The Socio-Economic Marine Research Unit (SEMRU)

National University of Ireland, Galway

Working Paper Series

Working Paper 14-WP-SEMRU-05

MARNET: An Economic Data Framework for the European Atlantic Arc

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Abstract

Strategies within Europe's Integrated Maritime Policy, including the Maritime Strategy for the Atlantic Area, Blue Growth, Maritime Spatial Planning and Marine Data and Knowledge, require coherent and comparable socio-economic data across European countries. Similarly, the Marine Strategy Framework Directive requires member states to carry out economic and social analysis of their waters and the reformed Common Fisheries Policy includes a social dimension requiring socio-economic data. However, the availability of consistent, accessible marine socio-economic data for the European Atlantic Arc regions is limited. Ocean economy studies have been undertaken in some countries (for example, Ireland, France, and UK) but timescales and methodologies are not necessarily comparable. Marnet is an EU transnational co-operation project involving eight partners from five member states of the Atlantic Area (Ireland, Spain, UK, France and Portugal). Marnet has developed a methodology to collate comparable marine socio-economic data across the Atlantic regions. The comparative marine socio-economic information system developed by Marnet could provide a template for other European States to follow that could potentially facilitate the construction of a Europe-wide marine economic information system as envisaged under the EU Integrated Maritime Policy.

Keywords: Atlantic Arc, maritime policy, MARNET, blue growth, maritime spatial planning, Marine Strategy Framework Directive, marine socio-economic data

Acknowledgement: This research was funded through EU Atlantic IV INTERREG funding

1. Introduction

In recent years the importance of marine resources for economic development has come to the forefront, in particular, with the focus on the Blue Growth agenda and the Blue Economy (COM, 2012a; COM, 2014b; Morrissey, 2014). To aid strategic decision making on the oceans and coastal regions, data is required on both natural resources and human activities. Coastal and marine policies in the European Union (EU) are increasingly recognizing the need and importance of socio-economic data to inform future decision making, management and regulation of marine sectors. This requirement is reflected for instance in the Integrated Maritime Policy (IMP) which aims to coordinate different policy areas under maritime sectors, the Marine Strategy Framework Directive (MSFD), as well as the revised Common Fisheries Policy (CFP). Despite this recognition, while there is data available in relation to the scientific side of the marine, socio-economic data is often scarce and/or incomparable across countries.

In December 2007, the European Council endorsed the EU IMP, which brought together the different policy areas relating to maritime activities and the marine environment. The need for economic and social information on maritime affairs is made clear from the main objectives of the IMP, including the development of an economic and social database for 'maritime sectors and coastal regions' as part of the IMP Action Plan for 2008 - 2010. A primary goal of the IMP is to construct a decision-making framework, involving national and local authorities and stakeholders of marine and coastal areas, to address a range of policy issues on marine and coastal resource management and monitoring, as well as issues related to the maritime economy and employment. Specifically the IMP covers the following cross-cutting policies:

- Blue Growth
- Marine data and knowledge
- Maritime spatial planning
- Integrated maritime surveillance
- Sea basin strategies

The policies listed above each call for comparable economic data across countries, sectors and/or time. The Blue Growth strategy aims to harness the potential of Europe's oceans, seas and coasts for jobs and growth (COM, 2012a). Blue Growth seeks to identify and tackle challenges (economic, environmental and social) affecting all sectors of the maritime economy (*op cit*). To identify and tackle these challenges, coherent, robust and reliable socio-economic data is required on all sectors of the marine economy. More specifically related to the collection of data, the Commission's Marine Knowledge 2020 aims to unlock and assemble data from different sources and facilitate its use (COM, 2012b). As part of this strategy, the EU launched a long term marine data initiative called EMODnet (The European Marine Observation and Data network) that provides data access to marine data across discipline-based themes. However, while scientific data and to some extent data related to

anthropogenic activities are documented there is no single source for comparable socio-economic data.

Article 10 of the recently approved EU proposal for the establishment of a framework for maritime spatial planning and integrated coastal management is another important EU policy document that calls for data collection and exchange of information related to maritime activities (COM, 2013b). The article highlights the need for environmental, social and economic data to be collected for both maritime spatial plans and integrated coastal management strategies. Since the publication of the IMP, serious effort has been given to the development of strategies in the different European Seas and Oceans recognizing their individual physical, socio-economic and environmental characteristics. Of particular relevance to this paper is the Action Plan for a Maritime Strategy in the Atlantic Area (COM, 2013a). Priority four of the action plan calls for the development of a marine socio-economic database across the countries. A further aim of the action plan is to support the reformed CFP by sharing information on tools that support fishery managers' understanding of the socio-economic and ecosystem impacts of management measures. As the CFP has been reformed over the years, there has been increasing recognition of the importance of socio-economic data related to coastal communities and fishing activities to inform policy. The framework for commercial fishing data collection and management has been in place since 2000 with Council Regulation (EC) 1543/2000. The most recent reform, which came into effect on January 1st 2014, obliges member states to collect socio-economic data (COM, 2013c).

In addition to the IMP and the recently reformed CFP, the MSFD also advocates the collection and analysis of socio-economic data across member states. The MSFD requires member states of the EU to put in place measures to achieve or maintain good environmental status in the marine environment by 2020 (Long, 2011). The Directive (COM, 2008) includes the requirement for member states to carry out 'an economic and social analysis of waters and of the cost of degradation of the marine environment' as an integral part of their initial assessments. Bertram and Rehdanz (2013) identified the four main requirements for the identification of marine economic values within the MSFD. These are:

- Initial assessment of a Member State's marine waters, including economic and social analysis (ESA) of the use of those waters, and of the cost of degradation of the marine environment (Art.8.1(c) MSFD).
- Establishment of environmental targets and associated descriptors outlining Good Environmental Status (GES), including due consideration of social and economic concerns (Art.10.1 in connection with Annex IV, No. 9 MSFD).
- Identification and analysis of measures needed to be taken to achieve or maintain GES, ensuring cost-effectiveness of measures and assessing the social and economic impacts, including cost-benefit analysis (Art.13.3 MSFD).
- Justification of exceptions to implement measures to reach GES based on disproportionate costs of measures, taking account of the risks to the marine environment (Art.14.4 MSFD).

In preparing the MSFD assessments, member states are also required to make every effort to ensure that assessment methodologies are consistent across the marine region or sub-region

(Long, 2011). This implies the need to define and collate marine socio-economic data in a consistent manner across member states – particularly in the case of those member states that are bordering common seas. Most member states produced an initial assessment of their maritime activities by 2012; however, these were not necessarily comparable even at the regional seas level. Indeed, the EU Commission itself acknowledges the fact that there was "a lack of available information and the existence of data gaps" when it came to reporting by member states on the economic and social analysis of the uses of marine waters and of the cost of degradation of the marine environment as required in Article 8(1c) of the Directive (COM, 2014a). The MSFD also provides that the initial assessment should be updated every six years (Art. 17.2 MSFD).

