ESPON
EUROPEAN UNION
Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

TOPIC PAPER

How can MSP support resilience of European land sea interactions?

August 2020

Caroline Creamer[1], Anne-Marie O'Hagan[2], Heather Ritchie[3] & Renaat De Sutter[4]

[1] Maynooth University; [2]University College Cork; [3]Ulster University; [4]Ghent University & HAEDES BV.

Table of contents

Key themes: MSP-LSI, climate change, coastal sustainability and planning policy, ocean economy, energy, tourism

MAIN POLICY QUESTIONS

- What are the main processes, factors and drivers that will shape future MSP development over the next 20 years?
- What are the long-term trends of climate change, and what are the main MSP-LSI impacts? What is the main impact on land of maritime activities? And vice versa? How can terrestrial and maritime spatial planning better consider these impacts?
- What could be the potential territorial consequences of MSP on development in the areas of urban/rural development, the environment, coastal communities, energy and the blue economy?
- How can coastal communities adapt to climate change and associated sea-level changes while also building a sustainable and resilient blue economy?
- What role can/should MSP play in improving the sustainability of blue and green growth?

ACRONYM LIST

CBD	UN Convention on Biological Diversity
CCA	Climate Change Adaptation
EBM	Ecosystem-based management
EC	European Commission
EEA	European Environment Agency
EU	European Union
GDP	Gross Domestic Product
GES	Good Environmental Status
ICM	Integrated Coastal Management
ICT	Information and Communications Technology
ICZM	Integrated Coastal Zone Management
IMCAM	Integrated Marine and Coastal Area Management
IMO	International Maritime Organization [UN]
IMP	Integrated Maritime Policy [EU]
IPCC	Intergovernmental Panel on Climate Change [UN]
LSI	Land Sea Interactions
MAP	Mediterranean Action Plan [UNEP]
MARPOL	International Convention for the Prevention of Pollution from Ships
MoS	Motorways of the Sea
MPA	Marine Protected Area
MS	Member States [EU]
MSFD	Marine Strategy Framework Directive [EU]
MSP	Maritime Spatial Planning
SAC	Special Area of Conservation [EU Habitats Directive]
SDG	Sustainable Development Goal
SOx	Sulphur Oxides
SPA	Special Protection Area [EU Birds Directive]
SROCC	Special Report on the Ocean and Cryosphere in a Changing Climate
SSS	Short Sea Shipping
STECF	Scientific, Technical and Economic Committee for Fisheries [EU]
TCM	Travel Cost Model
TENs	Trans-European Networks [EU]
UK	United Kingdom
UN	United Nations
UNCLOS	UN Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNFCCC	UN Framework Convention on Climate Change
WFD	Water Framework Directive [EU]

1. Introduction

Setting MSP within wider international and EU policy context

This ESPON topic paper summarises the evidence of ESPON studies (amongst others, MSP-LSI, ENSURE, TITAN, Locate, BT2050) and discusses the implications of Maritime Spatial Planning (MSP) for co-evolutionary resilience between Land and Sea Interactions (LSI).

The world's oceans and coasts are changing. The Territorial Agenda 2020 (2011) recognises maritime activities as playing a key role in territorial cohesion across Europe, and determines that Maritime Spatial Planning (MSP) should be integrated into the existing planning systems of all Member States (MS). With the cumulative effect of more intense and extensive maritime activities now coming to bear, and in the context of global sustainable development and climate emergency crisis, there is a growing urgency for MS to adopt their national maritime spatial strategies and to ensure their assimilation with land-use strategies.

This topic paper will explore how MSP can support and improve resilience – especially focussed on resilience in and between LSI. Increased resilience should help society and sectoral interests reduce the impacts of climate change on their activities and environments, whilst also helping to manage risks and promote sustainable development. Resilience, however, can mean different things to different people. This topic paper seeks to explore these differing aspects with a view to identifying how more coherent approaches to MSP can be implemented at local, regional, national scales. It will summarise current ESPON projects[1] and examples of how this has been approached to date.

This paper provides evidence, knowledge and policy learning to public authorities and other actors to enable more collaborative and coherent approaches. The theme of resilience is considered in the context of (1) LSI (2) Motorways of the Sea (MoS) and Short Sea Shipping (SSS) (3) Climate Change Adaptation and Community Resilience, (4) Tourism, (5) Blue Energy, (6) Marine Pollution, and (7) Mariculture.

In the discussion, resilience is highlighted as becoming an essential approach to assist decision-makers and regulatory authorities to better understand the changing landscape in which they will need to operate, especially in context of the relationships between land and sea planning; climate change impacts and the need for a thriving, sustainable ocean economy.

One of the key objectives of MSP is to contribute to the fulfilment of international, European and regional commitments set by both the European Union (EU) and the MS, in the field of protection of the oceans, seas and coastal waters. Many of the concepts and approaches used by MSP, such as ecosystem based management (EBM) and the integrated approach to marine management, have been adopted from the international conventions, Regional Seas Conventions and EU legislation and policies.

[1] Throughout the document we summarise previous ESPON projects as useful evidence for this topic paper (highlighted in red text boxes) and non-ESPON projects evidences (in blue text boxes).

Table 1.1 - legal and policy instruments at international, regional and EU levels influencing MSP development

Please note these tables are non-exhaustive and list only those instruments referred to in the text

INTERNATIONAL CONVENTIONS	DESCRIPTION
United Nations Convention on Law of the Sea (UNCLOS, 1982)	UNCLOS provides the legal framework for contemporary principles of protection of the marine environment, including the ecosystem-based approach, the precautionary approach and sustainable development.
Convention on Biological Diversity (CBD, 1993)	The CBD aims to halt biodiversity loss, ensuring the conservation and sustainable use of marine biodiversity, and to create a global network of marine protected areas (MPAs) by 2012.
UN Framework Convention on Climate Change and Paris Agreement (UNFCCC, 1992)	The objective of the Convention is to stabilise greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system." It states that "such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner."
International Convention for the Prevention of Pollution from Ships 1973, as modified by a 1978 Protocol (MARPOL)	The objective is to minimise pollution of the oceans and seas, including dumping, oil and air pollution. MARPOL is divided into Annexes according to various categories of pollutants, each of which deals with the regulation of a particular group of ship emissions. It was developed by the International Maritime Organization of the United Nations.
Ballast Water Management Convention 2004	This requires signatories to ensure that ships flagged by them comply with standards and procedures for the management and control of ships' ballast water and sediments. The Convention aims to prevent the spread of harmful aquatic organisms from one region to another and halt damage to the marine environment from ballast water discharge, by minimising the uptake and subsequent discharge of sediments and organisms.
REGIONAL SEAS CONVENTIONS	
Convention for the Protection of the Marine Environment and the Coastal Regional of the Mediterranean (Barcelona Convention) 1975, amended in 1995	This regional convention was originally adopted in 1976 with the key goal of reducing pollution in the Mediterranean Sea and protecting and improving the marine environment in the area, thereby contributing to its sustainable development. It has 22 parties – Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, the European Community, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, Syria, Tunisia and Turkey.
Convention on the Protection of the Black Sea against Pollution (Bucharest Convention) 1992	The legal framework for regional cooperation to protect the coastal and marine environment. It has 6 Parties - Russia, Turkey, Ukraine, Georgia, Bulgaria, Romania.
Convention on the Protection of the Marine Environment of the Baltic Sea (HELCOM) 1974, amended 1992 and 2014	This provides for the protection of the Baltic Sea from all sources of pollution from land, air and sea. It also commits the signatories to take measures to conserve habitats and biodiversity and for the sustainable use of marine resources. The 7 Baltic Coastal States are parties: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia, Sweden and the European Union is also a party.

Convention for the Protection of the Marine Environmental of the North East Atlantic (OSPAR) 1992	The legal instrument guiding international cooperation for the protection of the marine environment of the North-East Atlantic. It has 15 State parties: Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom, and the EU.
EU LEGISLATION	
Water Framework Directive (2000/60/EC)	The WFD provides a framework for maintaining and improving the status of surface waters including estuarine and coastal waters out to 1nautical mile from terrestrial baselines.
Integrated Maritime Policy (COM (2007) 0575)	IMP- known as the Blue Book - has sought to enhance the sustainable development of the European maritime economy and to better protect the marine environment by facilitating the cooperation of all maritime players across sectors and borders.
Marine Strategy Framework Directive (2008/56/EC)	The MSFD aims to achieve Good Environmental Status (GES) of the EU's marine waters by 2020. It provides a framework for maintaining and improving the status of marine waters out to the limits of Member States' waters.
Renewable Energy Directive (2009/28/EC)	This creates the overall policy for the production and promotion of energy from renewable sources in the EU. It requires the EU to fulfil at least 20% of its total energy needs with renewables by 2020.
Maritime Spatial Planning Directive (2014/89/EU)	This Directive sets out obligations to establish a maritime planning process, resulting in a maritime spatial plan or plans; such a planning process take into account land-sea interactions and promote cooperation among Member States.
Renewable Energy Directive (2018/2001/EU) [new]	This aims to help the EU to meet its emissions reduction commitments under the Paris Agreement. Establishes a new binding renewable energy target for the EU for 2030 of at least 32%, with a clause for a possible upwards revision by 2023.
INTERNATIONAL STRATEGIES	**DESCRIPTION**
2030 Agenda for Sustainable Development	In 2015 UN members set out 17 Goals as part of the 2030 Agenda which set out a 15 year plan to achieve the Goals – SDG 14 Life Below Water - to conserve and sustainably use the oceans, seas and marine resources.
International Ocean Governance: An Agenda for the Future of Our Seas (2019)	EU action on international ocean governance aims to build on this framework and work with others to improve the health of this resource which is open to all States.
Sendai Framework for Disaster Risk Reduction 2015-2030	This aims to substantially reduce disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.
EU POLICIES	
Europe 2020 Strategy (2010)	Calls for smart, sustainable and inclusive growth. The coastal and maritime sectors have significant potential for sustainable growth and are the key to the implementation of the European 2020 Strategy
Blue Growth (COM/2012/494 final)	Long term strategy to support sustainable growth in the marine and maritime sectors as a whole.
Clean Energy for all Europeans package (EU, 2019)	This consists of eight legislative acts, covering renewable energy, governance, energy efficiency, electricity market design, energy performance of buildings etc.
ICZM Recommendation (2002/413/EC)	This lists eight principles defining the essential characteristics of ICZM. Based on these principles, the Recommendation outlines steps which the Member States should take to develop national strategies for ICZM.

Motorways of the Seas (COM(2001) 370 final)	This aims to introduce new intermodal maritime-based logistics chains in Europe, which should improve our transport organisation. This represents the maritime pillar of the Trans-European Transport Network (TEN-T). It consists of short-sea routes, ports, associated maritime infrastructures, equipment, facilities and relevant administrative formalities.
EU strategy on adaptation to climate change (COM (2013) 216)	This aims to enhance the preparedness and capacity of all governance levels to respond to the impacts of climate change. Encourages Member States to adopt comprehensive adaptation strategies and creates funding assistance to help them build up their adaptation capacities.
EC Strategy for more Growth and Jobs in Coastal and Maritime Tourism (COM(2014)86)	This Communication proposes joint responses to the challenge of growing tourism and exploiting its potential in a way that sustainably produces economic benefits, with a view to capitalise on Europe's strengths and enabling it to substantially contribute to the Europe 2020 objectives for smart, sustainable and inclusive growth.

1.1 Key legislation and policies informing MSP development across EU: MSFD and MSP Directive

The European Commission (2014) highlighted the need for an MSP Directive due to the uncoordinated uses of coastal and maritime areas and ineffective use of marine resources, which in turn led to competition for maritime space and uncertain investments. Coherence planning of activities was needed as this demand for more maritime space came from the development and innovations in blue growth activities, such as; seabed mining, marine biotechnology, renewables energy installations, and cruise tourism alongside more traditional activities such as fishing, shipping and oil and gas infrastructure. As many of these activities run across national borders, cross border co-operation is essential. The planning of major investment in areas such as the North Sea, the Atlantic, Adriatic, Baltic and Black Sea Basin needs to be considered on a cross-border basis. Using the example of the development of renewable energy installations and offshore energy grids, coordination is needed between MS to allow for effective cross-border and trans-border planning. It is also important to consider the land sea interactions needed to facilitate such developments.

The MSP Directive also covers coastal waters in the hope that they could be managed more sustainably by taking account of the joined-up nature of coastal and marine interests through the acknowledgement of land sea interaction.

With the introduction of the MSP Directive, an ecosystem-based approach was promoted, to ensure that the collective pressure of maritime activities can contribute to the sustainable use of marine goods and services by present and future generations. The MSP Directive was to improve the implementation of environmental legislation across Europe in securing the link between coastal and maritime activities. In 2008 the Marine Strategy Framework Directive (MSFD), with the objective of protecting more effectively the marine environment across Europe[2], specifically refers to reducing the cumulative impact of all maritime activities in a given sea area, thus helping MS to reach Good Environmental Status (GES) of their waters by 2020. The Directive enshrines in a legislative framework the ecosystem approach to the management of human activities having an impact on the marine environment, integrating the concepts of environmental protection and sustainable use. According to the MSFD, each Member State must implement a marine strategy for its marine waters, in cooperation with other Member States sharing the same marine region. Those strategies include 5 steps:

- An initial assessment of their marine waters,
- The determination of the good environmental status of their marine waters,
- The setting of environmental targets,
- The establishment and implementation of coordinated monitoring programmes, and
- The identification of measures or actions that need to be taken in order to achieve or maintain good environmental status.

[2] See https://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm which was adopted on 17 June 2008.

Figure 1.1 *How EU Member States develop marine strategies*

In addition, the MSFD obligates MS to establish a coherent network of Marine Protected Areas (MPA). Again coherent cross-border planning is essential to reach that goal. The Directive also helps the EU to reach the Convention for Biological Diversity (CBD) objective of covering 10% of marine waters with designated protected waters.

The Directive lists four European marine regions: the Baltic Sea, the North-east Atlantic Ocean, the Mediterranean Sea and the Black Sea, located within the geographical boundaries of the existing Regional Sea Conventions. Cooperation between the Member States of one marine region and with neighbouring countries which share the same marine waters, is already taking place through these Regional Sea Conventions.

The International Maritime Organization (IMO) (part of the United Nations) has a long tradition in protecting the marine environment: the 1954 International Convention for the Prevention of Pollution of the Sea by Oil; the International Convention for the Prevention of Pollution from Ships of 1973, as modified by a 1978 Protocol (MARPOL)[3].

There are also Regional Seas Conventions between countries designed to address degradation of the marine environment through comprehensive and specific actions. A typical example would be “the Convention for the Protection of the Marine Environment of the North-East Atlantic” (the ‘OSPAR Convention') of 1992. This convention was originally agreed to deal specifically with the prevention and elimination of pollution from land-based sources; by dumping or incineration and pollution from offshore sources[4]. Since then it has been expanded to include other human activities and marine ecosystems.

In conclusion, international legislation has, from the beginning, taken into account both marine activities as well as land-based activities when dealing with environmental quality and formulating measures to reduce marine pollution.

[3] See http://www.imo.org/en
[4] See https://www.ospar.org/convention

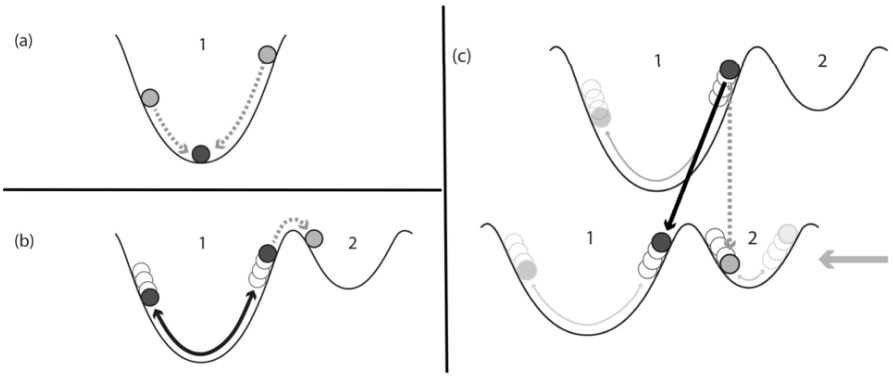
2.
Maritime spatial planning and resilience

There are new and increasing pressures on marine and coastal resources with socio-economic and environmental changes and challenges through the exploitation of marine resources, decline and regeneration of coastal communities, and the predicted impacts of climate change. Such issues may be informed by resilience thinking in order to guide future changes (McElduff and Ritchie, 2016).

The concept of resilience is not straightforward, with definitions carrying across social and scientific disciplines, it has been evolving considerably since its early references in the 1970s. Originally interpreted as the ability to '*bounce back'* (Holling, 1973), the concept of resilience has evolved to encompass an ecologic (Folke 2006) and a co-evolutionary perspective (Davoudi, 2012; Tempels, 2016) to acknowledge the interdependencies between social and ecological systems. Definitions of resilience can contain any combination of 3 major principles (Folke et al. 2002, Bernhardt & Leslie 2013):

- *the magnitude of shock or pressure that a system can absorb while remaining within a given state;*
- *the degree to which the system is capable of self-organisation in light of the shock or pressure; and*
- *the degree to which the system can build capacity for adaptation and learning to skip towards a new, more sustainable framework.*

Figure 2.1 *Engineering, ecologic and co-evolutionary resilience (source: Tempels 2016)*



Resilience is not merely the ability of a system to maintain the status quo but its capacity to prepare, adapt and innovate, and take advantage of emerging transformative opportunities (Folke, 2006). Ultimately, at the core of any definition of resilience, is the capacity of a system to keep functioning even when disturbed (Levin & Lubchenco 2008). Protection of the ecosystem services provided by the marine environment requires that the resilience of marine ecosystems is maintained.

