework Directive (MSFD, 2008/56/EC).

Not all riparian nations of Europe’s regional seas are members of the EU. International cooperation has led to regional seas commissions that provide support

for an international and cooperative perspective on regional sea quality. Examples include the OSPAR Commission (northeast Atlantic, including the North Sea) and the Helsinki Commission (Baltic Sea). Taken together these developments have resulted in improved environmental status in some areas but significant problems remain.

Although good data is available in relation to particular aspects of the environment for individual seas (e.g ICES, 2003), few environmental data sets cover European seas as a whole. Those that have been selected as environmental indicators for the purposes of this project illustrate the value of a more coordinated and consistent approach to data collection. It should be noted however that they present only a very partial picture, focus predominantly on coastal waters, and in some instances are based on modelled data rather than on extensive survey based data sets. With these limitations in mind, the following section provides examples of: some of the underlying changes that are thought to be associated with human induced climate change; some of the direct pressures that human activity on land and sea are placing on the maritime environment; and some of the management responses that are being put in place to improve the environmental status of European seas.

Data for sea surface temperature (SST) between1981-1982 and 2012 has been chosen as an indicator of potential climate change in the seas. SST has environmental relevance because marine ecological processes are profoundly influenced by temperature, and important differences are found between ecosystems at different latitudes. Changes in SST are therefore an indicator of potential background environmental stress. Analysis of the data highlights the complexity inherent in measuring and assessing the impacts of human induced climate change and the case for improved data and research in this important area. For example, not all the changes that are evident can be clearly attributed to anthropogenic causes, as many natural factors may also contribute to the pattern of variance. Equally it cannot be assumed that low levels of change are necessarily less significant from an environmental perspective. The Arctic is a case where current understanding suggests that even very subtle changes in environmental conditions may result in very significant changes to the ecosystem.

Two data sets have been selected as illustrative of human pressures on the maritime environment. The first illustrates one of the impacts of patterns of land based agricultural activity on the marine environment and relates to organic loads in the form of pesticides. Pesticides can bioaccumulate in organisms and so can become toxic. They can also magnify through foodwebs as each feeding level consumes contaminated prey. Biomagnification has a disproportionately strong effect on top predators due to their longevity and diet. Human consumption of top predators, such as tuna, can engender health risks. The data shows that loads of pesticides reaching the coast are quite common along much of the coastline of Europe's seas. The heaviest loads are associated with rivers draining large and/or intensively developed catchments, such as the Rhine, Rhone, Seine, Vistula, Po and Dnipro. The second data set illustrates the impacts that can be associated with sea based activities and relates to modelled data linking shipping activity to the presence of invasive species. The arrival of a non-indigenous species in Europe may not be, per se, a problem but some species populations can expand rapidly and so cause ecological and economic damage. Such alien invasive species cause the decline of indigenous

species, disrupt ecosystems' structure and function, particularly with the loss of ecosystem-engineers, and can have economic consequences should ecosystem services be compromised. Concentrations of invasive species are evident around many of Europe's sea ports and the southern North Sea is strongly highlighted, largely because of both the size of ports and the volume of shipping in this area. The potential for invasion is likely to be exacerbated by windfarm development and climate change. The former provides hard substrate that will facilitate establishment of some non-indigenous species; the latter will facilitate the northward movement of species that are already established.

Finally two data sets have been selected to illustrate patterns of activity concerned with improving the environmental status of European seas. The first relates to the EU bathing water directive and indicates the compliance of member states with the mandatory and the guide values of the directive. Although the dataset is relatively qualitative, it nonetheless provides one way of looking at the human perspective on water quality. It should be noted that this dataset only provides data for coastal waters, and is not relevant for the open sea. The data shows a positive picture in that the vast majority of waters along the European coastline conform to mandatory or guide values for bathing water quality. Sites that do not conform are few and are scattered around the coastline, with the exception of a strip between Rome and Naples. The second data set relates to the designation of protected areas in the form of NATURA 200 and Conservation of Arctic Flora and Fauna (CAFF) sites. Such areas may comprise terrestrial and aquatic components, and the data relates to both. Analysis of the data shows that with only a few exceptions, protected areas tend to be small in size and coastal including both terrestrial and aquatic zones. Open waters with protected status are larger in size but are relative limited at present with particular concentrations evident in the North Sea, the northeast Atlantic and, to a lesser extent, the Baltic Sea.

European Seas Overview

Table 3.2 provides an overview of the current situation in each of the European Seas based around the themes which have been the focus of the ESaTDOR project. This helps to clarify the existing character of each maritime region by identifying key areas of distinctiveness and similarity. The focus of the discussion here is upon drawing out key cross cutting messages rather than repeating the findings in relation to each European sea which are set out in the accompanying scientific report.

Key Areas of Distinctiveness

The distinctive character of each European sea has been shaped by a complexity of natural and human factors and both global and place specific interaction between these elements over millennia. This situation has produced a hugely rich and varied maritime picture which is fundamental to the environmental, social and economic well being of Europe. Some headline messages to emerge from our analysis in terms of the distinctiveness of European seas are set out below.

- The Arctic and Atlantic are Europe's wildest maritime regions.
- The Arctic is Europe's most pristine maritime environment with enormous untapped natural resources.
- The Black Sea and the Baltic are enclosed seas serving very large inland catchments as a drainage basin, trade route and leisure and tourism destination. They are low salinity, brackish seas with very distinctive ecosystems.
- The Arctic, Baltic and Black Seas are particularly fragile ecosystems making them especially vulnerable to human pressures.
- The southern North Sea is the most intensively used maritime region in Europe and is the focus of European trade with the rest of the world.
- The Mediterranean is both a biodiversity and cultural heritage hotspot. It is of global importance for tourism and a major global routeway for east west trade.
- The Atlantic is the key route-way connecting Europe with the rest of the world and offers the greatest potential within Europe for marine renewable energy development.
- Maritime activities with relatively high value added tend to be located around the Arctic Ocean, the Baltic Sea and the North Sea, whereas activities with relatively low high value added per employee are to a higher degree located around the Atlantic Ocean, the Black Sea and the Mediterranean.

Key areas of similarity

While each sea has its own particular set of characteristics, some common features can also be identified. Some headline messages to emerge from our analysis in terms of the similarities between the six European seas are set out below.

- All seas have a mixed and closely interconnected maritime economy, and in all cases tourism is by far the largest maritime sector in terms of employment.
- Human use of the sea is increasing in all regional seas.
- Shipping and renewable energy are key areas where growth is occurring or expected.
- All seas have seen significant improvements in bathing water quality and are building a network of maritime related protected areas for nature conservation.
- Problems of pollution and unsustainable exploitation together with the impacts of climate change continue to pose significant threats to the health of the marine environment.

Table 3.2 Overview of the current situation in Europe's Regional Seas

	Economic Use	Energy Cables and Pipelines	Transport	Environment
Arctic	Despite a low density of bed spaces, tourism is an important employment sector in the Arctic accounting for 12-14% of employment in coastal areas. Fishing/aquaculture is also significant and the region is a world leader in this sector in many respects. The Vestlandet region in Norway is important for shipbuilding industry and has experienced a change-process in the last ten years, in which the offshore-based part of the industry has experienced the strongest growth.	Energy is an important and growing sector in the Atlantic with oil and gas extraction, hydropower, wind, wave and other renewable sources and nuclear energy all being significant in different parts of the area. At present cable and pipeline capacity in the region is low compared with other European seas but important telecommunication links exist between Norway and Svalbard and Iceland and pipelines take oil and gas from offshore Norwegian fields to the mainland and the UK. Major growth in these sectors is underway	Shipping traffic in the Arctic is currently generally low, the exception being relatively heavy traffic along the Norwegian and Russian coastlines as well as between Iceland and mainland Europe. This may change due to reduction in ice presence. Already there are reports of increased traffic through Arctic waters to save travel time compared with Suez Canal shipment. Cruise travel is also increasing in the region. Currently there is a dispersed pattern of small ports showing a mixed pattern of growth and decline.	The Arctic Ocean is a unique but fragile marine ecosystem and relatively large parts of North-Eastern Greenland, Svalbard, Frans Josef's Land and their adjacent waters are now protected areas. At present levels of pollution in the region are low but current threats to Arctic biodiversity are climate change, unsustainable fishing practices and overharvesting of some species such as walruses and whales and sea mammals The increasing acidity of the ocean and thinning of the Arctic icecap also pose threats to the ecosystem.
Atlantic	Coastal tourism is the most significant maritime sector in most parts of the Atlantic followed by fishing which remains significant in some areas but is in decline. A wide range of other economic uses are also present reflected for example in regional clusters of industries associated with shipping and military activities. Activity is most concentrated in the Channel, and also to a lesser extent in the Irish Sea, on the north coast of Spain centred on Bilbao, around Lisbon in Portugal and the Straits of Gibraltar centred on Algeciras.	Oil and gas production have been important in the N. Atlantic and S. France but production is in decline. However offshore wind development is one of the Atlantic's fastest growing industries again presently focused in the north but with interest throughout the region. Wave and tide power are at an early development phase. The region is a focus of transatlantic telecommunication cables linking mainland Europe with north and south America, Africa and the Azores and Canaries.	Shipping is a key feature of the Atlantic. Many routes pass through the area with strong north/south and east west flows. There is a concentration of activity around the Channel but Europe's mega ports are located outside the region. A dispersed pattern of larger and smaller ports (mainly import) provide focal points for maritime employment throughout the area. Activity is mainly focussed on freight but activity includes cross channel passenger routes and two of Europe's top 10 cruise passenger ports – Southampton and Lisbon.	Generally good performance in improving quality of bathing waters and also good level of coastal protected area coverage. A new network of MPAs is beginning to emerge with notable concentrations at present in the Bay of Biscay. However organic and inorganic pollution remains a problem in coastal waters most notably within the Irish Sea. The presence of Invasive species is concentrated around many ports.

	Economic Use	Energy Cables and Pipelines	Transport	Environment
Baltic	Coastal tourism is a major economic sector especially in south-western parts of the Baltic Sea Region. In contrast fishing is in decline in most countries. The largest fishing fleets are located in Denmark and Poland. Leisure boating in the region supports many related activities including numerous shipyards, although employment in this sector is also in decline.	The production and transportation of energy is increasingly significant including a major flow of tankers exporting Russian oil to destinations beyond the Baltic and gas pipelines connecting Russia and Germany. Two oil platforms in Russian and Polish waters produce oil. Offshore wind is at an early stage of development with a spatial focus on southern and western parts of the Baltic Sea.	The Baltic Sea is dominated by short sea shipping with more than 80 % of Baltic states' trade transported by sea. It is a growing sector that is of strategic importance in the region and is of particular importance to the new EU member states. Activity includes bulk cargos, containers and a significant ferry trade. However, the majority of ships on the Baltic Sea are leisure boats served by numerous wharfs.	High compliance with bathing water standards. Pattern of improvement in relation to organic pollution. Currently around 7% of the area is covered by Natura 2000 designations. However despite many positive developments according to the HELCOM HOLAS-Assessment 2010 "None of the open basins of the Baltic Sea has an acceptable environmental status at present." Eutrophication is a major problem. This situation reflects the enclosed nature of the sea.
Black Sea	Economic activities are concentrated into three sectors. Firstly, traditional activities, in which shipbuilding and marine equipment are the most important. Seconldy, fisheries, though these have deteriorated dramatically. Thirdly, tourism, where the Black sea remains an important regional tourist destination, and is now attracting a wider market. The region also contributes a significant proportion of the global seaman work force. Maritime clusters are under development in Bulgaria and Romania.	The Black Sea region lies at the crossroads of major oil and gas export flows to the world energy markets. A number of regional initiatives are under way to maximise the opportunities presented by oil and gas export, including major pipeline construction, some of which will make use of seabed pipelines. However, renewable energy is underdeveloped at present., with only limited offshore potential. . .	The importance of Black Sea ports in international maritime trade is increasing, and cruise shipping is of modest but growing importance. Shipping accident rates are relatively small in comparison to the other EU regions.	The Black Sea has been exposed to natural and environmental fluctuations and to strong anthropogenic stresses. The state of the Black Sea environment continues to be a matter of concern due to the ongoing degradation of its ecosystem and the unsustainable use of its natural resources. The most important polluting factors in the Black Sea are land-based sources: tributary rivers and domestic and industrial discharges. Nutrient input and eutrophication are widespread problems, and there are hot-spots of heavy metal and oil pollution, especially in some coastal areas.