Despite the clear recognition of the need for socio-economic data to inform marine policy and decision making, the majority of data collected to date in relation to the IMP, EMODNET and marine policy generally, relates to marine environment data. Eurostat reports demographic and tourism statistics (number of nights spent) for maritime regions. Some work has begun on the collection of socio-economic data across Europe but generally at the country rather than EU level (Surís-Regueiro et al., 2013). Some member states have gathered and reported on marine socio-economic data at a national level in order to quantify the size and value of their marine economies, see for instance Pugh (2008), Kalaydjian et al., (2010), Vega et al., (2013). However, differences in timescales, data collection and methodologies make it difficult to compare figures across member states (Kildow and McIlgorm, 2010; Surís-Regueiro et al., 2013; Zhao et al., 2014). There is an obvious need for a comparable and comprehensive set of marine socio-economic data to set objectives within management, define and inform policy and to track performance across industries.

The EU Interreg IV (Priority 1) project Marnet (Marine Atlantic Regions Network) brought together eight partners across the five European Atlantic Arc countries – France, Ireland, Spain, Portugal and the United Kingdom (UK). A primary aim of the project was to develop a framework for the collection of marine socio-economic data across the participating countries. The framework developed a comparable and replicable data collection methodology using available data sources. This paper presents the framework developed by the Marnet project to collate that comparable marine socio-economic data across European Atlantic countries. It discusses the development of the framework, the success of partners working together and the issues that had to be overcome in order to produce the comprehensive EU Atlantic Arc marine accounts. The methodology has been successfully applied across the five member states – Ireland, Spain, France, Portugal and UK. While the focus of this paper is on the Atlantic area, the methodology can be applied across all European countries and, indeed, could be applied across other regional sea areas internationally.

The remainder of this paper reviews recent reports related to the marine economy, focusing specifically on the European Atlantic Arc area. This is followed by a discussion on the development of a framework for marine socio-economic data collection. The final section concludes with recommendations for future research and policy significance.

2. A Review of previous Research on Marine Socio-Economic Data Collection

While the need and importance of marine socio-economic data is increasingly being recognized within coastal and marine policies, the lack of a single methodology to define the marine economy across countries causes a number of problems. For instance, definitional, conceptual and methodological differences in analyses make comparisons difficult across countries (Kildow and McIlgorm, 2010; Surís-Regueiro et al., 2013). The lack of comparable data also leads to difficulties in the regulation of the marine, economy as well as a poor understanding of the importance of the marine economy for citizens across countries (Surís-Regueiro et al., 2013; Hynes et al., 2014). In their review of global marine economy studies, Kildow and McIlgorm (2010) find a broad agreement on the direct industrial uses of the sea, such as oil production and fishing, but less consensus on the direct services provided, such as marine transport and tourism.

Some European member states have collected and reported on marine socio-economic sectors at a national level in order to quantify the size and value of their marine economies. These include Ireland, France and the UK, see Table 1 for a summary of the reports. Outside of Europe, studies have also been undertaken for the US, Canada, China, New Zealand and Australia. While many countries produced detailed reports related to marine fishing efforts in their territorial waters for centuries, the earliest broad ocean economy studies were only first conducted on US maritime industries by the US Bureau of Economic Analysis in the 1970s. Other US studies followed in the 1980s and 1990s and, more recently, studies were conducted through the National Ocean Economics Project (Kildow et al., 2000; Kildow and Colgan, 2005). In the EU, Britain, Italy and France were amongst the first to generate reports on their domestic maritime industries (Mare, 1996; Pugh and Skinner, 1996; Kalaydjian, 1997). In the 1990s, marine economic reports were also issued on Norway and the Netherlands (Wijnolst et al., 2003) and internationally, efforts were also made to quantify maritime activities in Australia and Canada (RASCL, 2003; Anon., 2004; GSGislason, 2007). A number of these countries, and others, now attempt to update their marine economy statistics on a regular basis.

An action group on ‘improving sectoral (ocean and coastal) socio-economic data at regional and EU level’ was created by Eurostat in 2008. The purpose of this group was to recommend how best to collate data on coastal rather than marine socio-economic data at the regional and EU level. In 2009, IFREMER concluded this analysis for Eurostat that examined the potential of developing a marine socio-economic database for Europe. The authors of that study, Kalaydjian et al., (2009) highlighted the fact that the reporting efforts on marine activities, carried out by the aforementioned countries, all faced similar problems. Firstly, the study points to problems relating to the scope and coverage of maritime activities. In particular, questions were asked relating to the inclusion of all or some of the activities located on the coast and deciding on how far inland the coast extends. Other difficult questions dealt with which marine activities may or may not be defined as part of the marine economy. For example, should inland waterway transport be included? Should activities indirectly

connected to specific maritime businesses be included? Should downstream trade in marine-related products be included? Secondly, Kalaydjian et al., (2009) also highlighted difficulties in collecting maritime-specific data, especially for the sectors such as maritime equipment, marine tourism and a number of newly emerging marine services.

To answer some of these questions, Kalaydjian et al., (2009) presented the architecture of a database for maritime activities in Europe and also proposed methods to collect missing data and identified other relevant indicators to analyze maritime affairs. This architecture formed a template for the Marnet marine socio-economic database presented in this paper. In the remainder of this section, the discussion is focused on previous marine economy reporting efforts in the European Atlantic Arc countries – France, Ireland, Spain, Portugal and the UK. For a more in-depth review of global marine economy studies see Surís-Regueiro et al., (2013) or Kildow and McIlgorm (2010) and for a review of the relevant literature involved in the defining and characterization of the 'Coastal Economy' and details on sources, assumptions, and limitations of the socio-economic characteristics of these regions in Europe, the interested reader is directed to Hynes and Farrelly (2012).

Vega et al., (2013) carried out an analysis of Ireland's marine economy based on 2010 data. Previous versions of reports related to Ireland's marine economy have been carried out for 2007 and 2005 (O'Connor et al., 2005; Morrissey et al., 2010). The methodology followed was similar to that developed by the National Ocean Economics Program (NOEP)(Colgan, 2007). Using, where available, the European NACE code classification system, both fully and partially marine related activities are measured using indicators on turnover, value added, exports and employment. Where data could not be extracted from the national statistics for sectors referred to as 'emerging marine sectors', such as marine biotechnology and marine ocean energy, a survey of relevant companies was conducted.