With more devolved decision making at local levels, increasing academic and policy focus has been placed on the resilience of coastal and marine communities. Shaw (2012) suggests the 'turn' of resilience has been influenced by the search for meaningful responses to the scale and intensity of the contemporary problems facing government and society. These problems may be precipitated by environmental disasters (oil spill, exploitation), or climate disruption (flooding, sea level rise, temperature rise) or economic disasters such as (global recession) or social disasters (terrorism). (McElduff et al, 2016). Gallopin (2006) argues that adopting a socio-ecological-economic systemic perspective to resilience is beneficial when considering marine and coastal zone dynamics since it enables an examination of interconnecting issues and interlinked systems involving people in coastal communities, interest groups such as coastal and marine partnerships and decision makers and marine and coastal ecosystems (Lloyd et al, 2013). Walker and Salt (2006) state that the key to this thinking is anticipating change, rather than the ability to restore the status quo or adopt a 'business as usual approach' and placing emphasis on adopting an evolutionary approach (Simmer and Martin, 2009) which stresses adaptation and change.

3.
Land-sea interactions

Internationally, land-sea interactions (LSI) tend to be managed in a variety of different ways. Conceptually, integrated coastal management (ICM) is a management approach that understands the coast as a complex and dynamic system, which encompasses many interactions between people and ecosystems, and needs to be managed as an integrated whole. This represents a move away from customary sectoral management where issues and activities are managed in a singular way.

Whilst there is no international legislation requiring integrated coastal management, many instruments recognise the value of such approaches. The CBD, for example, adopted Decision II/10 in 1995, encourages the use of Integrated Marine and Coastal Area Management (IMCAM) as the most suitable framework for addressing human impacts on marine and coastal biological diversity and for promoting its conservation and sustainable use (CBD, Decision II/10). At the regional level, the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean has a Protocol on Integrated Coastal Zone Management (ICZM), which entered into force in 2011. This is supported by a dedicated Action Plan for its implementation (UNEP/MAP, 2011).

In the EU, the original proposal for MSP Directive sought to combine management approaches and include ICM as they connect in terms of their geographical scope (transition area from land to sea) and in their over-arching objective to better manage human uses in their respective areas of application (European Commission, 2013, SWD (2013) 64 final). Alas, during the negotiation stages of the Directive, ICM was dropped, purportedly due to its potential to infringe on MS planning competencies in the coastal zone. As such the adopted MSP Directive requires maritime spatial plans to “take into account” land-sea interactions as maritime and coastal activities are closely interrelated (see Figure 3.1). This is included in a number of the Directive’s recitals as well as Articles 1, 4 and 6. Article 7 deals explicitly with ‘Land Sea Interactions’ saying that MS can use other formal or informal processes, such as ICM, to take LSI into account.

Figure 3.1 *Maritime Spatial Planning and Land-Sea Interactions (source: ESPON 2020)*

Source: Willemijn Lambert

Prior to the adoption of the MSP Directive and many pilot projects on MSP, management of the LSI was achieved through the implementation of Integrated Coastal Zone Management (ICZM). This involved many types of ‘integration’ including inter-sectoral integration (among different coastal sectors), inter-governmental integration (between different levels of government), spatial integration (including LSI), international integration (dealing with transboundary issues), and science-policy integration (between different scientific disciplines and policy domains) with the ultimate aim of achieving sustainability (Ballinger, 2015; Kidd, 2014). In the EU, Member States were encouraged to develop coastal management strategies based on specific principles set out in the 2002 ICZM Recommendation (2002/413/EC).

Increasing maritime activities and greater awareness of the marine environment, stimulated debate around the need for a more focused marine planning effort. UNESCO led a number of international initiatives on MSP publishing a MSP handbook (Ehler and Douvere, 2009) and subsequently a guide on evaluating MSP (Ehler, 2014). The handbook (Ehler and Douvere, 2009) recognised that marine plan areas are typically "affected by human activities that are: (1) upstream from the marine management area (…); and (2) downstream from the marine management area" but did not address land-sea interactions in any more detail. It is estimated that about 70 countries had maritime spatial plans or were preparing them in 2018 (UNESCO, website) and hence, MSP is now viewed as critical to achieving better coherence between land and sea planning.

In order to assist planners in their implementation of the MSP Directive requirements, the Commission (DG Environment) ordered a study that culminated in the publication entitled "Land Sea Interactions in Maritime Spatial Planning", which is designed to provide an understanding of how LSI can be addressed when developing MSP (Shipman et al., 2018). This examines the LSI of eight key marine development sectors and how these can be considered in the context of MSP development. The sectors included are: aquaculture; desalination; fisheries; marine cables and pipelines; minerals and mining; ports and shipping; tourism and coastal recreation; and offshore energy. Key LSI's for each of these were identified and described according to the type of interaction being studied (i.e. environmental, socio-economic or technical); sources of information to be considered; existing policies and guidance; the availability of assessment tool(s); potential for the application of mitigation measures; stakeholders that should be involved in discussions relating to the interaction; and the management options that could be used to address the particular LSI. For each of the sectors covered, the issues and information to be considered by planners are set out in matrices.

EUROPEAN (NON-ESPON) PROJECT EVIDENCES

SIMAtlantic (2019-2021)

The 'Supporting Implementation of Maritime Spatial Planning in the Atlantic' (SIMAtlantic) project seeks to build capacity for implementation of the MSP Directive and provide support for the establishment of lasting mechanisms for cross-border cooperation on MSP in the Atlantic region. The project looks at land-sea interactions at two different levels: at a case study level and also as a cross-cutting theme in the project. The case study draws upon experience of more in depth LSI methodologies developed in other regional sea settings to undertake a pilot LSI study working with MSP authorities within the Irish Sea basin and the Irish Sea Maritime Forum. LSI dynamics from governance, socio-economic and environmental points of view will be explored along with what this might mean for future MSP and wider territorial planning activities. These findings will then be used to consider how competent authorities in the Atlantic region might address LSI issues in MSP. This will look at lessons learned from LSI practices to date and also explore potential innovations in relation to the management of LSI opportunities and risks, and the role that MSP and others might play. SIMAtlantic commenced in July 2019.

Pan Baltic Scope (2018-2019)

The Pan Baltic Scope project builds on earlier MSP projects (Baltic SCOPE, BONUS BALTSPACE) to develop tools and approaches that contribute to coherent maritime spatial plans in the Baltic Sea Region. A key objective of the project was to develop methods to build better MSP processes with land use planning processes to emphasise land-sea interactions. Working on LSI in the Baltic is recognised as particularly challenging as planning systems are under development for parts of the North-Eastern Baltic Sea, in Finland and Åland. The survey work conducted as part of the project indicated that whilst LSI is not a new concept, its meaning within MSP remains unclear which makes it difficult to implement (Morf et al., 2019). The final project report concludes the challenges identified for linking LSI to MSP; with the single most important challenge identified as being the awareness gap with respect to LSI and the need to make LSI more tangible by identifying specific LSI issues. Enablers for including LSI in MSP include slightly adjusting processes and perspectives and facilitating capacity development for local authorities to address LSI so they can link more easily with higher governance levels and across borders.

SIMNORAT (2017-2019)

The “Supporting the Implementation of Maritime Spatial Planning in the North Atlantic Region” (SIMNORAT) project aimed to support implementation of MSP within the North Atlantic region and carry out concrete and cross-border MSP initiatives between Member States. Involving France, Portugal and Spain, a core deliverable from the project was a report on LSI and relationships with ICZM which looked at how to integrate LSI aspects into spatial planning, thereby ensuring MSP is coherent with land use planning frameworks. A general framework for LSI within MSP, with a set of key principles, was taken as the basis for an overall review of LSI across marine and coastal governance arrangements at EU level. The dynamics of LSI were then analysed to highlight interactions of sectors with their spatial LSI and the impacts these land/sea uses may have on the environment. A gap analysis was used to identify if Portugal, Spain and France already consider LSI aspects and how they approach different land and sea dimensions given the management frameworks coming from ICZM, MSFD and WFD. The findings from this work shows that none of the countries have a precise or official definition for LSI, though they each consider LSI during MSP analysis or planning phase (Sousa et al., 2019). Portugal and France both consider LSI in their MSP approach and through different management instruments. In Spain MSP legislation requires that plans developed should be compatible with other planning approaches already in place. A critical gap identified from the SIMNORAT work is the need for a specific land-sea interactions framework to be embedded in the MSP process and how this can be implemented at the operational level during the different phases of MSP (Sousa et al., 2019).

SUPREME (2017-2018)

The overarching objective of the Supreme project was to support the implementation of MSP in the EU countries of the Eastern Mediterranean, including the Adriatic, Ionian, Aegean and Levantine Seas and to launch and carry out concrete, cross-border MSP cooperation initiatives between these countries. Whilst the focus of the SUPREME project was on the Eastern Mediterranean a number of those countries are parties to the Barcelona Convention and accordingly it was necessary to look at how the principles contained in that Convention could be integrated into MSP activities in the Eastern Mediterranean (Ramieri, 2018a). This found that there is an evident overlap in the potential geographical scope of ICZM (as defined by the Protocol on ICZM in the Mediterranean) and the EU MSP Directive as both include the territorial sea. The project also found that understanding and addressing LSI is crucial for sustainable management and development of coastal areas and coherent planning of land and sea-based activities. Ramieri et al. (2018a) state that LSI in MSP needs to take two different types of interactions into account: interactions related to natural land-sea processes and interactions between land and sea uses and activities. The project reiterates that categorisation of LSI elements can help to structure the understanding of such interactions but an integrated approach is required to address all aspects of LSI.

ESPON PROJECT EVIDENCES

European Sustainable Urbanisation through port city Regeneration - ENSURE

The ESPON ENSURE Project considers the potential regional impact of port city regeneration as a driver of European sustainable urbanisation, growth and resilience. Based on EUROSTSAT data, 144 small and medium sized port cities have been identified across Europe, with 96 having already engaged in some form of regeneration activity. Having identified the economic, social and environmental impacts of port city regeneration in small and medium sized port cities across Europe, and undertaken an analysis of actual port regeneration in four regions, the project developed a framework of good practice for implementing sustainable port city regeneration. Key trends driving port-city regeneration were identified as (1) global competition and the need to innovate, (2) sites of national/strategic importance, (3) population growth, (4) economic growth, and (5) re-integration of the city and the port. While regeneration very often follows the retreat of former industrial and port activities – mainly influenced by market trends, the resulting regeneration takes many forms – maritime, cultural, housing, business, etc.

A key recommendation from the research is the need for integrated or aligned city-port planning. The study has shown that while port and city do not always have the same interests, goals and, indeed, perceptions of the challenges, opportunities and policies that are needed, they can mutually reinforce each other because of their inter-linkages. Common port-city strategic plans or master plans that align land use play a key role in resolving any mismatches that may exist (2019a: 31). The study clearly evidences that strategic planning recognises that port-city issues cannot be addressed separately (p.32). Rather, such planning frameworks can firmly link local ambitions to wider regional,

metropolitan and national objectives. Closely aligned to the need for strategic planning is the need for multi-level governance frameworks

Maritime Spatial Planning and Land-Sea Interactions – MSP-LSI

The ESPON MSP-LSI project, finalised in early 2020, acknowledges the increasing need for policies and tools that reconcile the different – and increasing – demands on marine space, recognising that development which takes place in marine environments also have an onshore component or impact. LSI is also highly related to the economic benefits of MSP. The project focused on developing a framework for considering LSI in MSP which could be used as a tool for initial scoping of LSI issues in different MSP Contexts. The framework clearly demonstrates the complexity and various dynamic processes at play in LSI, and the challenges of balancing the inter-relationships between socio-economic activities both in the sea and on land with natural processes that span the LS interface. The project has also generated an initial checklist of LSI issues that are a potential MSP concern – with main concerns arising from this fieldwork and wider literature reviews including maritime transport, coastal tourism and offshore energy – all themes that feature in this Briefing Paper. The project team also developed a framework for investigating LSI in MSP – broken down into 4 key stages: LSI Scoping, Value Chain analysis, Governance Analysis, and Recommendations for Good Management of LSI. The processes acknowledge and elaborate on the range of challenges facing MSP-LSI and provide a range of tools to ensure these are effectively addressed in plan-making and future cross-sectoral strategies.

European seas and territorial development, opportunities and risks - ESaTDOR

The ESPON ESaTDOR project, finalised in 2013, was the first time that ESPON had 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. The project sought to understand land and sea interactions as an integrated whole. Using existing ESPON typologies, it aimed to map the different types of sea use across Europe in order to develop a typology of coastal/marine regions while also identifying development opportunities and risks for each of these regions. The resulting typology was developed by combining a limited number of land and sea-based data sets based around economic activity, environment and flows. It highlighted the intensity of land-sea interactions expressed by types of maritime regions, clearly demonstrating that land-sea interactions are dynamic and careful consideration needs to be given in thinking about the policy implications of different developmental scenarios which explicitly consider these dynamics.

4. Maritime transport

Maritime Cargo Transport is presented in the ESPON MSP-LSI report as the sector that most obviously requires LSI consideration. Maritime transport, including its inland (rail/water) hinterland connections, plays a critical role in directly and indirectly supporting Europe's economic and social wellbeing in a land/sea continuum. Additionally, it could play an important role in the policies regarding the transition to a low carbon economy. The ports in the Hamburg-Le Havre range are the most important gateways to Europe, but the ports in the Mediterranean are gaining importance, particularly in container shipping, due to Chinese interventions and its aggressive 'One Belt One Road' policies. However efficient and sustainable hinterland connections to the rest of Europe are not always secured from these Mediterranean ports. Furthermore the economic benefits from Maritime Cargo Transport move inwards far beyond coastal communities, where negative impacts (like pollution, congestion etc.) and territorial conflicts with other local development may be felt. Therefore port authorities need to deal with a local license to operate (Notteboom, 2004; Atzema et al. 2009; Boelens, 2011; Van den Berghe, 2018). Climate change is challenging the established efficiency of hinterland logistic networks, and needs the search for alternatives to guarantee 'Just in Time' sustainable deliveries. Partly for that reason the 'Motorways of the Sea' (MoS) concept was introduced in the 2001 White Paper for European Transport Policy as a competitive alternative for land transport (European Commission, 2001) and focused primarily on freight transport within Europe. It was intended to be a part of the Trans-European Networks (TENs), and centered on:

1. *Freight flow concentration on sea-based logistical routes;*
2. *Increasing EU cohesion; and*
3. *Reducing road congestion through modal shifts.*

A critical aspect related to new efforts to harness the advantages of Short Sea Shipping (SSS).