	Economic Use	Energy Cables and Pipelines	Transport	Environment
Mediterranean	Of all European maritime regions, the Mediterranean has the greatest share (52%) of people working in coastal and marine tourism. It accounts for approximately 30% of the world's international tourism.. Fishing also remains a key industry with Turkey, Italy and Spain reporting the largest catches. Other significant sectors include recreational boating, navy and coastguard. Clusters of shipping building and other maritime industries are evident throughout the region often linked to key naval establishments.	The region contains major centres of oil and gas production, mostly land-based in North Africa; there are some small offshore fields. It is important as a zone of transit for oil and gas, with major pipelines connecting N. African supply to European demand. To date offshore renewable energy development has been limited but interest in wind and wave power is growing. There are also important international telecommunications cables running mainly in an east-west direction plus some north-south connections, notably between France and N. Africa.	On a key east west route the region sees 30% of World maritime traffic. Growth in shipping reflects increased trade between the far East & other parts of the world. Most traffic is passing through to other areas including North Sea ports. Most ports in the region have a major transhipment component e.g. Algeciras, Gioia Tauro Marsaxlokk and Valencia. Short sea shipping between Med. destinations is important. Cruise trade is significant and growing with the largest ports Barcelona, Civitavecchia, Palma de Mallorca and Venice supported by many smaller destinations.	The region is a biodiversity hot-spot. Good progress with special area protection has been made particularly in the w. basin. Organic pollution has been a major issue and is heightened by the intensity of seasonal tourism with pollution hotspots remaining in areas with high eutrophic conditions. Good progress has been made on meeting bathing water standards although further progress is required in E and S Mediterranean Basin countries. Alien species present challenges around key shipping lanes, major ports and areas of aquaculture in the NW Mediterranean and Adriatic Sea.
North Sea	Maritime services, navy and coastguard activities, marine equipment and shipbuilding are all important sectors reflecting the presence of mega ports and energy development in the region. Fishing has historically been a major activity and fleets are highly industrialised with vessels operating increasingly outside the region in the Atlantic and beyond. Coastal tourism is popular and growing and of particular importance in more sparsely populated areas of the UK and in the southern part of the region.	The North Sea is one of Europe's premier energy-production regions. Large-scale oil & gas production mostly in Norwegian, UK and Dutch waters has been significant over the past 40years but output is declining and there is a shift to more, smaller fields. The region is home to the greatest concentration of offshore wind arrays in the world and further expansion is planned, particularly in UK and German waters. The North Sea has a high concentration of power and telecommunications cables linking its bordering countries.	The North Sea contains some of the busiest shipping routes and largest ports in Europe including Rotterdam, Antwerp and Hamburg which all have growing container trade and a good balance between imports and exports. Ferry activity is significant but declining in the southern North Sea and across the Skaggerak. Cruise activity is distributed throughout region with a concentration in the N. around Copenhagen, Oslo and Bergen. Southern ports mainly operate as passenger embarkation points. There is growth in some areas.	The North Sea is a young. relatively shallow sea with highest biodiversity occurring in coastal regions and in areas such as the Dogger Bank and along tidal fronts. Good progress has been made in establishing protective designations and in meeting bathing water standards but organic pollution remains an issue with hotspots associated with the Rhine, Elbe and Humber Rivers. Invasive species present significant environmental threats particularly in the vicinity of the very busy Channel and of large ports.

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 or 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 preferenced.

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 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 is nature and scope, some are bilateral and others are based on national concerns with an explicit understanding and requirement to co-operate 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. Whilst land use planning traditionally functions through one dimension (the surface of the land), 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 structure 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 too, 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 shelve 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 Animal, the Ramsar Convention which protects wetland areas and the UNEP Convention on Biodiversity) and often this is promote 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 tarnsnational activity that takes places occurs at the regional seas level. We have chosen this scale because many of the European regional seas in this project are not exclsuively bordered by EU members 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 (especailly when the regional sea is enclosed) or specific thematic issues, where the institutional agreement operates across severla regional seas (see fro example OSPAR). In many of these cases the EU was not the driving force behind these partnerships, but certianly through financial support is having an impact in the way these partnerships are able to acheive their objectives in the various regional seas, or in the case of the Northern Dimension as a partner the EU is seeking through dialogue and cooperation to facilitate 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 orginally ratified in 1978 and modified in 1995, in part promoted and funded by the UNEP nevertheless the Commission communicataions and financial inputs clearly indicate the importance of the regional sea and the need for synergistic action and constant dialogue and between partner countries.In the Blcak 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 perhaps noting that the 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 terms of its overcahing objective is to protect the marine environment of the north east Atlantic. It works through persauding partners to take 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 governace 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 turn, which has really risen to prominence since 2006, 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 and points 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 Strategic Framework Directive (208/56/EC) which parallels the Water framework Directive seeks to ensure that the marine environment has a 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. Clearly various Directorates within the Commission is showing increased interest in the threats to and potentials of 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 be 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 a funding 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 jurisdiction of national boundaries and in many cases operating as a cross border or transnational partnership. These are the focus of our more detailed, but selective case studies on MSP (see below).

Whilst there is growing evidence that the planning and management of the seas is of growing importance, 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 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. 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, but also between formal and (fairly) informal ones. Furthermore policies, programmes institutional arrangements need to be judged not just on their own but also as a cross-cutting perspective to deal with multidimensional challenges and a focus on coherence and cooperation. We have 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 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 rather 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 generis maritime issues and agendas. There is an emerging 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 though such activities are largely informal and non-statutory in character.

Coastal Governance in Practice

The role of the case studies as part of the ESTaDOR project was to provide a more in depth evaluation of the governance arrangements in different coastal and maritime regions and at least consider the potential transferability of good practice Three broad criteria were used in case study selection and no assumptions were made as to whether the selected case studies represented good or best practice. The three criteria were:-

- All the case studies (institutional arrangements or projects) must be cross border or transnational in character (ie should include the co-operation of more than one nation state);
- At least one case study in each region sea should focus on the arrangements that have been put in place to manage the maritime resources of the sea in its entirety; and
- At least one case study should explore transnational/cross border arrangements at a sub-regional sea scale, although specification was placed on the particular topic of theme.

All the case studies adopted a similar framework for the research and analysis, to aid comparison, although we acknowledge that each is unique. The methodology, the details of the individual case studies, case study syntheses can be found in the scientific report. Tables 3.3 to 3.8 provide a brief summary of the main characteristic of each of the case studies, and tables 3.9 and 3.10 provide a summary of the key themes and elements from the synthesis of the case studies. In total the research looked a 10 region sea case studies and 9 sub regional sea case studies

Table 3.3. Arctic Ocean: Case study list and description

	Case study title	Description
Regional Sea Case Study	**Nothern Dimension and Arctic Council**	The Northern Dimension, drawn up in 1999, is a common policy shared by four equal partners: the European Union, Norway, Iceland and the Russian Federation. The policy covers a broad geographic area, from the European Arctic and Sub-Arctic to the southern shores of the Baltic Sea, countries in the vicinity and from north-west Russia in the east, to Iceland and Greenland in the west. The policy's main objectives are to provide a common framework for the promotion of dialogue and concrete cooperation, to strengthen stability and well-being, intensify economic cooperation, and promote economic integration, competitiveness and sustainable development in Northern Europe. A renewed Northern Dimension policy was launched in 2006. The Arctic Council is a high level intergovernmental forum comprising the Arctic States and Permanent Participants representing Arctic organizations of indigenous populations.
Sub-seas Case Study	**Maritime delimitation treaty between Norway and Denmark**	In February 2006, the Government of the Kingdom of Denmark together with the Home Rule Government of Greenland and the Government of the Kingdom of Norway concluded an agreement on a maritime boundary between Greenland and Svalbard. The Agreement delimits the continental shelf, the Exclusive Economic Zone of Greenland and the fishery protection zone around Svalbard. The Agreement makes provisions for cooperation on the exploitation of mineral deposits found to extend across the limits of each nation's continental shelf, specifying the manner in which any deposit is to be most effectively exploited and how the proceeds are to be apportioned.
Sub-seas Case Study	**Maritime delimitation treaty between Norway and Russia (Barents Sea Treaty)**	The *Treaty between the Kingdom of Norway and the Russian Federation concerning Maritime Delimitation and Cooperation in the Barents Sea and the Arctic Ocean* (Barents Sea Treaty) was signed in 2010 and marks the end of a long process of negotiation between the two countries over ownership of the seabed, subsoil and overlapping Exclusive Economic Zones. The Treaty establishes a single delimitation line for their EEZs and continental shelf in areas within 200 miles of their coasts and a delimitation line between the Norwegian and Russian continental shelf where it extends beyond 200 miles. In addition, the Treaty formalises cooperation between Norway and Russia on fisheries and the conservation of fish stocks, and sets out provisions for cooperation on the exploitation of any petroleum deposits that extend across the delimitation line.

Table 3.4. Atlantic Ocean: Case study list and description

	Case study title	Description
Regional Sea Case Study	**The Atlantic Arc Commission**	The Atlantic Arc Commission is one of the six Geographical Commissions in the Conference of Peripheral Maritime Regions of Europe and seeks to integrate cooperation projects of varying scale, covering all the areas of sustainable regional development, into a coherent strategy. With post-2006 European policies in mind, the Regions have prepared an Atlantic Spatial Development Perspective (ASDP), which identifies actors, actions and policies to implement at different levels in order to support the sustainable growth of the Atlantic Arc. Priority Action Themes include transport - improving internal and external accessibility, inter-modality, developing maritime links; sustainable development, particularly ICZM; fisheries (within the constraints of the CFP) and research, innovation and improving competitiveness.
Sub-seas Case Study	**The British Irish Council**	The British-Irish Council was established in 1998 as part of the Multi-Party Negotiations (also known as the Belfast or Good Friday Agreement) between the British and Irish Governments and the political parties of Northern Ireland, with the objectives to promote positive, practical relationships among the people of the islands and to provide a forum for consultation and cooperation. The administrations of Scotland, Northern Ireland, the Republic of Ireland, Isle of Man, Wales, the UK, Jersey and Guernsey make up the BIC. The BIC operates through ministerial meetings and meetings of officials (civil servants) from each administration, and current work streams include spatial planning, energy (including offshore energy and grids), the environment and other issues of mutual national interest.
Sub-seas Case Study	**Solway Firth Partnership**	Solway Firth Partnership is a voluntary coastal management partnership which was launched in 1994 in response to formal support for integrated coastal zone management (ICZM) from UK Government and agencies. The need for ICZM around the Solway Firth is particularly pressing because the Solway crosses a national boundary between England and Scotland; this results in a necessary increase in the number of agencies and organisations working together under different legal, cultural and social systems. The importance of ICZM is further emphasised by the complexity and diversity of the Solway Firth as it contributes to the regional economy has a dramatic landscape which provides a haven for wildlife and is also of social importance. The Partnership works with stakeholders to increase sustainable use and management of the Solway Firth and also contributes towards regional, national and international policy development by providing vital input from the grass roots level.

Table 3.5 Baltic Sea: Case study list and description

	Case study title	Description
Regional Sea Case Study	**VASAB (Vision and Strategies for the Baltic Sea Region)**	VASAB (Vision and Strategies for the Baltic Sea Region), for co-operation on spatial planning and spatial development in the Baltic Sea Region was founded in August 1992. VASAB is an intergovernmental co-operation of eleven countries (Belarus, Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland, Russia and Sweden) of the Baltic Sea Region. VASAB has been focused on land based territorial development for a long time, but in 2006 began advocating the use of Maritime Spatial Planning (MSP) as a tool to harmonize different maritime activities. In 2010 VASAB and HELCOM launched a joint working group on MSP which will enable coordination and integration of MSP related actions and projects implemented within the framework of the EU Strategy for the Baltic Sea Region and its Action Plan and VASAB's Long-Term Perspective for the Baltic Sea Region.
Regional Sea Case Study	**HELCOM - Helsinki Convention**	The Helsinki Commission, or HELCOM, works to protect the marine environment of the Baltic Sea from all sources of pollution and restore and safeguard its ecological balance through intergovernmental co-operation. HELCOM's diplomatic role in bringing eight EU member states, one country outside of the EU (Russia) and the European Community together to join forces enables HELCOM to be an environmental policy maker for the Baltic Sea area by developing and enforcing common environmental objectives and actions and making recommendations of its own and supplementary to measures imposed by other international organisations. In addition, HELCOM acts as a focal point for providing information about the state of/trends in the marine environment and a coordinating body, ascertaining multilateral response in case of major maritime incidents.
Regional Sea Case Study	**MSP (Maritime Spatial Planning) Working Group / HELCOM-VASAB**	The Joint HELCOM – VASAB Working Group on Maritime Spatial Planning was launched in 2010 to enable coordination with the EU Strategy for the Baltic Sea Region and its Action Plan, but also as a forum on ICZM and MSP to provide input to VASAB's Long-Term Perspective and HELCOM's Baltic Sea Action Plan (see respective case studies for more context). MSP evolved out of BaltCoast, an Interreg III B project. VASAB's role is crucial in promoting MSP, while HELCOM has issued a recommendation on the Development of Broad Scale Marine Spatial Planning Principles. MSP is seen as an all-important tool of horizontal coordination and provides a great opportunity for coordinating the VASAB and HELCOM processes.
Sub-seas Case Study	**BaltSeaPlan Project - Trans-boundary Maritime Spatial Planning in the Baltic Sea / The case of the Pomeranian Bight**	The Marine Spatial Planning Pilot Project Pomeranian Bight/Arkona Basin comprises shares of territorial sea as well as of the EEZ of four countries: Denmark, Sweden, Poland and Germany. This area contains a wide range of topics, problems and conflicts which have been addressed with the BaltSeaPlan project (Planning the future of the Baltic Sea) co-financed by the Baltic Sea Region Programme of the European Union. Within the on-going BaltSeaPlan project responsible planning authorities together with NGOs and research institutes have developed a common cross-border vision outside official planning procedures. Even though the outcome of this process will be non-binding it is the first well-grounded example of what a transboundary maritime spatial plan in the Baltic Sea Region covering the area of Pomeranian Bight may look like.

