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Research for PECH Committee: Small-scale fisheries and "Blue Growth" in the EU

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This document was requested by the European Parliament's Committee on Fisheries.

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STUDY

Abstract

This study presents an overview of Blue Growth emerging industries and investigates the linkages with the traditional maritime activity of fisheries with emphasis on small-scale fisheries. Positive synergies are investigated as well as possible opportunities (and threats) that Blue Growth can or should offer to small-scale fisheries and coastal communities in the context of economic growth, employment and innovation.

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LIST OF ABBREVIATIONS

AC	Arctic Council
BG	Blue Growth
CFP	Common Fisheries Policy
CFR	Community Fleet Register
CFR	Community Fleet Register
CLLD	Community-Led Local Development
CLLD	Community-Led Local Development
DCF	Data Collection Framework
DCR	Data Collection Regulation
DG ENV	Directorate-General for the Environment
DG MARE	Directorate-General for Maritime Affairs and Fisheries
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission
EEA	European Environment Agency
EEA	European Environmental Agency
EFCA	European Fisheries Control Agency
EFF	European Fisheries Fund
EMFF	European Maritime and Fisheries Fund
EMODnet	European Marine Observation and Data Network
EP	European Parliament
ERDF	European Regional Development Fund
ESF	European Social Fund
ESIF	European Structural and Investment Funds
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FARNET	European Fisheries Areas Network
FFL	Fishing for Leave (UK campaign)
FLAG	Fisheries Local Action Group
FTE	Full-time equivalent
GDP	Gross Domestic Product
GFCM	General Fisheries Commission for the Mediterranean
GFH	Greenhouse gas emissions
GT	Gross Tonnage

GVA	Gross Value Added
ICCAT	The International Commission for the Conservation of Atlantic Tunas
ICZM	Integrated Coastal Zone Management
ICZM	Integrated Coastal Zone Management
IEEP	Institute for European Environmental Policy
IMP	Integrated Maritime Policy
LAG	Local Action Group
LIFE	Low-impact Fishers of Europe
LIFE	Low Impact Fishers of Europe
LSF	Large-scale fisheries
LSF	Large-scale fisheries
MED	Mediterranean
MPA	Marine Protected Area
MS	Member State
MSFD	Marine Strategy Framework Directive
MSP	Maritime Spatial Planning
MSY	Maximum Sustainable Yield
NAFO	Northwest Atlantic Fisheries Organization
NEAFC	North East Atlantic Fisheries Commission
NUFTA	New Under Ten Fishermen's Association
NUTS	Nomenclature des Unités territoriales statistiques
OECD	Organization for Economic Cooperation and Development
R&D	Research and development
RAC	Regional Advisory Council
RFMO	Regional Fisheries Management Organization
SME	Small and medium-sized enterprise
SSF	Small-scale fisheries
STECF	Scientific, Technical and Economis Committee for Fisheries
TAC	Total Allowable Catch
TFC	transferrable fishing concessions
ToR	Terms of Reference
UN	United Nations Organization
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
WFD	Water Framework Directive

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EXECUTIVE SUMMARY

The European Commission has developed a so-called **‘Blue Growth (BG) Strategy’** as the maritime dimension of the Europe 2020 strategy for smart, sustainable and inclusive growth. The seas and oceans are considered to provide great potential for innovation and growth. BG focuses on five key areas - blue energy, aquaculture, tourism, mineral resources and blue biotechnology – which have been identified as having high long term growth potential. Fisheries, being a traditional maritime activity is not integrated in the BG strategy, presumably because it is perceived as having limited potential for growth. Against this background, the European Parliament has commissioned this study on ‘Sustainable Blue Growth in the EU and Opportunities for Small-scale fisheries (SSF)’, which was awarded to Blomeyer & Sanz and prepared in the period October 2016 to February 2017.

The aim of the study was to investigate the links between fishing activity and the core BG innovation strategy. Emphasis was placed on defining what is or could be the role for SSF in BG and investigating any opportunities that BG can or should offer to SSF and coastal communities in the context of economic growth, employment and innovation.

A recent study by the OECD estimates that employment in industrial capture fisheries accounts for one-third of the total, about 11 million jobs and thus the largest employer in the global ocean economy (OECD 2016). The economic impact of SSF is not considered in the OECD study, but it states that there are about 100 million small-scale or artisanal fishers, thus implying that **SSF have a very significant importance**. In the EU fleets are dominated by SSF vessels, representing about **80% of all fishing vessels** (48,800 vessels in 2014) and **40% of the employment** in the fishing sector (29,000 FTE in 2014). SSF can be particularly important as a source of employment in remote coastal areas and as a contributor to the local economy. Although SSF catches are generally low, these have a high unit value and the product is often destined for tourist markets or local markets. The importance of SSF is even more evident in some regions (e.g. Mediterranean).

When comparing two socio-economic variables – Gross Value Added (GVA) and number of jobs - the contribution of BG sectors is far greater than that of the EU fishing fleet and the SSF sector. In 2013, BG activities were responsible for ten times the GVA and 15 times the employment that fishing activities generate. It is important to note that the coastal and maritime tourism sector is the dominant sector, overshadowing the other four BG activities (i.e. marine mining, blue biotechnology, blue energy and aquaculture). By 2020, the importance of **maritime economic activities in Europe is expected to grow at 3% per annum**, to an estimated GVA of EUR 590 billion and to 7 million persons employed; these figures include fisheries, shipbuilding and ship repair, cargo and ferry, and offshore oil and gas.

Achieving the Common Fisheries Policy (CFP) goal of **Maximum Sustainable Yield** is expected to result in significant benefits in the Northeast Atlantic alone; e.g. an almost doubling of landed value and an increase of profitability by a factor of 50. If the necessary restructuring is carried out (reduction of fishing capacity), GVA is expected to increase from EUR 1.8 million to EUR 5.76 billion in Northeast Atlantic fisheries alone, thus a strong argument for including fisheries in the BG strategy due to its economic importance and potential for growth (Section 2.2.2). It should be noted that the **fisheries sector is comparable in importance with four of the five other BG activities** (Table 13). For example, GVA in aquaculture was about EUR 1.6 billion in 2013 (Table 13).

Based on the case study for the **Mediterranean**, the main positive synergies were found between SSF and coastal tourism, biotechnology, and protected areas. There are however other positive synergies with maritime transport and aquaculture through shared facilities and suppliers. Although not investigated in depth, synergies between SSF and blue biotechnology may have relatively more potential in the North Atlantic, based on findings concerning the Arctic.

The cumulative effects of BG activities are placing an **ever-increasing pressure on the available space and water** (section 2.1.2), which also leads to a number of **conflicts or creates the potential for conflicts**[1]. There is also potential for conflicts/tension between SSF and coastal tourism, aquaculture and protected areas, as these have more direct impact and reduce the available area for coastal fishing. SSF do not have many options, as they cannot redeploy their effort to other areas.

From an ecosystem perspective, there are many **positive effects of BG activities**, which are primarily of a socio-economic nature such as jobs, GVA, food security, including positive synergies with fisheries. However, the **environmental impacts are generally of a negative nature**, involving changes in coastal dynamics, marine pollution, eutrophication, seabed morphology and integrity. Positive environmental effects are most evident in relation to climate change mitigation through the increasing use of alternative marine energy sources. There is concern that the cumulative burden of environmental effects would be detrimental to fisheries, including SSF (Section 2.6.2). These effects then impact on coastal communities that depend heavily on artisanal fishing. This shows the need for assessments on the local socio-economic contributions to coastal communities by BG activities (other than fishing).

The results of stakeholder consultations are generally in good agreement with the overall findings of this study and provided a focus on key issues for SSF, as well as examples of best practice. There was however **limited knowledge concerning the BG strategy amongst SSF stakeholders**, which shows the need for better communication and a more integrated approach. The main concerns were generally in the area of the CFP and the current struggle of SSF, primarily due to limited allocation of quota species and the current overexploitation of many stocks. The prevailing view on BG activities appears to be somewhat wary or distrustful.

Challenges and opportunities are identified and a number of recommendations are given on how to address specific concerns or weaknesses, including proposals for a new, more **integrated approach with more stakeholder involvement** and actions at various levels (i.e. (EU, national, regional, and local).

[1] http://barlavento.pt/mais/ambiente/movimento-algarve-livre-de-petroleo-protesta-a-porta-da-camara-de-aljezur
http://www.sulinformacao.pt/2016/01/pescadores-dizem-que-nova-aquacultura-off-shore-em-vrsa-os-deixa-sem-local-onde-trabalhar/
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http://www.medtrends.org/reports/MEDTRENDS_REGIONAL.pdf
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1. INTRODUCTION

The European Parliament’s (EP) Policy Department B: Structural and Cohesion Policies requested Blomeyer & Sanz to conduct this research assignment between October 2016 and February 2017. This report addresses the contractual requirement of submitting a draft final report by 13 February 2017.
This introduction presents the background (section 1.1), research objectives of the study (section 1.2), outlines the study methodology (1.3) and difficulties encountered (1.4).

1.1 Background

In relation to the theme of so-called Blue Growth and Blue Economy, the European Commission (EC) has recently published communications addressing the EP, the Council, the Committee of Regions and the Economic and Social Committee on these issues and related aspects:

- In 2012, DG MARE issued the Communication on "Blue Growth - opportunities for marine and maritime sustainable growth" (COM (2012) 494 final);
- In 2014, the EC published a second Communication on "Innovation in the Blue Economy: Realising the Potential of Our Seas and Oceans for Jobs and Growth" (COM (2014) 254 final/2);
- In 2015, the EC also launched a public consultation on Ocean Governance, including also Blue Economy "to gather perspectives on how the EU can contribute to achieving better international ocean governance, for the benefit of sustainable blue growth".

The EC considers Blue Growth to be the maritime dimension of the Europe 2020 strategy[2]. The seas and oceans are considered to provide great potential for innovation and growth. Marine and maritime sectors provide a sustainable source of economic growth, employment and innovation, as well as contributions to food security, from the ocean-based industries, the established as well as the emerging ones. The EC estimates that the ‘blue economy’ represents roughly 5.4 million jobs and generates a gross added value of almost EUR 500 billion a year, based on a study carried out in the period 2010 to 2012[3]. Further growth potential may be expected in five key areas which are identified as:

- Blue energy
- Aquaculture
- Maritime, coastal and cruise tourism
- Marine mineral resources
- Blue biotechnology

Although for the moment capture fisheries are not identified in the EU strategy, only aquaculture is identified as one of the five focus areas with high long term growth potential. This is in line with the EC proposal to promote aquaculture as part of the Common Fisheries Policy (CFP) reform through specific actions related to[4]:

[2] Communication from the Commission. Europe 2020; a strategy for smart, sustainable and inclusive growth. Brussels, COM (2010) 2020.
[3] EC 2012b, Blue Growth Study 'Scenarios and drivers for sustainable growth from the oceans, seas and coasts', ECORYS et al.
[4] https://ec.europa.eu/fisheries/cfp/aquaculture_en

- Reducing administrative burdens
- Improving access to space and water[5]
- Increasing competitiveness
- Exploiting competitive advantages due to high quality, health and environmental standards.

Another recent study by the OECD (2016) on "The Ocean Economy in 2030" estimates that employment in industrial capture fisheries accounts for one-third of the total, about 11 million jobs and thus the largest employer in the global ocean economy[6]. The second largest sector in terms of employment is maritime and coastal tourism, providing for about 7 million jobs. The fastest growth in jobs is expected to occur in offshore wind energy, aquaculture, fish processing and port activities. Fisheries production worldwide is expected to expand, but this will be driven by aquaculture primarily, while production from capture fisheries remains more or less flat[7]. One of the major challenges will be the sharing of space between diverse activities, accountability and the governance of this marine space.

However, it is important to point out that the above-referred OECD study does not consider small-scale or artisanal fisheries (SSF), only industrial capture fisheries. As pointed out in the study, the estimates of value added and employment in the ocean economy are extremely conservative[8]. In fact, the study does not consider the employment of around 100 million small-scale or artisanal fishers as well as the value added coming from this type of capture fisheries.

There is no specific reference to fisheries in neither of the EC Communications on 'Blue Growth' strategies. Nonetheless, the importance of including all maritime sectors in future growth is stressed, hence this implies the inclusion of capture fisheries. The benefits of 'Blue Growth' should be shared by all maritime sectors and coastal communities. Growth in some sectors should not be sought at the expense of other traditional sectors such as fishing, which is not directly mentioned in the strategy. The use of marine space can become a key issue for traditional fishing activities Instead, growth should spill over and benefit all the sectors. New marine activities should accommodate traditional coastal fishing.