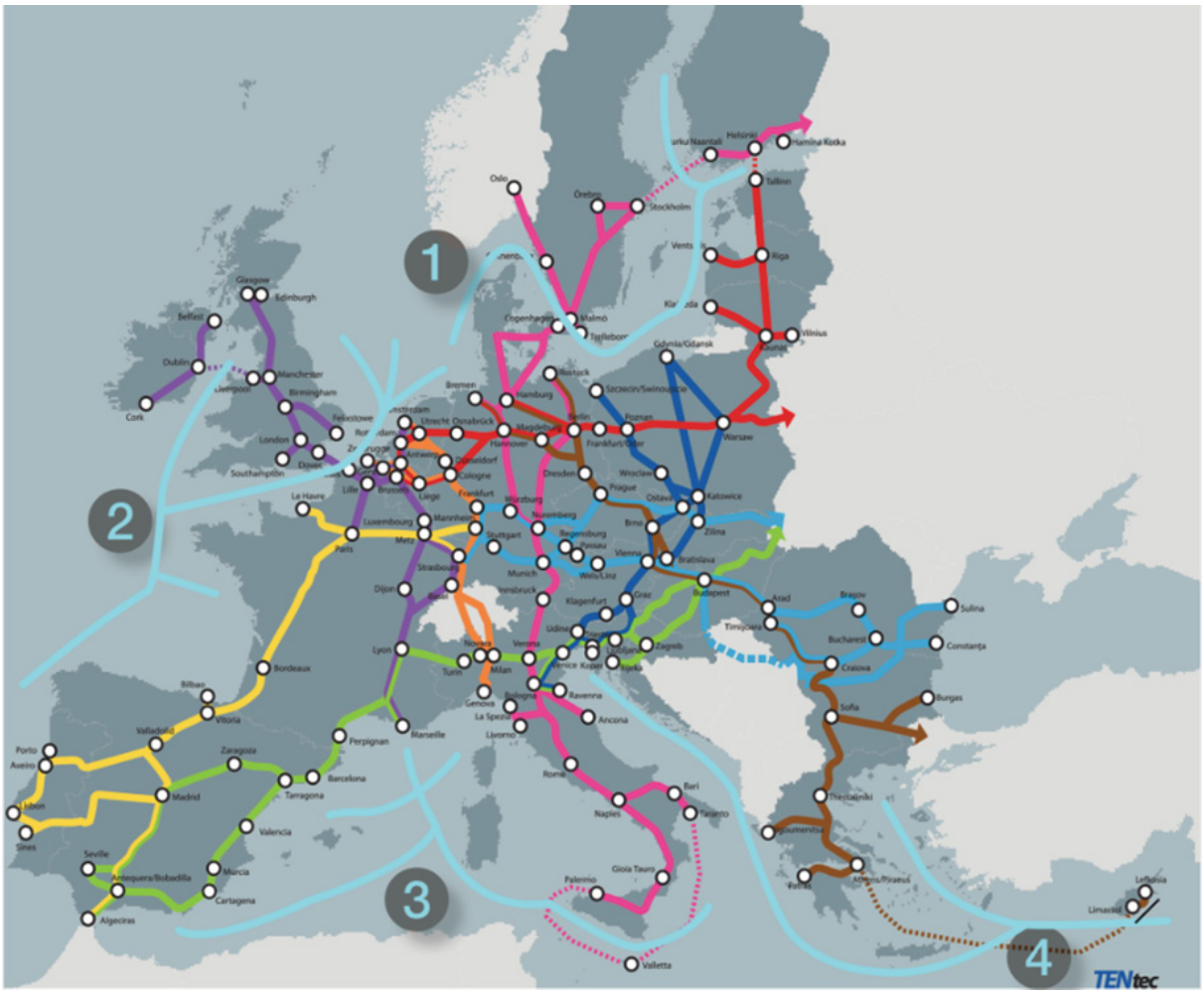
4.1. Motorways of the Sea

In 2006, five Task Forces were created covering the Baltic Sea, the North Sea, the Atlantic, the Eastern Mediterranean and the Western Mediterranean Sea, with a remit of implementing MoS projects and producing MoS masterplans. As a result, four priority corridors were designated for the setting up of projects of European interest[5]:

- Motorway of the Baltic Sea (linking the Baltic Sea Member States with Member States in Central and Western Europe, including the route through the North Sea/Baltic Sea canal);
- MOS of western Europe (leading from Portugal and Spain via the Atlantic Arc to the North Sea and the Irish Sea);
- MoS of south-east Europe (connecting the Adriatic Sea to the Ionian Sea and the Eastern Mediterranean, including Cyprus); and
- MoS of south-west Europe (western Mediterranean, connecting Spain, France, Italy and including Malta and linking with the Motorway of the Sea of south-east Europe and including links to the Black Sea)

[5] See https://ec.europa.eu/transport/modes/maritime/motorways_sea_et

Map 4.1: *The four corridors of the Motorways of the Sea (Source ESPON 2018)*



The MoS-concept has become a maritime pillar of the TEN-T and its budget ranged from some €300 million for the period 2009-2013, towards some € 500 million for the following period. The programme includes:

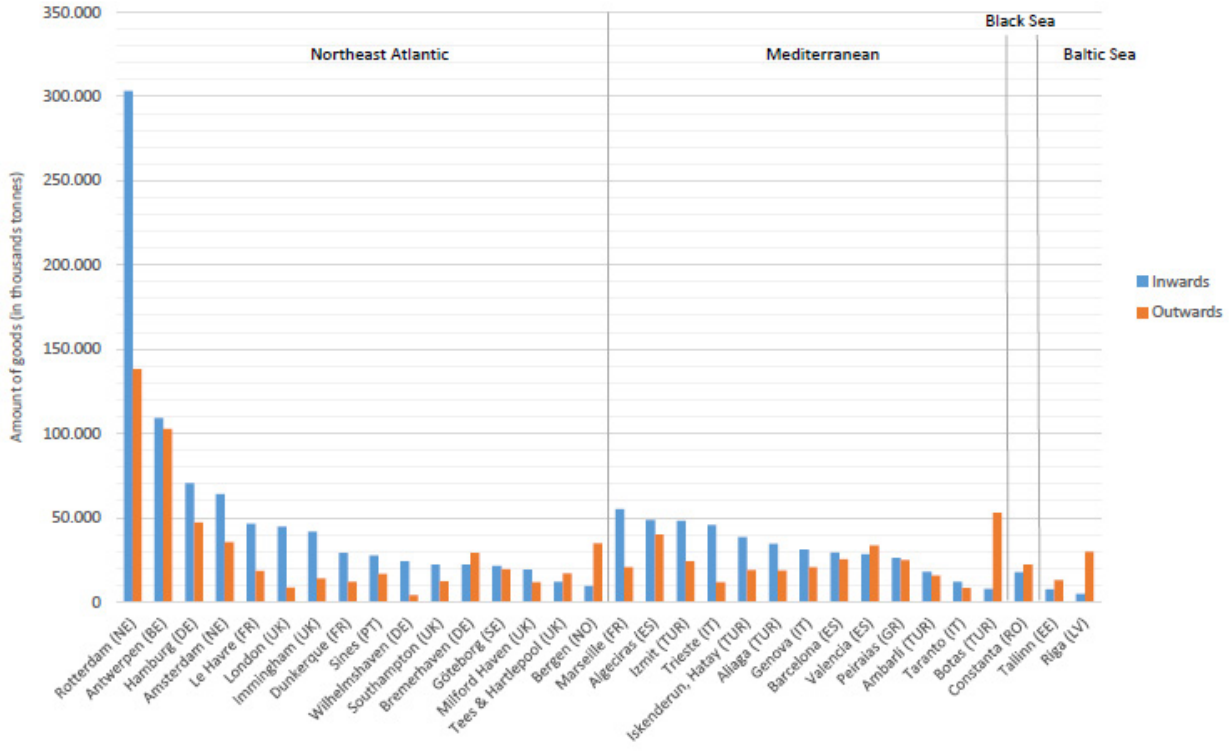
- Development of infrastructure for direct land and sea access, hinterland connections, facilities, associated to port operations;
- Development of maritime Information and Communications Technology (ICT) systems and services addressing logistics management systems in ports, safety and security, as well as administrative and customs procedures;
- Development of sea-based transport services which are open, integrated in door-to-door Short Sea Shipping links connecting the Core Network Corridors;
- Development of MoS in a harmonised and interoperable manner, duly taking into account its role as a link between intra-European trade and international trade; and
- Development of environmentally sustainable shipping covering new clean fuels facilities and on-board installations, environmentally friendly SOx abatement technologies[6]

In the 2013 TEN-T Guidelines (Regulation (EU) No 1315/2013) the MoS were redefined as an integrated part of the TENs which will contribute to LSI and the blue economy by integrating maritime links with the hinterland without any barriers. An enhanced focus beyond infrastructure policy for direct land and sea access was created, towards also ICT platforms for electronic management systems such as, safety, security, administrative and customs procedures in order to link maritime ports with freight villages outside the port area and beyond.

4.2 Short Sea Shipping (SSS)

As a result of MoS short-sea shipping (SSS) is at the forefront of the EU's transport policy, accounting for 40% of all freight moved in Europe, and 59% of the total sea transport of goods to and from the main EU ports in 2018 (Eurostat, 2020). The total gross weight of goods transported as part of EU SSS is estimated at almost 1.8 billion tons of goods in 2018, an increase of 4.4% from the previous year. The share of SSS in total sea transport varies considerably between the reporting countries.

Figure 4.2: *Flux of Goods in Ports of Europe, 2018 (Source: Eurostat, 2020)*



[6] See https://www.vleva.eu/nl/transport/calls/connecting-europe-facility-cef-%E2%80%93-motorways-of-the-seas-mos

Figure 4.3: *Short Sea Shipping of freight 2008-2018 (source: Eurostat)*

Short sea shipping of freight, 2008-2018

(million tonnes)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018			Change 2018/2017 (%)	Change 2018/2008 (%)
	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Inwards	Outwards	Total		
EU-27	**1 693.3**	**1 697.9**	**1 543.0**	**1 618.8**	**1 636.1**	**1 614.8**	**1 610.9**	**1 638.4**	**1 655.5**	**1 699.0**	**1 336.9**	**950.4**	**1 774.5**	**+4.4**	**+4.8**
Belgium	121.6	128.7	111.7	130.1	125.6	123.9	126.6	134.3	131.2	143.2	79.4	56.9	**136.2**	**-4.9**	**+12.0**
Bulgaria	19.4	20.9	18.2	18.9	21.2	22.1	24.1	21.9	21.5	23.2	11.0	12.1	**23.0**	**-0.6**	**+18.8**
Denmark	76.8	76.7	65.2	66.8	67.7	66.2	66.3	66.6	73.1	74.4	44.6	31.0	**72.5**	**-2.5**	**-5.5**
Germany	192.8	189.9	156.0	157.7	168.3	170.4	171.9	177.0	174.1	177.6	112.3	66.6	**175.3**	**-1.3**	**-9.1**
Estonia	30.0	22.9	22.6	28.3	31.2	25.5	28.3	29.9	23.7	22.9	9.7	15.4	**25.1**	**+9.6**	**-16.4**
Ireland	40.5	38.1	35.0	37.1	36.1	37.0	37.1	36.8	40.0	41.2	27.9	16.8	**44.1**	**+7.1**	**+9.0**
Greece	93.3	89.4	83.3	81.5	78.0	90.5	94.6	96.0	98.2	100.9	68.1	66.4	**112.0**	**+11.1**	**+20.1**
Spain (*)	192.0	187.1	174.4	176.8	187.0	191.1	186.0	193.9	193.5	195.5	141.2	103.0	**213.4**	**+9.2**	**+11.2**
France (²)	215.6	222.1	194.9	194.2	194.1	170.9	166.5	170.5	167.5	164.7	115.2	68.1	**178.2**	**+8.2**	**-17.4**
Croatia	19.2	18.5	16.3	15.5	13.2	12.1	12.1	10.4	11.9	12.9	9.2	4.2	**12.7**	**-1.5**	**-33.8**
Italy	329.8	334.0	308.5	310.7	298.7	285.5	272.3	262.5	272.2	283.3	241.9	162.3	**312.8**	**+10.4**	**-5.2**
Cyprus (*)	2.3	2.7	2.5	2.6	4.4	5.7	6.7	6.7	6.9	8.3	4.5	1.8	**6.2**	**-25.3**	**+166.6**
Latvia	49.4	49.2	48.8	47.0	53.4	61.0	56.3	58.2	56.2	50.1	7.1	40.4	**47.4**	**-5.6**	**-4.1**
Lithuania	23.3	28.6	25.4	28.3	32.2	32.4	31.3	30.7	31.3	33.0	17.1	21.1	**38.2**	**+15.9**	**+63.9**
Malta (³)	3.0	3.1	3.0	3.5	3.0	3.0	2.8	2.9	3.4	3.5	1.5	1.4	**2.9**	**-18.0**	**-3.8**
Netherlands	259.3	250.8	243.8	275.9	256.8	262.9	261.2	272.6	286.2	286.1	208.6	85.7	**293.7**	**+2.7**	**+13.3**
Poland	44.5	39.4	37.7	49.5	48.1	48.8	52.0	54.2	55.8	55.4	41.3	25.6	**66.2**	**+19.5**	**+48.9**
Portugal	36.6	35.2	29.3	35.4	35.7	34.7	39.2	41.7	44.9	46.7	33.7	21.5	**48.9**	**+4.6**	**+33.5**
Romania (*)	19.4	22.8	22.6	24.0	24.6	23.9	26.4	31.3	31.3	31.8	17.2	18.1	**35.4**	**+11.1**	**+82.2**
Slovenia	8.8	8.7	7.8	7.8	7.9	8.8	9.2	9.8	11.3	11.7	6.5	4.1	**10.6**	**-9.1**	**+20.4**
Finland	95.9	97.7	79.0	91.2	94.7	88.0	90.2	89.6	85.5	91.6	52.9	53.1	**100.9**	**+10.1**	**+5.2**
Sweden	144.3	148.0	130.4	148.7	148.0	142.1	145.8	149.9	151.1	153.1	86.2	74.7	**156.1**	**+2.0**	**+8.2**
United Kingdom	365.6	348.4	313.4	316.3	320.1	311.0	306.9	315.7	313.5	315.5	212.9	133.0	**313.7**	**-0.6**	**-14.2**
Norway	144.9	138.9	126.5	140.1	145.4	147.4	152.3	150.3	160.4	154.5	49.7	109.5	**153.1**	**-0.9**	**+5.7**
Montenegro	:	:	:	:	:	:	:	:	:	:	1.0	0.6	**1.6**	:	:
Turkey	:	211.4	214.5	242.6	256.9	254.6	264.0	258.5	268.5	274.0	165.1	155.8	**295.3**	**+7.8**	:

(:) not available

Note: The total figures exclude double counting of the same goods being reported as outward movements by one port and as inward movements by another. Country totals may therefore differ from the sum of inward and outward declarations, and EU-27 totals may differ from the sum of EU country totals (see methodological notes). Czechia, Luxembourg, Hungary, Austria, Slovakia and the EFTA countries Liechtenstein and Switzerland have no maritime ports.

(*) The data reported for certain periods contain a significant share of declarations to and from unknown ports (see methodological notes).

(²) 2009-2016: partially estimated by Eurostat.

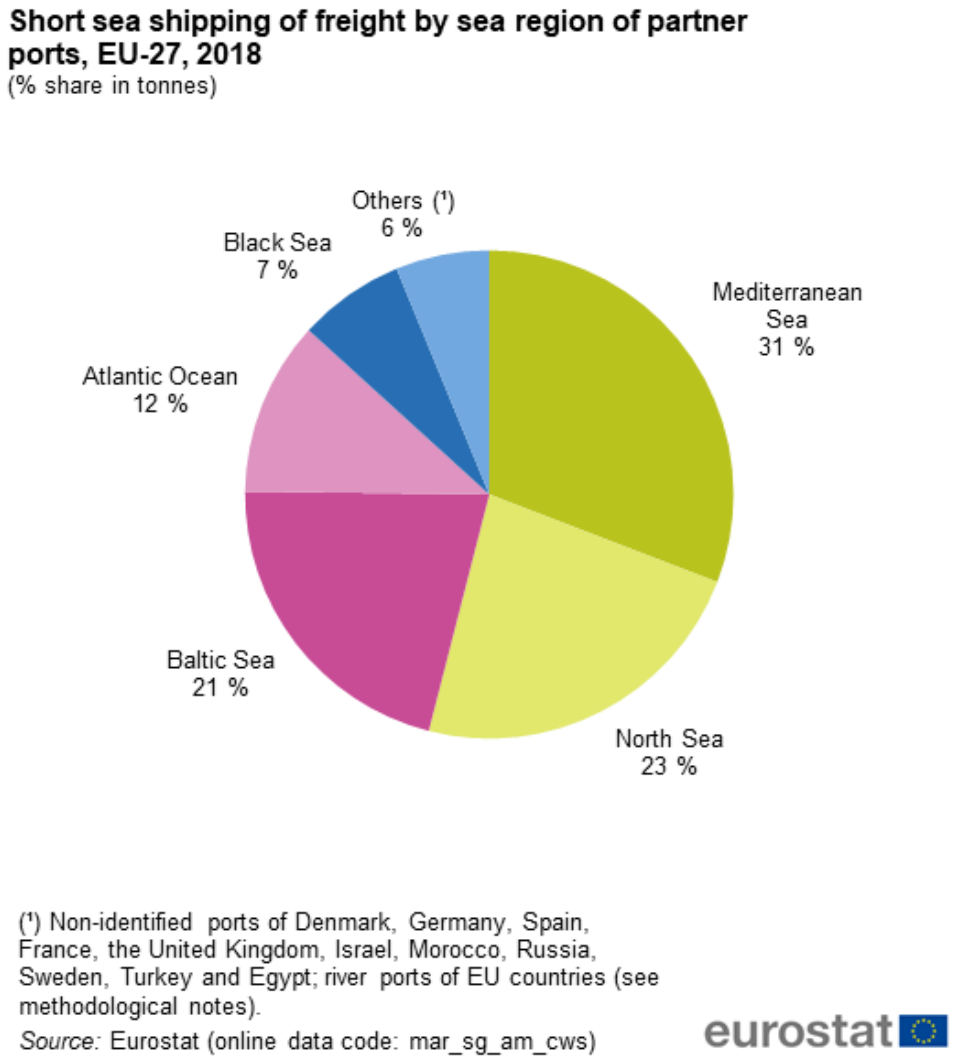
(³) 2018 data are provisional.

Source: Eurostat (online data code: mar_sg_am_cwd)

eurostat

SSS is biggest in the Mediterranean Sea basin (31%), followed by the North Sea (23%) and Baltic Sea (21%). However, with more than 200 million tons in 2018, Rotterdam is still the biggest SSS harbour in Europe, followed by Antwerp (almost 100 tons), and Hamburg, Marseille, Amsterdam, Trieste, Genoa and Algeciras (each with somewhere between 40-50 million tons). In general, liquid and dry bulk are counting for more than 50% of the SSS goods (in the Black Sea even up to 90% and in the North Sea up to 70%), whilst containers account for only a small part.

Figure 4.4: *SSS by Sea Region EU 2018 (source: Eurostat 2019)*



5. Climate change adaptation and community resilience

As already mentioned above, MSP-LSI is also important for the subject of climate change. At the European Union level, the MSP Directive (2014/89/EU) recognises climate change as a threat and highlights the need to increase co-evolutionary resilience between land and sea to it. Changes in the climate will lead to sea level rise, salinity intrusion, acidification, warmer waters, loss of oxygen, increases in coastal flooding, storm intensity, and potentially changing current patterns. These changes to marine and coastal ecosystems will result in considerable negative economic impacts, and an associated redistribution of marine ecosystems goods and services; for example, fisheries, aquaculture, coastal tourism and agriculture. Under a high-emissions scenario (between 3.2ºC and 5.4°C global temperature increase in 2018–2100), coastal regions could suffer economic losses of around €39 billion per year by 2050 and up to €960 billion per year towards the end of the century (Vousdoukas et al., 2018).