Table 3.6. Black Sea: Case study list and description

	Case study title	Description
Regional Sea Case Study	**The Black Sea Regional Energy Centre (and Black Sea Synergy)**	The case study dwells mainly on the Energy Centre, as its title suggests, and partly on the EU Black Sea Synergy communication of 2007. The Black Sea Regional Energy Centre (BSREC) was inaugurated in 1995. The establishment of the Centre was a joint initiative of the European Commission, under its SYNERGY Programme, and the countries of the Black Sea region. Black Sea Synergy was initiated in 2008 to encourage cooperation between the countries in the wider Black Sea Region and with the European Union. The Synergy offers a forum for tackling common problems, recognising that some issues require coordination at the regional level while encouraging political and economic reform. The BSREC acts as a focal point for energy related activities, aimed at developing co-operation between the Black Sea region countries and the EU in the energy field by promoting development and implementation of market oriented energy policy, encouraging energy efficiency and renewable energy projects, assisting investment and funding, and facilitating the collection and dissemination of energy sector related information at a regional level. In addition, Black Sea Synergy will stimulate dialogue on Black Sea maritime policies and offers a framework to improve coordination between relevant EU and regional policies and wide-ranging programmes such as Motorways of the Sea.
Regional Sea Case Study	**The Commission for the Protection of the Black Sea against Pollution (Black Sea Commision)**	The Commission of the Protection of the Black Sea Against Pollution implements the provisions of the Black Sea (Bucharest) Convention and the Black Sea Strategic Action Plan, which aims to help resolve the transboundary environmental problems of the Black Sea and is a joint effort between the six Black Sea countries supported by a permanent secretariat and a number of working groups on issues such as Integrated Coastal Zone Management (ICZM), pollution monitoring, biodiversity and fisheries and other living marine resources. The main challenges dealt with by the Black Sea Commission include combating pollution from land-based sources and maritime transport, achieving sustainable management of living marine resources, and pursuing sustainable human development.
Regional Sea Case Study	**Global Ocean Observing System (GOOS) in the Black Sea Area**	The Black Sea Global Ocean Observing System is an association formed by the Black Sea riparian countries in order to foster Operational Oceanography in the region and set up links with other regional and global organizations with similar objectives. Of its many objectives, the Black Sea GOOS will provide high quality data and time series, for a better understanding of the Black Sea ecosystem, contribute to international planning and implementation of the GOOS, identify regional priorities for the use of operational oceanography and co-operate with the Black Sea Environmental Programme (BSEP), the Permanent Secretariat of the Black Sea Commission (Secretariat for the Bucharest Convention) and other relevant bodies, to harmonise oceanographic activities in the region. The work of the Black Sea GOOS is guided by a Memorandum of Understanding (adopted 2001), an ad hoc Steering Committee and Executive Committee.

Table 3.7. Mediterranean Sea: Case study list and description

	Case study title	Description
Regional Sea Case Study	**Protocol on Integrated Coastal Zone Management in the Mediterranean**	In September 2010 the European Council adopted the decision to ratify the ICZM Protocol to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention). Having been ratified by six contracting parties, the Protocol entered into force the 24th of March 2011. The Protocol establishes a common framework for the integrated management of the Mediterranean coastal zone and calls upon Parties to work together to strengthen the coherence and effectiveness of the coastal strategies, plans and programmes established (either bilaterally or multilaterally) and to promote regional and international cooperation for the implementation of common programmes on the protection of marine habitats.
Sub-seas Case Study 1	**Adriatic – Ionian Initiative (AII) and Adriatic Sea Partnership (ASP)**	The Adriatic Sea is a highly sensitive marine area facing serious environmental challenges, yet it is also one of Europe's most highly developed industrial areas - economically significant for tourism and recreation, and as a major transport hub for energy resources. The Adriatic Sea Partnership (ASP) was established in 2006 and brings together existing institutional arrangements (such as the Trilateral Commission of Croatia, Italy, Slovenia for the Protection of the Adriatic and the Mediterranean Action Plan) and provides a joint platform for new initiatives such as the development of an Adriatic Management Plan. The Partnership also provides a mechanism to ensure coordination of activities stemming from EU initiatives such as the Marine Strategy Framework Directive and the Barcelona Convention. The Adriatic – Ionian Initiative, started in 2000, has 8 member countries and aims at improving cooperation in various fields of action.
Sub-seas Case Study 2	**The MedGovernance Partnership and Project**	The MEDGovernance programme is comprised of partners such as provincial and regional authorities, cultural and research institutes from the countries of the Western Mediterranean and is funded by the Med Programme. The activities of the MEDGovernance initiative include an analysis of regional policies for environment, transport and energy, migration, mobility and other topics, which will feed into the perspectives adopted by the Conference of Peripheral Maritime Regions (CPMR) on territorial cohesion. MEDGovernance also facilitates the coordination of regional plans towards a single Mediterranean framework, and builds capacity for collaboration on Mediterranean issues by offering training to public administrators, and through a social and economic forum (meeting) to compare and disseminate the actions of governance and to elaborate common policies at Euro Mediterranean and global level.

Table 3.8. North Sea: Case study list and description

	Case study title	Description
Regional Sea Case Study	**The OSPAR Commission**	The OSPAR Commission is the forum through which the Contracting Parties to the OSPAR Convention for the protection of the marine environment in the North East Atlantic cooperate, and the North Sea forms Region II (Greater North Sea) of the OSPAR Commission's maritime area. The OSPAR Convention deals with prevention and elimination of pollution from land-based sources, offshore sources, pollution by dumping or incineration and assessment of the quality of the marine environment and works through Contracting Parties agreeing to abide by the decision and recommendations of the Commission. The OSPAR Permanent Secretariat manages the reporting of Contracting Parties on the implementation of OSPAR measures and the reporting of data under OSPAR monitoring programmes. OSPAR work areas include monitoring and assessment, biodiversity and ecosystems, radioactive substances, climate change, and most significantly for the North Sea, eutrophication, hazardous substances and the offshore oil and gas industry.
Sub-seas Case Study 1	**The Trilateral Wadden Sea Cooperation**	The Wadden Sea lies in the south-eastern part of the North Sea and is bounded by the Netherlands, Germany and Denmark and a chain of offshore islands. Since 1978, these nations have cooperated on protection and conservation of the Wadden Sea focusing on management, monitoring and research, as well as political matters. A Joint Declaration on the Protection of the Wadden Sea was agreed in 1982, and a refreshed declaration was adopted in 2010 together with the Trilateral Wadden Sea Plan 2010 which sets out a framework for the integrated management of the Wadden Sea Area as an ecological entity, as well as its landscape and cultural heritage, within the cultural entities. It sets out a series of targets, as well as policies, measures, projects and actions to achieve these targets, to be implemented by the Wadden Sea countries.
Sub-seas Case Study 2	**Flemish-Dutch cooperation on the Scheldt estuary (Westerschelde Estuary)**	The Westerschelde Estuary begins at the port of Antwerp in Belgium and crosses the border between Belgium and the Netherlands and is significant as the only maritime route linking Antwerp to the North Sea. The need to maintain navigable waterways has led to changes in the morphology of the estuary and has had important consequences for the ecology and hydrology of the area, which provides access to ports, flood plains, recreation and fisheries grounds. The need to accommodate these interests has been addressed through several memoranda of understanding, a bilateral Long Term Vision for the Westerschelde (1999) and Development Plan (2004) which focuses on nature restoration and environmental monitoring as a means to compensate for the impacts of dredging. With no one body having overall responsibility for developing the Westerschelde, there remains great potential for conflict between competing environmental and socioeconomic demands.

Reflections from the Case Studies

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, national 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, a framework which 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.

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 MSFD and ICZM. MSP is however being embraced more in national strategies than in regional sea cooperations, 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, as 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 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.

Table 3.9. 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									
Arct/Noth. Dim.-Arctic Council	+	+			+			+	
Atl/Atlantic Arc	+			+		+	+		
Balt /VASAB	+					+	+		
Balt/HELCOM	+	+	+						
Balt/MSP Working Group	+						+		
BlackSea /Energy Centre			+	+					+
BlackSea/ Commission-Pollution	+	+	+						
BlackSea /GOOS		+		+					+
Med /ICZM Protocol	+	+				+			
North Sea/OSPAR	+	+	+						+
Sub-regional Sea Case Studies									
Arct/Nor-Den Treaty					+			+	
Arct/Nor-Rus Treaty					+			+	
Atl/Brit-Irish Council	+			+					
Atl/Solway Firth	+	+							
Balt/Pomeranian Bight		+					+		
Med/Adriatic		+	+						
Med/MEDGovernance				+		+			
North Sea /Wadden Sea		+							
North Sea /Scheldt Estuary		+		+					

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Table 3.10. 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							
Arct/Noth. Dim.-Arctic Council	+					+	
Atl/Atlantic Arc				+		+	
Balt /VASAB	+					+	
Balt/HELCOM	+					+	
Balt/MSP Working Group			+				+
BlackSea /Energy Centre			+			+	
BlackSea/ Commission-Pollution	+					+	
BlackSea /GOOS	+						+
Med /ICZM Protocol	+				+		
North Sea/OSPAR	+				+		
Sub-regional Sea Case Studies							
Arct/Nor-Den Treaty	+				+		
Arct/Nor-Rus Treaty	+				+		
Atl/Brit-Irish Council				+		+	
Atl/Solway Firth			+				+
Balt/Pomeranian Bight			+				+
Med/Adriatic			+				+
Med/MEDGovernance		+					+
North Sea /Wadden Sea	+					+	
North Sea /Scheldt Estuary	+				+		

Towards a typology for territorial development

The final element of the project in relation to assessing the current situation in Europe's seas was the creation of a maritime region typology which reflects the relative intensity of land/sea interactions based around the key themes which have been the focus of the work. 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.

To enable synthesis of the different data sets, the values in each instance were divided into quintiles to represent a spectrum of intensity ranging from very low to very high. For example in relation to the Economic Significance data sets, a sum of percentages was calculated of every economic sector related to maritime activities in each NUTS 2 region[1] (percentage of the total employment representing the maritime cluster) to generate an economic significance composite map. These sums have been classified by quintiles as follows:

Table. 3.11: Composite classification of maritime economic significance

Total Percentage of Employment	**Category name**
5.42 - 15.52	Very Low
15.52 - 17.60	Low
17.60 - 21.06	Medium
21.06 - 24.69	High
24.69 - 36.35	Very High

A similar approach was undertaken for maritime transport and cables data to produce a flows composite map and also to produce a composite picture of environmental pressure. The environmental pressure composite map was obtained by calculating the average (equal weight basis) of layers with information about

[1] Data for Denmark, Ireland and Slovenia are on national level because as no data was available on NUTS-2-level

invasive species as well as organic and inorganic inputs. Their values were reclassified into five groups (based on quintiles) as follows:

Table. 3.12: Composite classification of environmental impacts

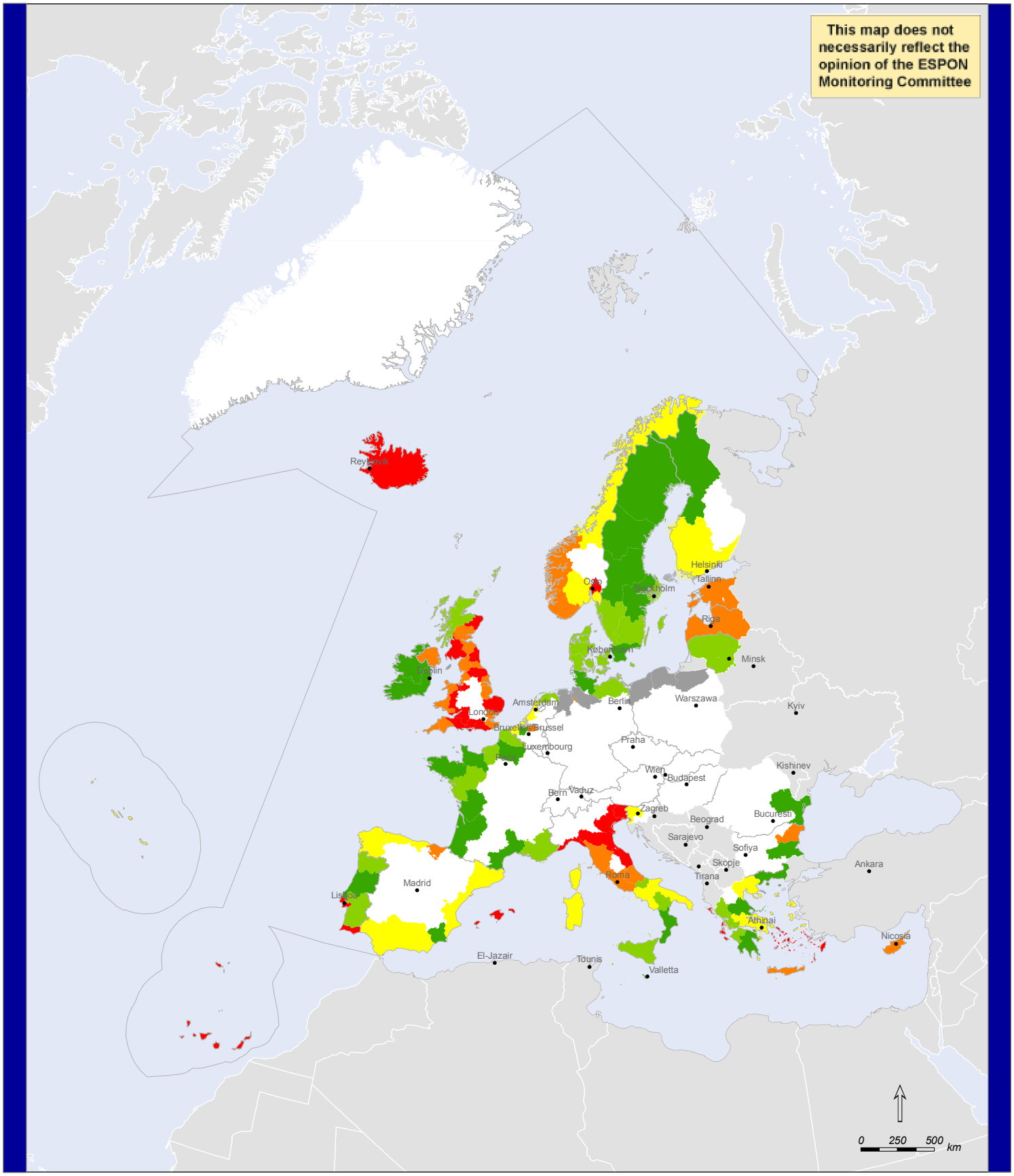
Organic Inputs	Invasive Species	Inorganic Inputs	Category name
-	0*	-	-
1 – 60	1 – 60	0.1 – 320	Very Low
60 -120	60 -120	320 - 640	Low
120 – 180	120 – 180	640 - 960	Medium
180 - 240	180 - 240	960 – 1,280	High
240 – 7,662	240 – 3,030	1,280 – 10,186	Very High

The Economic Significance composite map (Map EU27b) 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 EU28) which is 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 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.

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 EU30a) and hotspots (Map EU30b) and these were then used to identify which maritime regions should be classified as Core, Regional Hub, Transition, Rural and Wilderness areas. Map EU31 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 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 for this bridge the land sea divide, but the typology highlights the importance of a transnational perspective for example in coordinating regional hubs for example. 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.



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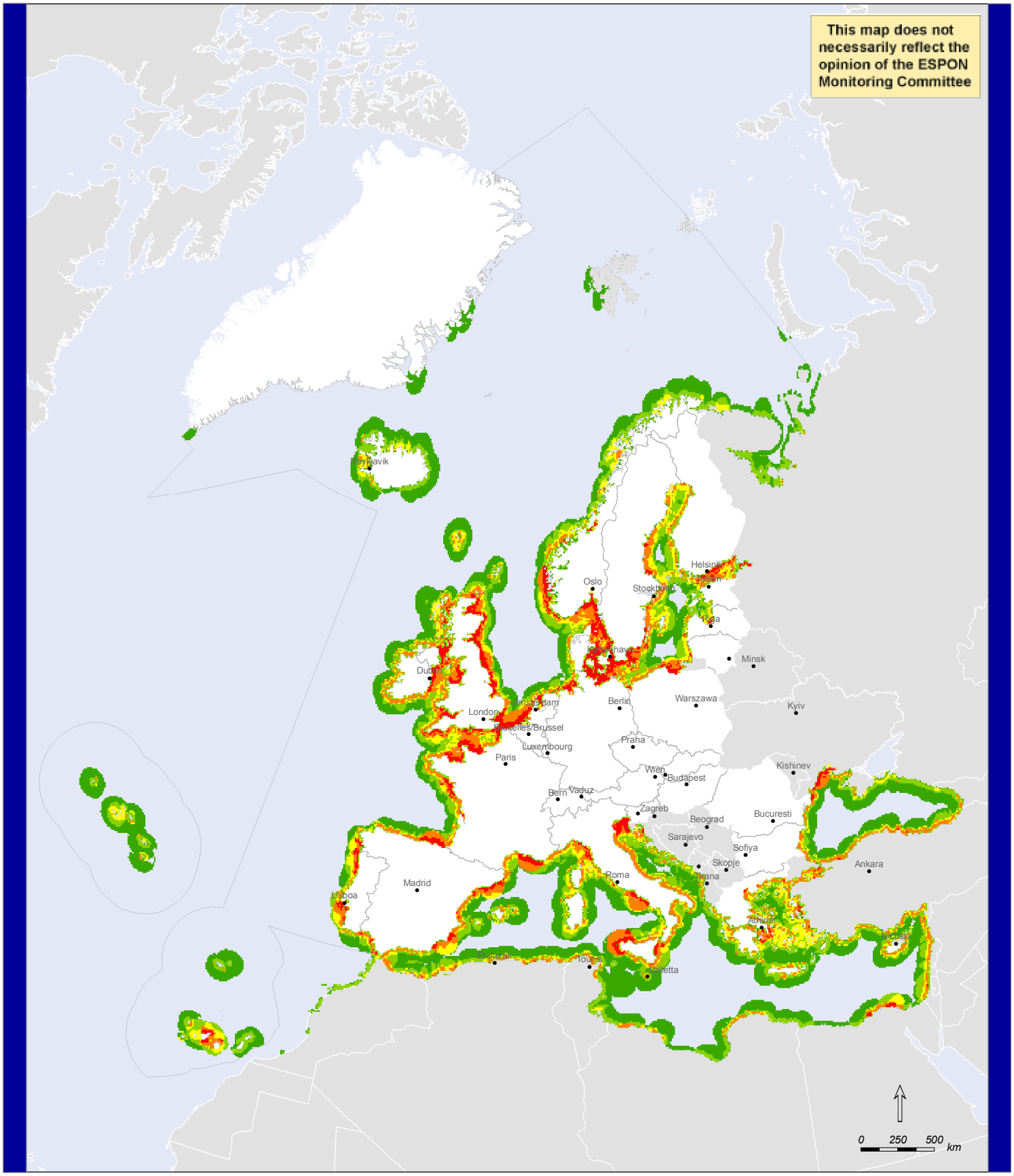
Thematic data: Economic Significance Composite Map.
Land boundaries: © EuroGeographics Association and ESRI. Regional level: NUTS2.
Sea boundaries: OSPAR Convention, EU Integrated Maritime Policy and EEZ.MEU27

EU27a. Maritime Employment Composite Map (percentage of total employment within each NUTS2 region)

- Very Low
- Low
- Medium
- High
- Very High
- No data



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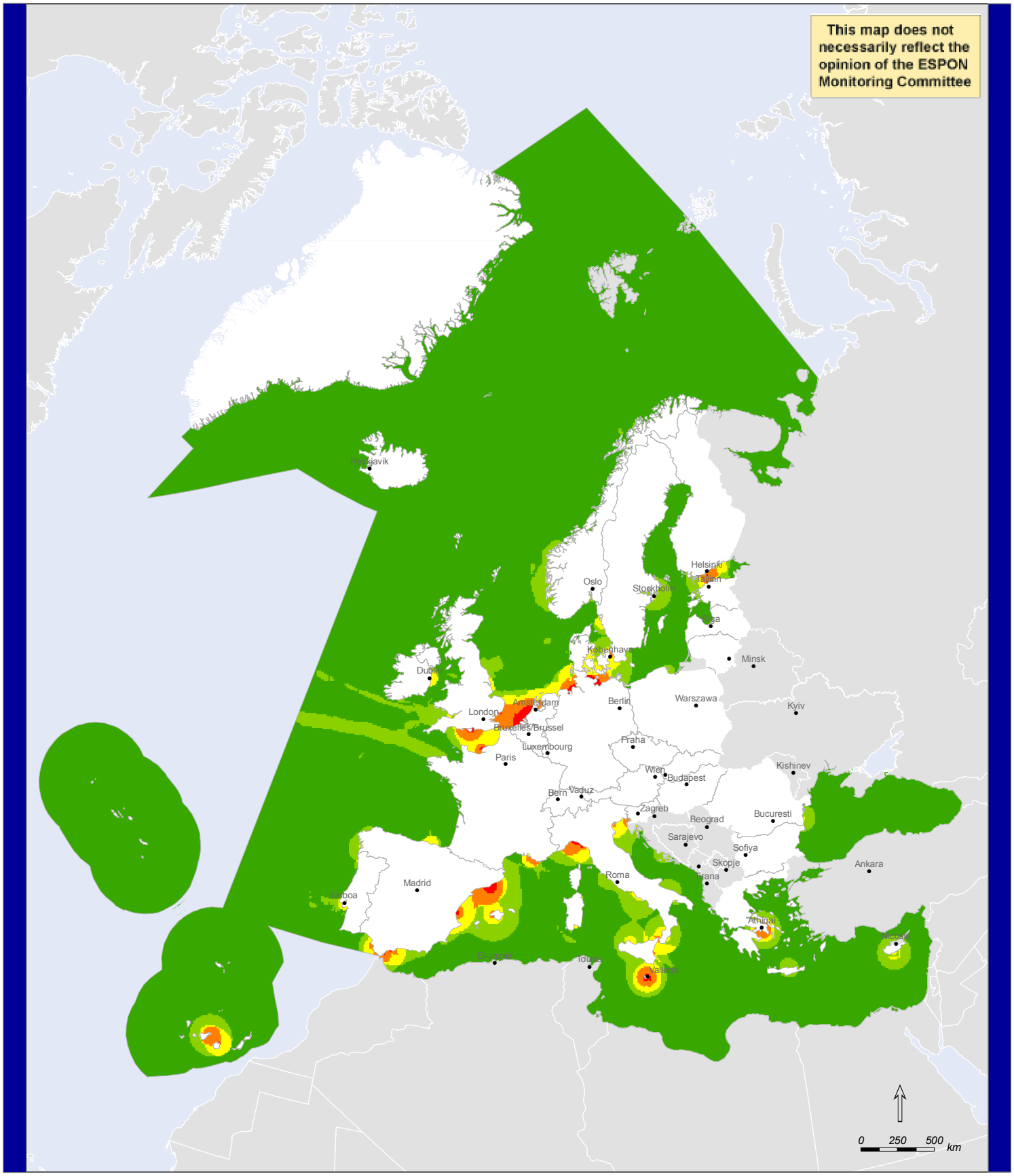
Thematic data: Environmental Pressures Composite Map.
Land boundaries: © EuroGeographics Association and ESRI. Regional level: NUTS2.
Sea boundaries: OSPAR Convention, EU Integrated Maritime Policy and EEZ.