Small fishing vessels account for over 40% of employment in fisheries and make up 80% of the fleet in the EU. However, small-scale fishers consider that the policy framework has benefitted large-scale fishing operations in the past, while at the same time disenfranchising and marginalising SSF[9]. There is general agreement that overcapacity, particularly in the large-scale fleet, has been a major driver behind the current situation of overexploitation in many stocks. Small-scale fishers would like to see that more fishing rights and opportunities are awarded to those that fish sustainably, while at the same time reduce fleet overcapacity and eliminate harmful subsidies and destructive practices.

Innovation in sectors like aquaculture, biotechnology or ocean energy is vital for the blue economy to thrive, as the EC underlines in its Communication on Innovation in the Blue Economy. A number of bottlenecks seem to currently be holding back this drive for innovation. They include a lack of highly skilled professionals, an under-investment in knowledge and technology, and the transfer from research results to the commercial stage is too slow.

5 The issue of access to space and water is dealt in a broader context in section 2.1.
6 OECD (2016), The Ocean Economy in 2030, OECD Publishing, Paris.
7 Ibid.
8 Ibid.
9 http://lifeplatform.eu/our-mission/

The EU has developed a new concept of interest for the blue growth potential, the “Smart specialisation". It is a new policy concept on innovation designed to promote the efficient and effective use of public investment in research. The Blue Growth (BG) programme and its specific funding should define how the different dimensions (i.e. EU, global, national, regional and basin) are considered when defining the relevant policy targets and designing approaches to evaluation, monitoring and impact assessment.

1.2 Research objectives

The objective of this study is to investigate the link between fishing activity and the core BG innovation strategy. Emphasis will be placed on defining what is and/or could be the role for small-scale fisheries in BG and investigating any opportunities that BG should offer to small-scale fisheries and coastal communities in the context of economic growth, employment and innovation.

In addition, the study will consider issues such as the need to foster a greater international co-operation in maritime and science technology as a means to stimulate innovation and strengthen the sustainable development of ocean technology by establishing international platforms for the exchange of knowledge, experience and best practice for the profit of the fisheries and related activities. This includes applied multidisciplinary ocean research in fisheries and related economic activities and lessons learned from regional research alliances for BG (e.g. transatlantic or Trans Mediterranean). Possible new fishing areas such as the Arctic and the possible implications of Brexit will also be considered.

1.3 Methodology and approach used

1.3.1 Mapping emerging and traditional activities in the EU

The approach used to provide an overview of traditional and emerging activities in marine areas is to map fishing effort (in vessel numbers) and other human activities at the European level. As of 7 November 2016, the EU Community Fleet Register (CFR) recorded 84,133 vessels, which is the basic data to analyse fishing effort and distribution of European fisheries in terms of number of vessels and GT[10]. The analysis is presented at the NUTS 2 level of regions.

The primary source of data to carry out this mapping of non-fisheries human activities in marine areas was the European Marine Observation and Data Network (EMODnet)[11]. EMODnet data on human activities deals with various marine and maritime activities such as:

- Aggregate extraction
- Dredging
- Hydrocarbon extraction
- Main ports
- Mariculture
- Ocean energy facilities
- Pipelines and cables
- Protected areas

[10] http://ec.europa.eu/fisheries/fleet/index.cfm
[11] http://www.emodnet.eu/

- Waste disposal (solids, including dredge material, dumped munitions, marine constructions)
- Wind farms
- Other forms of area management/designation

Datasets available at EMODNet come from a multitude of public and private data sources at EU, international, national, and local level. Using EMODNet makes it possible to obtain complete and harmonised datasets. The Cluster Mapping tool will provide sectoral and cross-sectoral regional data and visualisation of the geographical concentration of cluster development in Europe. In this way, it will be possible to obtain an interactive map of Europe with maritime activities sites and locations. In some cases, it was not possible to obtain the relevant georeferenced data such as for aquaculture and coastal tourism, but these are available as maps which can be compared to SSF effort.

Based on the general information compiled, the Mediterranean was chosen for a more thorough diagnosis of emerging (energy, blue biotechnology, algae aquaculture, tourism) and traditional (shellfish farming, fishing) coastal activities. SSF is predominant in the Mediterranean and the aim is to identify synergies that are of key importance when designing policy options. Considering that each sea basin presents unique characteristics, this type of analysis is more appropriate for specific cases.

In the Mediterranean, the information regarding fishing fleets is sparse, especially for SSF which suffers from a lack of a uniform and straightforward definition. Many small boats, especially those without engine, are not registered. Information on capacity (i.e. tonnage, power) is often missing or incorrect in the case of larger vessels. Moreover, the wide distribution of landing sites for SSF along coasts makes monitoring, control and surveillance difficult. Despite these limitations, the following sources of information were used to characterize SSF in the Mediterranean and the Black Sea:

- General Fisheries Commission for the Mediterranean (GFCM) fleet register, which was established in 2009 (Recommendation GFCM/33/2009/5 on the establishment of the GFCM regional fleet register).
- GFCM Task 1, established in 2009 by Recommendation GFCM/33/2009/3 on the implementation of the GFCM Task 1 statistical matrix.
- National reports to the Scientific Advisory Committee (SAC), questionnaires or any other information submitted by countries to the GFCM.
- Distribution of EU fleet by country (http://ec.europa.eu/fisheries/fleet/).
- Online statistics form OECD on fisheries by Members of the Organizations, (http://www.oecd.org/statisticsdata/).
- Annual FAO statistics (http://www.fao.org/fishery/countryprofiles/search/en).
- Statistics from GFCM on activities and production of fishing fleets of GFCM Members (i.e. the GFCM Task 1).

The Mediterranean review will describe maritime activities and their potential for sustainable blue growth (jobs, innovation) and identify challenges (obstacles, synergies and potentials), especially involving the fishing activity. The overview includes an identification of the different types of synergies between maritime economic activities such as:

- Shared suppliers
- Enabling activities

- Shared (multipurpose) activities
- Common use of infrastructure
- Shared input factors

The work is also based on a review of relevant literature: Integrated Coastal Management Zone documents, Spatial Management Schemes, assessments and publications of the associated territorial Business Cluster, and complemented with stakeholder interviews when appropriate or necessary.

1.3.2 Review the role of existing EU policies

The aim is to provide an overview of the policy framework governing marine areas, focusing on the linkages with fisheries and related activities in coastal communities, including the management of resources at a more local level. Emphasis was placed on presenting the CFP, as this is the main EU policy governing SSF and fisheries in general. However, the CFP is part of the broader Integrated Maritime Policy and linked to EU legislation such as Marine Strategy Framework Directive, the Water Framework Directive, and the Habitats and Birds Directives, which strive to implement an ecosystem approach to marine management, covering all sectors. The main sources of information were the legal texts concerned, complemented by stakeholder interviews.

1.3.3 Support provided by the Horizon 2020 strategy and European Structural and Investment Funds

This part of the study provides an analysis of BG developments at EU level in the context of the Horizon 2020 Strategy, especially those aspects with implications for the EU CFP. Other projects related to BG will be identified under different initiatives (e.g. Marie Curie Actions).
Furthermore, an overview on Community-Led Local Development (CLLD) is given, including the role of Fisheries Local Action Groups (FLAGs) and the linkages to European Structural and Investment Funds, including the European Maritime and Fisheries Fund (EMFF). The EMFF is a particularly important source of financing for economic growth and supports fishermen in the transition to sustainable fishing. The analysis will consider how EMFF funds can limit or foster the synergies between the fishing and other BG activities.
The main data sources are publicly available information, complemented by stakeholder interviews.

1.3.4 Identification and analysis of existing projects in the EU and its Member States

The aim is to identify and analyse existing SSF projects meeting BG criteria in different regions of the EU, with specific reference to those delivering a fair standard of living in the SSF sector. An inventory of existing projects in European SSF meeting BG criteria is presented for the Mediterranean, which was chosen as a particularly relevant case study on potential for BG and the opportunity for development: i.e. technology transfer / uptake to the commercial sector (value adding of fisheries by-products, clean energy for fishing vessels, algae and multi-trophic aquaculture…).

Various data sources were used such as the CFR, DCR, DCF, EFF, and Eurostat. This was complemented with telephone interviews and email exchanges with project leaders, beneficiaries, collaborating universities or business clusters (e.g. funding, project outputs, value added, jobs created, etc.), fishers’ organisations, and national administrations.

1.3.5 Analysis of good practices example at global level

A summary of global best BG practices in fisheries is provided, especially with regards to SSF and SMEs specifying legal, administrative and economic drivers of growth. This includes a comparison of definitions between European BG and the FAO's concept of Blue Economy[12].
For the selection of projects that meet the European BG criteria, the same methodology was used as in the preceding section (1.3.4). Three projects were selected to illustrate global best blue growth practices in fisheries (especially with regards to SSF and SMEs). These are presented in the form of a matrix where scope of the project and several relevant features are described with regards to small-scale fishing such as:

- problem statement which describes the issues that the project is meant to address, thereby providing a rationale for action;
- intervention logic of the project or funding dedicated to blue growth, which should clarify the causal chain whereby certain inputs (namely funding or capital) are expected to lead to outputs, results and impacts (which are linked to objectives at different levels). This also allows us to consider the role of external factors (such as prevailing economic conditions and industry trends) might play;
- assessment of the key factors; i.e. human, environment, geophysical, institutional;
- type of funding;
- relationship with small scale fishing: impact assessment of the projects studied in terms of habitats, marine species, competition with the fisheries activities for marine space and environment. Synergies raised in the projects with SSF.

1.3.6 Assessment of the impact of the rapid growth of ocean industries

This part analyses BG in relation to upcoming issues and challenges such as the potential impact of rapid growth of ocean industries on the ocean environment, its consequences for the use of maritime space and implications for ocean spatial management with focus on SSF. This was assessed by collecting information on key environmental variables. As this type of information is not available by country, the approach used was to assess potential environmental effects of BG activities at ocean/basin level.

The study also provides indications on the economic significance of BG activities related to the sea and on the possible existence of conflicts between different uses of maritime space. The available economic data on BG activities is production and employment (i.e. not full-time) and this is available at country level, but only for one year (snapshot). Given these limitations, a cost-benefit analysis (*sensu stricto*) was not possible. Instead, the study provides an approximation to the qualitative (environmental) cost and the economic benefit/significance (in terms of production value and employment) for the year 2014. This was complemented with the economic benefit/significance of SSF by country.
These tasks relied on a combination of desk research of available literature on the subject and compilation of available data, complemented with consultations with stakeholders.

1.3.7 Analysis of fisheries SMEs' roles in achieving growth and their projects

An assessment of the situation of SSF and the challenges these are facing is presented, based on the views of the sector and considering the recent reform of the CFP. The views on BG are of importance as well as the identification of possibilities/threats for SSF. Another issue is how SMEs in fisheries can meet the goals of BG, and what are their needs in terms of technology development, capacity-building for a higher added value, knowledge and skills development.

[12] https://sustainabledevelopment.un.org/rio20

This part of the study was based primarily on consultation with stakeholders, followed up by desk research on key issues.

The survey also considered the views on the possible need to propose a new development model for fisheries and related activities to be incorporated into the BG strategy. The Joint Declaration of European artisanal and low impact fishers and shellfish harvesters, which was presented at the European Artisanal Fishermen’s Congress 2012, was used as the framework for these consultations on the possible need for a new approach to the management of SSF in the EU.

Stakeholders were identified through LIFE, who provided the contact details of members, as well as other sources. The LIFE Platform or ‘Low Impact Fishers of Europe’ is an umbrella organisation run by fishermen with the stated aim of providing a clear and coherent voice at EU level for the previously mainly silent majority of European fishers who are smaller scale and who use low impact fishing gears and methods, but have historically lacked dedicated and effective representation in Brussels and at MS level[13]. Efforts were made to obtain a reasonably representative sample of views touching on the various European Seas.

This was complemented with small-scale survey of Spanish fishers with the prime objective of collecting views on interactions between BG and SSF, identifying opportunities and threats. The survey included also questions about coastal problems, the contribution of BG industries to economic development, and the effect of BG activities on the ocean environment.

A list of persons/associations/organisations consulted or interviewed is given in Annex I.

1.4 Difficulties encountered

The study was carried out during the period between October 2016 and February 2017. It was not possible to achieve as broad a perspective as desired in the consultation of SSF associations and organisations (section 1.3.7). Many of the associations did not react or declined to participate in interviews, which appears to be related to a somewhat wary or distrustful view on BG activities. Therefore, a high reliance was placed on interviewing LIFE staff, some of whom represent specific sea basins such as the North, Baltic, Mediterranean and Black Seas (Annex I).