A similar assessment was carried out for the French marine economy with the objective of assessing the weight of the French marine economy, its position with respect to international competition and its role within public services in France (Kalaydjian et al., 2010). The classification of the marine sector activities follows the French system of Nomenclature d'Activités Française, 2003 (NAF 2003) based on NACE 2003. The indicators used to evaluate each industrial activity included turnover, value added, employment, number of companies and export rates. The most recently published data on the French marine economy is for 2009.

Pugh et al., (2008) estimate the economics and employment statistics for marine activities for the UK marine economy for the reference year 2006. They also report on numbers employed, value added, exports and turnover. The classification system used is the UK Standard Industrial Classification of Economic Activities (SIC) which is carried out in conjunction with the EU NACE system. The two systems are identical. Other studies carried out on the UK marine economy include Pugh and Skinner (2002) who estimate levels of marine related activities using data for years 1999 – 2000. More recently Morrissey (2014) reviewed two time frames, 2003 – 2007 and 2008 – 2011, providing an insight into the performance of the

marine sector over time. However, this study looks more at trends for a subset of marine data for the English, rather than UK, economy.

Table 1. Summary of Atlantic Area Marine Economy Reports

Country	Most Recent Reporting Year	Geographical Coverage	Industry Structure	Proxies
Ireland	**2010**	**NUTS 0**	**NACE Rev 2**	**Turnover, GVA, Employment, Exports**
France	**2009**	**NUTS 0**	**NAF 2003**	**Turnover, GVA, Employment, Exports**
UK	**2006**	**NUTS 0**	**SIC**	**Turnover, GVA, Employment, Exports**
Spain	**2009**	**NUTS 0**	**NACE Rev 1**	**Turnover, GVA, Employment**

(Pugh, 2008; Kalaydjian et al., 2010; Gonzalez Romero and Collado Curiel, 2012; Vega et al., 2013).

A recent report carried out by Ecory's (2013), commissioned by DG MARE, aimed to examine in closer detail the individual development patterns of the marine industries within the European Union and their prospects for future development. It also attempted to evaluate the state of play and growth potential of five countries: France, Ireland, Portugal, Spain and the UK, all of which border the Atlantic. Using a value chain approach, the study identified the components of the marine economy and provided a detailed analysis of marine economic activities and their contribution to economic growth and job creation within the Europe 2020 agenda. Components of the marine economy were identified and a detailed analysis of marine economic activities provided. However, much of the data used was sourced from national marine economy reports, leading to the issue of incomparable timescales and in some instances the comparison of statistics based on different sectoral definitions. While the data was collected across countries, the timing of data available was an issue. Like for like comparisons of marine socio-economic data are not achievable for a number of reasons, including:

- Differing definitions of the marine economy
- Inconsistent geographical scales – some countries may report national figures while others will report regional data, or even lower spatial scales
- Varying timescales – while countries all report annual data, the year chosen generally differs across countries, making it difficult to make a true cross-country comparison

- Differing proxies and estimates across countries – with no cooperation between countries producing national reports, each country will have a different approach to creating estimates or using proxies where data is not readily available
- Subsectors within a certain sector may not be the same

3. Framework development of the Atlantic Marine Economy database

To overcome the problems and inconsistencies listed in the previous section, the Marnet project developed a coherent framework for a marine economy database and applied a robust methodology for the collection of comparable marine socio-economic data on maritime activities in the Atlantic Area. The framework was developed through the collaboration of partners from member countries, namely France, Spain, Ireland, Portugal and the UK. The aim of the project was to set out a clear definition of the Atlantic marine economy, identify and classify marine socio-economic indicators to be used to value the different economic activities in Atlantic regions and use a marine industries classification system relevant to all countries as well as a common geographical structure. Data is collected across sectors, space and time. To ensure consistency among countries, Eurostat statistical classifications are used – NUTS (Nomenclature of Territorial Units for Statistics) for the spatial dimension and NACE for the sectoral dimension of the data. NACE and NUTS have been used for two major reasons: 1) they provide a common standard for the definition of economic activities in Europe in general and in the Atlantic countries in particular; 2) they provide a full coverage of the activities and geographical zones identified as relevant for the Atlantic marine economy without double accounting in terms of business or spatial units.

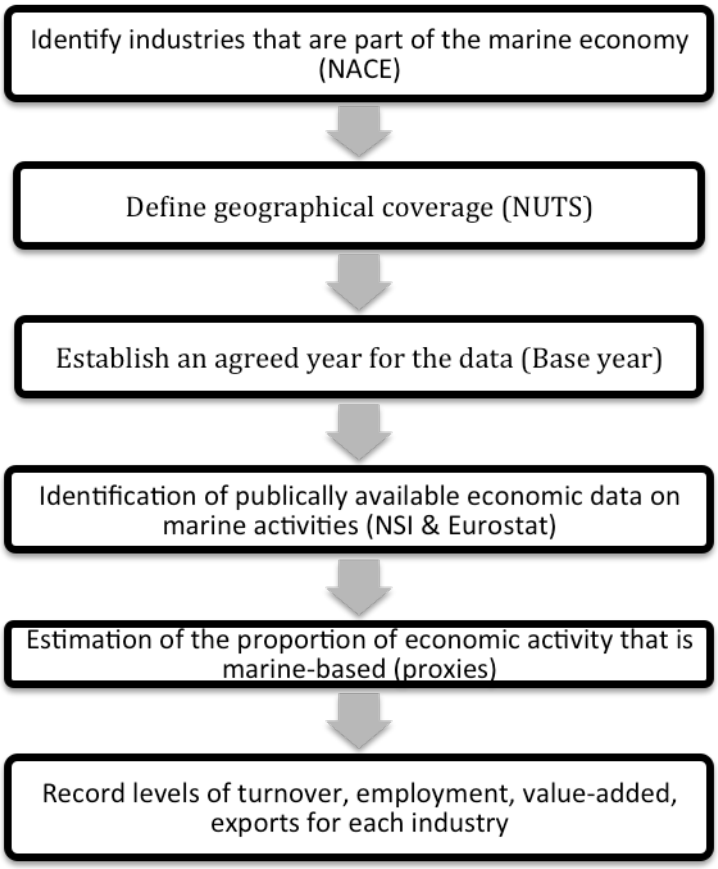
In 2007, the National Oceans Economic Program (NOEP) produced a guide for the measurement of market data for the ocean and coastal economy (Colgan, 2007). Marnet followed the same objectives set out in the NOEP methodology. Specifically, the data collection framework had to meet the following criteria across the Atlantic region (Colgan, 2007):

- Comparability across industries and space: The data should be consistent across all countries
- Comparability across time: The data should be sufficiently consistent over time so that changes can be observed and measured accurately
- Theoretical and accounting consistency: Double counting of economic activity should not occur; all measures can be summed across industries and geographies
- Replicability: The collection of data should use a methodology that can be replicated by others

The approach is to some extent similar to that proposed by Surís Regueiro (2013), which follows the NOEP methodology, but applies it to a European setting, and was also guided

by the recommendations in the Eurostat report mentioned previously (Kalaydjian, 2009). The overall goal was to establish a clear, common and replicable marine economic data framework for European Atlantic regions. Figure 1 summarizes the Marnet Framework.