EU28. Environmental Pressures Composite Map

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



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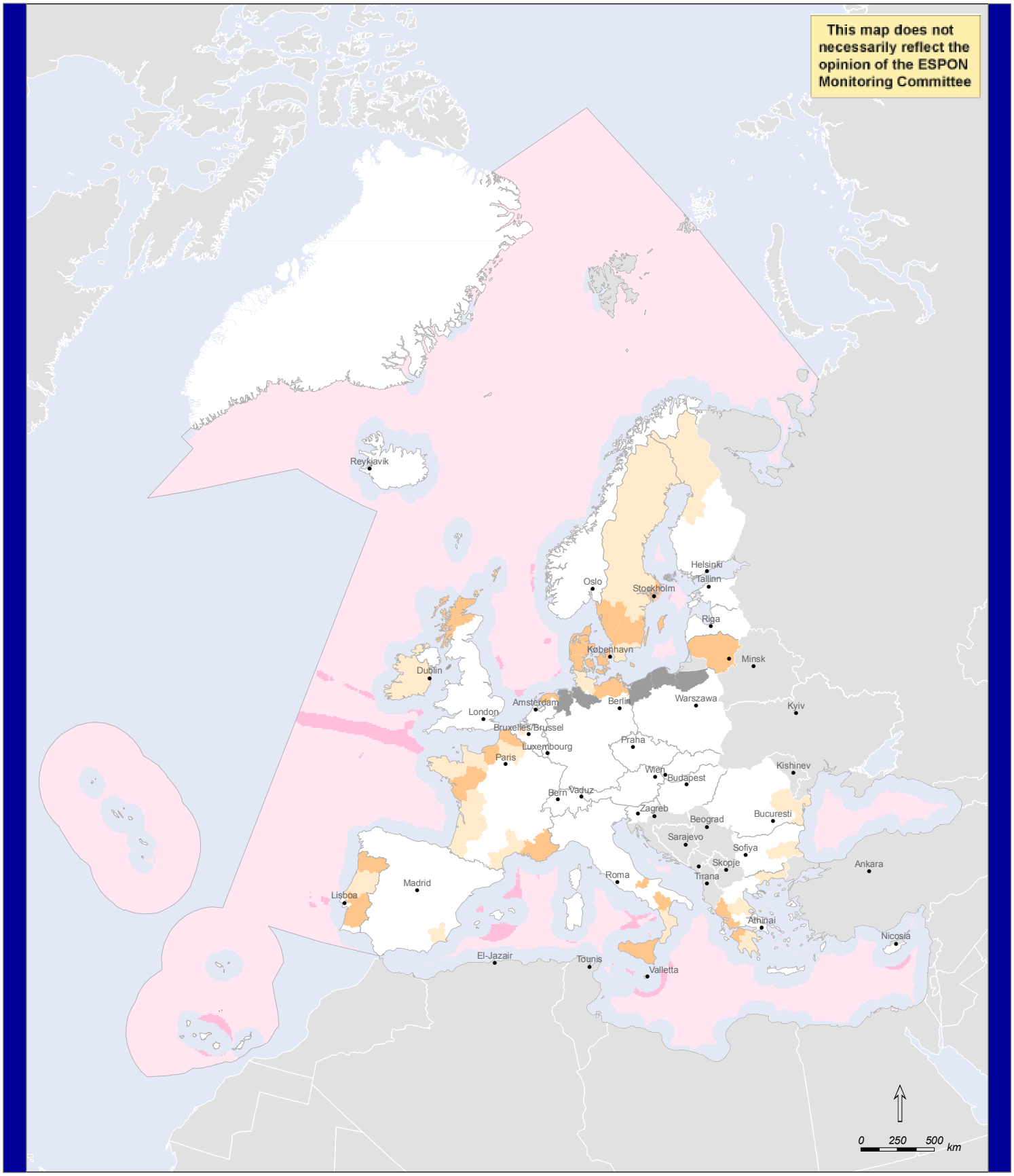
Thematic data: Flows Composite Map.
Land boundaries: © EuroGeographics Association and ESRI. Regional level: NUTS2.
Sea boundaries: OSPAR Convention, EU Integrated Maritime Policy and EEZ.

EU29. Flows Composite Map

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



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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.

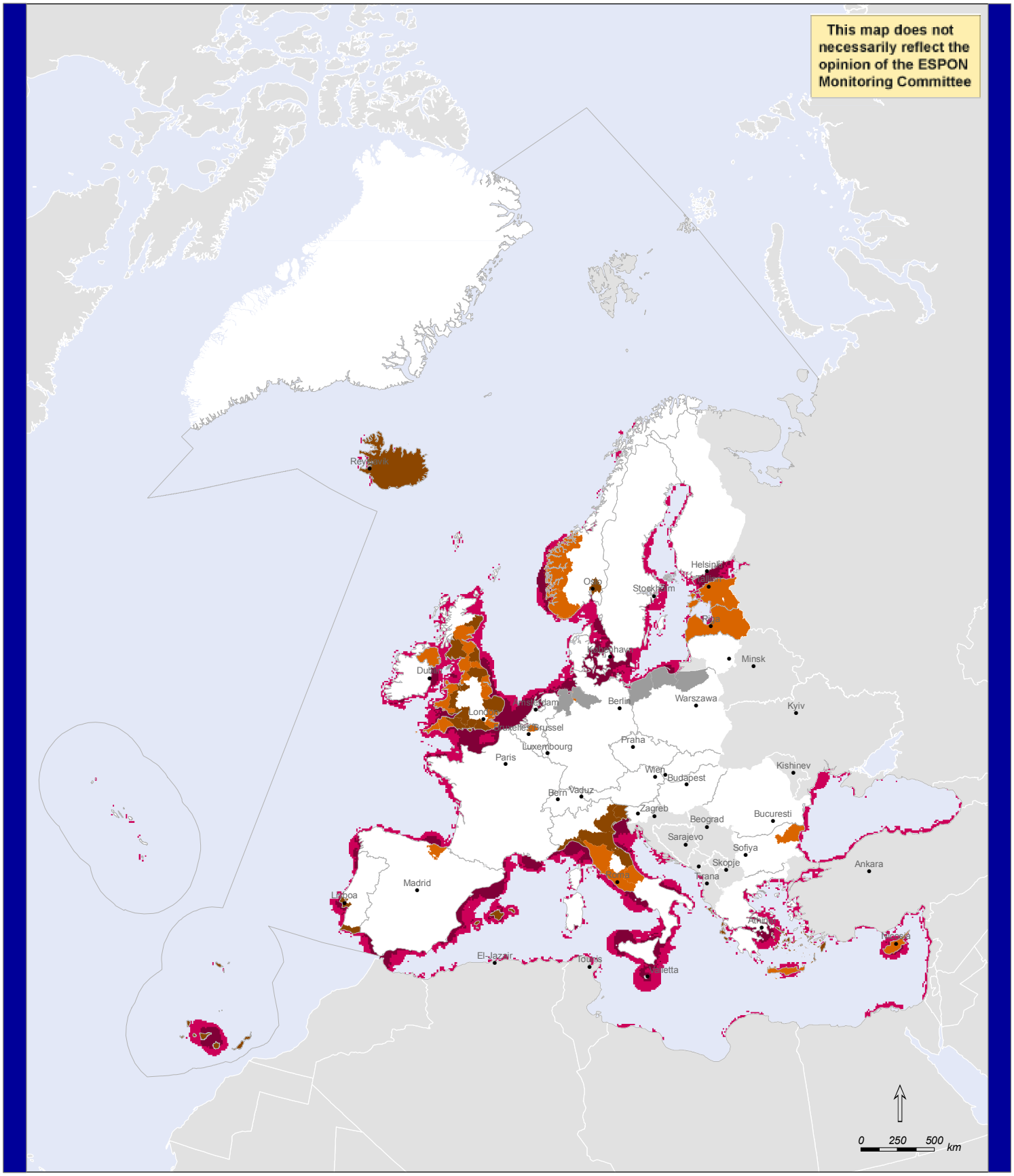
EU30a. Typology Map (coldspots)

Sea *(Enviromental Pressures and Flows)*

- Very low intensity
- Low intensity

Land *(Economic Significance)*

- Very low intensity
- Low intensity
- No Data



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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.

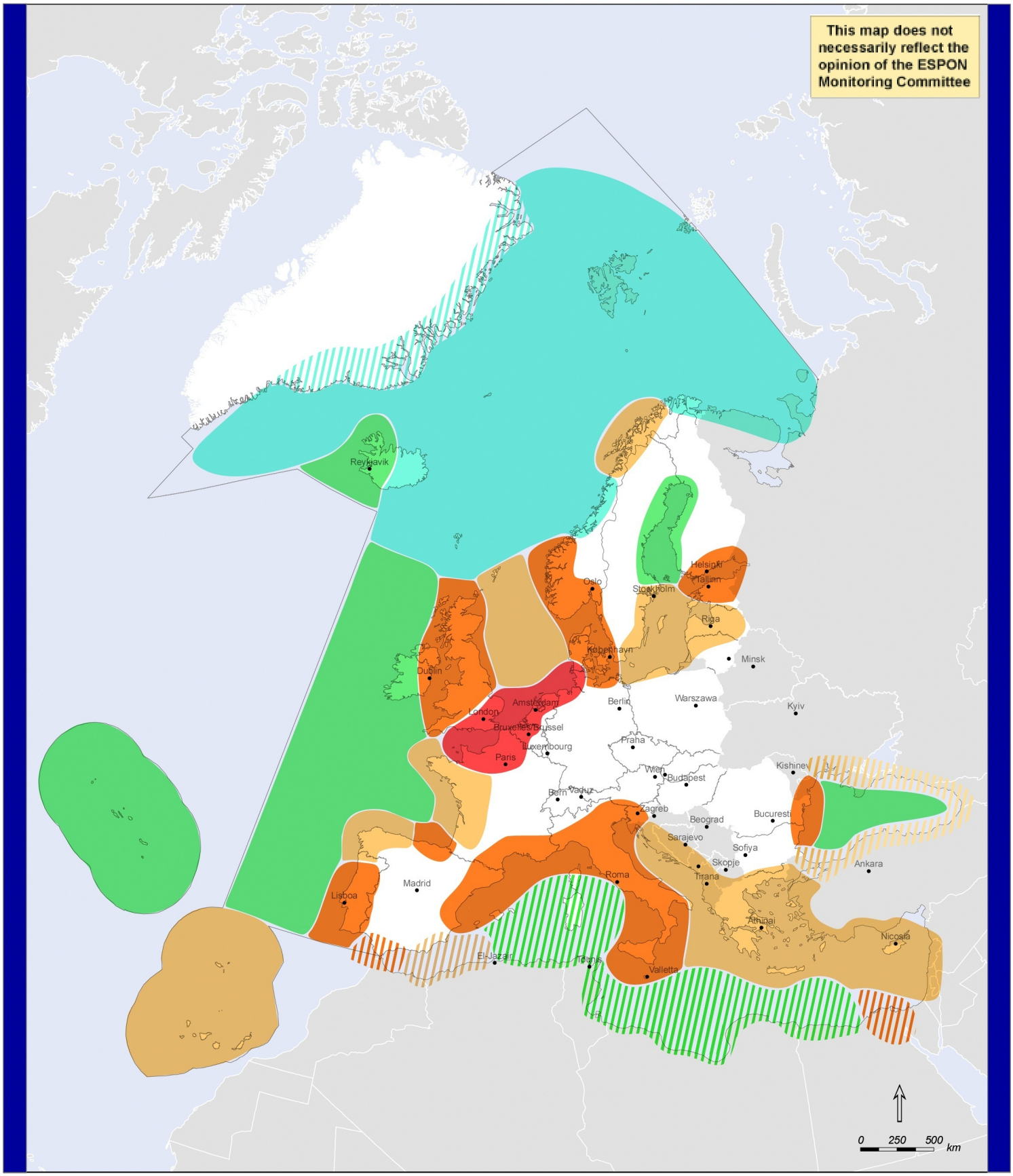
EU30b. Typology Map (hotspots)

Sea *(Enviromental Pressures and Flows)*

- High intensity
- Very high intensity

Land *(Economic Significance)*

- High intensity
- Very high intensity
- No Data



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

EU31. Regions derived from typology map (schematic)

- European Core
- Regional Hub
- Transition
- Rural
- Wilderness
- Typology influenced by lack of data

Chapter 4: Options for Policy Development

The previous chapter has outlined of the baseline or current situation in European Seas. In this chapter we look to the future in order to explore possible options for policy development. The chapter starts by providing a summary of the work we have undertaken in relation to opportunities and risks and then sets out the key findings from the scenarios work package, before concluding with a series of policy recommendations that have been drawn from the various strands of the research.

Territorial Development Opportunities and Risks

As the title of our project suggests a key aspect of work has entailed 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.

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, as shown in Table 4.1 all thematic areas identify globalisation as a key development which offers important opportunities for Europe's maritime regions. 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

However as can be seen from Table 4.2 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 transhipment of freight goods from seas to terrestrial modes of transport.

Key European Sea Opportunities

Turning to the European Sea, an overview of the key territorial development opportunities that have been highlighted in the accompanying regional sea reports is provided in Table 4.3. This reiterates many of the messages outlined above in the thematic discussion but instead of linking to key global trends the picks 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

Table 4.4 provides a corresponding overview of key risks to territorial development in European Seas and it reveals both the wide range of risks identified and the place specific character of a number of them. Again many of the issues raised in the thematic analysis reappear here, but new points also emerge. For example, there is 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.