[13] http://lifeplatform.eu/

2. FINDINGS

2.1 Emerging and Traditional Activities in the EU

KEY FINDINGS

- **EU fleets are dominated by SSF vessels**, representing **85%** of all fishing vessels and **40%** of the employment in the fishing sector. SSF can be particularly important as a source of employment in remote coastal areas and as contributor to the local economy.
- Overall **catches of SSF are generally low**, but these have a high unit value and the product is often destined for tourist markets or local markets with high purchasing power in the EU. Fishing is conducted relatively near to shore and fishing operations last usually one day or less.
- The importance of SSF in the **Mediterranean** is even more evident, representing **22% of landed** value and 55% of employment.
- Of the various maritime activities that were mapped and combined with SSF fishing effort, the effects of mining activities such as aggregate extraction and dredging are mostly potentially negative. Other activities such as hydrocarbon extraction, ocean energy, submarine cables, maritime transport, and aquaculture may be potentially negative and result in conflict, but these are more manageable.
- The potential for **positive synergies** are expected to be most important in the interactions between SSF and coastal tourism, including ecotourism, and between SSF and marine protected areas, where SSF can take on functions related to tourism and monitoring/management of protected areas. There are, however, other positive synergies with maritime transport and aquaculture through shared facilities and suppliers.
- There is also potential for **conflicts/tension** in relation to intensive coastal tourism, aquaculture, and protected areas, as these reduce the available area for coastal fishing. SSF do not have many options, as they cannot redeploy their effort to other areas.
- In the case of **aquacultur**e, potential conflicts appear to be more likely rather than synergies. Intensive cage fish farming can restrict local access to fishing grounds, modify the marketing flow by the introduction of new products from aquaculture, and result in the introduction or transfer of diseases to natural resources.
- In the **Arctic**, the governance framework of international waters has to be developed, but the potential for BG is high. There is large potential for growth and innovation in the fisheries sector and developments in this sector, as well as marine biotechnology, are expected to bear fruits in the shorter term.

2.1.1 Characteristics of SSF fleets in Europe

Current legislation defines the SSF as 'fishing carried out by fishing vessels of an overall length of less than 12 meters and not using towed gear', which was specified in the EFF regulation and this is repeated in the current EMFF regulation[14]. This definition for SSF is too restrictive, as it does not take into account the specificities of fishing in the various MS. There is a need to refine this definition to include other characteristics, such as size and type of enterprise, spatial–temporal dimension of operations, social organization, economic behavior, dependence

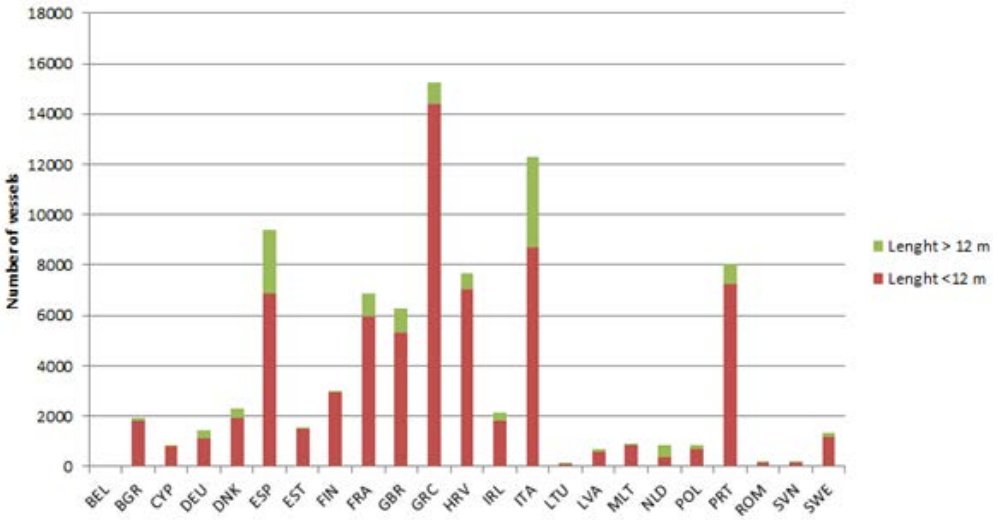
[14] Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014.

on local ecosystems, environmental impacts, and contributions to the local economy. A note published by the EP on SSF in the context of the CFP reform came to similar conclusions (Iborra Martín 2012).

However, as this is outside the scope of this study, the following analysis is based on this legal definition, where SSF fleets are described in terms of physical characteristics (vessels and gears) and activity (geographic range, fishing activity).

EU fleets are dominated by SSF vessels, which becomes evident when calculating mean vessel length (8.8 m) and mean nominal engine power (75.7 kW)[15]. Mean vessel length is between 7 and 12 m for all MS except for the Netherlands (20m), Lithuania (16m), and Belgium (28m). In 2016, SSF vessels represented 85% of the EU fleet out of a total of 82,784 units. SSFs are present in all European coasts and have socio-economic importance in peripheral and ultra-peripheral regions. The fleets showing the largest number of small vessels are: Greece, Italia, Croatia in the Mediterranean Sea and Portugal in the Atlantic Sea (Figure 1).

Figure 1: Numbers of SSF vessels and large-scale vessels in each MS



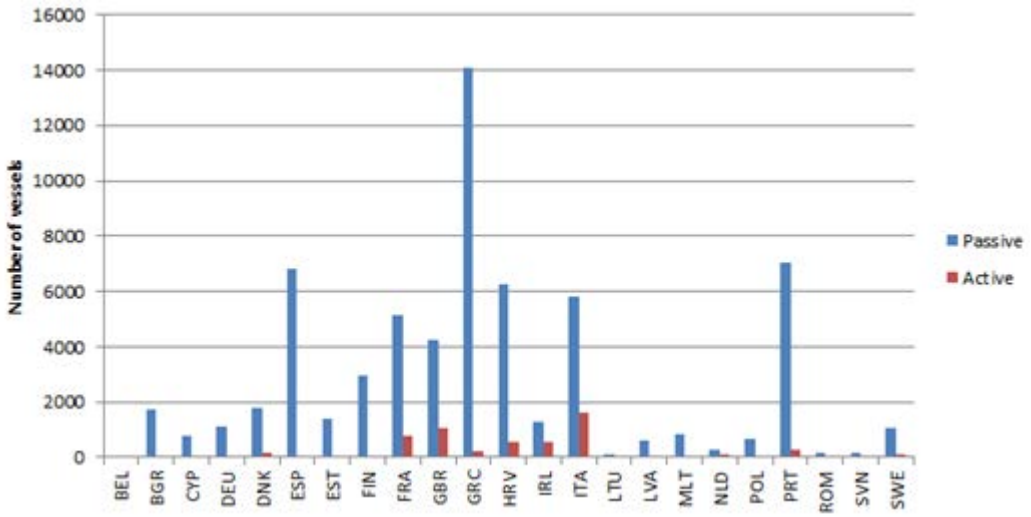
Source: CFR 2016

Two categories of gears are used by the EU fleet; mobile or active and static or passive gears. Mobile fishing gears are those that are towed from a fishing vessel, land-based vehicle or by hand, such as dredges and trawls. Static gears such as drift and fixed nets, hook and lines, or pots and traps are actively deployed from a vessel, but remain anchored to the seabed until they are retrieved. At the EU <12m fleet level, more than 90% use passive gears (Figure 2).

SSF vessels use a variety of fishing techniques to target a wide array of seasonally changing resources (Figure 3). The under 12m fleet mainly uses nets (41,000 vessels) and longlines and lines (13,000 vessels). Less than 9,000 vessels use pots. Bottom trawls and Dredges concern respectively 2,300 vessels and 1,300 vessels.

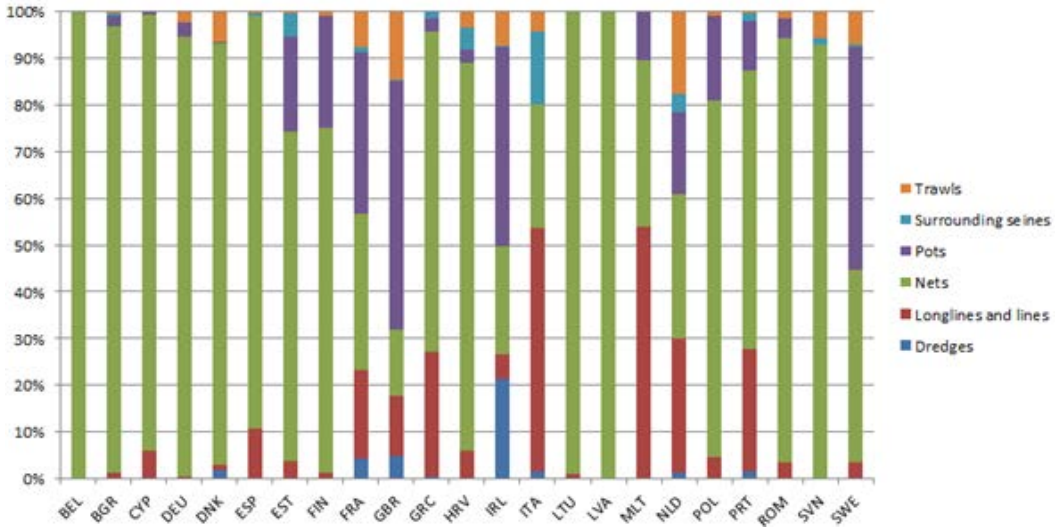
[15] Based on data extracted from the CFR.

Figure 2: Number of vessels less than 12m length, using passive and mobile gears in each MS



Source: CFR 2016

Figure 3: Percentage of SSF vessels according to declared main gear

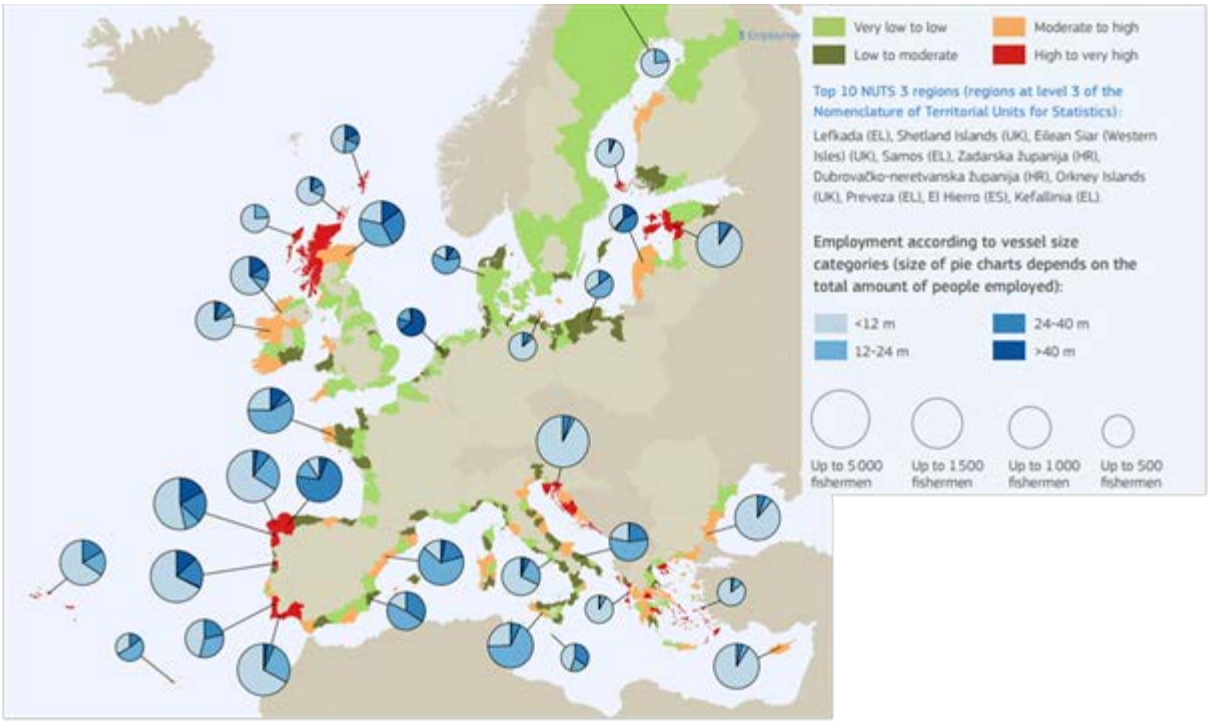


Source: CFR 2016

Fishing is conducted relatively near to shore and fishing operations last usually one day or less. The SFF sector represents over 40% of the fishing sector's total employment[16]. SSF can be particularly important as a source of employment in remote coastal areas (Arthur *et al*. 2011). Within these coastal areas, the role of fisheries and aquaculture and the level of dependence vary across the EU (Figure 4). Indeed, across the EU, many coastal areas dependent on fishing and aquaculture are facing declining populations and increased economic hardship. At the same time, the seas, fisheries and aquaculture have the potential to act as a driver of local development.