Throughout history, society and industry have adapted to changing economic conditions and drivers on both land and sea by developing new industries based on natural resources and environments but currently, with increasing and changing threats (both perceived and real), it can become harder to adapt. This may overpower existing planning and management processes, particularly in MSP which, in many countries, is still only in development stage. This has necessitated thinking about how adaptive capacity and resilience of natural and anthropogenic systems can be increased so as to mitigate the effects of climate change. Instruments that foster the ability to respond and adapt to change are therefore needed in MSP.

In addition to economic impacts, climate change has many direct and indirect consequences for coastal communities and hence efforts to increase their resilience are needed. In combination with adverse effects from human activities on ocean and land, impacts are already being observed on both habitats and biodiversity, as well as ecosystem functioning and services (IPCC, 2019a; 2019b). Vafeidis et al. (2011) estimate that approximately 52 million people in Europe live in low-elevation coastal zones (LECZ) covering 481,695km2. The frequency and intensity of most types of extreme weather events is expected to change as a result of climate change. This may impact upon port activities and have consequences for freight transport. Climate change may also exacerbate coastal erosion, via sea-level rise, increased storminess, higher waves and changes in prevalent wind and wave directions (EEA, 2012). The most recent information on how the ocean (and cryosphere) have and are expected to change with climate change has been assessed in the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC) (IPCC, 2019a; 2019b). The report considers risks and opportunities these changes bring to ecosystems and people, and mitigation, adaptation and governance options for reducing future risks.

In response, many countries have commenced adaptation planning efforts in an effort to increase resilience; a key objective being to close the remaining knowledge gaps on climate change impacts on coastal areas, marine ecosystems and maritime sectors. This requires a focus being placed on four broad categories: a) global drivers, b) local impacts, c) socio-economic drivers and d) adaptation costs and benefits (SWD (2013) 133 final). In 2013, the European Commission adopted an EU strategy on adaptation to climate change (COM (2013) 216). This aims to enhance the preparedness and capacity of all governance levels to respond to the impacts of climate change. The strategy encouraged Member States to adopt comprehensive adaptation strategies and funding assistance to help them build up their adaptation capacities and take action. It also sought to 'climate-proof' EU policies in key sectors including fisheries. Another objective of the strategy concentrates on addressing gaps in knowledge about adaptation and further developing the European climate adaptation platform (Climate-ADAPT). Guidelines on preparing adaptation strategies were produced along with the Strategy (SWD (2013) 134 final). These provide a step-by-step approach to adaptation planning, including best practice principles and a self-check test. Between 2013 and 2018, the number of MS with a national adaptation strategy went from 15 to 25. An evaluation of the Strategy was conducted in 2018 and concluded that whilst the strategy has made progress, Europe is still vulnerable to climate impacts both from within and outside its borders (EC, 2018, COM/2018/738 final).

As part of adaptation strategies across Europe, there is growing evidence of increasing synergies between climate change, energy and maritime policies as member states seek to reduce their carbon emissions and transition to cleaner energies/transform their energy production. As highlighted in ESPON's MSP-LSI research, offshore windfarm development is being promoted by Dutch, German and Polish governments as a key strand of their

climate change/energy transition agendas. It further notes the need for policy action concerning freight transport as climate change impacts on stablished logistic networks. Recognising that climate change does not adhere to administrative boundaries, local governments on the Ireland/Northern Ireland border are jointly developing a (cross-border) regional climate change strategy – as part of the INTERREG-Northern Periphery 'Collaborative Learning Initiative Managing and Adapting to the Environment (CLIMATE)'.

In building resilience, robust adaptation measures will need to be undertaken in coastal and low-lying areas to protect them from increasing climate and sea level rise risks, including coastal erosion. One potential solution in this regard is Green Infrastructure (GI) which also incorporates blue spaces if aquatic ecosystems are concerned and involves the use of 'greening' methods[7] to improve resilience of coastal areas; thus both stablising and delivering a wide range of ecosystem services (ES). ESPON's GRETA research demonstrates how GI offers "an economically viable and sustainable infrastructure that delivers goods and services" through which "a multitude of policy objectives can be addressed" (p.13). ESPON's policy brief on Green Infrastructure in Urban Area (2020) notes that Investments in coastal infrastructure are urgently needed to ensure community safety and economic prosperity whilst, at the same time, not jeopardising the ecosystems and natural resources. Marine plants, for example, not only act as a coastal protection mechanism but as a habitat for living organisms also act as natural carbon sinks. Some plants can also act as nurseries for commercially valuable fish. The ESPON policy brief also points to the role of other soft engineering structures as coastal management tools in terms of storm surges and coastal erosion. Opportunities for blending soft and hard infrastructure solutions are being demonstrated by the INTERREG-funded Eco-Structure project is promoting the incorporation of secondary ecological and societal benefits into coastal defence and renewable energy structures, with benefits to the environment, to coastal communities and to the blue and green sectors of the Irish and Welsh economies[8].

At the international level, the Paris Agreement, Sendai Framework for Disaster Risk Reduction and the UN Sustainable Development Goals have urged further action on climate change adaptation globally. Sustainable Development Goal 13, for example, expresses the need to take urgent action to combat climate change and its impacts. The first target under the goal is to "strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries". The second target relates to the need for all countries to integrate climate change measures into national policies, strategies and planning. The IPCC (2019b) states that the impacts of climate-related changes in the ocean and cryosphere increasingly challenge current governance efforts to develop and implement adaptation responses from local to global scales, and in some cases push them to their limits. For marine and coastal areas, MSP represents a key opportunity to address these challenges.

EUROPEAN PROJECT EVIDENCES

Policy Coherence in Adaptation Studies: Selecting and Using Indicators of Climate Resilience (PCAS) (2019-2020)

The objective of this project is to identify, select and apply a set of climate resilience indicators for Ireland based on current international practice and tested through stakeholder engagement. Multiple indicators exist at international level to 'measure' resilience. This project seeks to ensure that any indicators selected for application are tailored to Ireland-specific circumstances and information needs. A key factor in this is cohesion between climate activities: having numerous indicator sets that potentially conflict, will limit their uptake by Government, agencies and local authorities and ultimately hinder efforts rather than support them. As such, the project involves a process of targeted effective co-design involving relevant stakeholders to ensure the indicators selected fit Ireland's observed and projected climatic risks and impacts, as well as its adaptation and development priorities.

Connecting Nature (2017-2022)

The Connecting Nature project focuses on the implementation of nature-based projects in urban settings. The impact of these initiatives on climate change adaptation, health and well-being, social cohesion and sustainable economic development in these cities is then measured. Innovative actions to stimulate the start-up and growth of commercial and social enterprises active in producing nature-based solutions and products is an integral part of the project. Increasing nature in urban settings supports collective action towards a sustainable, inclusive, healthy and resilient future for cities

[7] i.e. re-planting sand dunes to stabilise dunes, potentially reduce the impact of storm events, sea level rise
[8] See http://www.ecostructureproject.eu/

and towns of all sizes, locations, budgets and capacities as demonstrated through a number of case studies around the world. With 31 partner organisations from 16 countries, the project consortium will develop policy and practices necessary to scale up urban resilience, innovation and governance using nature-based solutions in a range of different contexts.

Coastal Communities Adapting Together (CCAT) (2019-2020)

Funded under the Interreg Ireland Wales Programme, CCAT aims to support coastal communities in understanding climate change and how to adapt around the Irish Sea. The project will use interactive games so that children and young people can understand how climate change is affecting their local area. In parallel, communities will be involved in collaborative planning for the future through, for example, a cross-border learning exchange programme, cross-border knowledge exchange workshops and learning resources for schools and adult education.

Collaborative Learning Initiative Managing and Adapting to the Environment (CLIMATE) (2017-2020)

This Interreg Northern Periphery and Arctic Programme-funded project addresses climate change on local and regional levels through using models of best practice to develop climate adaptation plans for local authorities across four different regions: Northern Ireland, Sweden, Republic of Ireland and the Faroe Islands. The transnational approach means that UK and Irish partners will learn from the climate adaptation expertise of Scandinavian and Faroes partners whilst UK and Irish partners will share their knowledge and experience of effectively utilising a 'bottom-up' community led approach to achieving desired results. The project will develop a method for the creation of a Climate Adaptation Plan and Preparedness Scale matrix for local authorities. The overall ambition is for each region to build capacity to develop models that will protect, promote and deliver a new sustainable development culture.

ESPON PROJECT EVIDENCES

ESPON Policy Brief on Green Infrastructure in Urban Areas

The ESPON policy brief (2020) considers the role of Green Infrastructure (GI) – which includes both green and blue areas – as a tool for organising urban areas to protect and support the integrity of ecological and cultural functions and for ensuring the sustainability of urban areas. The policy brief builds on the ESPON GRETA project which identified Strategic Environmental Assessment (SEA) as an example of a suitable policy tool for incorporating GI into strategies, plans and programmes. The brief notes how places in low-elevation coastal zones are confronted with rising sea levels due to climate change, which brings with it risks of coastal storm surges, coastal erosion and flooding; and that GI needs to be planned with the consideration of future climate change impacts in mind. "Blue and green spaces are key for maintaining mental and physical health and play important roles for many kinds of tourism, which in turn provides considerable economic benefits and is a vital source of income for many countries" (p.19). However, as demonstrated by ESPON GRETA, few cities in Europe have seen an increase in GI in the period from 2006 to 2012. This presents a critical opportunity for more joined-up, cross-sectoral planning, particularly in the face of the urgent need for climate change mitigation and adaptation action.

Climate Change and Territorial Effects on Regions and Local Economies in Europe - CLIMATE

The ESPON CLIMATE Project (2009-2011) noted that coastal regions are among the areas most negatively impacted by climate change because coastal flooding is a dominant problem. CLIMATE further noted that when considering the impacts of coastal flooding alone, the pattern varies across Europe and not all coastal regions are affected equally. The report stated that coastal regions often exhibit considerable concentrations of population which, when combined with other climatic stimuli like temperature increase, can lead to greater impacts. In conclusion, the project contended that coastal regions in Southern Europe are generally more impacted by climate change than Northern European - except for the regions adjacent to the North Sea which are considerably prone to coastal flooding (2011: 60). Indeed such is the threat of flooding across the North Sea that a number of Dutch scientists have proposed building two mammoth dams to "completely enclose the North Sea and protect an estimated 25 million Europeans from the consequences of rising sea levels as a result of global heating" (The Guardian, 12 February 2020).

Territorial Impacts of Natural Disasters - TITAN

The ESPON TITAN Project (2020-2021) considers the economic impact of natural disasters such as: river floods, droughts, storm surges (coastal floods) and earthquakes and undertook an analysis of the best practices of disaster risk management and climate change adaptation at territorial level. The research will address the following natural hazards (the list may be expanded): floods and landslides, water scarcity and droughts, storms and earthquakes.

The project aims to develop a methodology for assessing the economic impact of natural disasters at two scales: a broad scale using existing data covering Europe; and a more focused scale centred on regional/local scale. At least one regional or local entity will be selected to test the methodology. The project will also identify instruments and tools, from spatial planning and territorial development, for disaster risk management and climate change adaptation measures and provide assessment of their benefits and usefulness.

Focusing on storm surges, TITAN will map how often a NUTS3 area has been affected by storm surges. This will be done using the HANZE database. The project will consider the territorial vulnerability of European regions to natural disasters. When it concludes, TITAN will propose instruments and policies for both disaster risk management and adaptation.

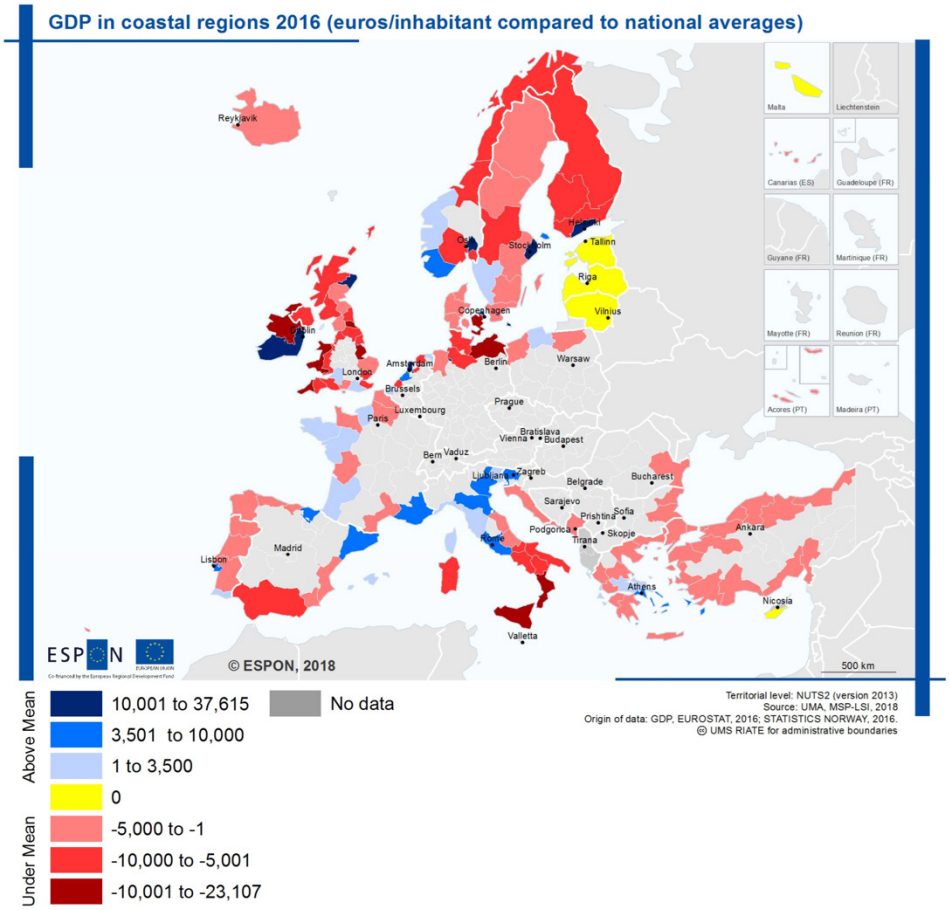
6. Tourism

6.1. Coastal Tourism

Coastal tourism is a vital part of the world economy but also facilitates access to 'blue spaces', offering significant health benefits and shaping peoples' relationship with the coast (Jarratt and Davies, 2019). Within the European Union, tourism is the largest employer in coastal regions, where 51% of all EU hotel bed capacity is concentrated. Coastal municipalities account for only 15% of the EU's land area and 21% of its population (European Commission, 2017a, 2017b). In the UK in 2015 seaside locations accounted for 39% of holiday nights and were associated with £3.84 billion of visitor spending (Visit Britain, 2017). Coastal tourism locations have been one of the fastest growing elements of the world's largest industry for some time. Similar figures can be accounted for in the value chain analysis of the ESPON MSP-LSI report for the case studies in the Croatian Coast, Gulf of Gdansk, Pomeranian Bight and Slovenia.

Nevertheless the employment in coastal tourism is often temporary, seasonal and poorly paid. That's one of the reasons why the ESPON MSP-LSI report has accounted a relatively weak performance in terms of GDP of many coastal areas in Europe. Except for Southern Ireland, Southern, Norway the Cote d'Azur and some coastal regions in France, all other high performance coastal regions are connected to big cities like Athens, Rome, Venice, Barcelona, Bilbao, Amsterdam, Oslo, Stockholm and Helsinki.

Map 6.1 *GDP in Coastal regions 2016 (source: ESPON MSP-LSI 2019)*



Coastal zones are often (temporarily) stressed environments due to the fact that most of the coastal tourists come by car; and with respect to the future more importantly due to climatic hazards (storm surges and sea level rise) and anthropogenic pressures. Jarratt and Davies (2019) stress that it must be acknowledged that coastal tourism is taking place more and more within an era of global warming. The importance of coastal tourism is recognised by governments for the blue economy, there is a need for policies to address the effects of 'overtourism'.

The ESPON MSP-LSI report stresses the need for a more considered and integrated landward planning model with more focus on smart sustainable (and seasonally adaptive) transport means, strategic terrestrial planning considerations and if possible cross-overs with other blue economy sectors in low seasons periods.

There is a need to further increase efforts to stem chronic degradation and support the conservation of the natural and cultural landscapes to ensure their continued delivery of ecosystem services, which serve as a foundation for life and livelihood to these rural communities (Carr and Ó'Fatharta, 2020). Post-industrial societies need to re-connect to nature, since mass tourism and leisure can also be regarded as one of the root causes of climate change, which threaten the existing shoreline to which tourists are drawn. Adaptation policies in response to coastal change, needs to adjust and manage tourism, reduce vulnerability and increase resilience.