Table 4.1 Synthesis of Key Thematic Opportunities

	Economy	Energy	Environment	Transport
Increased Gobalisation of the economy	Maritime locations have an enhanced comparative advantage due to gateway location Relative unique character of places enables bespoken new higher end tourism to develop	Higher global demand for fossil fuels increases the potential for further exploration and production in existing and new areas.	Maintaining a 'good environmental status' enhanced the potential for more managed and high quality tourism activities	Growing global shipping activities increase the importance of large ports as gateway s to Europe. This then increases the needs to short sea shipping and goods and services redistributed both too and from these hubs. Both have significant direct (through shipping and port related activities) and indirect impacts on economic activity Cruise activity increases as a result of leisure and tourism, both from within Europe, but also from a global perspective with big local impacts where cruise ships berth.
Climate Change	Potential new opportunities particularly in marine renewable energies and coastal tourism	Exhausted oil and gas fields offer new potential for carbon capture and storage Drive to reduce reliance on fossil fuels, driven by regional and global scarcity, facilitates the development of marine renewables, creating onshore economic growth and employment opportunities onshore		New shipping lanes are opened, initially temporary, may be permanent, shortening routes from the Far East and perhaps preferencing more northern European ports.
Demand for marine based resources	Growing demand for marine resources lead to new mechanisms for farming maritime resources	Potential synergies with other marine uses, through the protection of some areas from commercial fishing	'Good environmental status' enables existing traditional maritime activities (fisheries and tourism) to flourish whilst providing new potentials in emerging markets (e.g. aquaculture). Harvested marine resources with few contaminants are good for human health	
Governance		New opportunities for transnational/European collaboration in the integration of energy networks, gas, oil and electricity networks through the development of a European grid system		

Table 4.2 Synthesis of Key Thematic Risks

	Economy	Energy	Environment	Transport
Increased Gobalisation of the economy	Possible relocation of activities due to comparative advantage elsewhere, combined with loss of specialist know-how Global / inter-regional competition for limited numbers of tourists alters existing destination patterns	Exploration and exploitation of new fossil fuel resources in increasing challenging environments increases the threat of accidents in ecosystems whose resilience may be limited		New developments in major ship sizes means existing gateways to Europe no longer maintain a pre-eminent position global and European terms as new super ports are developed and Europe is served through short sea shipping routes.
Climate Change	Sea level rises; coastal erosion, etc create new challenges for coastal communities	Over exploration and exploitation of marine based fossil fuels slows the drive for a low carbon economy.	Continued global warming affects the seas in unanticipated ways, but probably increases the risks to communities and economies that are coastally located, through increase in sea level rises and greater frequency and intensity of extreme weather conditions.	
Overexploitation of the natural environment	Overdevelopment of land based activities threatens the quality of the marine environment, and over exploitation of marine resources both threaten traditional maritime activities, particularly in tourism and fishing	Expansion of offshore renewable infrastructure, wind, wave and grid systems adversely impact on the natural environment and restrict seabed use.	This leads to 'bad environmental status' and reduces the potential of traditional maritime activities, most notably fisheries and tourism (including ecotourism), but also the potential for new marine activities such as aquaculture. Continuing resource exploitation is bad for the health of humans and the ecosystem due to the direct and indirect impacts on species.	Increased shipping activities may provide an increased threat to both the marine environment, through accidents, pollution incidents, and the threat of invasive species, and land based activities through the increased intensity of activity combined with the need for new infrastructural development.
Inadequate port infrastructure				Lack of new infrastructure at the ports, including the connections to land based or other destinations, threatens the effectiveness of ports to maintain their gateway functions.
Governance		Uneven socio-economic benefits and environmental impacts of offshore development require careful management if territorial cohesion is to achieved.		Administrative burdens need reducing to facilitate SSS and the transhipment of freight goods from seas to terrestrial modes of transport. Also needed to enable the speedy development/expansion of port infrastructure, though this may compromise /preference shipping interests

Table 4.3 Synthesis of Key Regional Seas Opportunities

	Arctic	Atlantic	Baltic	Black Sea	Mediterranean	North Sea
Tourism Development	Scope for some growth in tourism	Discerning tourism and cruise tourism.	Increased opportunities for continued growth of cruise shipping using the Baltic as a destination	Expansion of tourist potential to wider European markets	Good environmental status across the sea maintains and enhances tourism potential	A good ecological status enhances the potential for tourism. Leisure yachting leads to marina devts. Potentials for increase in cruise ship activities
Ports and Shipping	New opportunities of improved access to and through the regional sea itself, but benefits to the sea and its communities are unclear.	Some potential to increase the share of global shipping activities as a gateway to Europe and benefit from more short sea shipping		Som epotential for growth in cruise shipping	Potential to increase the share of global shipping activities as a gateway to Europe and benefit from more short sea shipping	Opening up of the Arctic helps to maintain the North Sea ports strategic position as the gateway to Europe.
Sustainable Fisheries	Potential for increased fishing associated with changing sea ice cover	Sustainable fishing and farming of fish				Improved environmental management has leading to enhanced potential for a renewal of the exploitation of marine animals through fishing or aquaculture
Energy related Development	New potential for the exploration and exploitation of new fossil fuels .	Further potential for the development of wind energy, but also in the longer term tidal and wave energy, particularly in the short term in the shallower seas.	Limited potential for further offshore wind but scope for developing carbon capture and storage facilities. Integration of energy networks facilitated by the development of transnational grids	Regional export of oil and gas, especially by major pipeline development. Some regional potential for renewable forms of energy, especially solar energy	Improved strategic importance of the sea as oil and gas transported from N. Africa to Europe, through new pipelined	New opportunities opening up, particularly in the shallower parts of the North Sea for new renewable energy (particularly wind). Potential for carbon capture and storage in old oil and gas fields
New industries	New commercial opportunities are opened up by enhanced interests in the mining of natural resources (on land and sea)	Algae for the biotech industry. Longer term potential for blue biotechnology & deep sea mining for mineral resources.				
Governance	Potential for more global and local governance and the management of its resources	Devt. of Atlantic Strat. offers potential for a strategic approach to territorial development opportunities	Longstanding Baltic Sea collaboration provides the basis for developing an integrated and coherent macro-region	Increasing regional cooperation evident, with initiatives ongoing in energy and environmental policy	Longstanding collaboration to env. Quality improvement provides opportunities for further collaboration.	

Table 4.4 Synthesis of Key European Seas Risks

	Arctic	Atlantic	Baltic	Black Sea	Mediterranean	North Sea
Increased competition for maritime space		Competing interests for marine space may reduce scope for other activities without integrated planning and management New fixed renewable energy infrastructure offshore may constrain and compete with other existing activities	Some restrictions on other uses as a result of the development of offshore wind energy, particularly in the southern part of the Baltic.			The intensity of development conflicts in this heavily used sea are aggravated by land based pollution which limits the potential for traditional maritime industries
Benefits of development may go to other areas	The benefits of resource exploitation are felt by entrepreneurs from outside the region		Relatively high labour costs may limit the potential for regional seas innovation			
Over-reliance on particular maritime sectors				Fishing practices remain unsustainable.	The over reliance of some coastal locations on tourism might make these economies vulnerable due either to a general downturn in the tourist economy in general or a decline in the quality of a local offering	Declining role of the North Sea as a producer of cheap fossil fuels (oil and gas) will have an impact on local dependant regional economies.
Lack of supporting landward infrastructure		Lack of landward facing transport connectivity limits the potential of maritime transport growth for many Atlantic ports.		Low levels of investment in infrastructure.	The potential of short sea shipping limited by the lack and costs of land based infrastructure.	Expansion and improvement plans for major ports are delayed thereby threatening the primacy of North Sea ports within a European context

	Arctic	Atlantic	Baltic	Black Sea	Mediterranean	North Sea
Negative environmental impacts of intensified use of coastal and maritime areas	More intense human activities creates more pressure on the terrestrial and maritime environments and/or Damages the natural environment irreversibly upon which new ecotourism potential is dependant. Traditional fishing and spawning grounds are affected by changes in sea temperatures	Intensifying use of the sea impacts negatively on the ecological health of marine and coastal areas. Large scale renewable energy developments might have unintended consequences for both the local and wider regional sea's environment.	Quality of the marine environment in a relatively enclosed sea threatened by land based pollution, which whilst being reduced in recent years will still take a long time to disappear meaning the sea is still vulnerable to increased human use.	Pollution risks associated with increased oil transport, especially by ship. Continued threat of euthropication associated withlarge-scale nutrient discharges.	Poor environmental status potentially adversely affects traditional maritime activities of fishing and tourism.	Increased intensity of use threatens the environment through land based pollution which in turn limits the potential for traditional fishing stocks to revive and the potential for an emergent aquaculture industry
Increased risk of accidents	Challenging physical environment means that any exploration and exploitation of fossil fuel reserves carries the potential of serious accidents affecting the vulnerable natural environment. Increased shipping, both commercial and tourism based creates the potential for more accidents and incidents with new challenges for emergency response teams that are currently under resourced.	Increased shipping activities (goods and cruise) increases the potential of pollution incidents and accidents requiring more effective emergency responses.	Increased gas and oil transportation from Russia, through the Baltic, initially by ship, but in the medium term via pipeline has the potential for a polluting incident	Higher level of risk associated with substandard ships and lower operating standards in the region		

	Arctic	Atlantic	Baltic	Black Sea	Mediterranean	North Sea
Impacts of climate change					Impacts of global climate change, particularly in the southern states of the Mediterranean, may intensify human pressure on the coastal zone, including increasing political instability and numbers of refugees in the region	
Governance	Increased demand for access to Arctic natural resources threatens global security, combined with the need to address sovereign state jurisdictions within the regional sea.		EU customs legislation raises the cost of the transhipment of goods associated with SSS, thereby limiting its potential growth.	Low level of administrative reform is a barrier to inward investment	The potential of short sea shipping limited by the costs associated with dealing with customs regulations Unresolved conflicts over maritime boundaries acts as a deterrent to more effective mechanism for cooperation and progress in the management of the regional seas. Overexploitation of fishery resources due to high demand combined with inefficient and ineffective local and regional governance arrangements threatens the sustainability of fishing as an activity.	Intra EU formulation in customs legislation increases the costs of short sea shipping, hampering potential growth in this sector. .

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 scenarios workshop, held in Amsterdam on 21st June 2012 which brought together a range of maritime 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 Spring 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 go down as economies of scale are realised.
- **Maturity**: economic activity remains stable at a big size. 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 was exploring the territorial development implication 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 we have developed.

Key Challenges facing Europe's Maritime Regions (DG MARE, 2012, p7)

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.

Tables 4.5, 4.6 and 4.7 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 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 4.8. 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 4.9 and 4.10 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 preferenced. These ultimately are political decisions, but what this emerging approach is beginning to bring into sharp focus is that land sea interactions are inextricably linked, with decisions made for one environment having consequences for the other, and that integrated thinking should be the way forward.

Table 4.5 Scene Setting for the Maritime Region Territorial Development Scenarios Europe's Marine Environment

Europe's Marine Environment Current Position	
Opportunities	**Risks**
*Growth Stage** Marine aquatic products Marine monitoring *(Pre) Development Stage** Blue Biotechnology Marine minerals mining *Other* Conservation Services	Pollution/invasive species Continuing fisheries depletion Species loss Decline in water-based/ecotourism due to poor environmental quality Human health impacts
Future Challenges and Drivers for Change	
Challenges	**Drivers for Change**
Globalisation and competiveness	Increased world trade linked to increase in invasive non native species Growing recognition of positive linkages between environmental care and economic prosperity
Global warming and climate change	Leading to species migration Rising sea temperatures reducing carbon absorption
Poverty and mobility	
Scarcity of natural resources and vulnerability of the planet	Increasing human exploitation of marine resources in/on/under the sea Increasing environmental awareness and protection/management measures for both land and sea
Urbanisation and concentration in coastal regions	Increased surface runoff/pollution Intensification of agriculture and increased diffuse pollution affecting marine environment
Demographic change	
Global and European Financial Crisis	

Globalisation and competiveness	Increased world trade Increased through traffic through European Seas Relative decline in importance of European trade and ports

Table 4.6 Scene Setting for the Maritime Region Territorial Development Scenarios Europe's Land/Sea Flows

Europe's Land/Sea Flows Current Position	
Opportunities	**Risks**
*Mature Stage** Offshore oil and gas Short sea shipping Yachting/Leisure boating *Growth Stage** Offshore wind Cruise Tourism Maritime surveillance *(Pre) Development Stage* Ocean renewable energy *Other* International energy grids Carbon storage Development of motorways of the sea New shipping routes in the Arctic	Increased carbon emissions associated with oil and gas development Environmental damage associated with new energy sources Restrictions to other sea uses associated with energy development Increased shipping accidents Increased air and sea pollution and invasive species Administrative barriers to short sea shipping/transport of goods Poor landward connections limiting shipping growth potential
Future Challenges and Drivers for Change	
Challenges	**Drivers for Change**
Globalisation and competiveness	Increased world trade Increased through traffic through European Seas Relative decline in importance of European trade and ports
Global warming and climate change	Increased focus on energy efficiency of shipping Increased focus on renewable energy production Greater use of telecommunications as an alternative to travel
Poverty and mobility	Increased international passenger movement both legal and illegal
Scarcity of natural resources and vulnerability of the planet	Continuing interest in oil and gas development in European seas Increasing long distance movement of oil, gas, water by pipeline
Urbanisation and concentration in coastal regions	Settlement pattern supporting increased short sea shipping / marine renewable development
Demographic change	Supporting growth in cruise tourism / leisure boating?
Global and European Financial Crisis	Uncertain global trade (sustained decline or medium/long term recovery?)