[16] https://ec.europa.eu/dgs/maritimeaffairs_fisheries/magazine/sites/mare-magaz/files/past-issues/mag65_en.pdf

Figure 4: Fishing dependency in NUTS-3 regions, measured as the ratio between the fishing fleet employment and total employment in the region



Source: Facts and figures on the Common Fisheries Policy, EC, Edition 2016

In spite of the relatively low volume of catches (LSF), SSF play above all a socially important role and they are an integral part of the European coastal zone in terms of local economic contributions. Indeed, fish products are mostly destined for local sale and for tourist markets with high purchasing power in the EU (Guyader *et al*. 2013). The relatively higher prices obtained by SSF create the potential for a lucrative activity, supplying high-quality fishery products locally. Whether this potential is realized depends on the state of stocks, access to high-value species and catch rates in SSF. This is dealt with in the following sections.

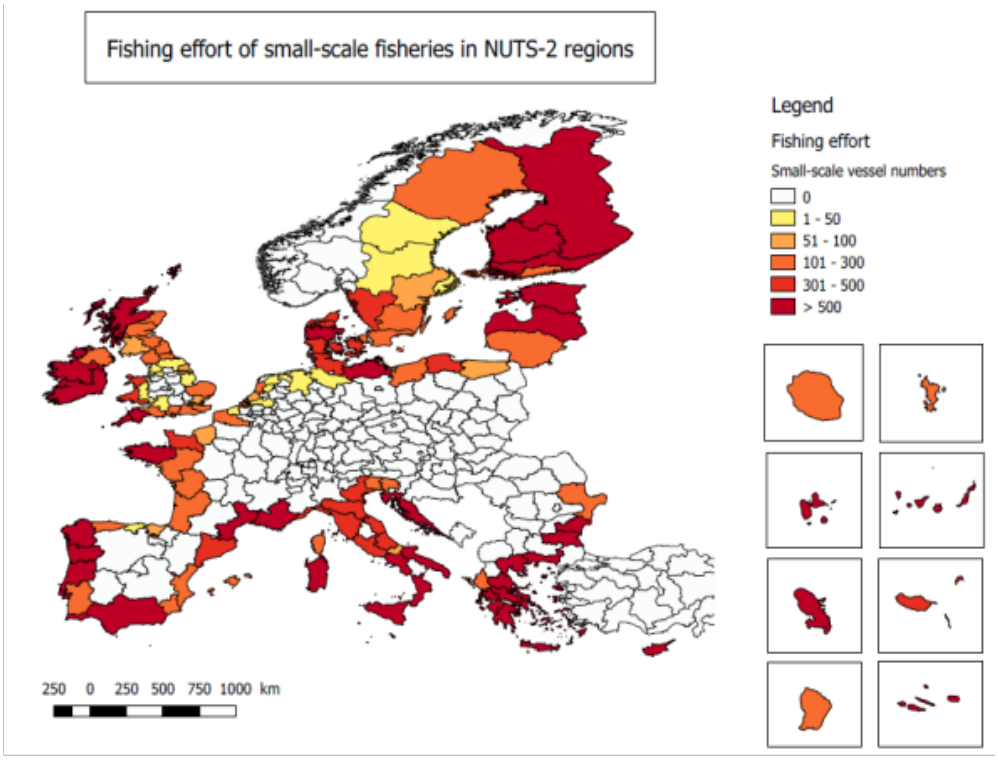
2.1.2 Synergies between SSF and other maritime activities

SSF effort and other maritime activities (aggregate extraction, hydrocarbon, energy facilities, cables, protected areas, wind farms, etc.) were mapped at EU level. Data extracted from CFR were used to map distribution in terms of number of vessels and GT[17]. Only vessels with a size under 12 meters were retained (all types of gear included). Data were aggregated at NUTS 2 level, which consists of 1,276 regions as of 1 January 2015[18]. The ports of operation of the vessels were linked to a NUTS 2 region. For all figures, the projection system is EPSG 4326, WGS 84.

Figure 5 and Figure 6 show the effort of small-scale fisheries in number of vessels or GT by NUT 2 regions. A large proportion is located in the coastal regions of the Mediterranean.

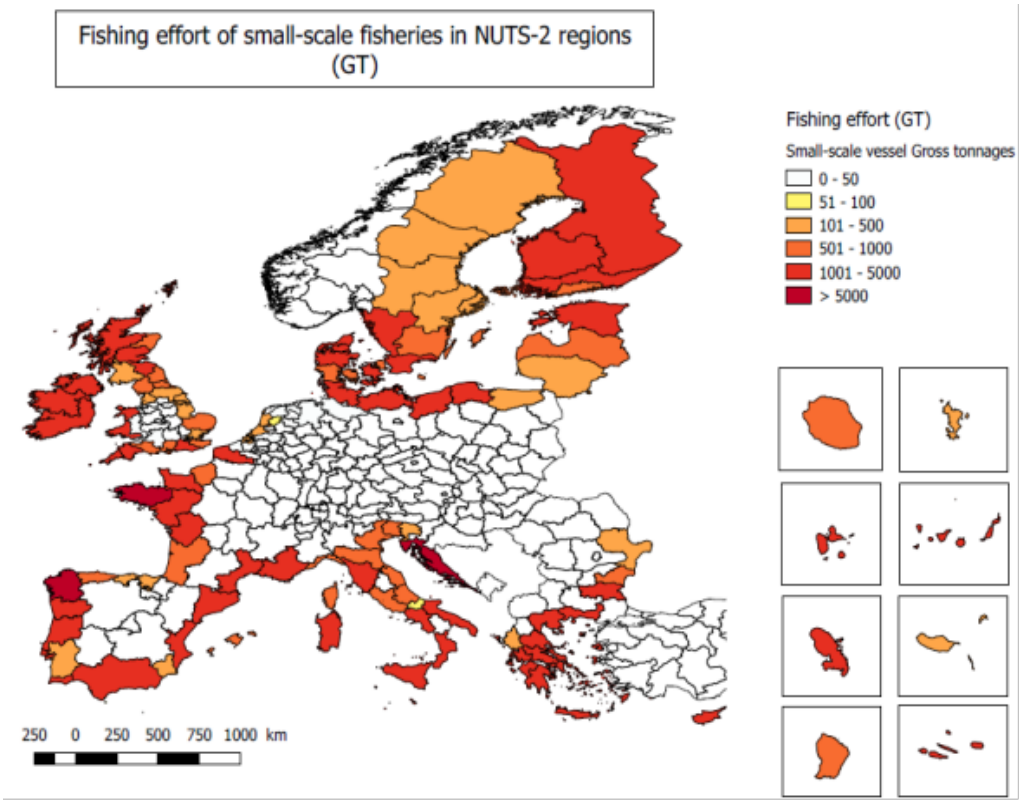
[17] Data extraction made in November 2016.
[18] Base map of NUTS-2 regions used is from Eurostat web site: http://ec.europa.eu/eurostat/web/gisco/geodata/reference-data/administrative-units-statistical-units/nuts#nuts13.

Figure 5: Small-scale vessel numbers in NUTS-2 regions



Source: CFR 2016

Figure 6: Small-scale fisheries in gross tonnages in NUTS-2 regions



Source: CFR 2016

Aggregate extraction and dredging sites

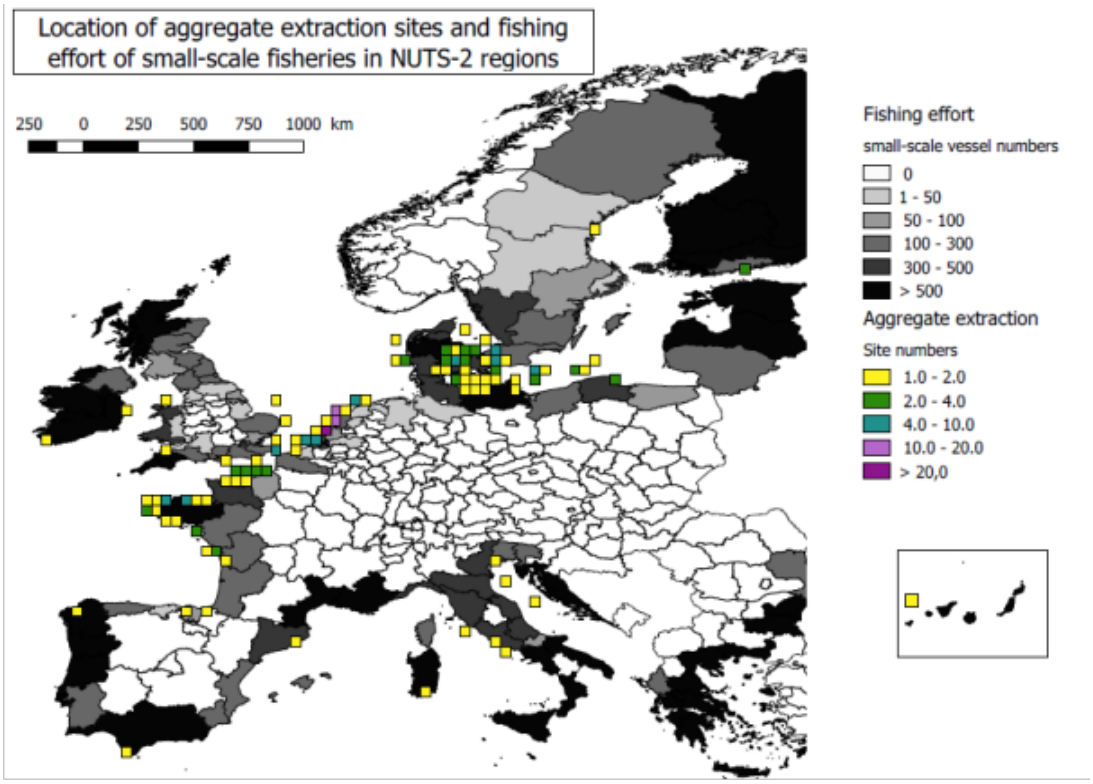
The European Marine Observation and Data Network (EMODnet) provides geographical information on various marine and maritime human activities, which were combined with data on fishing effort. The geodatabase on aggregate extractions and on dredging in the EU was created in 2014 by AZTI-Tecnalia for EMODnet, which is the result of aggregate and harmonised datasets provided by several sources across the EU. The database contains points representing aggregate extraction and dredging sites.

Aggregates are the collective term for sand, gravel and crushed rock extractions. They are essential raw materials for the construction industry and are also widely used in beach replenishment schemes. Dredging is the removal of sediments and debris carried out underwater, in shallow seas.

These types of activities are known to impact the marine environment in a variety of ways, some of which have the potential to affect fisheries. These impacts include: restriction of access to fishing grounds; local destruction or damage to benthic organisms as a direct result of dredging and the potential for wider area effects due to the re-distribution of finer material. Dredging may alter the physical characteristics of sediments and the seabed with potential longer-term consequences for benthic organisms including fish. Interactions between extraction or dredging activities and SSF are therefore negative.

Figure 8 combines extraction and dredging sites and SFF effort. They highlight many sites in the coastal areas of NUTS regions where a significant SSF fleet exists.

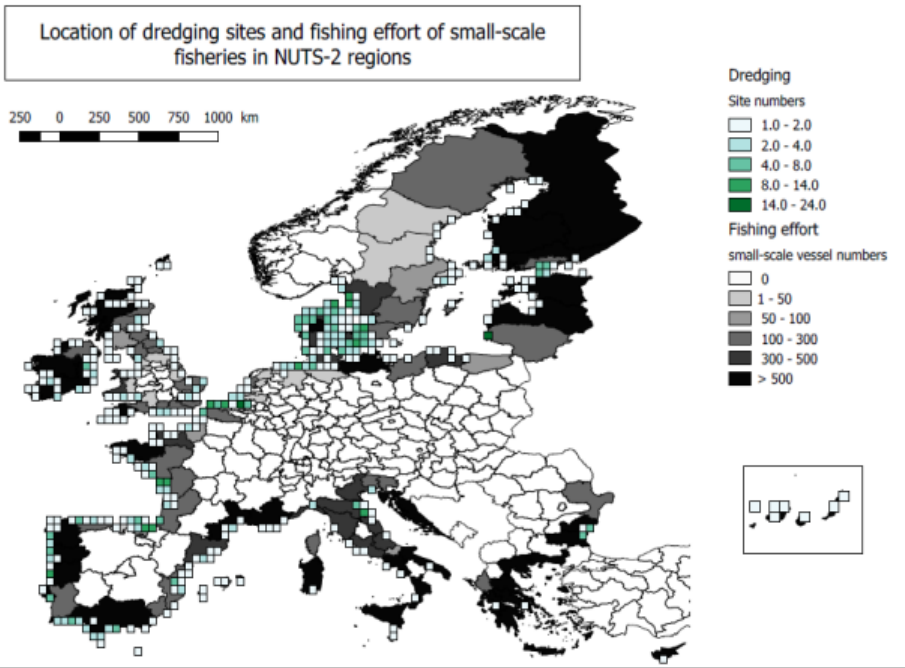
Figure 7: Location of aggregate extraction sites combined with SSF effort[19].