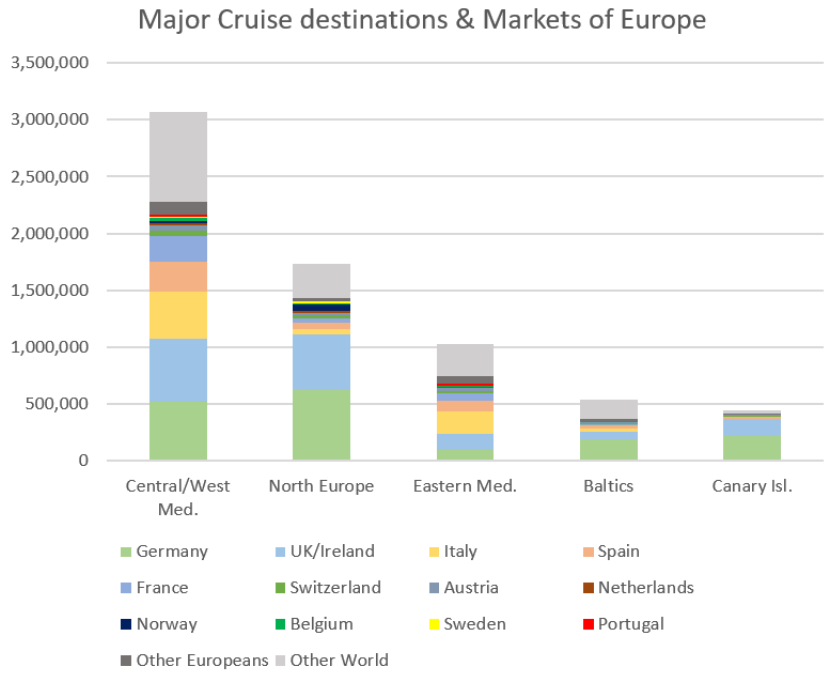
6.2. Cruise Tourism

Cruise tourism can be traced back to the beginning of the 1960s, coinciding with the introduction of the first non-stop air travels between the USA and Europe and the decline of transoceanic ship travel (Brida and Zapata, 2007). Major maritime travel companies went bankrupt or had to change markets. Nevertheless, at first, cruise tourism was only a marginal market for the wealthy with some half a million passengers annually in 1970 to 1.4 million in 1980 and 3.8 million in 1990 worldwide. Due to the introduction of the economies of scale, including cheap one-way flights for travellers to embark or return to their homes, the reduction of prices and the opening up of new markets, it has turned into a mature and steady growing industry (CBI, 2020). In 2000, this sector had some 7 million passengers, rising to some 18 million in 2010, and almost 30 million annually in 2019. The largest market is North America with 14-15 million passengers annually, followed by the (Western) European markets with7.5 million passengers. The Asian market is on the rise with 4.5 million passengers currently. The global output worldwide is estimated to be $34 billion with an FT equivalent of 1.1 million jobs (CLIA, 2019).

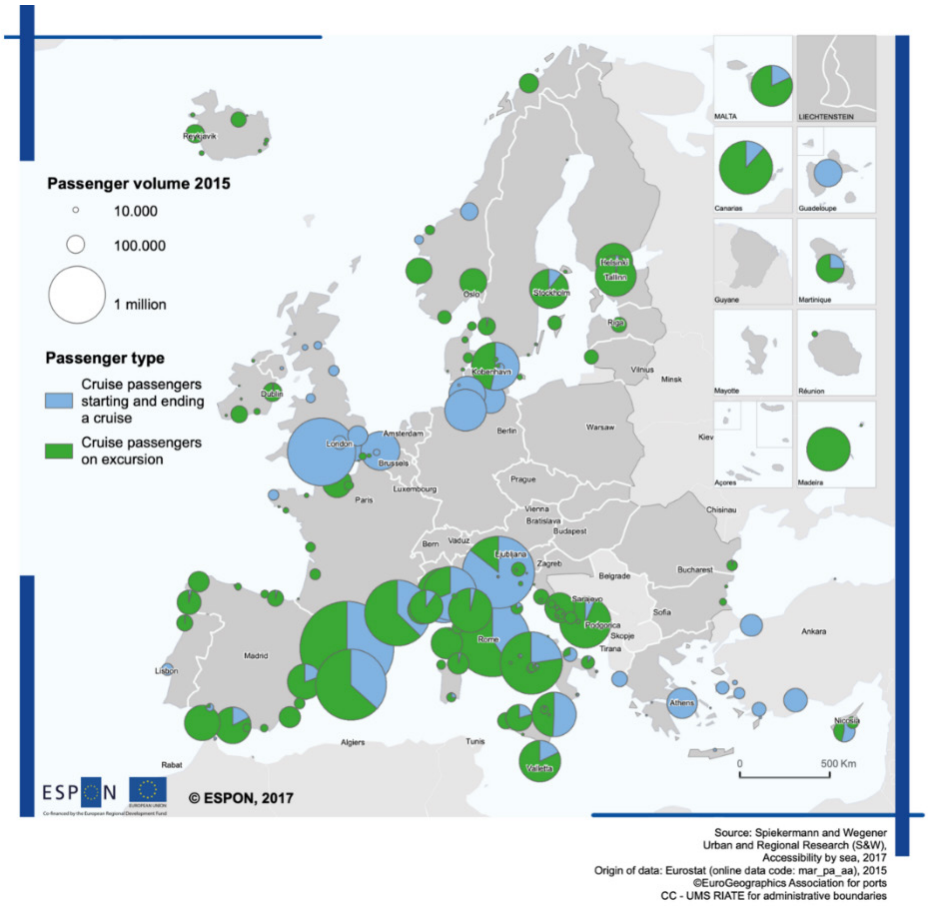
With regard to destinations the Caribbean/Bahamas/ Bermuda region is still by far the major destination to cruise (almost 40% of all the cruise tourists), followed by European destinations (25%), Asia/China (15%), Australia/ New Zealand/Pacific, NA West Coast/Mexico/Pacific and Alaska (each 3-5%). Only 1% makes a Transatlantic or World Cruise.

Within Europe the major destination areas are: Central/ West Mediterranean (3 million passengers), North Europe (1.7 million passengers), the Eastern Mediterranean (1 million passengers), the Baltics and the Canary Islands (each 450-500 thousand passengers). Germans (main destination North Europe) and the UK/Irish (main destination C/W Mediterranean) are by far the most cruise minded Europeans, followed by the Italians, Spanish and French, also the Swiss, Austrians and Norwegians are with 1.5-1.9% of the total population cruise-minded people.

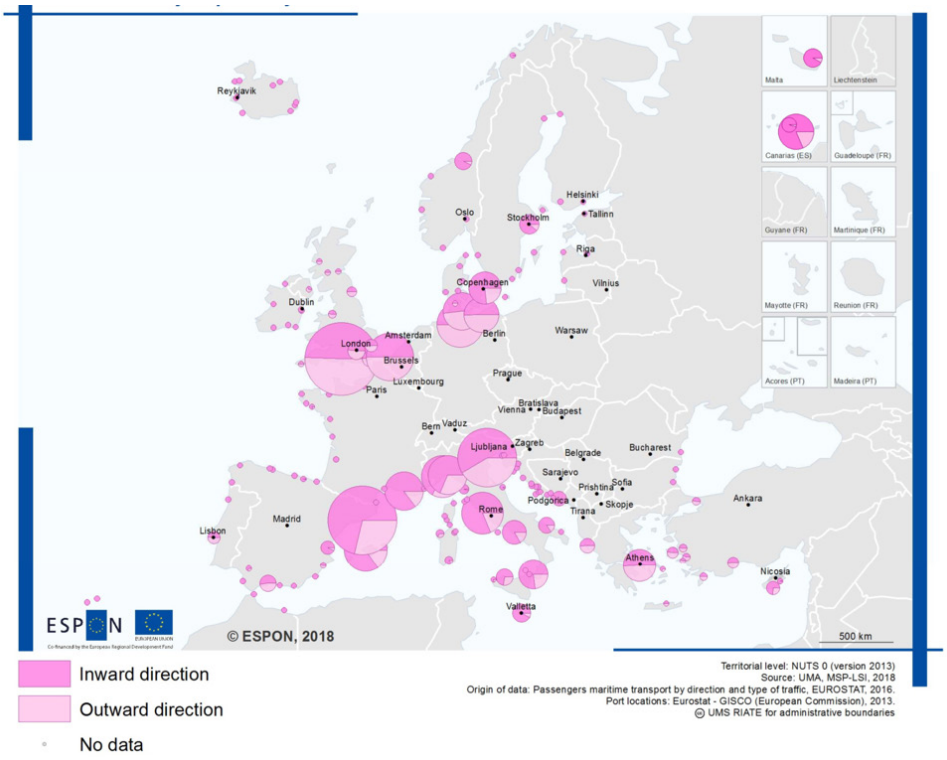
Map 6.2: *Major cruise destinations & Markets in Europe (Source: CLIA 2019, reworked by the Authors)*



Map 6.3: *Cruise passengers 2015 (at ports starting/ending or call for visit; source ESPON 2017)*



Map 6.4: *Cruise Tourism at European Ports 2016 (by direction; Source: ESPON 2019)*



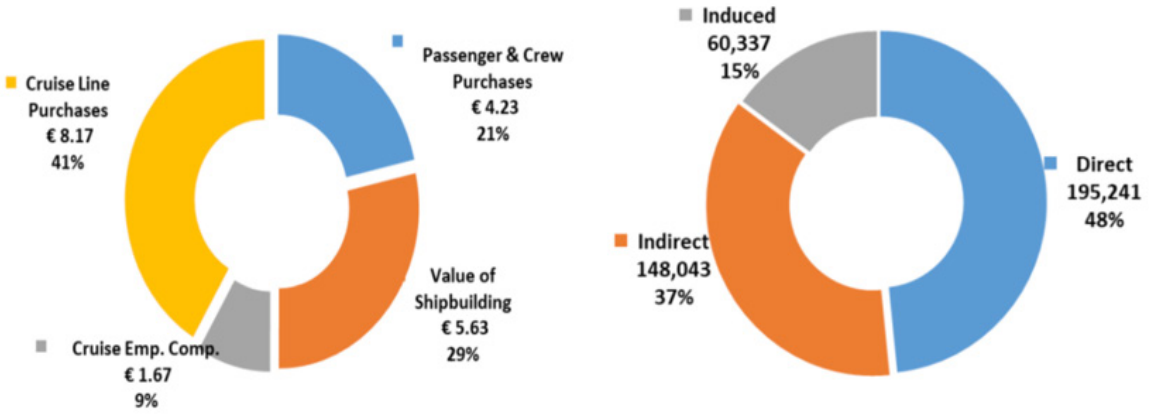
6.2.1 Economies of Scale

Akin to the maritime logistic sector itself, cruise tourism is dominated by the economies of scale. Since the mid-1990's the biggest cruise ships have more than quadrupled across tonnage (from 50,000 towards even more than 200,000), have grown a third longer (from some 260 meter towards 360 meter), almost doubled their widths (32 to 65 meter) and have more than doubled the total passenger numbers (from some 2,700 to 5,500-6,700 max). Moreover the sea cruise market is at the moment more or less dominated by four major global cruise line holdings, like The Carnaval Corporation & plc (120,000 fte), The Royal Caribbean Cruises Ltd. (RCCL) (70,000 fte), The Norwegian Cruise Line Holding (NCLH) (33,000 fte), and the MSC Cruises (23,500 fte), a daughter of the MSC (world's second biggest container shipper). Recently Asian liners have been introduced into the market. Regional players can still play a prominent role in specific regions or niche markets, these four conglomerates dominate more or less 90% of the global cruise market. Each of these cruise conglomerates have started to invest in facilitating tour operators, such as RCCL in the Madrid based travel agency Pullmantur, the German tourist company TUI and the Grand Lucayan Resort, turning it into Holistica and Freeport Harbour.

6.2.2 Economies of Scope

The The ESPON MSP-LSI report stresses the need for a local 'stickability' of the cruises revenues. Although the European economic benefits of cruise tourism in total have been estimated some €20 billion and 400,000 jobs in 2017 (CLIA 2018), only 1/5th of the direct cruise industry expenditures goes to the host port-cities. Excluding airfares, cruise passengers spent an average of some €80 at embarkation port-cities, and almost €65 at each port visits. Some report (Kester 2002, Klein 2005) this is estimated as less than 30% of the average expenditures of a normal land tourist, because cruise tourists spent the most of their holiday budget at the ship itself. Additionally due to the investments of the cruise liners in facilitating land-based resorts, hotels and travel agencies, parts of these investments still return into the pockets of the major cruise line conglomerates. There is a need for more policies in relation to recapturing the millions of euros of the host port-city to build a cruise ship dock or to adapt the harbour and fairways periodically to host the ever-bigger cruise ships (Brida and Zapata 2007).

Figure 6.5: *Direct cruise industry expenditures, and total employment impact in Europe 2017 (Source: CLIA, 2018b)*



6.2.3 Smart Cruise Tourism

Cruise tourism has got a major impact on the environment and local liveability. In 2002 Johnson identified for major impacts:

- Modifications to the natural and built environment in port-cities to serve as a cruise destination;
- Operational impacts related to the use of energy, water and the marine ecosystem;
- Impacts associated with transferring cruise passengers;
- Impacts related to recreational activities on wildlife and preserved historic areas.

Although some of these impacts have been restricted by the global MARPOL Conventions, Copeland (2008) has pointed the finger on the difficulties in implementation of these regulations due to the diversity of 'flag states' in which cruise ships are registered. In addition, and also due to the ever-growing attention for climate change, (nearby) accidents in mooring the massive cruise ships at fragile historic cities, have shocked the world in 2019 and increased the awareness for more sustainable operations. Therewith the ESPON MSP-LSI report stressed the need for more 'smart' MSP-LSI planning to support the sustainable development of the sector through for example enabling cruise berths on sea, or in a way that it protects economic, social, cultural and environmental interests at the local area itself.

EUROPEAN PROJECT EVIDENCES

The Economic Value of Outdoor Recreation on a Coastal Beach and Dune System in Ireland's Southwest, The Whitaker Institute, NUI Galway, Dept of Geography and Office of Public Works

Research Findings: This research is the first study to estimate the recreational value of Irish coastal beach-dune systems. A negative binomial individual Travel Cost Model (TCM) was developed using data collected through on- and off-site surveys in the Maharees and Castlegregory communities, Dingle Peninsula, Co. Kerry, West Ireland, during summer 2019. Consumer Surplus [CS] value of €3.09 per person per beach-dune visit was estimated, comparing favourably with CS values of Mediterranean destinations. Aggregated seasonal CS figures amount to €165k based on summertime visitation levels. Using survey data, summer visitors to Castlegregory and the Maharees spend in excess of €9m in the local economy through accommodation, food, recreation bookings, and transportation expenses. Additionally, a qualitative cross-comparison of over 30 alternate Irish coastal destinations named by survey respondents revealed that only Achill Island, Co. Mayo could match the Maharees in terms of fully providing the key natural amenities enjoyed by visitors. This finding highlights the Maharee's uniqueness and socioeconomic value for beach-dune recreation.

ESPON PROJECT EVIDENCES

ESPON Evidences: Policy Brief "Shaping new policies in specific types of territories in Europe: islands, mountains, sparsely populated and coastal regions"

Next to the MSP-LSI report, the Policy Brief on Islands, Mountains, Sparsely Populated and Coastal Regions (ESPON, 2017) dedicated a specific part in the chapter about accessibility to cruise toruism. Here cruise tourism is seen as an important source of tourism for many EU islands, provided the islands possess adequate port facilities to host cruise vessels. However, the study clarifies that it is important to differentiate between those port-cities that start or end a cruise and those port-cities where cruise ships are only doing a call at the harbour. In the first option passengers often need to stay over for at least a night to embark or to end their cruise, whilst in the latter the cruise call is often only used for a day excursion to disembark in the morning, embark again in the evening, have dinner and stay over the night on the cruise ship itself. Moreover, many passengers stay at the ship, since cruise passengers can find various attractions on board, including even golf simulators, ice-skating rinks, planetariums, boxing rings and others.

In this respect many port-cities in the Mediterranean Sea are only called for interim stops of a cruise, whilst larger ports in the northern parts of Europe are in addition also start or end points of a cruise. The only exception is Venice, and for a lesser part also Genoa, Civitavecchia, Savona, Barcelona, Palma Mallorca, Piraeus Athens, and some ports in Turkey, who also served significant passenger numbers in 2015 to start or end a cruise.

7.
Energy

Offshore energies are a key growth sector of the blue economy. The term blue economy in EU parlance refers to both established and emerging economic sectors that occur in the oceans and seas. The blue economy directly employs over 4 million people in the EU and accounts for 1.3 % of EU GDP (European Union, 2020). Traditional sectors, such as shipbuilding and offshore oil and gas industries, are in decline whilst sectors such as offshore wind and blue biotechnology show positive signs of growth. MSP can enable the development of many blue economy sectors by increasing stability, transparency and predictability of the business climate, particularly through zoning for specific uses and also by stimulating greater coordination and clarity in relation to consenting and licensing processes. This means that MSP can also assist developers in identifying new spatial locations for their activities.

There are significant differences in the sectors that contribute to the blue economy from different sea basins. Offshore wind and ocean energy development are key drivers for Blue Growth policy across northern Europe. In the southern Atlantic, Mediterranean and Black Sea sea-basins the focus is on new combinations of maritime economic sectors (Przedrzymirska et al., 2018), possibly due to increasing competition for sea space. In recent years, multi-use has been advocated as a way of minimising pressures on marine space and a potential favourable outcome from MSP, with the EU funding a number of research projects on the topic (e.g. TROPOS, MERMAID, H2Ocean, MUSES, MARIBE, SUBMARINER, MUSICA). This differs from single-use planning in that the same ocean space can be allocated to and used by multiple uses where possible to maximise spatial efficiency and productivity (Schupp et al., 2019).