Figure 1. Steps in defining the marine economy framework.



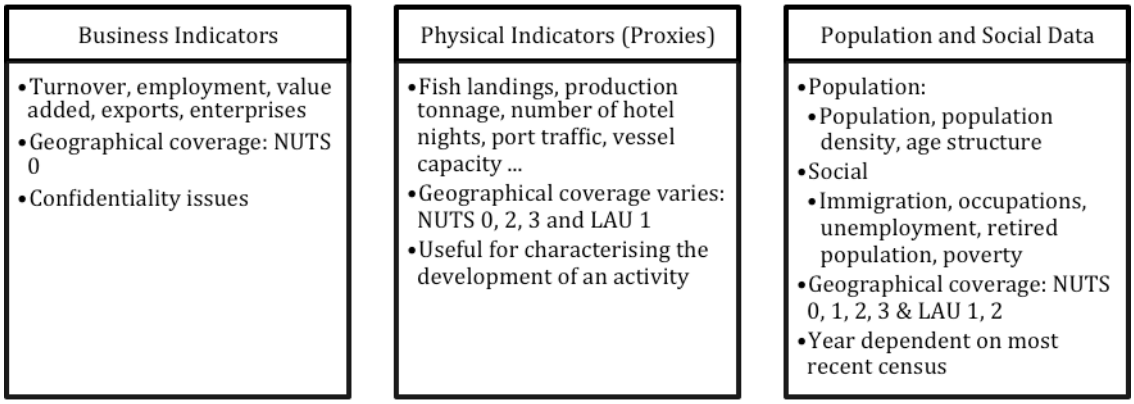
To develop a framework for the Marnet project, a methodology for the identification, collection and classification of socio-economic data relating to marine activities in the Atlantic Area was proposed. The process was started in 2013 with the aid of stakeholder participation in each partner region. Figure 1 illustrates the approach taken to identify and measure relevant marine economic and social activity in the Atlantic Area, some of which will be discussed in more detail below.

In the development of the framework a decision on what data to collect and the preferred data sources was agreed upon by the Marnet partners. Indicators should ideally be representative, quantifiable, comparable, reliable, adaptable and relevant. These objectives were achieved using the current indicators selected by the process. A stakeholder meeting was held in each partner region in order to develop a comprehensive list of indicators, applicable across sectors for valuation.

The agreed upon dataset is comprised of business indicators, physical indicators (also referred to as proxies) and population and social data. Business indicators include data on turnover, value added, employment, exports and number of enterprises. This data is available from national statistics institutes (NSI) for each industry by NACE code. The physical indicators can be used to give further information on a sector such as production tonnage for fish landings, or number of accommodation nights in relation to marine tourism. The physical indicators vary by sector. Where industries are only partly marine, proxies can provide a useful means to make estimates on the marine share of the industry. Where data is not readily available, or is not easily extracted or identifiable as marine, a proxy can be used as a representation. Proxy indicators can be both easier to collect and appropriate for characterizing the development of a given activity in a particular geographical area. These indicators are often available from Eurostat, NSIs and the relevant national government agencies or departments.

The final information collected within the framework was related to population and social data, including information on density, age structure, occupations unemployment and poverty. This constituted a major dimension of the framework along with the structural business dimension. Given the diversity of occupation classes used by the Atlantic NSIs, three main categories were agreed upon by the Marnet team as a common structure of the occupied population. All of these indicators have been defined for the Atlantic zones determined by NUTS codes. Some have been defined for the basic administrative regions only (e.g. poverty index) while others were defined at as low a spatial scale as possible to represent coastal areas (e.g. population density or the occupied population structure).

Figure 2. Summary of Marnet data collection. Indicators collected and spatial scale.



To ensure the reliability and comparability of data, the preferred data sources were established databases within national statistics institutes (NSI) and Eurostat that were based on the NACE classification system. Where data was not available from these institutions, other public and private sources were utilized to gather data, such as state agencies, R&D institutes and industry associations. In some cases, data available from the NSIs was only available at higher geographical levels, for example, NUTS 0 (see

definition below); therefore other sources were used to get more localized data sets and proxies.

4. Geographic/spatial comparability

As highlighted by Hynes and Farrelly (2012), there are numerous definitions of a coastal region or zone in the literature that one might use in attempting to examine the socio-economic characteristics of the Atlantic Arc EU member states. However, as the aforementioned authors point out, many of these definitions do not facilitate the collection of comparable statistics on coastal regions for use by policymakers, in pre-existing and accessible data portals. For this reason, a single uniform definition of the spatial element of the data collection within the Marnet project was employed and was based on the EU NUTS classification. The NUTS classification is a hierarchical system for the division of economic territories of the EU for the purpose of collection, development and harmonization of EU regional statistics, and socio-economic analysis of regions (Anon., 2014). In addition to NUTS0, defined as the highest geographical level, i.e. the whole territory of a member state, there are three levels of NUTS regions defined by Eurostat:

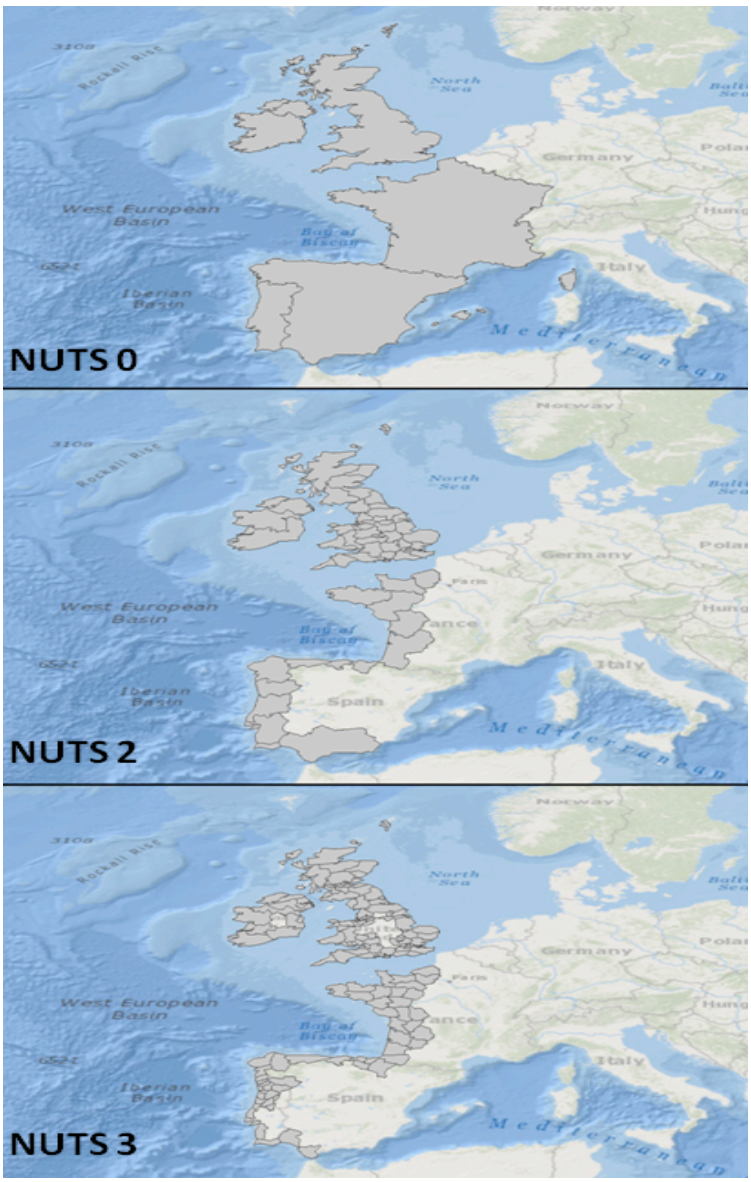
- NUTS 1: major socio-economic regions, in most cases these are defined using country boundaries
- NUTS 2: basic regions for the application of regional policies
- NUTS 3: small regions for specific diagnoses

In addition to the NUTS classification, in order to meet the demand for statistics at a local level, Eurostat has set up a system of Local Administrative Units (LAU) compatible with NUTS. At the local level, two levels of Local Administrative Units have been defined:

- The upper LAU level (LAU level 1, formerly NUTS level 4)
- The lower LAU level (LAU level 2, formerly NUTS level 5)

The NUTS regions for the Atlantic Area are presented in Figure 3.

Figure 3. NUTS boundaries for the Atlantic regions.



All data – accounting, social and proxies – were collected at the NUTS 0 level. For some countries, accounting data was only available at this level. Proxies and social data were collected at the lower spatial scales where available. Social data was collected down to the local administrative unit levels.

5. Economic coverage (industrial comparability)

In the development of a European data framework it was crucial that there was comparability across the maritime economic sectors and industries. As previously mentioned, the economic coverage of the marine sector is defined using NACE (**Nomenclature Générale des Activités Économiques dans les Communautés Européennes)** codes, the EU statistical classification of activities. NACE codes are similar to the NAICS (North American Industry Classification System), with slight differences depending on industry specificities in the EU and North America. Specific EU member states classifications, including SIC and NAF mentioned above, follow the NACE system with slight modifications depending on national specificities. It is the European industry standard classification system and thus allows for collecting comparable data among countries. Using the NACE system, activities were divided into marine specific activities (for example, shipping and fishing), marine linked activities and impacted activities (for example, tourism).

- *Marine specific activities* use marine resources and the essential physical and spatial characteristics of the sea. They are performed at or near the sea and include, among other activities; marine biological, mineral and hydrocarbon resource extraction.
- *Marine linked activities* produce inputs for marine specific activities or use outputs from marine specific activities in the production process. Some of these activities are not necessarily performed at sea or in coastal zones.
- *Impacted coastal activities* include a variety of coastal construction, wholesale or retail trade businesses, real estate, banking, etc. These activities are not necessarily of a marine nature but are impacted by marine linked and marine specific activities.

Activities are divided further into both fully and partially marine/maritime activities as presented in Table 2. Also included are public and semi-public activities such as defense and education. These sectors cannot be assessed in the same terms as private businesses. Marnet identified 15 marine sectors made up of a total of 52 NACE codes. The data collected is at the NACE four-digit level. The NACE system assigns unique two-, three- and four-digit codes to each industry (Vega et al., 2013). The first level refers to sections, the second level, identified by a two-digit code, refers to divisions, the third level, identified by a three-digit code, refers to industrial groups, while the fourth level is more detailed by industry and refers to classes and is identified by a four-digit code (Anon., 2008). The four digit codes are presented in Table 2.

Table 2. NACE Codes Identified for the Data Collection Framework Divided into Aggregate Marine Sectors.

SECTOR	NACE CODE	Description	Maritime Share
Shipping & Maritime Transport	50.1	Sea and coastal passenger water transport	F
	50.2	Sea and coastal freight water transport	F
	52.22	Service activities incidental to water transportation	F
	77.34	Renting and leasing of water transport equipment	F
	52.24	Cargo handling	P
Marine Based Tourism	55.1	Hotels and similar accommodation	P
	55.2	Holiday and other short stay accommodation	P
	55.3	Camping grounds, recreational vehicle parks and trailer parks	P
	56.1	Restaurants and mobile food service activities	P
	56.3	Beverage serving activities	P
Marine Leisure	93.11	Operation of sports facilities	P
	93.12	Activities of sports clubs	P
	93.19	Other sports activities	P
	93.21	Activities of amusement parks and theme parks	P
	93.29	Other amusement and recreational activities	P
	77.21	Renting and leasing of recreational and sports goods	P
Sea Fisheries & Aquaculture	3.11	Marine fishing (landings value)	F
	3.21	Aquaculture	F
Seafood Processing	10.2	Processing and preserving of fish, crustaceans and mollusks	F
	47.23	Retail sale of fish, crustaceans and mollusks in specialized stores	F
Oil & Gas Exploration and Production	6.2	Extraction of natural gas	P
	6.1	Extraction of crude petroleum	P
	9.1	Support activities for petroleum and natural gas extraction	P
	49.5	Transport via pipeline	P
Other mining and quarrying	8.12	Operation of gravel and sand pits, mining of clays and kaolin	P
	8.93	Extraction of salt	F
	9.9	Support activities for other mining and quarrying	P
Marine manufacturing	30.11	Building of ships and floating structures	F
	30.12	Building of pleasure and sporting boats	F
	33.15	Repair and maintenance of ships and boats	F
	38.31	Dismantling of wrecks	P
	71.11	Architectural activities	P
Construction (IE BCI ex VAT)	42.91	Construction of water projects	P
	42.21	Construction of utility projects for fluids	P
	42.22	Construction of utility projects for electricity and communication	P
	42.99	Construction of other civil engineering projects	P
	43.99	Other specialized construction projects	P