Table 4.7 Scene Setting for the Maritime Region Territorial Development Scenarios Europe's Coastal Areas

Europe's Coastal Areas Current Position	
Opportunities	**Risks**
*Mature Stage** Coastal Tourism Coastal Protection *Other* Research and innovation and industrial cluster development associated with: Short Sea Shipping Offshore Oil and Gas Offshore Wind Cruise Tourism Marine Aquatic Products Maritime Monitoring and Surveillance Blue Biotechnology Ocean renewable energy Marine minerals mining	Environmental pressures caused by intensive coastal land use Relatively high labour costs requires high capital intensity and ongoing innovation to maintain competitiveness Inadequate governance arrangements for resource exploitation Pollution threat to marine living and non living resources Poor landward connections limiting shipping growth potential
Future Challenges and Drivers for Change	
Challenges	**Drivers for Change**
Globalisation and competiveness	Increasing focus on development based around indigenous regional strengths. Increased importance of research and innovation to maintain competitive edge
Global warming and climate change	Decarbonisation of maritime industrial clusters a major focus
Poverty and mobility	Potential labour shortages if international in-migration is not supported
Scarcity of natural resources and vulnerability of the planet	Increased competition for land and natural resources in coastal areas
Urbanisation and concentration in coastal regions	Population flows may help counterbalance peripherality of coastal regions and support regeneration and economic growth
Demographic change	A driver for development of types of leisure and care industries in coastal regions
Global and European Financial Crisis	

Table 4.8 Maritime Region Territorial Development Scenarios

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 axles(Henocque and Lafon, 2011). The European core remains dominant and there is a high intensity of sea use as goods and services continue 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 transhipment 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 4.9 ESPON Territorial Development Scenario 1

The Future of Europe's Maritime Regions ESPON Territorial Development Scenario 1 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/ transhipment 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 transhipment points Opportunities for adding value to imported/exported goods at transhipment 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 4.10 ESPON Territorial Development Scenario 2

The Future of Europe's Maritime Regions ESPON Territorial Development Scenario 2 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.

Options for Policy Development

As illustrated in the previous discussions the coverage of the ESaTDOR project has been extensive and reflects its initial 'scoping' function as the first ESPON project to look at the sea and focus on achieving a better understanding of land sea interactions and what these might mean for territorial development in Europe. As demonstrated in Chapter 2 there have been distinct components of the work which have been the focus of separate work packages. These components have included: data and mapping: thematic analyses related to economic use, energy cables and pipelines, transport and environment; European Sea analysis covering the Arctic, Atlantic, Baltic, Black Sea, Mediterranean and the North Sea; and issues of Governance. At all stages of the work efforts have been made to exchange understanding across the various components in order to develop an integrated view. The scenario's work package in particular has acted as focal point for integration and has also helped inform the discussion of options for policy development that is set out below

Options for Policy Development: Data and Mapping

Despite recent advances in mapping cumulative impacts, many limitations remain. Nonetheless, preliminary spatial analyses such as the outcomes of ESaTDOR can provide information relevant to precautionary Europe wide management and conservation efforts. The table below identifies some major gaps in marine related knowledge as well as recommendations to the relevant stakeholders aiming at making key knowledge available in the future, thus feeding broader and deeper marine impact analysis.

Table 4.11 Recommendations for data and mapping

Audience	Recommendation	Justification for recommendation
Conventions, global and regional decision makers	Coherence in Sea boundaries definition is key to provide reliable multi-thematic Sea maps. Reliable boundaries are key for supporting marine planners and decision makers in correct planning and decision making	Inconsistencies in the definition of sea boundaries adds complexity to mapping and data collection, as regions defined for example by Exclusive Economic Zones, Regional Sea Conventions, the Water Framework Directive, Marine Strategy Framework Directive Marine Regions and EU Integrated Maritime Policy do not necessarily correspond, being focused on either ecosystem functions or thematic interests such as transport and covering different sized geographical areas.
(Marine / maritime) Local, national, and regional decision makers and data managers	Sharing of reliable and consistent datasets is key to provide an overview of the status and trends of (European) marine space.	Within ESaTDOR, challenges on data availability and reliability were encountered and some highlighting of this issue is a major outcome from this project. Across the different European seas, a lack of homogenous and harmonized thematic statistical information was very common.
Regional decision makers	There is a need to work on a broader extent than the territorial and marine administrative delimitations for spatial management, and specifically Seascape management depends on many dynamic factors (fish stocks, ecosystems, pollution, boat flows,…) whose effects are broad (seawide or further) and cannot be fully captured in one space.	Uneven coverage of particular Seas Within ESaTDOR, datasets corresponding to the North Sea are well represented through bodies such as Eurostat, the EEA and ICES, whereas for regions such as the Black Sea, the Mediterranean Sea, and Arctic Sea data sources are more scattered affecting the reliability of the project's outcomes in these regions.
Fisheries managers, marine stakeholders, and marine institutions.	Reliable and broad scale fisheries datasets need to become available publicly in order to be used in broad scale marine assessments.	The use of ocean resources is increasing, but by far, the single largest use of ocean resources worldwide is still Fisheries. [i] Reliable data on fisheries is still a major issue being the main stressor of Oceans biodiversity that is repeatedly unveiled in studies due to the lack of reliable datasets. The Sea combined impact outcomes (Sea typologies) from ESaTDOR project are still dwarfed by the lack of reliable fisheries data to use in the assessment.

Options for Policy Development: Thematic

Economic Use

Economic activities related to the European Seas such as the traditional maritime sectors like shipbuilding, tourism and seafood are important for the European economy, particularly for some coastal regions. In order to maintain and develop these sectors for the long term in accordance with the goal of territorial cohesion, economic activities must be conducted in a sustainable and knowledge-based manner and the emphasis should be on developing high quality, high value forms of employment. The following issues should then be addressed.

Table 4.12: Recommendations on the maritime economy

Audience	Recommendation	Justification for recommendation
EU, national, regional and local decision makers, maritime businesses, maritime research and education institutions	**Cluster development in maritime sectors:** Stimulate cluster development in different geographical areas supported by connections between research and education institutions and maritime businesses and stakeholders. Promote and stimulate better cooperation between different industries. Support creation, sharing and transfer of knowledge within and between clusters	Traditional maritime sectors will continue to play a vital role in the economy of Europe's maritime regions, but further efforts are needed to support their future development and promote their global competiveness. These include nurturing regional and European wide links between businesses and research and education institutions and between related industries.
Regional Seas Commissions, EU, national administrations, oil, gas and mineral extraction businesses	**Extractive industries – oil, gas and minerals:** Ensure the environmental friendly extraction of oil and gas and marine minerals. Implement adequate safety and security systems associated with these industries. Develop emergency planning and response, particularly in remote areas such as the Arctic.	It is likely that oil and gas extraction will continue to be a major feature of the maritime economy particularly in the Arctic and more remote marine areas. Offshore mineral extraction is also envisaged in these locations. The promotion of environmentally sensitive production and emergency planning and response infrastructure in these fragile and remote locations will be important..
EU, national, regional and local decision makers, tourism businesses	**Tourism:** Develop tourism policies which support climate change and environmental protection ambitions and focus on developing an all year round tourism industry in coastal regions here appropriate	Tourism is the bedrock of the maritime economy and offers opportunities for further growth in most areas. However, the focus should be upon sustainable modes of tourism and all year round tourism opportunities wherever appropriate. Tourism development in the Arctic requires particular care and attention.
EU, national governments, Fisheries managers, and marine research institutions.	**Sustainable fisheries:** A fisheries policy which prevents overfishing and promotes sustainable development of the seafood industry should be promoted.	Fishing remains an important industry in many maritime regions. Increased efforts to encourage and support sustainable fisheries including marine aquaculture should be seen as a key dimension of European food security.
ESPON	**Data:** Data on economic use on NUTS2 and NUTS3 level**.** Data that show the development in the different sectors over time**.** Data on employment, production values and value added.	Various suggestions are put forward related to data availability and analysis to improve understanding of Europe's maritime economy.

Energy, Pipelines and Cables

Table 4.13: Recommendations for energy, cables and pipelines

Audience	Recommendation	Justification
European Commission, Norwegian government	Set criteria for acceptable exploration and exploitation of new hydrocarbon reserves, especially in the Arctic	To ensure stringent environmental standards are adhered to , especially in ecologically-sensitive regions
ESPON	Europe-wide data-gathering on spatial patterns of offshore oil and gas production and supply	To access and harmonise disparate sources of data
European Commission, Mediterranean, Black Sea, Arctic and Baltic national governments	Governance arrangements for establishing good energy relations with surrounding regions, especially North Africa and Russia	To ensure reliable, long-term security of supply of gas and oil from neighbouring regions
European Commission, ESPON	Assessment of technical developments and national government plans and forecasts for exploitation of marine renewables, especially offshore wind power	To evaluate trends and likely future spatial demands of marine renewable across Europe, and potential restrictions imposed upon other sea uses
Barcelona Convention, member states of the Mediterranean and Black Sea regions	Promotion of marine renewable energy potential	To initiate the development of marine renewables, especially wind energy, in southern European seas
OSPAR, HELCOM, VASAB, Irish, North and Baltic Sea governments	Assessment of potential hubs / clusters for the development of marine renewables, especially offshore wind power	To develop a strategic approach to the large-scale mobilisation of the marine renewables industry in north European seas
European Commission, OSPAR, HELCOM, VASAB, Irish, North and Baltic Sea governments, Friends of the Supergird, ENTSO-E	Strategy for implementation of north European transnational offshore grid systems	To take forward emerging recommendations on transnational offshore grid systems and the European Supergrid, as put forward by *OffshoreGrid* project, Friends of the Supergird and ENTSO-E
European Commission, Mediterranean and Black Sea governments	Assessment of long-distance gas pipeline options	To optimise future large-scale supply of gas from producer countries
European Commission, North Sea governments	Assessment of current technological progress on long-term subsea storage of carbon and potential North Sea storage sites	To evaluate the prospects for carbon storage in the North Sea region and ensure that options for future development are maintained
European Commission, national governments, European public	Programme of public information and engagement on the contribution of European seas to future energy needs and possibilities	To gain the trust and participation of communities in the potential consequences of energy policy for the marine environment and coastal economies

Transport

The transport industry is an important part of the European economy, employing some 10 million people and representing up to 5% of the European GDP. The EC is willing to promote a sector where many European companies are world leaders in infrastructure, logistics, manufacturing of transport equipment and management systems. Transport accounts for about one fourth of GHG emissions in Europe By 2030, the goal for transport will be to reduce GHG emissions to around 20% below their 2008 level. Based on current European policies and strategies, the following key issues will need to be addressed in the European maritime transport system:

Table 4.14 Recommendations for transport

Audience	Recommendation	Justification
EU, national, regional and local decision makers,	Promote maritime transport for intra-EU transport.	The transport White paper promotes a major shift for road freight over 300 km to other modes such as rail or waterborne transport, facilitated by efficient and green freight corridors. To meet this goal will also require appropriate infrastructure to be developed.
EU, national, regional and local decision makers, and port and IWW operators	Support better integration of ports and hinterlands	More efficient hinterland connections for ports (*Blue Lanes*). Seaports need to increasingly be connected to the rail freight network and, where possible, to the inland waterway system.Market access to ports needs to be further improved. Deployment of TEN-T infrastructure and a integration of modal systems is needed.
EU, national, regional and local decision makers, and port operators	Facilitate the development of short-sea shipping	Simplify the formalities for ships travelling between EU ports through *Blue Belt* in the seas around Europe. These conditions are necessary to promote the development of motorways of the sea, the maritime dimension of the TEN-T core network.
EU, national, regional and local decision makers, and port and IWW operators	Improve connection with inland water-way transport.	A suitable framework must be established to connect marine and inland waterway transport. Technological systems like RIS (*River Information System*) to be implemented for integrated management of the IWW.
Regional Sea Conv, EU, national govts, port /shipping operators/ Universities	Improve environmental performance of marine transport	Promoting high global maritime standards, modern vessels and cleaner fuels for shipping. Overall, the EU CO2 emissions from maritime transport should be cut by 40% (if feasible 50%) by 2050 compared to 2005 levels.
Regional Sea Conv, EU, national govts, port /shipping operators	Improve maritime safety.	Passenger ship safety needs to be proactively addressed and modernised. Enhanced vessel traffic monitoring (SafeSeaNet and RIS) to supporting maritime and river transport safety and security, as well as the protection of the environment from ship-source pollution.
Regional Sea Conv, EU, national govts, port /shipping operators	Enhance maritime security.	A risk based approach to the security of cargo originating outside the EU should be considered. Common information sharing environment for the surveillance of the EU maritime domain. Increase the level of security along the supply chain. 'End-to-end' security certificates should be considered.
EU, ESPON	Improve data related to maritime transport	Key areas for data enhancement include: flows: shipping routes, cruise routes (application of GPS technologies); SSS at port level, with origin/destination information; traffic in neighbouring countries (Mediterranean + Baltic + Black Sea); port hinterlands (keeping track of the full freight route: Foreland - European port - NUTS3 of hinterland); reight type at port level (crossing of Eurostat and COMEXT databases); Economic data on shipping activity

Environment

Table 4.15: Recommendations for Environment

Audience	Recommendation	Justification
Regional Sea Conv, EU, national govts, renewable energy industry/ Universities	Extend network of multi use marine protected areas	To safeguard the ecosystem services from the marine environment, it might be sensible to increase the number of Marine Protected Areas (MPA's) and opportunities to co locate these with other seas uses such as wind farms should be fully explored.
EU	Integrate MSFD and INSPIRE requirements and terminology	INSPIRE categories which describe the essential/required datasets, on the whole, mesh poorly with terminology from the Marine Strategy Framework Directive. Development of a common language and definitions of terms between both directives could significantly improve the value of both directives.
EU	Integration of MSFD and EEA approaches to Driver-Pressure-State-Impact-Response	A related issue is that the MSFD uses a terminology in which 'drivers' and 'pressures' are described, but these do not correspond with the 'drivers' and 'pressures' of the European Environmental Agency (EEA). As the Driver-Pressure-State-Impact-Response (DPSIR) approach of the EEA is widely used, using the same terminology but with a different meaning seems not appropriate. A streamlining of the terminology of the MSFD to match that of the EEA seems appropriate.