7.1 Blue Energy

Blue energy refers to offshore wind, wave and tidal energy. It is widely acknowledged as a key source to provide utility scale electrical power to meet rising demand for electricity, in a clean and sustainable way. Given the climate urgency and ambitious goals towards the achievement of the United Nations' Sustainable Development Goals (SDGs), growth of the Blue Energy sector brings new challenges to spatial planning and strategic policies. The Territorial Agenda 2030 states that MSP should be integrated into the existing planning systems to promote sustainable development of a land-sea continuum. In this sense, the fostering of blue energy technologies must be oriented towards an integrated management of infrastructures, activities, nature, space and people. Such integration is often difficult due to the intensity of land-sea interactions, the numerous sectors operating in the sea, the transnational character of certain economic sectors and the need to ensure sustainable human-nature relationships. Spatial planning is a key factor in answering such challenges.

7.2 LSI and Blue Energy

New activities and investments in the blue energy field are expected to intensify the magnitude of hot spots of LSI in certain locations. This results in more pressures on natural species, habitats and ecosystems in those regions, but also raises important questions on how to deal with the momentum of blue energy within areas that already support multiple activities and associated infrastructure such as harbours, ports, fishing activities and other local pressures. In addition, there are also important aspects related to the social and economic activities performed in the locations where new technologies might be placed. To avoid the uncontrolled intensive use of the space available at coastal areas and nearshore locations, blue energy technologies are now looking for multi-functionality and interaction with other sectors, as a factor to enhance offshore energy technologies based on optimised spatial usage.

The growth of blue energy creates new dynamics in population movement. As a new and developing industry it is expected to result in increased employment and economic growth in peripheral and sometimes deprived coastal regions (EC, 2014). As a result, housing marketz, population distribution and resources consumption may change, the hinterlands may face lack of working-age people and the disparities in the GDP distribution may increase. Spatial planning and management of newly populated or growing areas becomes a key challenge, further strengthening the argument for integrated land and sea planning. New activities and technology developments increase the need for highly skilled jobs in places where such skills may not be present, thus implying the creation of new infrastructures to support to such learning needs.

Along with the social dimension, the environmental aspects are also complex and can be decisive. Many coastal regions also host Natura 2000 areas, and if in the same area as a proposed offshore energy project, this can lead to additional consenting requirements and environmental monitoring. Coexistence with Natura 2000 sites highlights the need for space optimization. Also, the effects of energy installations on their surrounding areas can be closely monitored through pilot studies and licensing conditions to ensure interactions with the receiving environment are understood and inform future planning processes. This learning-by-doing methodology based on pilot studies can then be translated into clear choices and criteria regarding future locations for blue

energy equipment. This becomes particularly important in the North Sea basin due to the quantity of transnational relationships and the numerous interactions between countries and sectors, meaning that MSP policies must be aligned and coherent.

Currently, transnational planning on LSI and energy resources indicates there is room for improvement, namely, in relation to energy issues, including licensing procedures, environmental management, marine conservation, infrastructures investment, proper planning of land-sea grid connections, etc. Such improvements can boost offshore renewable energy with additional efficiencies from cross-border coordination, more certainty in planning for developers, stakeholders, and expanded opportunities from shared infrastructures, and local dynamics at social and economic level.

A good example of multi-use is the placement of wave energy converters within coastal infrastructures such as in harbours, ports and breakwaters (Cascaio et al.,2019; Cabral et al., 2020). In these studies, energy converters are built into the cross-section of breakwaters and harbour structures, so that land usage is optimised and the energy connection is made directly to the ports' grid to reduce their ecological footprint. The North Sea basin is rich in the number of coastal infrastructures that could be studied for the multi-use and integration of similar energy converters. This could provide a considerable boost for blue energy use while improving the sustainability and energy self-sufficiency in many major ports. National and local spatial planning and management policies of coastal areas and infrastructures should encourage multi-purpose uses, as advocated in the MSP Directive. According to the European Commission (2014), ocean energy has the potential to create new, permanent, high-quality jobs in project development, component manufacturing and operations.

Blue Energy at the North Sea – A Case Study

The North Sea is an inland sea of the Atlantic Ocean in North Western Europe with considerable wave power potential, estimated at a maximum of approximately 11KW/M (Beels et al., 2007). The fact that the North Sea shelf has considerably small water depths in comparison with the Atlantic coasts and other locations, makes it a particularly interesting place for blue energy deployment, including tidal and ocean energy technologies. The attractive energy potential, along with the experience and potential synergies with oil and gas and offshore wind makes the North Sea one of the most interesting places for blue energy. By the end of 2016, alongside the deployment of several single wave and tidal energy devices, the first tidal energy farms were installed and connected to the electricity grid. Even though marine energy is geographically distributed and abundant, some types of energy, such as wave energy, are better distributed than others, e.g. tidal range energy is more suitable to places with large tidal variations. Blue energy projects are often place-driven, meaning they can only occur where there is an available and usable wind, wave or tidal resource. They do not only depend on the energy potential itself but also on the macro-interaction between maritime policies and planning of different countries, locals and the numerous activities operating in those coastal regions.

Unlike offshore wind, many ocean energy technologies, are at a very early level of maturity, thus meaning that the time for coherent investments and impactful planning policies is now. The attractiveness of blue energy investments has social and economic effects that are complex. These need to be wisely managed to avoid the increasing economic gaps between urban and rural regions and populations, as well as to reduce the impacts on more traditional sectors such as fisheries, maritime transport and navigation routes. This is clearly recognised by the main findings of the ESPON project NORTHSEA STAR (ESPON, 2013), which points out that social learning, social changes and decisive social partners are among the most important criteria affecting the energy transition.

Map 7.1: *Offshore Wind Farms in the North Sea at the different stages of development (Source IEA, 2018)*

ESPON PROJECT EVIDENCES

ESPON Locate Project

The ESPON Locate Project considers the policies/actions required to ensure a smooth transition to a low-carbon economy/lifestyle. In term of tidal wave energy, the project records the greatest potential to be in Northern and Western Europe. However, harnessing this energy source is hampered by most of the maritime technologies not being 'market-ready'. With few significant installations, there is hardly any exploitation of tidal/wave energy within Europe to date.

NORTH SEA STAR – NSS

The ESPON North Sea Star Project (concluded in 2014) aimed to provide a deeper understanding of the most likely future energy scenarios for the North Sea Region; while recognising that the region faces many of the same energy challenges as the rest of Europe. The project notes that energy policy is a multi-dimensional, multi-faceted and extremely complex area of policy. Shifting to renewable energies, while becoming (relatively) energy self-sufficient, will involve substantial investment in the energy infrastructure. Eight case studies of energy projects funded under the North Sea Region Programme and two energy project clusters, Low Carbon Regions in the North Sea (LOWCAP) and Energy Vision North Sea Region (EVNSR) were examined as part of this project. Through the case studies, a broad range of activities – and their potential impacts – were considered: from incorporating energy efficient construction techniques into new buildings, facilitating the use of alternative sources of energy (biomass from algae and biochar), innovation in smart grids and demand management, policy integration and building capacity in organisations to support the energy transition. Whilst acknowledging that "existing energy systems tend to be very difficult to 'dislodge'", the study concludes that the North Sea Region is well equipped to make the transition towards a low carbon economy. In considering a number of alternative scenarios, Scenario 2, "Zero Carbon Society", was unanimously recommended as the target for the North Sea Region in line with the EU's Energy Roadmap 2050.

ESPON ReRisk Project

The ESPON ReRisk Project (2008-2010) acknowledges that coastal regions tend to have a high potential for onshore and offshore wind and could offer opportunities for developing wave and tidal energy technologies. In strategic planning terms though, the project notes there are challenges between planning "offshore wind parks or advanced ocean technologies and existing security issues, fishing interests, cargo traffic, tourism or protection of marine biodiversity" (ESPON, 2010: 70).

8.

Marine pollution

Annex III of the MSFD provides a concise overview of potential anthropogenic pressures on the marine environment and uses and human activities in or affecting the marine environment. While focusing on the Atlantic marine region, the Table below gives a clear overview of the very complex land-sea interaction affecting the marine environmental status:

- Physical restructuring (e.g. canals, coastal defence, dredging, offshore structures)
- Extracting of non-living resources (e.g. oil and gas, sand, minerals, salt)
- Production of energy (e.g. wind energy at sea, non-renewables, energy transmission)
- Extracting and cultivation of living resources (e.g. fishing, mariculture)
- Transport (e.g. transport facilities, shipping)
- Urban and industrial uses (e.g. urbanisation, waste water, industrial waste water)
- Tourism and leisure infrastructure and activities
- Others such as military defence, scientific research

Table 8.1 *Activities potentially causing marine pollution*

Table 4 Coverage of activities reported by Atlantic marine region Member States

Activity	Short name	BE	DK	FR	DE	IE	NL	ES	SE	UK
Energy production: Marine-based renewable energy generation (wind)	RenewableEnergy			■	■	■	■		■	■
Energy production: Marine hydrocarbon (oil and gas) extraction	OilGas				■	■	■	■	■	■
Extraction of living resources: Seaweed and other sea-based food harvesting	SeaweedOther Seafood					■		■	■	
Extraction of living resources: Extraction of genetic resources/bioprospecting/maerl	GeneticBioprospectMaerl					■				
Extraction of living resources: Fisheries incl. recreational fishing (fish and shellfish)	Fisheries		■	■	■	■	■	■	■	■

Figure 8.1 *Thematic summary of the different policy progress at European level (Source: EEA, 2019)*

Thematic summary assessment

Theme	Past trends and outlook		Prospects of meeting policy objectives/targets
	Past trends (10-15 years)	Outlook to 2030	2020
State of marine ecosystems and biodiversity	Trends show a mixed picture	Deteriorating developments dominate	☒ Largely not on track
Pressures and impacts on marine ecosystems	Trends show a mixed picture	Deteriorating developments dominate	☒ Largely not on track
Sustainable use of the seas	Trends show a mixed picture	Developments show a mixed picture	☐ Partly on track
Marine protected areas	Improving trends dominate	Developments show a mixed picture	☑ Largely on track

Note: For the methodology of the summary assessment table, see the introduction to Part 2. The justification for the colour coding is explained in Section 6.3, Key trends and outlooks (Tables 6.2, 6.3, 6.4 and 6.5).

8.1 Measures to combat marine pollution

As noted earlier, the MSFD aims to achieve Good Environmental Status of the EU's marine waters by 2020, with each MS having to adopting a programme of measures by 2017. These measures are national or international measures aimed at reducing a specific land based or marine activity pollution source, often by limiting a certain activity. For example, Belgium has defined measures concerning the maximum limitation for the introduction of hard substrates, as well as the follow-up of environmental impacts repercussions of the offshore wind farms. Other measures relate to existing international legislation, e.g. for shipping, Belgium ratified the Ballast Water Management Convention (IMO) which entered into force in 2017.

In Special Protected Areas (Birds Directive, SPAs) and Special Areas of Conservation (Habitat Directive, SACs) Member States can adopt specific and stronger measures. Belgium for instance, has a list of banned activities in SPAs (high speed ships, marine sport competition, construction, industries, dumping of dredged materials) since 2005 (Royal Decree of 14th October 2005) and limits fishing activities and conserve the gravel fields within the SAC 'Vlaamse Banken' to protect the seabed (Milieu Ltd. et al., 2017). SPAs and SAC form in Belgium together 37 % of the marine waters.

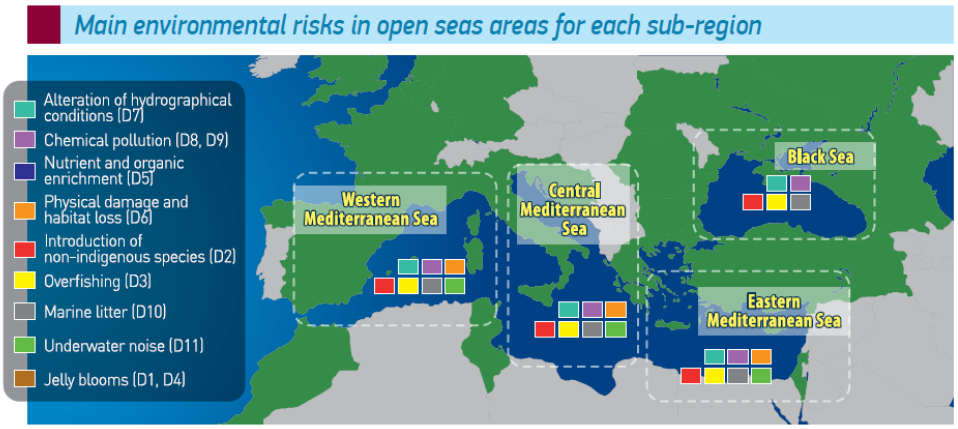
8.2 The Black Sea and marine pollution

The Black Sea remains one of the seas most heavily impacted by human activities in the world. A combination of features renders its ecosystem highly sensitive to pressures from such activities. Scientific evidence on the ecosystems of the Black Sea remains very limited compared to other seas (European Commission, 2019a).

The Convention on the Protection of the Black Sea against Pollution (also referred to as "Bucharest Convention") was signed in Bucharest in April 1992 and ratified by all six Black Sea countries. It forms the basic legal framework for regional cooperation to protect the coastal and marine environment. Population in the coastal zone is growing in Bulgaria, Russia and Turkey and decreasing in Romania and Ukraine. Coastal erosion is increasing. The leading sectors are tourism, food processing, agriculture and transport, including shipping. Oil trans-shipment has a large impact on the environment. On 8th May 2019, the European Commission together with the Republic of Bulgaria, Georgia, Romania, the Russian Federation, the Republic of Turkey, Ukraine and the Republic of Moldova have launched a Strategic Research and Innovation Agenda for the Black Sea (SRIA). Some aspects are quite relevant for marine pollution: integrate LSI to the deep basin, ocean-engaged citizens, and incentives for innovation in developed blue sectors: living resources, transport and tourism; nurture emerging Blue Black Sea sectors: energy, aquaculture and biotech.

The Commission on the Protection of the Black Sea Against Pollution[9] is the central organization in which the 6 member states cooperate to reduce marine pollution and revive the marine environment of the Black Sea. The Black Sea is exposed to many threats that need to be addressed urgently such as overfishing and unregulated fishing, marine pollution, uneven development of aquaculture and invasive species are the most important threats, although not the only ones. The decline of marine living resources were generated by: eutrophication (sources from agriculture, municipal waste, industry) and harmful substances (sources from agriculture, industry, municipal waste) (Perseus, 2015). Given the large amount of pollution sources with interacting pressure on the environment, the impact of each individual source is not always straightforward to determine.

Figure 8.2 *Main Environmental risks in open seas for the Mediterranean and Black Seas (Source: CPBSP 2017)*



[9] See http://www.blacksea-commission.org

The policy questions for the near future related to marine pollution are given in the Black Sea Integrated Monitoring and Assessment Program as follows (CPBSP, 2017):

1) What is the level of nutrient enrichment/eutrophication? Are the national and regional efforts to combat eutrophication effective and do we see them reflected in the level of nutrient loads and change in eutrophication-related impacts?

2) Which are the Black Sea specific priority pollutants and what is their impact on ecosystems and human health? Does pollution reduction occur? Are the measures introduced efficient?

3) Is bathing water quality safe for human health?

4) What is the response of biodiversity to pollution (including bio-pollution) and eutrophication, and what is the extent of habitats destruction/revitalization? Are the measures taken efficient?

5) Does biota contamination exceed the human consumption safety limits? Are the measures taken efficient?

6) How do overfishing, pollution (including bio-pollution) and eutrophication affect the stocks of major marine living resources?

7) What is the impact of increasing oil/gas exploration and exploitation activities in the Black Sea?

8) What are the effects of climate change? What are the measures taken and their efficiency?

9) How much are coast and sea-floor integrity destroyed and what is the Black Sea ecosystem response to this disturbance?

10) What are the long-term trends in hydrographical conditions and what will be the consequences for the Black Sea ecosystem?

11) What are the levels of marine litter in the Black Sea and how to minimize its impact on marine organisms, especially on cetaceans?

12) What are the levels of noise pollution in the Black Sea and how to reduce the risk from noise pollution for fish and cetaceans in the Black Sea?

EUROPEAN PROJECT EVIDENCES

EMBLAS – results

83% of the marine litter (see also Suaria et al, 2015) found in the Black Sea is plastic, namely bottles, packaging and bags. The large rivers (in Ukraine study included the Danube and the Dniester) bring between 6 to 50 items of litter per hour to the sea. The amount of marine litter in the Black Sea is almost twice as high as in the Mediterranean Sea (90.5 vs. 50 litter items / km2). Microplastics were found in the sediments of the Black Sea both in its shelf parts and in the depths of more than 2,000 m.

The concentrations of some priority hazardous chemical substances dangerous for marine and human life exceed their toxicity threshold values. Among these substances were benzo(a)pyrene, several pesticides, insecticides and also mercury and flame retardants in fish. In addition, 124 chemicals dangerous for the sea ecosystem and human health were identified including persistent organic pollutants, metals, pesticides, biocides, pharmaceuticals, flame retardants, industrial pollutants and personal care products. These substances had not been monitored earlier and they will be proposed to be included for regular monitoring (EMBLAS, 2019).