Source: EMODnet and CFR 2016

[19] Effort data was obtained from the CFR and is expressed as the number of SSF vessels, at country level.

Figure 8: Location of dredging sites combined with SSF effort.



Source: EMODnet and CFR 2016

Hydrocarbon extraction sites

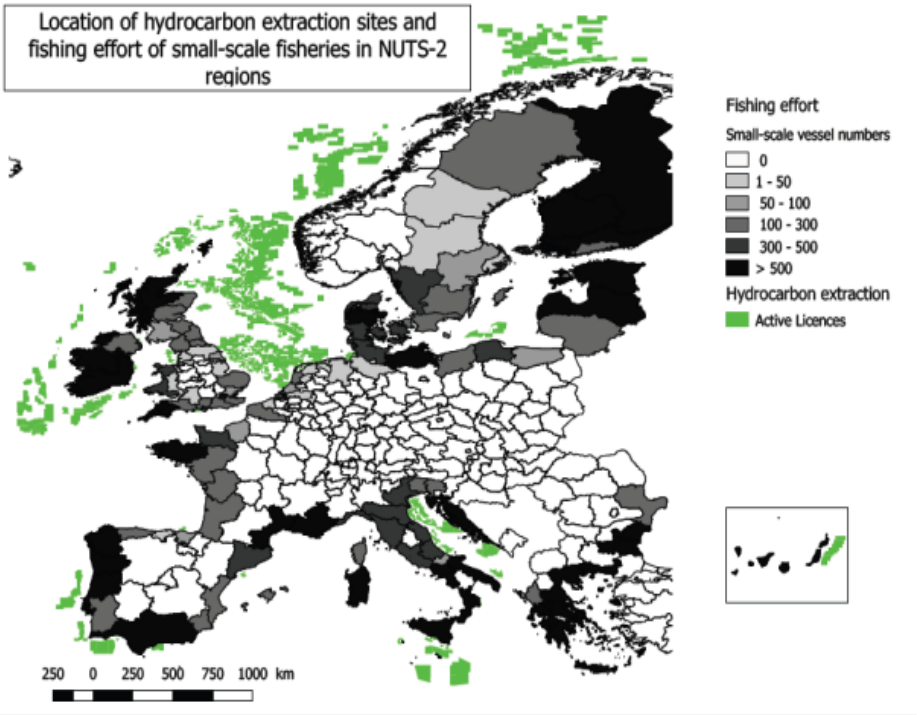
The geodatabase on offshore hydrocarbon licences in the EU was created in 2015 by Cogea for EMODnet, which contains polygons representing active offshore hydrocarbon licences.

Most hydrocarbon extraction sites are located in North Sea area (Figure 9). The fishing and hydrocarbon industries must coexist in a marine environment that is sensitive to exploitation and contamination. Although fishing is not permitted inside safety zones and the total area protected increases with the number of offshore installations, it is not considered to affect catching rates, as fishing effort can move to other areas. But declining fish stocks and increased regulation could lead to increasing conflicts between the two industries competing for the same water space (Gomez and Green 2013).

The potential to interfere with the environment and with fishing activities is potentially relevant during prospection phase or in case of offshore O&G accidents.

During prospection phase, commercial fish species are sensitive to sound and, at close range, larval fish might even be killed by seismic sources. Seismic surveys might disturb commercial fish and spawning fish away from territory where they have chosen to aggregate and place a risk for stock productivity. In case of accidents, an exclusion safety area is established to limit and control potential effects, the mortality of some fish and the running out of others, leads to reduction of stock availability. Disturbing fish away from traditional areas may affect SSF activities.

Figure 9: Location of hydrocarbon extraction sites combined with SSF effort.



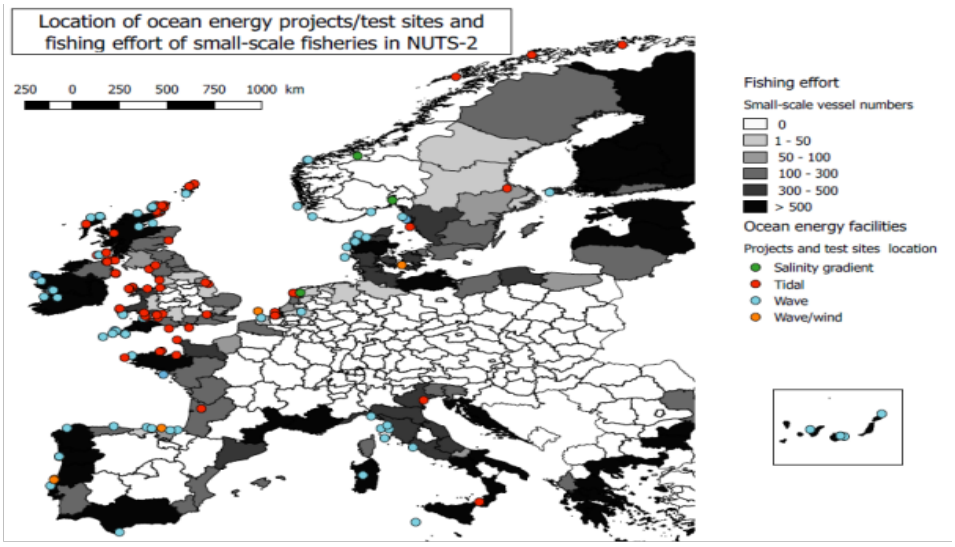
Source: EMODnet and CFR 2016

Ocean energy projects and test sites

Figure 10 and Figure 11 present the locations of projects and test sites for marine energy installations (salinity gradient, tidal, wave and wind facilities). The number of ocean energy projects are expected to increase in the coming years.

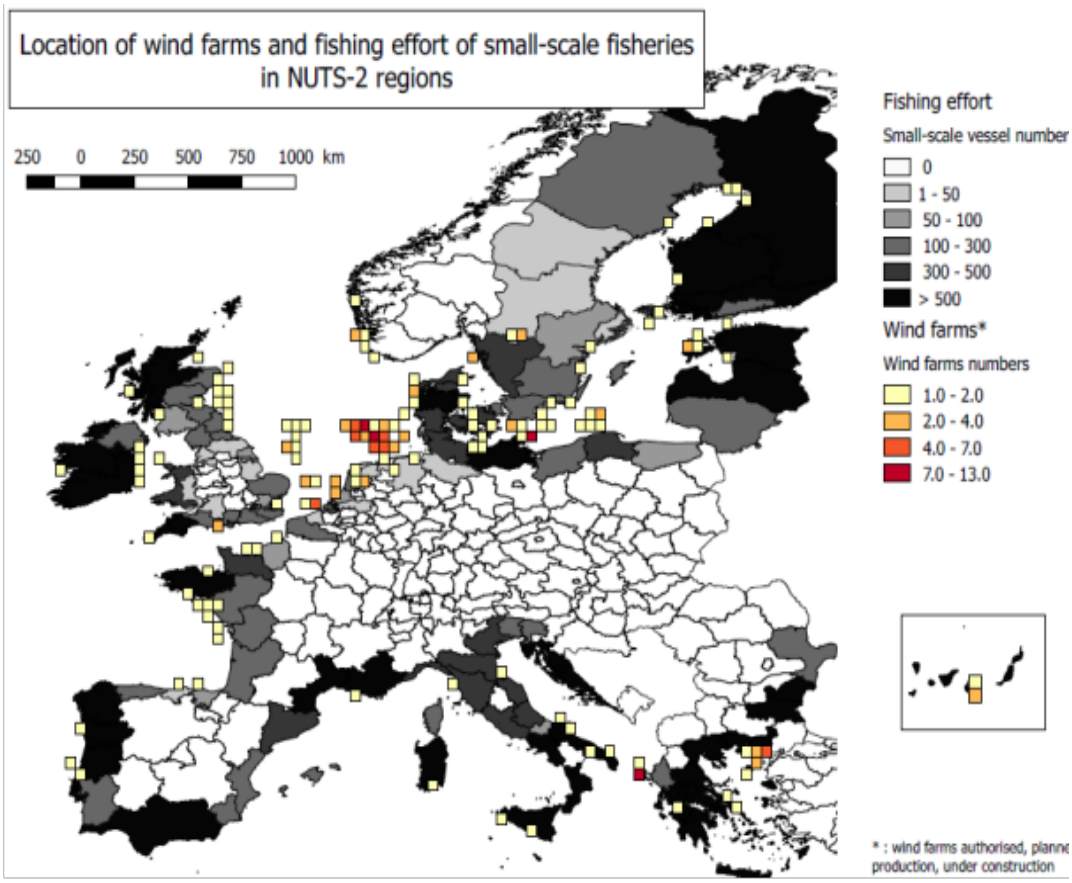
This type of activity influences SSF because they are often located near the coast and deprive the fishermen of access to their fishing grounds. There are nevertheless possibilities of cohabitation especially for passive gears. Some studies suggest that turbines of wind farms may actually increase fish populations by acting as artificial reefs (Zhang 2015).

Figure 10: Location of ocean energy projects/test sites combined with SSF effort



Source: EMODnet and CFR 2016

Figure 11: Location of wind farms combined with SSF effort



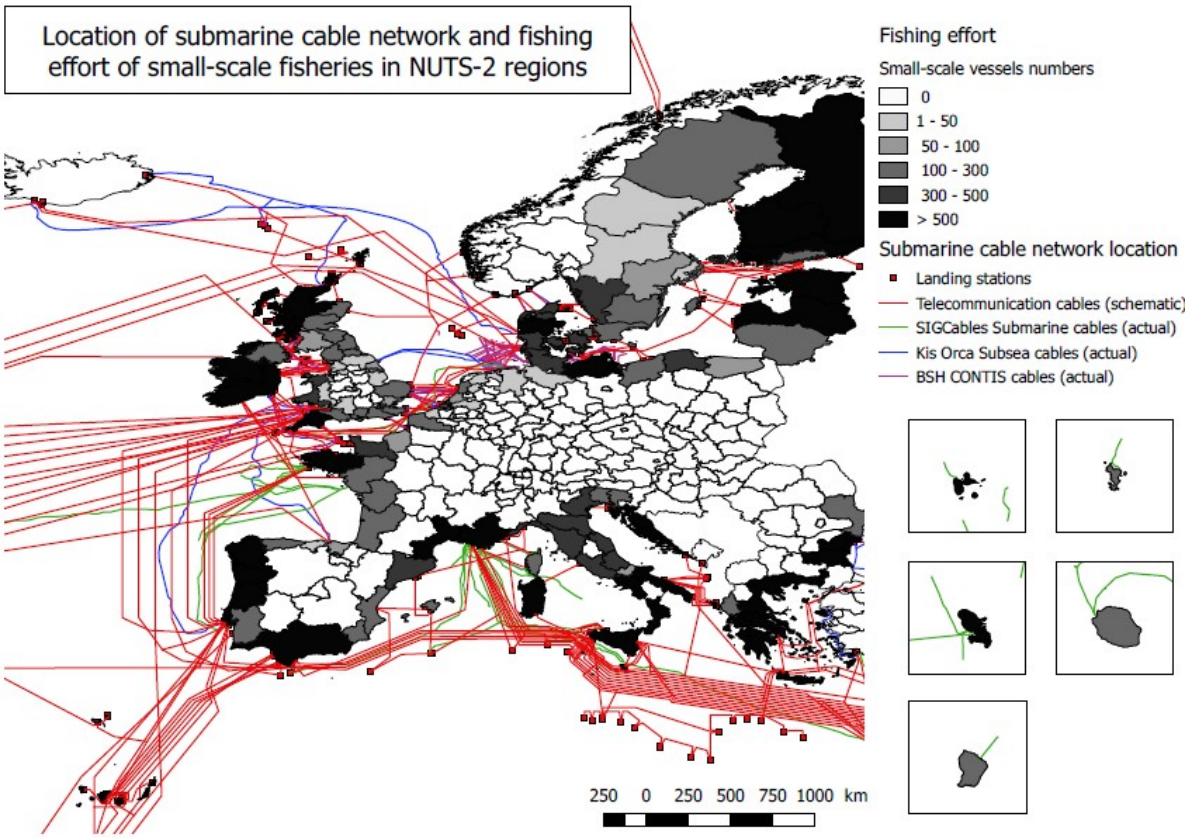
Source: EMODnet and CFR 2016

Submarine cables

The dataset on submarine telecom cables was created by Cogea in 2014 for EMODnet, based on data are collated from a variety of sources: SIGCables (managed by Orange), the Federal Maritime and Hydrographic Agency (BSH Contis), and Greg's Cable Map (via Kis-Orca). The database contains lines representing actual cable routes locations.