Marine Renewable Energy	35.11	Production of electricity (marine renewables)	P
	35.12	Transmission of electricity (renewables)	P
Inland water transport	50.3	Inland passenger water transport	F
	50.4	Inland freight water transport	F
Education	85.32	Technical and vocational secondary education	P
	85.41	Post-secondary non-tertiary education	P
	85.42	Non-tertiary education	P
	85.51	Sports and recreation education	P
Research and Development	72.19	Other research and experimental development on natural sciences and engineering	P
Public Services	84.13	Regulation of and contribution to more efficient operation of businesses	P
	84.22	Defense activities	P
	84.24	Public order and safety activities	P
Maritime insurance	65.12	Non-life insurance	P
	65.2	Reinsurance	P
High Tech Marine Services	71.12	Engineering activities and related technical consultancy	P
	71.2	Technical testing and analysis	P

The table also shows whether the NACE is fully (F) or partly (P) marine. In the case of partly marine codes, proxies need to be used to identify the maritime share.

As highlighted in Section 2, the use of different time periods in national marine economy reports has been the cause of many difficulties in comparing marine economy data. The release of business data differs across countries, most usually being made available with a two-year (*t*-2) time lag. For the Marnet framework, it was agreed to take 2010 as the reference year to allow for a complete and comparable representation of the ocean economies across all sectors at the time of the data collection phase. This reference year was suitable for the access to data for all countries from their NSIs. Partners were encouraged to collect previous and more recent data if available.

6. Limitations identified

In applying the data collection framework some limitations and difficulties were identified. These included confidentiality, identification of marine activities in national accounts, the need for physical indicators and identifying appropriate timeframes.

In the NACE classification system, a code may be only partially marine related. In this instance, it is difficult to quantify the value of the marine specific activity. Where a NACE code is only partially marine based, proxies, estimates or physical indicators will be required to estimate the proportion of the data associated with the marine sector. Overcoming this issue with proxies is shown in

Table 3 in the case of marine tourism.

The availability of data across countries also differs. Comparable data collection can be difficult to ensure across all partner regions. By requiring each country to source its data from Eurostat and the National Statistics Institutes, the occurrence of non-comparable statistics can be minimized for data characterizing marine activities at the national (NUTS 0) level. However, documenting the Atlantic marine economy also requires local business data and proxies (i.e. at NUTS 2, 3 and LAU levels). Some of these local indicators may be unavailable from NSIs; differences may then appear between the datasets of the different countries in the absence of a common standard for the Atlantic local zones. In such cases, the preferable option is to take stock of the definition and source of local indicators with the objectives of changing these and improving data comparability when further updates of the database are carried out in the future and when alternative relevant data sources become available. The metadata set, drawn up parallel to the database, is therefore an essential tool for the gradual development of the latter.

Confidentiality of data is another major issue, especially when comparing data across regions. Data can be classified as confidential for a number of reasons. The National Statistics Institutes will have regulations in place regarding the release of confidential data. In Ireland, for example, for commercially sensitive activities, confidential data occurs if one business makes up 80% or more of the turnover or employment of a given economic sector; or if a NACE code includes less than three firms. In order to overcome confidentiality issues, and to compare data across countries, the partners agreed upon 15 aggregate sectors. Each aggregate sector contains a number of single NACE codes aggregated together to make up a larger sector. By doing this, the confidentiality restrictions in most cases are satisfied, allowing sectors to be compared throughout the Atlantic Arc region.

Finally as mentioned above, a difficulty to a comparable framework is the availability of data in time. The baseline year of 2010 was agreed for all partners.

7. Applying the framework

Using the framework established by the Marnet consortium, it was possible to collect and collate comparable data across the five European member states.

Table 3 gives an example of using the data collected to compare the marine tourism industry across countries. As shown in Table 2, the marine tourism sector is made up of five NACE codes. Each of these codes will only be partly marine related as tourism can obviously be unconnected with marine activities or may not even occur in coastal areas. However, proxies available from national tourism boards provided an estimate of the share of general tourism related to marine tourism. Using these proxies and the business data collected on employment and GVA, it is possible to compare countries for 2010.

Table 3. Comparison of Aggregated Marine Tourism Data for Reference Year 2010 across Atlantic Arc Countries at NUTS 0 spatial scale

	France	Ireland	Spain	Portugal	United Kingdom
Proxy: % share marine tourism	23%	10%	75.6%	18%[1]	8%
Total Tourism GVA (€)	31,663,211,000	2,727,021,000	50,951,226,170	657,370,801	2,549,657,088
Estimated Marine Tourism	7,282,538,530	272,702,100	38,519,126,984	118,326,744	203,972,567
Total Tourism Employment (NPE)	140,280	12,083	836,125	40,255	127,760
Marine Tourism GVA as a % GDP	1.63%	1.72%	4.87%	0.38%	0.15%

Marine tourism is made up of NACE codes: 55.1, 55.2, 55.3, 56.1 and 56.3. NPE refers to Number of People Employed. * The proxy estimate for Portugal relates to 2009 data.

Comparisons across other marine industries such as seafood processing are more straight forward as the associated NACE codes are completely marine. Table 4 presents data collected from NACE 3.11, fisheries, and NACE 3.21, aquaculture. Employment, GVA and the share of GVA as a percentage of GDP are presented.

[1] The proxy value for the percentage share of marine tourism for Portugal was obtained by considering only 13,5% and 20,4% of the total GVA of tourism activities in the Oporto and Lisbon metropolitan areas, respectively, as in the Marine Strategy Framework Directive ("Diretiva Quadro da Estratégia Marinha"). This could underestimate severely the share of marine tourism in Portugal as both areas are in the coastline. If we arbitrarily imputed 50% of the total GVA of marine tourism in these areas and add it to the corresponding value for the rest of the country, the percentage share of marine tourism for Portugal would be 28%.

Table 4. Aggregated Data for Fully Marine Sectors.