ESPON PROJECT EVIDENCES

Territorial Scenarios for the Baltic Sea Region – BT2050

BT2050 has been exploring a variety of territorial development challenges and trends that might shape the further development of the Baltic Sea Region (BSR) – which includes Poland, Belarus, Lithuania, Latvia, Estonia, Finland, Norway, Sweden and Denmark as well as North-West Russia and Northern Germany. Three scenarios were developed for the Baltic Sea Region.

- A Baseline Scenario – a continuation of current trends (e.g. steady economic growth, the inflow of immigrants) and policy practices (e.g. EU political integration) over the coming three decades; leading to continued growth in the urban-rural divide with bigger cities continuing to generate economic power while the rural areas will continue to decline.
- Well-being in a circular economy: a RE-mind of a good life - envisaging a transition towards a circular economy where smaller cities and towns will become more prominent, potentially resulting in a boost to local production.
- Growing into green-tech giants: the ecological footprint clear-up – centred on the BSR becoming a giant in green technological advancements and innovation.

The Baltic Sea is heavily polluted and any increase of activity – even to promote the 'green' agenda – will put additional pressures on the ecosystem. In looking to alternative scenarios, the development of a sustainable blue economy is highlighted as offering a solution to replace less sustainable industries, energies and practices (European Commission, 2019a). In terms of integrated action, there is a recognised need to use the Baltic Sea assets wisely. This includes spatial planning on a cross-border basis, where evolving technological advancements could play a role; or using maritime assets to adapt to climate change (e.g. shifts to renewable energies/energy storage), nurturing water/'blue' and green cross-border clusters, supporting economic development (e.g. growth of the green economy, strengthening of sea connections between BSR and Asian ports) and advancing a resilience agenda (e.g. Sweden currently produces less than 50% of the food it consumes).

9. Mariculture

9.1 Status and drivers of the sector

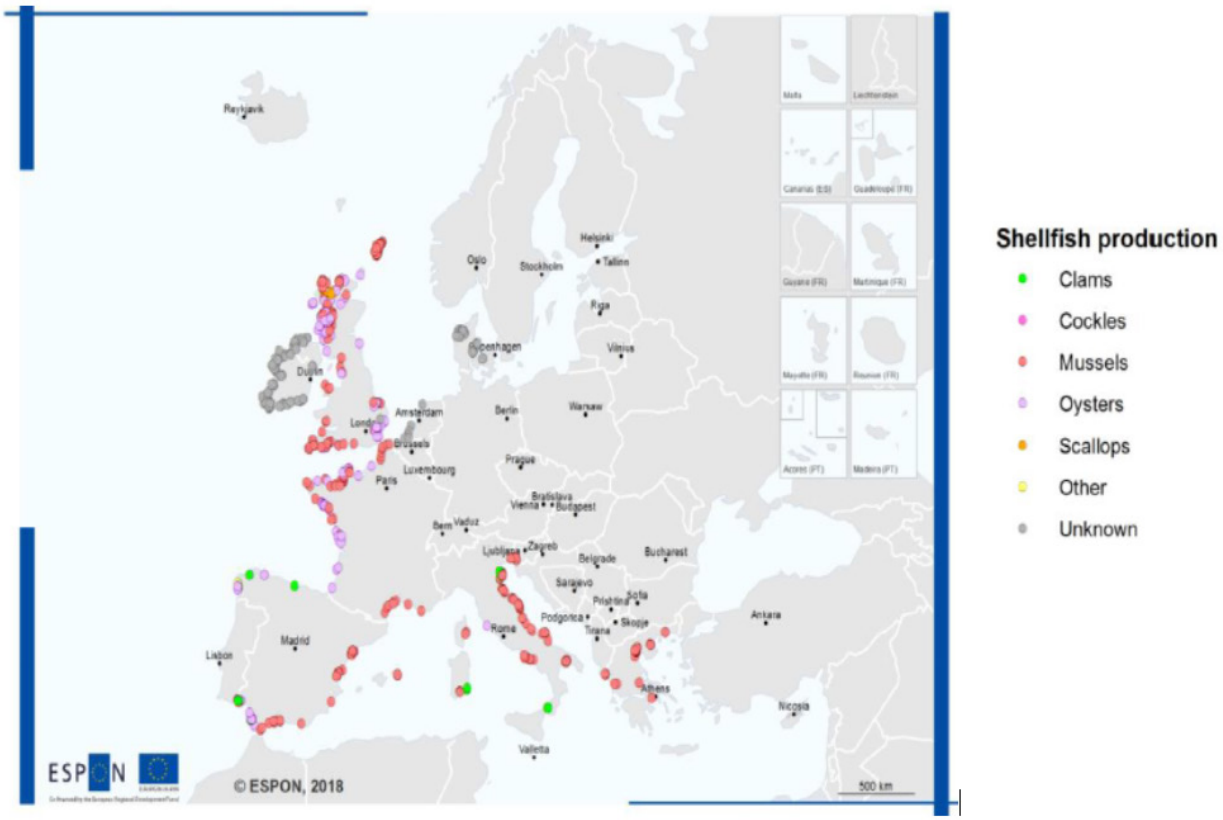
Mariculture, or marine farming, is the cultivation and harvest of the food of the seas (seaweed, molluscs, crustaceans, etc.) in their natural environment. The European Commission's Blue Growth strategy, adopted in 2012, identifies aquaculture (incl. mariculture) as one of five emerging sectors of high potential for job creation and innovation; others including coastal tourism and ocean energy also covered in this Briefing Paper.

EU aquaculture production has been stagnant in the last decades, not participating in the global increase of aquaculture production. The EU is the largest importer of seafood in the world. Its self-sufficiency in meeting a growing demand for fish and aquaculture products from its own waters is 45%. However, the turnover and economic performance of the EU aquaculture sector have increased over time. Aquaculture has been identified as a sector with a high potential for sustainable jobs and growth in the Blue Growth Strategy (European Commission, 2019b).

In the EU, mariculture is responsible for about 20% of the EU's fish production and directly employs some 80 000 people (ESPON, 2019c). Mariculture is seen as having the potential to boost growth and jobs in EU coastal and inland areas and it is envisaged that close cooperation with the processing industry can further improve job creation and competitiveness in both sectors.

EU aquaculture production is mainly concentrated in five countries: Spain, the United Kingdom, France, Italy and Greece (STECF, 2018). But mariculture is a growing activity also in other countries such as Slovenia (ESPON, 2019b).

Figure 9.1 *European shellfish production in 2019 (ESPON, 2019b)*



9.2 Mariculture at the land-sea interface

The main motivations to consider mariculture and specifically large scale offshore aquaculture as a potential important offshore activity in the future are the potential of mariculture in (i) the regenerative developments of the North Sea and oceans worldwide to boost biodiversity and (ii) as elements in mitigating the effects of climate change given their capacity to capture CO2, (iii) the optimal use of marine resources and (iv) need for multi-functionality of the marine space.

Increasing demand and consumption from a growing global population are driving further expansion of both inland and marine aquaculture (i.e., mariculture, including marine species farmed on land). However, the growth of mariculture is dependent on the availability of suitable farming areas for new facilities, particularly for open farming practices that rely on the natural oceanic environmental parameters such as temperature, oxygen, and chlorophyll (Oyinlola et al., 2018). Particularly, most offshore areas considered environmentally suitable are not being used for farming activities. Oyinlola et al., 2018 therefore suggest that the lack of environmentally suitable area for mariculture is not the main limiting factor for the expansion of mariculture in most regions of the world. Instead, competition for space by other sectors such as tourism, shipping, as well as the availability of a good policy framework are the two main factors hampering aquaculture development.

Aquaculture may compete in the access to space with coastal tourism, ports, shipping, offshore oil and gas, marine mining (aggregates) and fishing. Synergies may exist with offshore windfarms (e.g. multi-use platforms) (EC, 2019). In the past, the focus for offshore developments was on mono-culture, i.e. marine traffic, wind energy production. In the future, offshore projects will need to be able to capture the regenerative potential, provide ecosystem services and therefore have to guarantee a sustainable multi-use of the scarce space at sea. Future projects need not only to apply regenerative development for the offshore space, but need to contribute to increase bio-diversity and implement the role of offshore developments in climate change mitigation and adaptation measures. This implies that not only energy production (by wind, waves, tidal, floating solar) and energy storage (by artificial islands, hydrogen production), but also the integration of mariculture in a sustainable bio-diversity increasing way will be a necessity.

Traditionally, mariculture has taken place at the LSI, in intertidal areas, estuaries, and sheltered bays. While calm waters and easy access make nearshore seafood farming attractive, some environmental impacts and conflicts with other uses are accentuated in the increasingly crowded coastal zone. Advances in technology and culture methods have made it possible to establish farms further from shore and in rougher open-ocean conditions, opening up new expanses to potential aquaculture farming (Gentry et al., 2017).

Finally, mariculture raises a range of territorial planning issues related to the provision of: suitable sea/coastal space for hatching, nursing, and raising of stock including in fish farms; port landing; processing facilities; and transportation infrastructure enabling speedy delivery of produce to final consumers (ESPON, 2019b).

EUROPEAN PROJECT EVIDENCES

Mariculture – case study for the Belgian Part of the North Sea

The Marine Spatial Plan for the Belgian part of the North Sea provides a unique opportunity to integrate ecosystem based solutions. Not only areas for energy generation and storage, pipelines and cables are defined, but also specific areas for (marine aquaculture) mariculture. With the Marine Spatial Plan 2020-2026, a framework for an additional wind zone of more than 220 km²has been established, including combination with mariculture. As such the offshore wind sector and the mariculture sector will affect and could support each other. In Belgium, the first research projects are on the way to study the operational multi-functionality of offshore windfarms and off-shore mariculture projects. It is recognised that the rough North Sea with its erratic waves and strong winds makes it hard to harvest offshore mariculture and that future research needs to focus on (i) improvement of the harvesting techniques, (ii) area site selection (e.g. windmill farms) and (iii) diversification towards other species and types of mariculture, but also on (iv) the chance of survival of these mariculture structures off-shore in extreme storm conditions, their interaction with other infrastructure in view of installation, mooring, operation and maintenance. Other outstanding aspects like environmental impact, legislation and consenting, insurance, bankability and economic viability are still in embryonal phase.

“EDULIS”, studied the feasibility of mussel culture in offshore wind farms, 30 to 50 kilometres off the Belgian coast. In May 2017 a first experimental mussel culture system was installed in the C-Power wind farm. At this location mussel seed capture and further mussel growth is being monitored. Regular mussel sampling results are being linked to the prevailing environmental factors to document mussel growth. In November 2017 a second mussel culture system was placed in the Belwind concession.

A second research project is “WIER & WIND”, an INTERREG project aiming to demonstrate the technical and economic feasibility of large scale seaweed cultivation in offshore wind parks. This 3-years-project, started in 2019, has the aim of installing and running a 2 Ha seaweed farm nearby a windmill park in the North Sea on the border between Flanders and The Netherlands.

10.
Key analysis and recommendations

In summary,

- There is a real difficulty with defining resilience and even more so once MSP added in - when we think of resilience and marine environment, it is often in relation to coastal and marine communities and how they respond to contemporary (often climate change related events).
- The key seems now to anticipate change, there is need to focus more on LSI, what it means practically (there is no one definition of LSI) and specifically how can MSP (in all the topics we've looked at) support resilience?
- We now need to think about adaptive capacity and resilience to mitigate effects of climate change.
- Coastal communities are more likely to face economic loss and ecosystem function and services loss. How do we reduce future risks, ensure EU policies are Climate Proofed.
- A key challenge is to align sectoral management and wider integrated management frameworks (such as MSP) to the terrestrial counterparts/equivalents.

Key aspects concerning LSI in marine and coastal planning are:

- It is deemed appropriate to consider afresh how far MSP is capable of going beyond a sea-based remit to fully address LSI issues and agendas.
- MSP has relatively limited opportunities to effectively deal with LSI issues on its own and working in isolation. From a maritime sector perspective, this is in part because many, if not the majority of the impacts, effects and needs associated with LSI are felt on the land and, are therefore, beyond the direct scope of MSP. The management of LSI should take into account the interactions of planning processes and plans for land and sea areas.
- EU and MS competences can come into conflict in respect to LSI, coastal planning is a MS competence (not EU) so a key challenge is how this can be addressed effectively.
- It is important to ensure that legal, administrative, consultation and technical processes are coordinated to avoid unnecessary duplication, incoherence, conflicts, waste of resources and/or excessive demand of stakeholders' efforts.
- The challenge is to plan and manage inshore and offshore activities in a harmonised manner considering the functional integrity of the land-sea continuum.
- The achievement of this coherence also requires alignment/integration of the different approaches, methodologies and tools applied respectively on land and at sea.
- Much greater emphasis needs to be placed on identifying and influencing suitable implementation mechanisms that may fall beyond the narrow scope of MSP or terrestrial planning.

For MSP-LSI

Additionally, there are environmental impacts related to blue energy growth, which are of greater importance to ensure a sustainable exploitation of sea resources. For example, unlike offshore wind farms and near shore oil and gas platforms, a vast majority of blue energy devices related to wave, tidal and oceanic currents are often submerged, thus having less impact on the visual pollution levels. This could be a positive impact of alternative harvesting technologies in the North Sea basin, which is a place of high concentration of offshore wind farms. However, the bottom placement of these converters brings additional challenges in terms of the aquatic fauna and flora species that might be affected by the presence of large energy farms beneath sea surface. This is also extendable to aquaculture and fishing, ships and vessels routes, sub-sea cable landing and many other sea-related fields of activity. Thus, multi-functionality may have its limitations, particularly in the cases where the species and habitats are highly sensitive, e.g. offshore locations, but also on coastal regions where the space occupation is already very intense. While wave, offshore solar panels and tidal current devices might be implemented in hybrid platforms from offshore wind, they surely have more difficulties in coexisting near aquaculture farms or small fisherman's areas. These are common challenges in blue energy economy

that spatial planning needs to attend to. Such problems are only minimised by means of optimised spatial planning and licensing strategy along with an efficient data and synergy development between the blue energy sector and the remaining ones.

For MoS

A revision of the MoS concept is expected at the EU level, due to concerns regarding Brexit and inward migration. Additionally, the contribution of maritime transport to climate change policies are questioned, due to ongoing pollution from the maritime sector. SSS has been proven to enhance new opportunities for smaller EU harbours against the overwhelming dominance of the major EU-gateways in international (mainly container) trade routes. SSS could also provide a contribution to more sustainable LSI logistics.

- SSS looks promising for (also) smaller harbours, but how to ensure sufficient and sustainable door-to-door logistics?;
- In this regard we probably need to become more focussed and situational, on what can be best done on inland (multi-modal) routes, and what through SSS;
- Such a new strategy would also need to include missing links through Brexit
- ESPON could deliver preparing studies for such a strategy with regard to 'which routes, for which goods', ' property and economic value of key points', major physical or institutional bottlenecks, relations to 'circular economy' and the like.

Climate Change and Coastal Communities

- Climate change represents an evolving challenge facing MSP. The impacts of climate change such as sea level rise will cause a redistribution of marine ecosystems goods and services, which, in turn, will result in relocations, conflicts of use and further environmental impacts.
- Incorporating climate adaptation and mitigation measures into MSP policy will result in reduced vulnerabilities across the marine socio-economic-ecological system.
- There is a need to raise awareness of the anthropogenic impacts of climate change on various ocean basins – and the learning to be shared.
- For coastal communities, greater emphasis must be given to establishing an agreed approach to measuring vulnerability assessment.
- As climate changes, and sea levels rise, greater research is required into the stresses on coastal ecosystems that provide economic opportunity, recreation, habitats, energy, food, and protection from storms – and the inter-relationship between them.
- Need to move away from a marine sectoral approach in adaptation planning to a more holistic approach.

For Coastal Tourism

- Coastal zones offer blue spaces that are at risk of over-tourism and must be recognised as stressed environments due to impacts from climate change.
- Physical changes in these environments will cause wide ranging socio-economic impacts globally, which will have negative impacts on the coastal tourism sector.

For Cruise Tourism

- Need to rethink the cost-benefit value of Cruise Tourism especially for those harbours which are only called;
- Need to rethink the concept of Cruise Tourism with regard to climate change, threats (like terrorism and epidemics) and vulnerable (ecologic, historic....) features at land and sea;
- What could an economies of scope mean for Cruise Tourism next to or instead of an economies of scale?;
- What could the latter mean for new employment possibilities in EU, especially in/around the Mediterranean countries?; and

- There is also here a need to develop a new EU-wide strategy for Cruise Tourism in a post-corona period, and ESPON could deliver new studies for that with regard to the above.

Blue Energy

- Transnational planning on sea-land interaction and energetic resources shows room for improvement, namely, in energy issues, including licensing procedures, environmental management, marine conservation, infrastructures investment, proper planning of sea-land grid connections, etc.
- Such improvements can boost marine renewables with additional efficiencies from cross-border coordination, reduced planning uncertainty for developers and boosting local dynamics at social and economic level.
- The spatial planning policies and management policies at coastal areas and infrastructures might be important to boost the multi-functionality of blue energy concepts.
- Raise the awareness on the crucial role of an early spatial planning and policy making to ensure a controlled and positive evolution of the industry, while focusing on the social and environmental needs.