The number of submarine telecommunication and power cables are expected to increase in the coming years, primarily as the result of the number of offshore wind farm transmission cables (Figure 12). This could intensify potential environmental impacts, but the effects of the electromagnetic fields created by these cables on migrating species (fish, marine mammals) are not sufficiently understood. Since cable routes are confined, such impacts are not likely to be significant.

Figure 12: Location of submarine cable combined with SSF effort



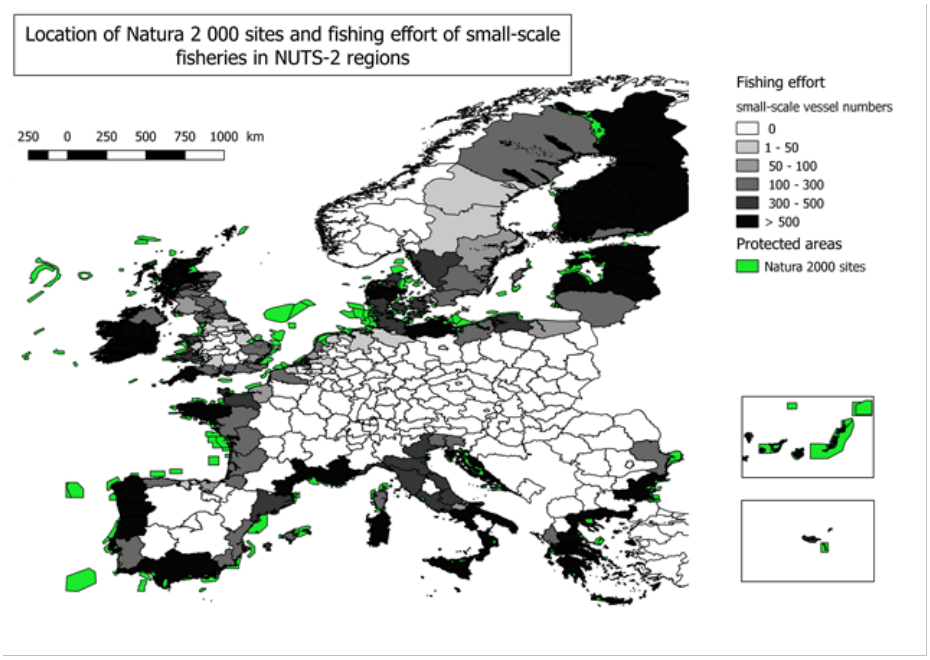
Source: EMODnet and CFR 2016

Marine Protected areas

The dataset on marine and coastal protected areas in the EU was created in 2015 by Cogea for EMODnet. The dataset is based on the European Environmental Agency's (EEA) datasets concerning "Natura 2000" and "Nationally designated areas (CDDA)". Natura 2000 is an ecological network composed of sites designated under the Birds Directive (Special Protection Areas, SPAs) and the Habitats Directive (Sites of Community Importance, SCIs, and Special Areas of Conservation, SACs). The Common Database on Designated Areas (CDDA) is more commonly known as nationally designated areas (Figure 13 and Figure 14).

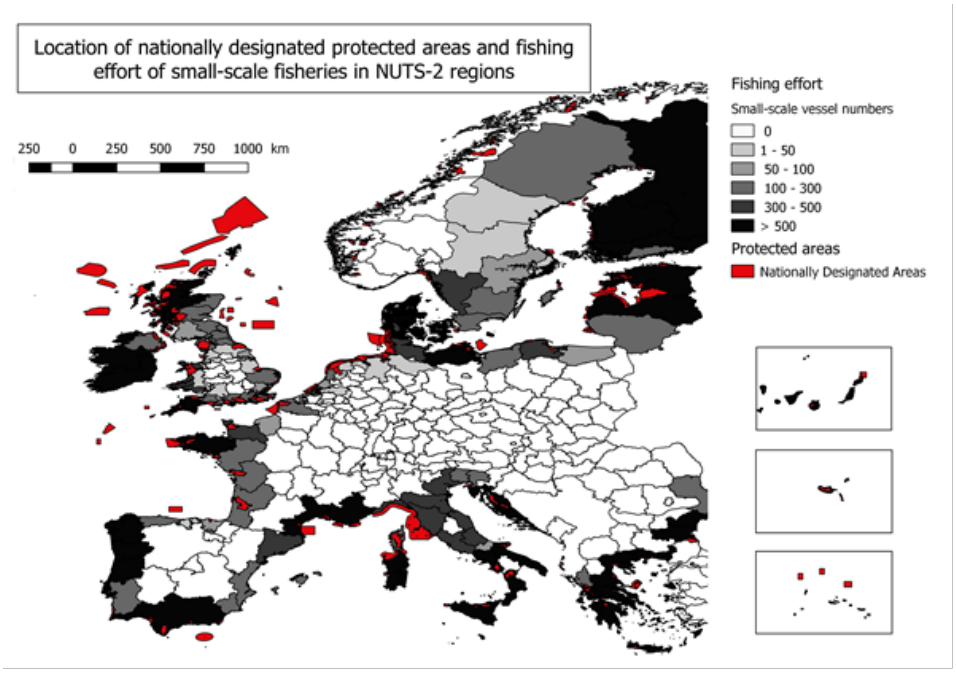
In a context of overfishing, the establishment of protected areas are used as tools for protecting biodiversity. These marine protected areas (MPAs) are subject to preservation measures to protect habitats that are necessary for fish reproduction and growth. SSF and protected areas are in principle compatible, but the synergies will be discussed in the following sections.

Figure 13: Location of Natura 2000 sites combined with SSF effort



Source: EMODnet and CFR 2016

Figure 14: Location of nationally designated protected areas combined with SSF effort



Source: EMODnet and CFR 2016

Aquaculture

Aquaculture production by the 20 EU Member States reached 1.33 million tonnes and EUR 4.51 billion in 2014, according to EU DCF and EUROSTAT (STECF 2016b). This corresponds to a 4% decrease from 2012 production figures. Employment in the EU-20 aquaculture sector is about 69,700 people (Figure 15). Based on the data available for both 2012 and 2014, the employment increased by 1% during this two-year period. The sector is dominated by SMEs;

90 % of the 11,865 aquaculture enterprises are microenterprises (with less than 10 employees), most of which are concentrated in Greece, Spain, France, Italy and the United Kingdom, making up 77 % in volume and 76 % in value of EU totals (STECF, 2016b; DG MARE website). The number of enterprises with more than 10 employees has increased from 1,040 in 2012 to 1,230 in 2014 corresponding to an increase of 21% (STECF 2016b). Finally, potential development of the aquaculture sector can be assessed based on the Future Expectations Indicator (FEI), which indicates whether the industry in a sector is investing more than the depreciation of their current assets. With DCF data from 19 countries (excluding Poland) the FEI for the EU aquaculture sector was estimated to be negative at 5.8% in 2014. This is a decrease from the 3% reported in 2012 (STECF 2016b). This appears to show negative expectations on the future development of the sector, but this masks both positive and negative expectations depending on the sector and the MS, as well as high variability between years since some major investments (e.g. vessels) do not occur frequently. In 2014, a high FEI was observed for Croatia (12.3%), Denmark (33.0%), Italy (28.4%) and the Netherlands (59.3%). On average, this was estimated at 2.0% in 2014.

Figure 15: Economic and employment indicators for the EU aquaculture sector 2014

Country	Number of enterprises	Total sales volume	Turnover	Employment	FTE	Average wage
	number	*thousand tonnes*	*million €*	*number*	*number*	*thousand €*
Bulgaria	354 ▲	6.8 ▲	17.2 ▲	924 ▲	679 ▼	3.3 ▲
Croatia	175 ▲	12.7 ▲	73.6 ▲	2231 ▲	1117 ▼	22.1 ▲
Cyprus	16 ▲	4.9 ▼	32.3 ▬	388 ▲	337 ▲	10.5 ▬
Denmark	115 ▼	46.4 ▬	159.8 ▬	506 ▬	336 ▲	72.1 ▬
Estonia	9 ▬	0.4 ▲	1.5 ▲	36 ▲	30 ▲	10.7 ▼
Finland	170 ▲	11.7 ▲	59.7 ▼	515 ▼	329 ▼	39.5 ▲
France	2953 ▬	225.9 ▬	833.9 ▬	16454 ▼	9114 ▲	28.3 ▲
Germany*	10 ▬	6.9 ▲	15.0 ▲	60 ▲	60 ▲	55.0 ▲
Greece	248 ▲	118.1 ▲	613.3 ▲	5129 ▲	4640 ▲	21.4 ▲
Ireland	277 ▬	31.7 ▼	116.3 ▬	1821 ▬	941 ▬	31.9 ▲
Italy**	587 ▬	185.8 ▲	566.9 ▲	5112 ▬		
Malta	6 ▬	8.6 ▼	97.3 ▼	179 ▼	153 ▼	23.1 ▲
Netherlands	110 ▬	60.1 ▲	69.7 ▲		212 ▬	50.2 ▲
Poland**	1242 ▲	36.3 ▲	89.3 ▲	7764 ▲		11.8 ▲
Portugal	1428 ▬	8.8 ▲	53.0 ▲	2357 ▼	799 ▬	12.9 ▼
Romania	430 ▬	10.6 ▲	19.1 ▼	2542 ▲	2001 ▲	4.3 ▼
Slovenia*	7 ▼	0.5 ▲	0.8 ▲	20 ▼	19 ▼	14.5 ▼
Spain	3035 ▬	288.2 ▲	545.7 ▲	19914 ▲	5946 ▲	22.6 ▲
Sweden	142 ▬	14.0 ▬	56.9 ▲	411 ▬	278 ▼	44.5 ▲
United Kingdom	551 ▬	214.7 ▲	992.6 ▲	3310 ▲	2761 ▲	35.2 ▬
Freshwater not reported		19.5 ▬	92.4 ▼			
Other none DCF		43.9 ▲	103.3 ▲			
Total DCF reported	***11865*** ▲	***1293.1*** ▲	***4414.0*** ▲	***69673*** ▲	***31446*** ▲	***23.4*** ▲
Total EU		**1337.1** ▲	**4517.3** ▲			

Source: EU MS DCF data submission & EUROSTAT, 2016.
* German and Slovenian data only include the marine sector. The volume and value have been added under "Freshwater not reported" using Eurostat data.
** Italian data on FTE is not reported as the working group consider it unreliable.
*** Polish data on average wages only refers to the marine aquaculture sector.

Source: STECF 2016

Harmonised and georeferenced data is not available at European level. There is however a recent study which used various methods to map and analyse spatial properties of marine finfish aquaculture sites in the EU, covering 10 MS (Cyprus, Spain, France, Greece, Croatia, Ireland, Italy, Malta, Slovenia, United Kingdom) (Hofherr *et al.* 2015). A general finding was that aquaculture sites occupy only limited space, which would indicate that expansion of marine aquaculture in the EU is not likely to be constrained by a lack of space and suggest potential for development. At a local level however, conflicting sectoral interests with other coastal economic activities may exist and limit potential of growth and new projects (for example on the French coast and in particular in Brittany and the Portuguese southern coast).

Marine recreational fishing

Recreational fishing is fishing which is not deemed to be commercial fishing (i.e. it does not have sale or profit connotations), and is not undertaken for predominantly subsistence purposes. This activity constitutes a considerable social and economic activity at European level. Total expenditure is believed to exceed EUR 25 billion a year in Europe (Jobard *et al*. 2016) and the number of sea anglers is estimated to be 8-10 million in Europe. By comparison, the value of trade in commercial fishery products in the 28 EU member states in 2014 was estimated at EUR 25 billion. However, more data is needed on the relative importance in social, economic and environmental terms of marine recreational fishing in the EU. ICES has been working on identifying suitable data collection surveys for recreational fisheries since late 2000, addressing major issues of minimizing sources of bias, efficient targeting and how to deal with under-coverage.

Progress is being by providing data on recreational fishing for specific stocks (e.g. European sea bass, cod, salmon, sharks, eels and tuna), but more is needed to better manage fish stocks and assess the impacts of recreational fishing. More efforts are needed from MS on data collection in recreational fisheries.