Options for Policy Development: European Seas Synthesis

Tables 4.16 and 4.17 provides an overview of the policy recommendations set out in the six European Seas reports. From this it is clear that a number of areas of common concern emerge, as well as issues that are prominent in particular maritime regions. Further details of the thinking behind the recommendations in each sea area are provided in the accompanying scientific report, while the following summary provides a summary of the recommendations together with an associated justification.

Table 4.16 Summary of Main Recommendations

Audience	Recommendation	Justification
Regional Sea Conventions/EU, National and local governments, universities, maritime businesses, civil society	Improve data collection and integration and support for maritime research, knowledge exchange and stakeholder capacity building	Access to good quality data in support of maritime planning and management and maritime business development is a major issue in most European Seas. Improved data collection, integration and sharing is needed. Harmonisation of MSFD and INSPIRE language and definitions should feature here. Measures supporting knowledge exchange and stakeholder capacity building, including closer interaction between research and education institutions and maritime stakeholders are required if key territorial development opportunities and risks are to be addressed.
Regional Sea Conventions/EU, National and local governments, universities, maritime businesses	Promote the development and adoption of sustainable management and business practices	Research and knowledge exchange related to sustainable management and business practices will be essential to ensure that the uptake of territorial development opportunities does not create unsustainable pressures on the environment. Key areas for attention include food and energy and development in the Arctic region.
Regional Sea Conventions/EU, National and local governments, civil society	Promote improved governance including mechanisms to facilitate ongoing stakeholder engagement.	The limitations of existing governance arrangements are identified in all the European Seas reports. Refinement of structures to support more integrated approaches to maritime planning and management and at a range of different scales is called for. There is in particular a need to facilitate and support ongoing stakeholder engagement in maritime strategy development and implementation.
Regional Sea Conventions/EU, National and local governments	Develop an integrated sea basin perspective	The lack of an integrated sea basin perspective was one of the reasons put forward for improved governance arrangements. Lack of integration between sectors, across national boundaries and between marine and terrestrial planning it is felt impedes effective planning and management for Europe's maritime regions.
EU, National and local governments, universities, maritime businesses, civil society	Develop strategic responses to key opportunities	A strategic response to the development of key maritime territorial development opportunities is required. This includes careful identification and nurturing of maritime clusters in each European Sea.
EU, National and local governments, universities, maritime businesses	Developing multi-use approaches	Realising the range of territorial development opportunities identified is likely to result in increasing competition for marine space and more dispersed use of the sea. Opportunities for multi-use development should be fully explored to address these concerns.
Regional Sea Conventions/EU, National and local governments	Improved implementation of policies and plans	It is interesting that the only European sea report to highlight matters of implementation was that for the Baltic. This is the region where integrated planning is most advanced and the effectiveness of implement ion is increasingly coming to the fore.

Table 4.17: Overview of the policy recommendations set out in the European Seas reports

Area	Arctic	Atlantic	Baltic	Black	Mediterranean	North
Improved data Supporting research Knowledge exchange and stakeholder capacity building	Knowledge/ research				Stakeholder capacity building Improved data collection and availability	Data should be centrally collected and publicly available MSFD and INSPIRE Directive should use common language/definitions
Development and adoption of sustainable management practices	Responsibility/sustainable management					Sustainable food and sustainable energy
Improved Governance including stakeholder engagement	Engagement/ governance	Developing the governance framework	Stakeholder Engagement Integration of governance regimes		Resolution of jurisdictional disputes	Forum for southern north sea
Developing and Integrated sea basin perspective		Integrating planning for the land and sea			Development of a common strategy	Developing an integrated sea based perspective
Developing multi-use approaches		Developing multi-use approaches				
Strategic response to key opportunities		A strategic approach to the development of maritime clusters			Realising key opportunities	
Improved implementation of policies and plans			Improved implementation of policies and plans.			

Options for Policy Development: Governance

Certain recommendations are tentative and open to discussion. They should be regarded rather as issues over which choices have to be made. In a number of cases totally contradictory recommendation could legitimately be made, depending on different viewpoints and experiences. The “hard law” / “soft law” dilemma is a classic example. This shows perhaps the importance of maintaining a balance and of taking into account specific regional conditions.

Table 4.18: Recommendations for Governance

Audience	Recommendation	Justification
General and scientific community	Better integration of maritime dimension in spatial planning theory and analysis.	Maritime affairs and planning are poorly represented in planning literature.
	Cooperation of scientific communities involved in spatial (terrestrial and maritime) planning.	Relevant scientific communities often speak a different language and have communication problems.
	Spatial planning scientific community must develop new approaches, especially regarding the co-existence of top-down / holistic and bottom – up, place based approaches in maritime space.	This is a key challenge especially in maritime space because of its material difference from terrestrial space. In addition, the concept of sovereignty is essentially different is sea space.
	Organization of further education and training courses to help overcome barriers between disciplines.	It is of importance for active practitioners to rethink and reformulate their approach to practice.
	Maritime spatial planning and marine environment protection must be well represented in university curricula of coastal states.	Future experts should acquire knowledge and skills of which present scientists were deprived.
European Union	Creation of more effective “hard law” frameworks in the case of exclusive EU regional sea spaces.	Although it is of essence to maintain a balance, implementation suffers in the absence of binding decisions to the detriment of effectiveness and the status of governance arrangements.
	Greater EU involvement in negotiations with non-EU coastal states as the representative of regional sea governance arrangements.	Here too the proper balance is required, but a greater role for the EU would add prestige and power to governance arrangements.
	EU-guided boundary delimitation of European sea space.	Without prejudice to national sovereignties, the EU must play a role to break the stalemate of boundary delimitation in particular regional sea cases.
	Systematic screening of overlapping and competing governance arrangements as an input to determine EU support.	The proliferation of arrangements is not convincingly justified and tends to create redundant bureaucracies and ineffective partnerships of doubtful usefulness.
	Coordination of sectoral interests, as pointed out under “sectors”.	The EU, in close cooperation with international bodies, especially those of the UN system, can bring together sectoral maritime interests on a Europe-wide scale and help eliminate mutual suspicion;

ESPON / technical studies	Studies to improve analytical foundations and information bases of maritime planning.	Maritime planning is still in an early development stage and needs a body of supporting work to reach the maturity enjoyed by land planning.
	In depth studies of regional seas to build upon findings of ESaTDOR.	ESaTDOR has done a lot to create an informational base and to accumulate practical experience; this has to be built upon to address regional sea- and place-specific particularities.
	Study of comparative legal frameworks of maritime governance.	The complexity of legal frameworks resulting from all governance levels demands specialized study, which will help make maritime policy and planning more effective.
Regional seas / governance arrangements	Cooperation of regional seas partnerships and *fora* to avoid replication of efforts.	This is one more point about the proliferation of agencies and partnership which have accumulated over the years and often address the same issues.
	Creation of overarching governance structures to avoid overlapping functions.	Agreement on a single overarching arrangement in each regional sea, without neglecting lower level , locally-oriented partnerships, might improve efficiency.
	Respect for subsidiarity and local particularities.	This is the other side of the coin. Management cooperation and concentration will be weakened if subsidiarity and local consensus are undermined.
	Effective combination of a regional sea binding framework with local partnership freedom.	The central challenge of maritime governance is the dual arrangement of a unifying, regional sea, regulatory framework and of place-based open partnerships.
	Adaptation of governance arrangements to changing EU framework.	Regional sea governance arrangements cannot but reconsider their remit and field of action in the light of a tighter regulation regime at EU level, in order to serve effectively their objectives.
Sectors and activities	Sectoral business and professional communities must get together and work on common approach to maritime space.	Conflict of interests is what bedevils most efforts to coordinate actions in regional and sub-regional seas. Non-cooperation on the side of private interests undermines maritime policy.
	Key marine space activities such as wind-generated energy, shipping, oil drilling, fisheries and aquaculture, tourism and leisure must develop effective communication channels and set priorities, at EU and national level and under guidance of the respective official agencies.	The first step of the above common approach is for private sector activities to set up communication channels, platforms and *fora*, for mutual information exchange and discussion opportunities, with the EU and member-countries acting as networking activators.
National / sub-national administrations	Coordination of terrestrial, coastal management and maritime spatial planning processes.	Land use planning, ICZM and MSP frequently remain disjointed and uncoordinated, even at national level, let alone at the local scale.
	Guidelines regarding marine space to be embedded in binding statutory provisions.	Statutory planning is often devoid of provisions for ICZM and, even more so, MSP. This is exacerbated by poor

		knowledge and expertise.
	Systematic information dissemination campaigns at local and regional level.	Marine environment problems and maritime planning barriers are on the whole much less understood by the public at large, than land use problems.
	Cooperation with business and professional organizations, NGOs and local communities.	Public planning authorities at all levels must improve their understanding of stakeholder views and appreciate the latter's potential contribution to maritime planning objectives.
	Coordination of sectoral interests, as pointed out under "sectors".	Public authorities must reach beyond their role as rule-makers and statutory planners, to act as instigators of supporting stakeholder networks.

Chapter 5: Issues for Further Analytical Work

This is the first ESPON project to focus on Europe's regional seas, within the context of an emerging policy interest in understanding and managing land sea interactions, so that aspirations of territorial cohesion can be better achieved. The research was therefore of an introductory nature and wide ranging and the results are inevitably exploratory and indicative, and point in the direction of further work.

Our concluding comments are subdivided into a number of key themes which draw upon the ESaTDOR experience. Our comments relate to: technical issues associated with data availability and mapping challenges; the challenges of scale and nature of governance arrangements to deal effectively with land sea interactions; and challenges for scenario development.

Data Availability

The first challenge that the 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 consistent with other (land based) ESPON projects which also 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 (eg. 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.

The issue of data availability is increasingly being recognised in the context of European projects and initiatives relating to the seas and maritime activities. Hence the INSPIRE Directive aims to ensure that marine data is collected and made available in a more consistent and comparable manner. More work does need to be undertaken in this regard. A starting point for ESPON would be to establish a limited number of land-sea interaction indicators, and set about consistent and spatially-meaningful data collection in relation to those indicators. For example, within the environmental field there should be closer alignment between the requirements of the Marine Strategic Framework Directive and the INSPIRE Directive.

Data and Mapping Infrastructure

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, modelled 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.

Governance Challenges

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 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 a 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.

Developing Scenarios

ESaTDOR has begun to set out baseline conditions as a means of thinking more creatively about future development scenarios. This is not intended to be a predictor of the future, but rather a way of engaging in more informed policy debate about what could happen. The focus has not specifically been on building scenarios, but on providing a starting point for further and more specific work. In building our initial scenarios we drew our inspiration from other ESPON work, in particular the scenarios being developed as part of the ET2050 project. Our stakeholders suggested a number of limitations in the use of these scenarios for understanding land sea interactions. Firstly, the ET2050 scenarios, in common other ESPON projects, are land- or terrestrially-orientated. For broader territorial scenarios, the role and importance of the sea must be explicitly considered. Secondly, the numbers of scenarios presented were too many and complex and in some regards too similar. There was a call for fewer, more distinctive and diverse scenarios. Finally, 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.

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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
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
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

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