For Blue Economy

- MSP is a powerful tool for Blue Growth, but it can only realize its full potential by being strongly interconnected not only with the whole set of other Blue Growth measures but also as part of the overarching framework of an IMP.
- A key is to minimise conflicts for sectors operating in same spatial areas – big issue is that Blue Growth strategy does not recognise resilience.

Marine pollution

- With the MSFD, aiming to achieve Good Environmental Status of the EU's marine waters by 2020, there is a legal framework to implement measures aimed at reducing a specific land based or marine activity pollution source.
- The Black Sea remains one of the seas most heavily impacted by human activities in the world : Population in the coastal zone is growing increasing the amount of municipal waste, coastal erosion is increasing, tourism, food processing, agriculture and transport, including shipping and finally oil trans-shipment all have a large impact on environment.
- The development of a sustainable blue economy could offer a solution to replace less sustainable industries, energies and practices

Mariculture

- Not only energy production (e.g. by wind, waves, tidal, floating solar) and energy storage (e.g. by artificial islands, hydrogen production), but also the integration of mariculture in a sustainable bio-diversity increasing way will be a necessity.
- Traditionally, mariculture has taken place at the LSI where easy access make nearshore seafood farming attractive, but environmental impacts and conflicts with other uses are accentuated. Advances in technology and culture methods have made it possible to establish farms further from shore, opening up new expanses to potential aquaculture farming.
- Aquaculture may compete in the access to space with coastal tourism, ports, shipping, offshore oil and gas, marine mining (aggregates) and fishing. Synergies may exist with offshore windfarms (e.g. multi-use platforms). Informed siting decisions today about farm location and density can and should be made today, using sound MSP principles.

References

https://www.seai.ie/technologies/ocean-energy/ocean-energy-technologies/ , Consulted on 27th March 2020.

https://eeas.europa.eu/headquarters/headquarters-homepage/346/black-sea-synergy_en. Consulted on 17th March 2020.

https://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm, Consulted on 15th March 2020.

https://ec.europa.eu/environment/marine/international-cooperation/regional-sea-conventions/bucharest/index_en.htm., Consulted on 15th March 2020.

http://www.imo.org/en, Consulted on 14th March 2020.

https://www.ospar.org/convention, Consulted on 14th March 2020.

Ballinger, R (2015). On the edge: Coastal governance and risk. In U., Fra.Paleo (Ed.). Risk Governance. The Articulation of Hazard, Politics and Ecology (pp. 373-394). Dordrecht: Springer

Benzie, M., Adams, K.M., Roberts, E., Magnan, A. K., Persson, A., Nadin, R., Klein, R.J.T., Harris, K., Treyer, S. and Kirbyshire, A. (2018). Meeting the global challenge of adaptation by addressing transboundary climate risk: A joint collaboration between SEI, IDDRI, and ODI. Discussion Brief. Stockholm Environment Institute, Stockholm.

Bernhadt, JR. and Leslie, HM. (2013) Resilience in Climate Change in coastal marine systems, Annual Review of Marine Science, 5, 371-392

Bria, Juan & Sandra Zapata (2010). Cruise tourism: economic, socio-cultural and environmental impacts: in: Leisure and Tourism Marketing, Vol1, no.3, 205-226.

BSC (2019). State of the Environment of the Black Sea (2009-2014/5). Edited by Anatoly Krutov. Publications of the Commission on the Protection of the Black Sea Against Pollution (BSC) 2019, Istanbul, Turkey, 811 pp.

CBI (2010). The European market potential for cruise tourism; Ministry of Foreign Affairs, The Netherlands, Centre for the promotion of Imports from developing countries, 2020-01-29.

CLIA (2018a). Global Passenger Report (derived from cruising.org/research, 24-03-2020)

CLIA (2018 b). Contribution of Cruise Tourism to the Economies of Europe 2017; Washington

CLIA (2019). Cruise Trends and Industry Outlook (derived from Sarah Kennedy cruising.org/research, 25-03-2020).

Copeland, C. (2008) 'Cruise ship pollution: Background, laws and regulations, and key issues', http://www.ncseonline.org/NLE/CRSreports/07Dec/RL32450.pdf.

Commission on the Protection of the Black Sea against Pollutions (2017). BLACK SEA INTEGRATED MONITORING AND ASSESSMENT PROGRAM for years 2017-2022.

Committee of the Regions (2015). Opinion of the Committee of the Regions—Innovation in the Blue Economy: Realising the Potential of Our Seas and Oceans for Jobs and Growth (2015/C 019/05).

Davoudi, S. (2012). Resilience, a bridging concept or a dead end? Planning Theory and Practice, 13, 299–307.

EEA. (2012). Climate change, impacts and vulnerability in Europe 2012. An indicator-based report. EEA, Copenhagen, Denmark. Available from: https://www.eea.europa.eu/publications/climate-impacts-and-vulnerability-2012

European Commission (2019a). JOINT STAFF WORKING DOCUMENT. Black Sea Synergy: review of a regional cooperation initiative - period 2015-2018.

European Commission (2013) Commission Staff Working Document: Climate change adaptation, coastal and marine issues (SWD(2013)133 final). Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: An EU Strategy on adaptation to climate change. Brussels, 16.4.2013. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013SC0133&from=EN

European Commission (2018). Report from the Commission to the European Parliament and the Council on the implementation of the EU Strategy on adaptation to climate change (COM/2018/738 final). Available from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2018:738:FIN

European Commission (2017). Report on the Blue Growth Strategy Towards More Sustainable Growth and Jobs in the Blue Economy (SWD (2017) 128 final).

European Commission (2011). Territorial Agenda of the European Union 2020: Towards an Inclusive, Smart and Sustainable Europe of Diverse Regions, Agreed at the Informal Ministerial Meeting of Ministers responsible for Spatial Planning and Territorial Development on 19th May 2011 Gödöllő, Hungary.

European Commission (2011a): White Paper European Transport: Roadmap to a single European Transport Area, Brussels 28.03.2011.

European Commission (2001): White Paper European transport policy for 2010: time to decide, Brussels 12.9.2001

European Commission / EASME (2018). Technical Study on Maritime Spatial Planning (MSP) for Blue Growth. Written by the European MSP Platform under the Assistance Mechanism for the Implementation of Maritime Spatial Planning (February 2018). ISBN 978-92-9202-344-7 doi: 10.2826/04538 Available from: https://www.msp-platform.eu/sites/default/files/20180419_published_version_.pdf

European Commission (2019b). The EU Blue Economy Report. 2019. Publications Office of the European Union. Luxembourg.Scientific, Technical and Economic Committee for Fisheries (STECF) – Economic Report of the EU Aquaculture sector (STECF-18-19). Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92- 79-79402-5, doi:10.2760/45076, JRC114801.

European Economic and Social Committee (2015). Opinion of the European Economic and Social Committee on the 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions—Innovation in the Blue Economy: Realising the Potential of Our Seas and Oceans for Jobs and Growth' (2015/C 012/15).

EMBLAS (2019). http://emblasproject.org/archives/3276, Consulted on 16th March 2020.

ESPON (2019a). ENSURE – European Sustainable Urbanisation through port city Regeneration, (Draft) Final Report, September 2019, Targeted Analysis Project, Luxembourg: ESPON

ESPON (2019b). Territorial Scenarios for the Baltic Sea Region in 2050 – BT2050. ESPON: Luxembourg.

ESPON (2019c). MSP-LSI – Maritime Spatial Planning and Land-Sea Interactions.

ESPON (2018). Territories and low-carbon economy (ESPON Locate), Annex to the Final Report (Scientific Report). ESPON: Luxembourg.

ESPON (2017) Revealing territorial potentials and shaping new policies in specific types of territories in Europe; Islands, mountains, sparsely populated and coastal regions; ESPON EGTC: Luxembourg.

ESPON (2010). ReRisk: Regions at Risk of Energy Poverty. Final Report. Luxembourg: ESPON.

Folke, C. (2006). Resilience: The emergence of a perspective for social-ecological systems analyses. Global Environmental Change, 16, 253–267.

Gallopin, G. C. (2006). Linkages between vulnerability, resilience, and adaptive capacity. Global Environmental Change, 16(3), 293–303.

Gentry, R. R., Lester, S. E., Kappel, C. V., White, C., Bell, T. W., Stevens, J. and Gaines, S. D. (2017), Offshore aquaculture: Spatial planning principles for sustainable development. Ecology and Evolution, 7: 733–743. doi: 10.1002/ece3.2637.

Holling, C. S. (1973). Resilience and stability of ecological systems. Annual Review of Ecology and Systematics, 4, 1–23.

IPCC (2019a). IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. Available from: https://www.ipcc.ch/srocc/download/

IPCC (2019b). Summary for Policymakers. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. Available from: https://www.ipcc.ch/srocc/chapter/summary-for-policymakers/

Johnson, K., Dalton, G., and I. Masters (2018). Building Industries at Sea: 'Blue Growth' and the New Maritime Economy, River Publishers.

Kester, J.G.C. (2002). 'Cruise tourism', Tourism Economics, Vol. 9, No 3, pp.337–350.

Klein, R. (2005). Cruise Ship Squeeze: The New Pirates of the Seven Seas, New Society Publisher.

Kremer, H.H., Le Tissier, M.D.A., Burbridge, P.R., Talaue-McManus, L., Rabalais, N.N., Parslow, J., Crossland, C.J., and B. Young (Eds.) (2005). Land-ocean interactions in the coastal zone: science plan and implementation strategy. IGBP Report 51; IHDP Report 18. International Geosphere-Biosphere Programme.

Levin, S. and Lubchenco, J. (2008) Resilience, Robustness, and Marine Ecosystem Based Management, Bioscience, 58(1), 27-32

Lloyd, M. G., Peel, D., & Duck, R. W. (2013). Towards a social-ecological resilience framework for coastal planning. Land Use Policy, 30, 925–933

http://www.loicz.org/cms02/products/publication/reports/index.html.en.html

LOICZ. (2014). Consultation document signalling new horizons for Future Earth – Coasts. L OICZ Signpost. Available from: https://s3-eu-west-2.amazonaws.com/futureearthcoasts/wp-content/uploads/2018/05/30154928/LOICZ-Signpost-Web.pdf

McElduff, L., Peel, D., Ritchie, H. and M.G.Lloyd (2016) The Octagon Values Model: community resilience and coastal regeneration, Urban Planning and Transport Research, 4:1, 1-25,

McElduff, L. and Ritchie, H. (2018) Fostering coastal community resilience: Mobilising people-place relationships, Area, 50, 186-194

Milieu Ltd et al. (2015). Article 12 Technical Assessment of the MSFD 2014 reporting on monitoring programmes Atlantic Regional report. 10 December 2015.

Milieu Ltd et al. (2017). Article 16 Technical Assessment of the MSFD 2015 reporting on Programme of Measures. Belgium Report. December 2017.

Morf, A., (ed) Cedergren, E., Gee, K., Kull, M., Eliasen, S. (2019). Lessons, stories and ideas on how to integrate Land-Sea Interactions into MSP. Nordregio, Stockholm. Available from: http://www.panbalticscope.eu/wp-content/uploads/2019/12/LSI-report-Pan-Baltic-Scope.pdf

Oyinlola MA, Reygondeau G, Wabnitz CCC, Troell M, Cheung WWL (2018) Global estimation of areas with suitable environmental conditions for mariculture species. PLoS ONE 13 (1): e0191086. https://doi.org/10.1371/journal. pone.0191086

Przedrzymirska, J., Zaucha, J., et al. (2018). Multi-use Concept in European Seabasins. Edinburgh: MUSES Project.

Ramieri, E., Addis, D., Mourmouris, A. (2018a). Recommendations and guidelines to support common understanding and integration of Barcelona Convention principles in MSP activities with a focus on EU Member States within marine waters of the Adriatic, Ionian, Aegean and Levantine Seas (Deliverable No 1.1.2). SUPREME project. Available from: http://www.msp-supreme.eu/files/c-1-1-2-barcelona.pdf

Ramieri, E., Bocci, M., Markovic, M. (2018b). Relationship between LSI and ICZM. EU Project Grant No.: EASME/EMFF/2015/1.2.1.3/02/SI2.742101. Supporting Implementation of Maritime Spatial Planning in the Western Mediterranean region (SIMWESTMED). Priority Actions Programme Regional Activity Centre (PAP/RAC). 44pp. DOI: 10.5281 /zenodo.2592147. Available from: https://zenodo.org/record/2592147#.XntYx4ieQ2x

Ramieri, E., Bocci, M. and Marković, M. (2019). Land Sea Interactions in the framework of ICZM and MSP. SUPREME and SIMWESTMED project report published by PAP/RAC, Croatia. Available from: http://paprac.org/storage/app/media/Meetings/Land%20Sea%20Interactions.pdf

Ramesh, R., Chen, Z., Cummins, V., Day, J., D'Elia, C., Dennison, B., Forbes, D.L., Glaeser, B., Glaser, M., Glavovic, B., & Kremer, H. (2015). Land-ocean interactions in the coastal zone: Past, present & fu¬ture. Anthropocene, 12, 85-98. https://doi.org/10.1016/j.ancene.2016.01.005

Schultz-Zehden, A., Weig, B., and I. Lukic. (2010). Maritime Spatial Planning and the EU's Blue Growth Policy: Past, Present and Future Perspectives (Chapter 6). In: J. Zaucha, K. Gee (eds.), Maritime Spatial Planning: Past, Present and Future, pp.121-149. https://doi.org/10.1007/978-3-319-98696-8_6

Schupp, M.F., Bocci, M., Depellegrin, D., Kafas, A., Kyriazi, Z., Lukic, I., Schultz-Zehden, A., Krause, G., Onyango, V. and Buck, B.H. (2019). Toward a Common Understanding of Ocean Multi-Use. Frontiers in Marine Science, 02 April 2019, https://doi.org/10.3389/fmars.2019.00165

Shaw, K. (2012). The rise of the resilient local authority? Local Government Studies, 38, 281–300.

Shipman, B., Roberts, H., Dworak, T., Zamparutti, T., Krüger, I., Veidemane, K., Mashkina, O., Parrod, C., Ceresil, E., Moarcas, A., Oulès, L. (2018). Land-Sea Interactions in Maritime Spatial Planning. Guidelines produced under Contract no. 07.0201/2015/714041 with the European Union (DG Environment). Available from: http://ec.europa.eu/environment/iczm/pdf/LSI_FINAL20180417_digital.pdf

Simmie, J., & Martin, R. (2009). The economic resilience of regions: Towards an evolutionary approach. Cambridge Journal of Regions, Economy and Society, 3, 27–43.

Sousa, L.P., Dilasser, J., Ganne, M., Cervera- Nuñez, C., Quintela, A., Marques, M., Silva, A., Alves, F.L., Sala, P., Campillos-Llanos, M., Gómez- Ballesteros, M., Alloncle, N. and Giret, O. (2019). Land-Sea interactions and relationships with Integrated Coastal Zone management. EU Project Grant No.: EASME/EMFF/2015/1.2.1.3/03/SI2.742089. Supporting Implementation of Maritime Spatial Planning in the European Northern Atlantic (SIMNORAT). Cerema - UAVR. 12 pp. DOI: 10.5281/ zenodo.2594720

Suaria Giuseppe, Melinte-Dobrinescu Mihaela C., Ion Gabriel, Aliani Stefano (2015). First observations on the abundance and composition of floating debris in the North-western Black Sea. Marine Environmental Research 107, 2015, 45-49.

Tempels, Barbara (2016) Flood Resilience: A Co-evolutionary Approach; Phd. Ghent University

The Guardian (2020). Giant dams enclosing North Sea could protect millions from rising waters, Published 12 February 2020. See https://www.theguardian.com/environment/2020/feb/12/giant-dams-could-protect-millions-from-rising-north-sea [accessed 20 March 2020].

UNEP/MAP. (2011). Action Plan for the Implementation of the ICZM Protocol for the Mediterranean 2012 – 2019. Available from: https://www.pap-thecoastcentre.org/razno/Action%20Plan%20clear%20version%2013%20Sept%2011%20BS-2.pdf

Vafeidis, A., Neumann, B., Zimmermann, J., and Nicholes, R.J. (2011). Migration and Global Environmental Change. MR9: Analysis of land area and population in the low-elevation coastal zone (LECZ). Final Report of the UK Government's Foresight Project.

Vousdoukas, M.I., Mentaschi, L., Voukouvalas, E., Bianchi, A., Dottori, F., and L. Feyen. (2018). Climatic and socioeconomic controls of future coastal flood risk in Europe. Nature Climate Change, 8, 776–780. doi:10.1038/s41558-018-0260-4

Walsh, C and Kannen, A. (2019). Planning at Sea: Shifting planning practices at the German North Sea coast, Raumforschung und Raumordnung / Spatial Research and Planning, Volume 77, Issue 2, pp.147-164

ESPON

EUROPEAN UNION

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

espon.eu

ESPON 2020

ESPON EGTC
4 rue Erasme, L-1468 Luxembourg
Grand Duchy of Luxembourg
Phone: +352 20 600 280
Email: info@espon.eu
www.espon.eu

The ESPON EGTC is the Single Beneficiary of the ESPON 2020 Cooperation Programme. The Single Operation within the programme is implemented by the ESPON EGTC and co-financed by the European Regional Development Fund, the EU Member States and the Partner States, Iceland, Liechtenstein, Norway and Switzerland.