Coastal tourism

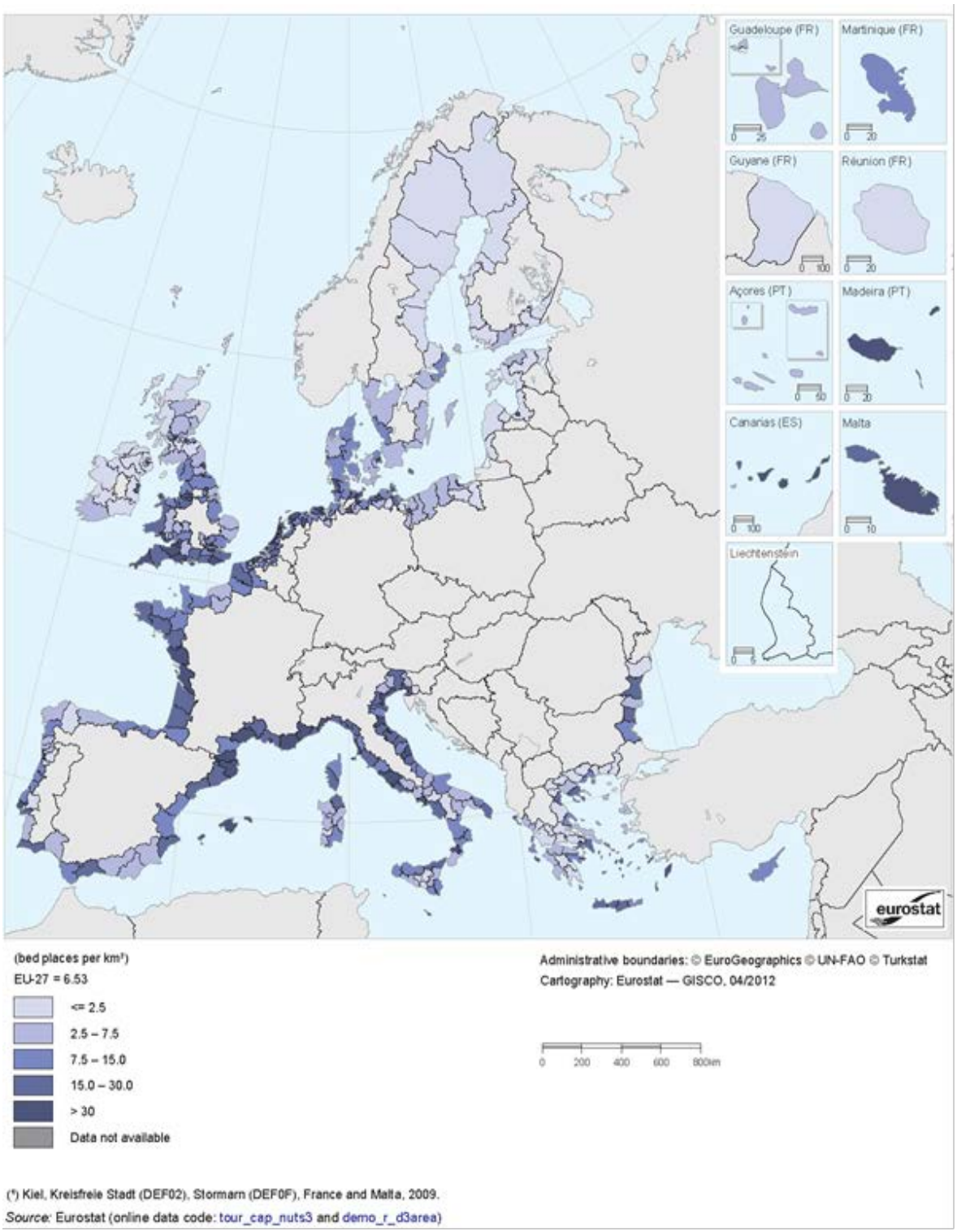
The International Coastal and Marine Tourism Society (ICTMS) defines coastal and marine tourism as those “recreational activities which involve travel away from one's place of residence which have as their host or focus the marine environment and/or the coastal zone." It includes many activities such as scuba diving and snorkelling, wildlife observation, all types of beach activities, visits to fishing villages and lighthouses, maritime museums and events, and others. It was not possible to find georeferenced data on coastal tourism but Figure 16 presents regional tourism statistics such as the number of bed places per kilometer square by NUTS 3 coastal regions.

In the EU, there were around 28.1 million beds distributed among hotels, campsites and other collective tourist accommodation in 2009, of which nearly three fifths were in coastal regions. EU coastal regions around the Mediterranean Sea offered 7.1 million bed places equivalent to 43% of the total among all coastal regions. The second largest amount of tourist accommodation available was along the coast of the North-East Atlantic Ocean, with 4.9 million bed places. At a national level, the coastal regions of France, Italy, the United Kingdom and Spain had by far the greatest number of bed places available for tourist accommodation, collectively accounting for 71.9% of the total in EU coastal regions. Climatic conditions, cultural reasons and visits to coastal regions are on account of the attraction of the coast region.

Tourism in coastal regions can provide employment opportunities and also contribute to regional development and economic and social integration. Synergies between tourism activities and SSF are seen as generally positive and need to be developed. Tourism activities

can offer fishermen a good way to diversify their activities. It can be done outside or in combination with fishing activity during the year as a potential means of earning additional income. Developing tourism activities can help the economic development of fisheries areas. Recreational fishing can also be included in this kind of tourism. Synergies will be discussed in the next section.

Figure 16: Coastal tourism – density of tourism accommodation in EU coastal regions by NUTS 3 regions in 2010



Source: Eurostat

Maritime transport

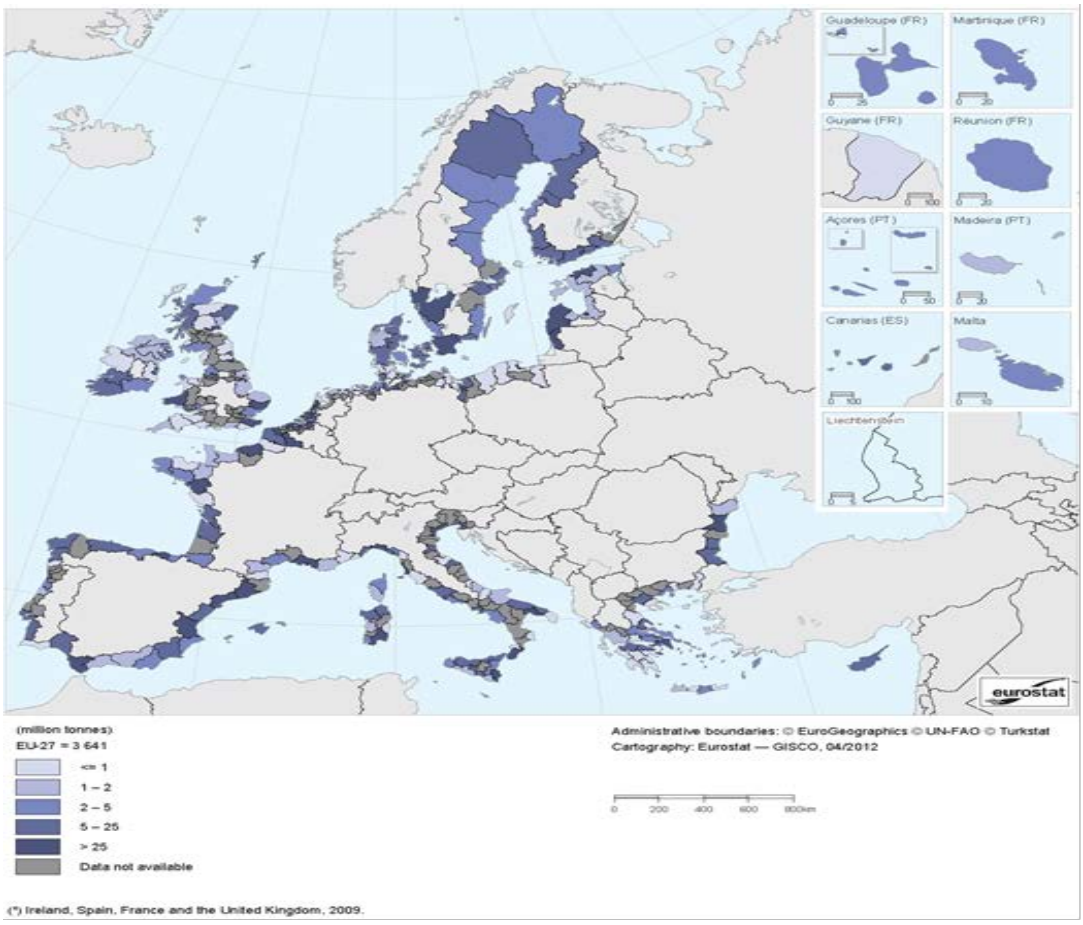
Maritime transport is the main mode of exchange between the EU and the rest of the world: around two fifths of the EU’s external freight trade is seaborne. Short sea shipping also plays a significant role in intra-EU trade especially with islands and peripheral maritime regions.

It was not possible to find georeferenced data of maritime transport including freight and passengers for a comparison with SSF effort. Data was extracted from Eurostat total gross weight of maritime goods handled and distribution of maritime passengers in EU coastal regions by NUTS-3 (Figure 17 and Figure 18).

Ports in North Sea regions and the Mediterranean dominate maritime goods handled in EU coastal regions. In the same way, the Mediterranean Sea basin dominated maritime passenger transport, accounting for more than half of all passengers along the EU’s coast. The next largest share is in the Baltic Sea, followed by the North-east Atlantic Ocean and then the North Sea. The main ports for passengers are Piraeus, Napoli, Kent and Pas-de-Calais for the English Channel and Messina in Sicily.

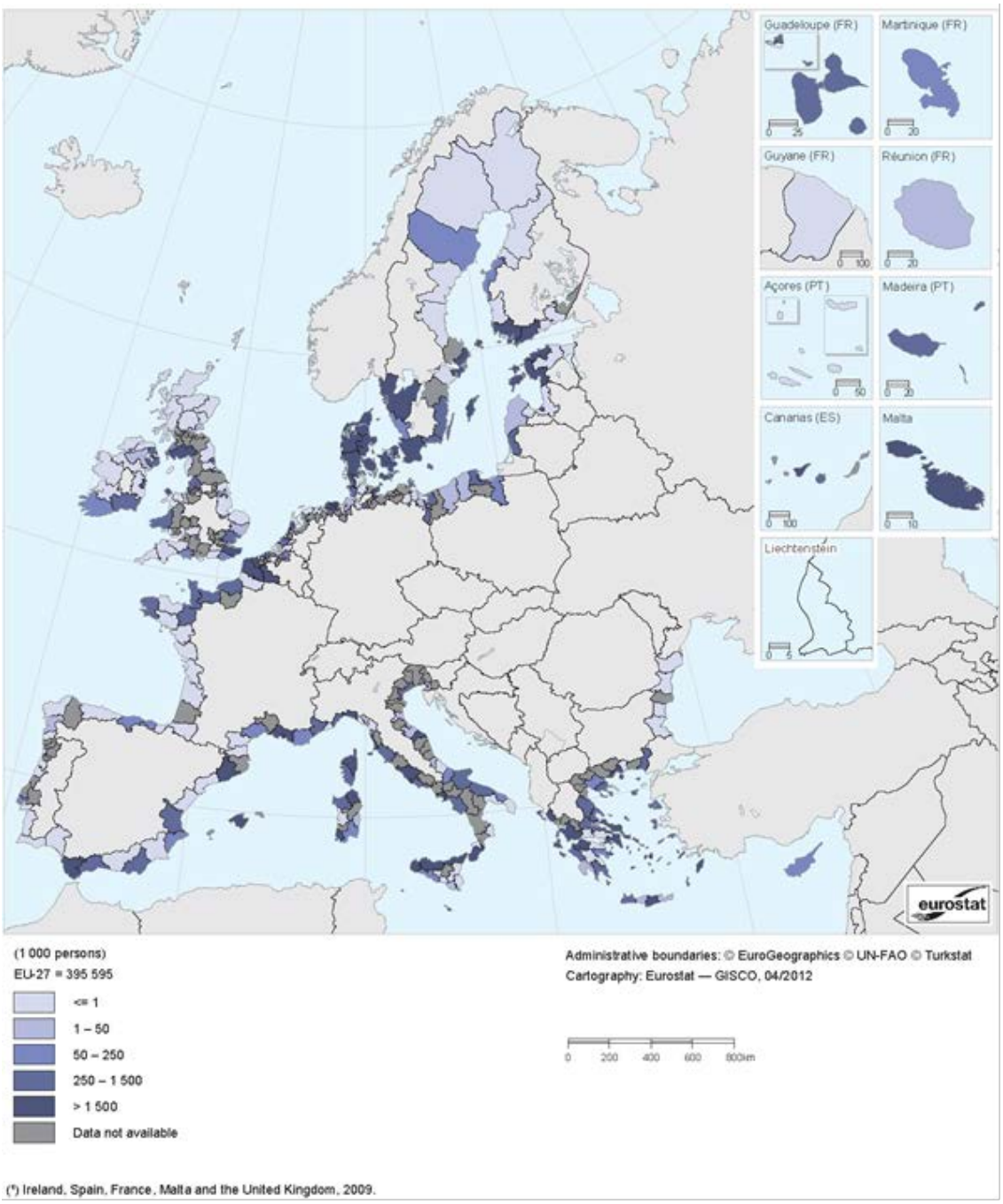
The European shipping and ports sectors cause multiple pressures on the marine and coastal environment. Environmental pressures include abrasion (impact with the seabed), introduction of non-indigenous species, introduction of non-synthetic and synthetic compounds, smothering and sealing, marine litter, and underwater noise. Concentrations of maritime transport and port activities combined with other socio-economic activities can result in hotspots for environmental pressures. Environmental degradation can consequently have negative impacts on socio-economic activities which depend on the goods and services provided by marine and coastal ecosystems like SSF activities.