Fully Marine Sectors Aggregated Data 2010	Shipping and Maritime Transport	Sea Fisheries and Aquaculture	Seafood Processing	Oil and Gas Exploration and Production	Marine Manufacturing	Inland Water Transport
Gross Value Added (GVA) (€)						
France	2,834,700,000	1,335,841,000	738,838,000	393,282,000	1,557,808,000	224,137,000
Ireland	422,061,000	226,800,000	89,470,000	61,182,000	9,473,000	n/a
Portugal	42,589,337	251,052,950	199,515,213	99,725,298	85,203,263	10,962,354
Spain	2,659,195,000	913,400,000	1,662,256,750	c	1,391,499,930	66,652,000
UK	4,805,568,000	553,747,200	759,326,400	29,802,687,712	2,030,702,400	66,484,800
			Employment (Number of People Employed[2])			
France	21,381	19,426	15,428	814	22,557	2,870
Ireland	4,633*	6,524*	3,064*	861*	237	n/a
Portugal	3,817	12,135	13,342	130	3,793	853
Spain	36,715	68,133	41,774	c	24,122	1,056
UK	c	13,172	18,000	38,000	c	c
			GVA as a % GDP 2010			
France	0.15%	0.07%	0.04%	0.02%	0.08%	0.01%
Ireland	0.27%	0.14%	0.06%	0.04%	0.01%	n/a
Portugal	0.02%	0.15%	0.12%	0.06%	0.05%	0.01%
Spain	0.25%	0.09%	0.16%	-	0.13%	0.01%
UK	0.28%	0.03%	0.04%	1.72%	0.12%	0.00%

Using the NACE codes for fully marine sectors data was aggregated for 2010. c denotes confidential data. Data is not presented at the individual NACE level. Reference year 2010, Spatial Level NUTS 0

The data collected has been made available through the Marnet atlas of marine socio-economic data (http://marnet.locationcentre.co.uk) and can also be accessed through the Marnet network website[3].

8. Conclusions

European policies are recognizing the importance of socio-economic data to inform future decision making, management and regulation of marine sectors. European policy, such as the IMP, emphasizes the need for economic and social information on maritime affairs in its objectives. These include the construction of a decision-making framework, involving national and local authorities and stakeholders in maritime and coastal areas. In its Integrated Maritime Policy for the European Union, the EU commission also proposed

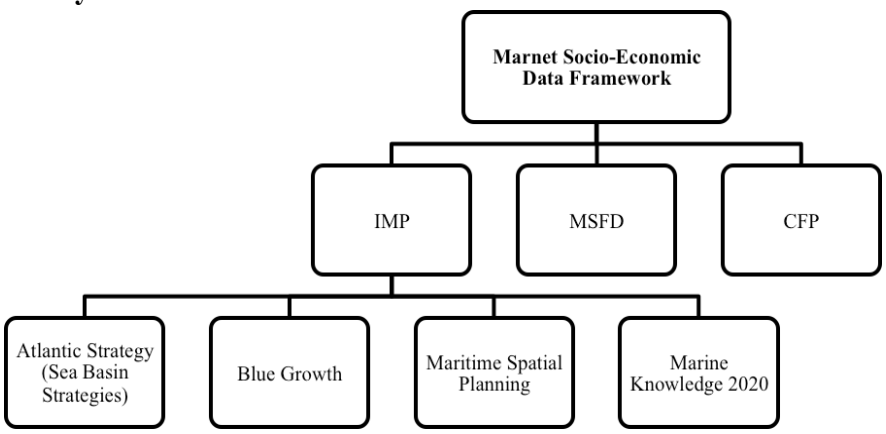
[2] Data on employment refers to number of people employed (NPE) with the exception of figures marked with *, these relate to full time equivalents (FTE)
[3] marnetproject.eu

developing a database on economic and social data for maritime sectors and coastal regions (Action 6.5).

While efforts have been made previously to report on the value of the European marine economy or elements of the marine economy (Kalaydjian, 2009; ECORYS, 2013), true comparisons, using these sources, are not possible across countries due to the use of secondary data from country reports that may have differing time frames, sectors, and/or spatial scales. Other data sources on the marine economy may only report on coastal regions, profiling demography statistics, but not industry related data. For example the Eurostat database reports some statistics specifically related to maritime regions, including demography and coastal tourism. The Interreg project Marnet developed and applied a framework for the collection of consistent and comparable marine socio-economic data across the Atlantic Arc countries. The framework creates a clear template for comparison and analysis of marine socio-economic data across time, space and industry.

The marine socio-economic data framework developed also contributes to requirements under a number of marine policies, including the Integrated Maritime Policy, the Marine Strategy Framework Directive, the EU Atlantic Strategy and the recently reformed Common Fisheries Policy presented in Figure 4.

Figure 4. The contribution of the Marnet Socio-Economic Data Framework to European Policy



Of particular relevance to the applied Marnet framework is the Action Plan for a Maritime Strategy in the Atlantic Area (COM, 2013a). The Atlantic Action plan aims to revitalize the marine and maritime economy. The plan identifies four priority areas. While the need for marine socio-economic data is evident in each priority, it is most relevant in priority 4 – the creation of a socially inclusive and sustainable model for regional development. With this in mind, the EU Commission seek to '*develop appropriate and usable marine socio-economic indicators to measure, compare and follow trends in the development of the blue economy'*.

The Marnet framework developed has been applied to the Atlantic Arc countries in Europe and, as such, contributes to the priority area of developing relevant socio-economic indicators. It is, however, relevant to all European countries. It can provide a template for other European states to follow that could potentially facilitate the construction of a Europe wide marine economy information system.

In terms of further development of the Marnet database, a range of options could be considered; the present discussion will be limited to an example. The remaining difficulties to be overcome result from the specific nature of the marine economy which rests on a spatial definition and remains without clear delimitations in national accounts. As mentioned earlier, a number of marine activities are part of sectors which include both marine and non-marine activities. It would be costly in terms of additional business inquiries (given those already carried out by NSIs) to combine local level data available and collected at a fine spatial resolution level (preferably at the LAU level) with business data available on every marine subset of NACE sectors; all the more if this extended database was regularly updated. The exercise would also have limitations both in terms of the nature of collectible data at this high resolution level and in terms of confidentiality, not to mention the inquiry burden on enterprises.

A less costly option is indicated by the final stage of the Marnet project: the practical initiatives were undertaken with the objective of using the database to analyze certain marine sectors in specific areas with potential for further economic development, and of increasing the awareness of the availability and the utility of the database. This approach will also help identify further data requirements to improve the database. This exercise suggests that it would be relevant to explore the possibility of: 1) regularly updating the existing database at reasonable cost in accepting its limitations and data gaps; 2) developing extensions of this main database, with higher resolution on specific sectors and geographical areas considered relevant with respect to maritime policy and marine economy issues. This would require data from complementary sources, consistent with the main database, the extensions of which would be updated on a case by case basis.

Other options could be derived from this example, depending on sectors and areas to be scrutinized, on the need for data update frequency, and on data acquisition costs to be estimated. Whatever the selected options, the sustainability of the database will rest on the existence of a common framework as developed in the Marnet project and based on the EU statistical classifications of activities and spatial areas. This is the key condition for securing a reliable set of indicators permitting to assess the value of the marine economy in broad terms and to verify the consistency of datasets developed in the future.

References

Anon. (2004). The economic contribution of australia's marine industries. Allen Consulting Group, National Oceans Office.

Anon. (2008). Nace rev 2: Statistical classification of economic activities in the european community. Eurostat Methodologies and Working Papers. Luxembourg, Eurostat.

Anon. (2014). "http://epp.Eurostat.Ec.Europa.Eu/portal/page/portal/nuts_nomenclature/introduction." Retrieved 15/09/2014.

Bertram, C. and K. Rehdanz (2013). "On the environmental effectiveness of the eu marine strategy framework directive." Marine Policy 38(0): 25-40.

Colgan, C. (2007). A guide to the measurement of the market data for the ocean and coastal economy in the national ocean economics program. National Oceans Economics Program, Edmund S Muskie School of Public Service,University of Southern Maine.

COM (2008). Directive 2008/56/ec of the european parliament and of the council of 17 june 2008 establishing a framework for community action in the field of marine environmental policy (marine strategy framework directive). Brussels, European Commission.

COM (2012a). Blue growth: Opportunities for marine and maritime sustainable growth. Comunication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Brussels, European Commission: 12.

COM (2012b). Green paper marine knowledge 2020: From seabed mapping to ocean forecasting. Brussels, European Commission. 473 final: 28.

COM (2013a). Action plan for a maritime strategy in the atlantic area: Delivering smart, sustainable and inclusive growth. Brussels, European Commission. 279 final: 12.

COM (2013b). Proposal for a directive of the european parliament and of the council: Establishing a framework for maritime spatial planning and integrated coastal management. Brussels, European Commission: 35.

COM (2013c). "Regulation (eu) no 1380/2013 of the european parliament and of the council of 11 december 2013 on the common fisheries policy, amending council regulations (ec) no 1954/2003 and (ec) no 1224/2009 and repealing council regulations (ec) no 2371/2002 and (ec) no 639/2004 and council decision 2004/585/ec." Official Journal of the European Union.

COM (2014a). Commission staff working document: Annex accompanying the document commission report to the council and the european parliament the first phase of implementation of the marine strategy framework directive (2008/56/ec) - the european commission's assessment and guidance European Commission: 194.

COM (2014b). Innovation in the blue economy: Realising the potential of our seas and oceans for jobs and growth. Communication from te Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Brussels, European Commission: 10.

ECORYS (2013). Study on deepening understanding of potential blue growth in the eu member states on europe's atlantic arc - sea basin report. Brussels, DG Mare. FWC MARE/2012/06 – SC C1/2013/02.

Gonzalez Romero, A. and J. C. Collado Curiel (2012). "El impacto económico del sector marítimo español: Producción efectiva, valor añadido y empleo." Economía industrial 386: 17-26.

GSGislason (2007). Economic contribution of the oceans sector in british columbia. GSGislason & Associates Ltd. , Vancouver: Canada/British Columbia Oceans Coordinating Committee.

Hynes, S. and N. Farrelly (2012). "Defining standard statistical coastal regions for ireland." Marine Policy 36(2): 393-404.

Hynes, S., D. Norton and R. Corless (2014). "Investigating societal attitudes towards the marine environment of ireland." Marine Policy 47(0): 57-65.

Kalaydjian, R. (1997). French marine related economic data. Brest, Ifremer.

Kalaydjian, R. (2009). Study in the field of maritime policy - approach towards and integrated maritime policy database Eurostat. 2007/S 179-218229.

Kalaydjian, R., F. Daurès, S. Girard, S. VanIseghem, H. Levrel and R. Mongruel (2010). French marine-related economic data, 2009. Brest, France, Marine Economics Department, IFREMER.

Kildow, J. and C. Colgan (2005). California's ocean economy. National Ocean Economics Program, Monterey Bay: California State University.

Kildow, J., H. Kite-Powell, C. Colgan and E. Bruce (2000). The national ocean economics project: The contribution of the coast and coastal ocean to the us economy. Research strategy and work plan. , University of Southern California, Wrigley Institute.

Kildow, J. T. and A. McIlgorm (2010). "The importance of estimating the contribution of the oceans to national economies." Marine Policy 34(3): 367-374.

Long, R. (2011). "The marine strategy framework directive: A new european approach to the regulation of the marine environment, marine natural resources and marine ecological services." Journal of Energy and Natural Resources Law 29(1): 1-44.

Mare, F. d. (1996). Il valore dell' industria marittima in italia (summary). Roma, Federazione del Mare.

Morrissey, K. (2014). "Using secondary data to examine economic trends in a subset of sectors in the english marine economy: 2003–2011." Marine Policy 50, Part A(0): 135-141.

Morrissey, K., S. Hynes, M. Cuddy and C. O'Donoghue (2010). Ireland's ocean economy. Socio-Economic Marine Research Unit, NUI Galway.

O'Connor, J., J. O'Leary and Y. Shileds (2005). Ireland's ocean economy and resources. Marine Foresight Series No 4. Marine Institute.

Pugh, D. and L. Skinner (1996). An analysis of marine-related activities in the uk economy and supporting science and technology. Information Document n°5. Southampton: Inter-Agency Committee for Marine Science and Technology, SOC.

Pugh, D. and L. Skinner (2002). A new analysis of marine-related activities in the uk economy with supporting science and technology. IACMST Information Document No 10.

Pugh, D. T. (2008). Socio-economic indicators of marine-related activities in the uk economy. Project OSR 07-04. T. C. Estate, http://www.thecrownestate.co.uk/newscontent/92-socio-economic-marine-activity-indicators.htm.

RASCL (2003). La contribution du secteur maritime à l'économie canadienne, 1988-2000. Roger A. Stacey Consultants Ltd., Ottawa, Division des Politiques sur les océans, Pêches et Océans Canada: 68.

Surís-Regueiro, J. C., M. D. Garza-Gil and M. M. Varela-Lafuente (2013). "Marine economy: A proposal for its definition in the european union." Marine Policy 42(0): 111-124.

Vega, A., R. Corless and S. Hynes (2013). Ireland's ocean economy,, SEMRU Report Series, ISSN 2009-6933 (Online).

Wijnolst, N., J. I. Janssen and S. Sødal (2003). European maritime clusters: Global trends, theoretical framework, the cases of norway and the netherlands, policy recommendations. Delft, DUP Satellite.

Zhao, R., S. Hynes and G. Shun He (2014). "Defining and quantifying china's ocean economy." Marine Policy 43(0): 164-173.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