Figure 17: Total Gross Weight of Maritime Goods handled in EU coastal regions by NUTS-3 regions in 2010



Source: Eurostat

Figure 18: Maritime passengers in EU coastal regions by NUTS-3 regions in 2010[20]



Source: Eurostat

2.1.3 The case of the Mediterranean

The EU fishing fleet operating in the Mediterranean and Black Sea comprises some 43,000 vessels and SSF vessels are the predominant fleet segment with 34,024 vessels, accounting for 79% of the total number of vessels. Detailed information is given in Annex II.

[20] It was not possible to find more recent information, including on Croatia.

Considering all countries in the GFCM area of competence, SSF in the Mediterranean and Black Sea involve a large number of fishing techniques and these target numerous species, adapting to fishing seasons based on a rotational system. However, the most common fishing gear used in the Mediterranean SSF is static nets, particularly trammel nets and gillnets.

SSF landings amount to 12% of the total landings in the area, but account for 22% of landed value and 55% of employment. The fleet segment 'Polyvalent SSF vessels from 6 to 12 m LOA (w/ engines)' is particularly important and is ranked 3rd in terms of landed value ($438 million USD).

Based on the analysis presented in Annex II, the most important maritime economic activities in the Mediterranean were identified as: maritime transport (short-sea shipping, cruise and port cities), oil & gas, and coastal tourism. Aquaculture and fisheries are other important economic activities. Table 1 presents estimates of the economic importance of maritime activities through three indicators: gross value added, employment and short-term growth trend.

Table 1: Estimated economic importance of maritime activities in the MED

Activities	Gross Value Added (Euros)	Direct and Indirect employment	Short-term growth trend
Small-scale fishing	2.1 billion in 2008	222,000 direct in 2012	Employment stable Declining fishing catches since 1990 (overfishing)
Aquaculture	3.5 billion Euros in 2011	122,820 direct 765,900 indirect in 2008	Continue increasing – 4% per year since 1990
Tourism	135 billion Euros in 2012	3.2 million direct 5 million indirect in 2011	Constant growth during the last decades (with 58 million of international arrivals in 1970 and 290 million in 2011)
Maritime transport	27 billion Euros in 2010	550,000 direct in 2010	Increases in terms of total trade
Offshore oil and gas	22 million Euros in 2011	29,000 direct in 2013 188,000 indirect in 2013	11.6% per year between 1970 and 2009

Source: Plan Bleu 2014

Tourism is the most important maritime activity in the Mediterranean far ahead of maritime transport and offshore oil and gas activities. Aquaculture and SSF activities have a similar economic weight but low compared to other activities. The MEDTRENDS project has studied the main scenarios in maritime economic activities for EU MED countries during the next 20 years, which is presented in the following (Figure 19)[21].

[21] http://www.medtrends.org/medtrends.php

Blue biotechnology is an emerging sector related to the use of marine biological resources through biotechnologies (e.g. gene sequencing, biofuels, micro and macro algae, coproducts of seafood, etc.). Although still underexplored, it is believed that marine biological resources may have a high potential to bring benefits to several domains, such as health (pharmaceuticals, biomaterials), cosmetics, food (functional and nutraceutical foods, etc.), energy (renewable energy processes, …), aquaculture (seed, feed,…), and bioremediation (de-pollution, biofuels, …). UNEP has estimated a global market for marine biotechnology products able to generate over EUR 2.5 billion by 2017, with a high potential for expansion. Moreover, the EU has valued that this sector might be producing a GVA close to EUR 1 billion in European waters, along with the creation of high qualified jobs. Several conditioning factors may favour the consolidation of the bio-prospecting sector as a sustainable and economically viable activity in the Mediterranean region in the short/ midterm (Plan Bleu 2016). DG MARE (2012b) has assessed the impact of blue biotechnology and has estimated an annual growth rate around 4-5%. Overall employment in the sector is currently expected to be in the range of 11,500-40,000 people (Remotti and Damvakeraki 2015).

Figure 19: Future trends of main maritime sectors in the MED

Sector	Expected development trend of sector	Estimations
Oil and gas exploration and extraction	↗	• **Offshore oil production could increase by 60% between 2010 and 2020** at the Mediterranean regional level, rising from 0.7 mbd to 1.12 mbd. • **Offshore gas production could increase five-fold from 2010 to 2030,** from 55 Mtoe/year to 250 Mtoe/ year at the Mediterranean regional level.
Maritime transport and ports	↗	**4% per annum growth rate in global trade over the next decade** can be anticipated and will be reflected in international maritime traffic routes at the Mediterranean regional level (Suez-Gibraltar axis, Aegean Sea, Adriatic Sea, and to a lesser extent the northwestern Mediterranean)
Professional fishing	↘	A **downward trend** is expected at an uncertain rate at the Mediterranean regional level.
Recreational fishing	↗	An **upward trend** is expected at an uncertain rate in the Mediterranean countries of the EU.
Marine aquaculture	↗	Forecast of fish aquaculture production in the Mediterranean countries of the EU anticipates a **112% increase between 2010 and 2030.** Production could jump from 280,000 tonnes to nearly 600,000 tonnes.
Tourism (coastal tourism, cruise tourism, recreational boating)	↗	**International tourist arrivals in the Mediterranean should increase by 60% between 2015 and 2030 to reach 500 million arrivals in 2030** at the Mediterranean regional level. France, Italy and Spain will remain the three biggest destinations.
Renewable energy	↗	While no marine renewable energy was produced in 2014, predicted production of electricity by offshore wind farms could reach **12 gigawatts (GW) in 2030** in the Mediterranean countries of the EU.

Source: Piante and Ody 2015

Based on current importance, short-term growth rates, long-term potential, and other criteria such as innovativeness, competitiveness and sustainability, we consider aquaculture and tourism as the most promising activities (Table 2).

Table 2: Future potential expected in maritime economic activities

Activities	Future potential
Small-scale fishing	+
Marine aquaculture	+++
Coastal tourism	+++
Maritime transport	+
Offshore oil and gas	+
Blue Biotechnology	++

Note: (+++: high, ++: moderate, +: low)

The potential of BG can be reinforced by taking advantage of synergies. Synergies are a pre-condition for future growth and development. Different types of synergies between SSF and other maritime activities include:

- Shared suppliers: several economic activities make use of similar inputs. This may trigger agglomeration or clustering effects;
- Enabling activities: an activity which provides conditions for the development of another activity;
- Shared (multipurpose) activities: one activity serving several maritime functions;
- Common use of infrastructure, including ports but also offshore islands;
- Shared input factors, including specialised workers;
- Alignment of environmental impacts; common output-input relations contribute to increased sustainability.

Table 3 shows existing and potential synergies between SSF and other maritime activities in the MED. This overview does not pretend to be complete, but considers what are expected to be the main positive synergies.

Table 3: Positive synergies between SSF and other maritime activities

Synergies	Maritime transport	Offshore oil and gas	Coastal tourism	Blue Biotechnology	Aquaculture	Protected areas
Shared suppliers	x					
Enabling activities			x	x		X
Shared activities						
Common use of infrastructures	x		x			
Shared input factors			x	x	x	X
Alignment of environmental impacts			x	x		X
TOTAL	+		++	++		++

SSF activities have important potential connections with coastal tourism, since fishing areas typically have many natural and cultural assets, which can appeal to tourists and may benefit of the same infrastructures. The use of these synergies would enable diversification in the local economy, provide additional jobs and income to families, and help stabilise the declining profitability and employment in the fisheries sector. One such strategy is to diversify into tourism-related activities by complementary activities for examples: pesca-tourism[22], recreational fishing or marine tourism (wildlife observation, festivals, workshops, museums, and thematic villages).

The SSF sector has important synergies with shipping activities (short-sea shipping, cruise shipping) as it uses the same port facilities. Synergies with the maritime transport cluster are also related to shipbuilding, where the supplier industry located in the MED can serve a wider variety of vessel types.

There are also potential synergies with blue biotechnology that allows integrating new marine value chains (marine biomass from seaweed, microalgae, shellfish aquaculture residues and wastes) and to develop sustainability new marine-derived products.

Marine protected areas (MPAs) can be used as a fisheries management tool that can contribute to the sustainable exploitation of fish and the conservation of aquatic biodiversity. MPAs have positive effects on fish stock abundance, recruitment and age structure, thus contributing to fisheries resources and productivity, stability and resilience. There are beneficial effects for fisheries. There are possible synergies with SSF in that fishermen can assume responsibility in the monitoring of these sites, use these MPAs for touristic purposes, as well as benefit directly from more sustainable exploitation of fish resources.

However, increasing maritime economic activities are likely to generate not only synergies but also tensions: on or around fishing grounds and near fishing ports, but also where renewable energy is to be generated, where leisure activities take place, and where natural habitats are protected (Table 4)[23].

Recent changes and economic pressures are creating a new situation for fishing communities in the Mediterranean. There has been a rapid increase in fishing activity. Indeed, the trend towards modernisation with its increase in boat size and effectiveness is resulting in ever more acute fishing pressure. According to the GFCM, certain commercial species are in an alarming state as a result of over-fishing). The development of small-scale fisheries in the Mediterranean must therefore be oriented, not towards an increase in fishing effort, towards sustainable fisheries and the development of identified synergies with other maritime activities such as tourism and management of protected areas (income diversification), and the enhancement of product quality as well as their commercialisation (increase in value added). The priority should be on environmental protection and ensuring the sustainability of such activities for future generations.

[22] Commonly used term in the Mediterranean for tourism linked to fishing.

[23] http://barlavento.pt/mais/ambiente/movimento-algarve-livre-de-petroleo-protesta-a-porta-da-camara-de-aljezur
http://www.sulinformacao.pt/2016/01/pescadores-dizem-que-nova-aquacultura-off-shore-em-vrsa-os-deixa-sem-local-onde-trabalhar/
https://gylle.dk/svoemmende-burhoens-sviner-og-forurener/
http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_8_Offshore_Wind_and_Other_Commercial_Activity.pdf
http://aissr.uva.nl/binaries/content/documents/personalpages/g/i/r.j.vanginkel/en/tab-two/tab-two/cpitem%5B25%5D/asset?1355373420036.
http://www.medmaritimeprojects.eu/download/ProjectFishmpablue/FishMPABlue_Outputs/FishMPABlue_6_Governance%20toolkit_EN.pdf

Table 4: Potential tensions between SFF and other maritime activities

Types of tension	Marine transport	Offshore oil and gas	Coastal tourism	Recreat-ional fishing	Aqua-culture	Protected areas
Restriction of access to fishing grounds		+	++	+	++	++
Impact on Biodiversity				+		
Impact on stock productivity			+	++		
Damage to ecosystems/ pollution	+		+ +		+	

Note: level: ++ high, + low

2.1.4 Blue Growth in the Arctic

EU Arctic Policy

The EU has a long-standing relation with the Arctic due to a combination of various historical, geographical, and socio-economic factors. This is not the focus of this study, but suffice to note that three MS have territories in the Arctic - Denmark (through its sovereignty over Greenland), Finland and Sweden – and these are members of the Arctic Council (AC), the main forum for international cooperation in the Arctic. Iceland and Norway are members of the European Economic Area and likewise AC members. Seven EU MS are observers to the AC - France, Germany, Italy, the Netherlands, Poland, Spain, and the United Kingdom. It is however important to point out that none of the EU MS are considered Arctic coastal states. The special case of Greenland is that it is an autonomous country within the Kingdom of Denmark, but managing its own fishery resources outside the CFP.

A unique feature of the AC is that six organisations representing Arctic indigenous peoples have status as Permanent Participants, thus creating the possibility for active participation and direct consultation[24]. The EU has always shown, during the process of developing an Arctic policy, a commitment to engage with Arctic indigenous peoples and local communities to ensure that their views and rights are respected and promoted.

The development of an EU Arctic Policy has been underway for some years. In 2008, the EC published a communication on "The European Union and the Arctic Region", which delineated EU interests in the Arctic and its role in contributing to sustainable development of the region[25]. Key strategic interests were defined as hydrocarbon reserves, maritime transport, fishery resources, and concerns in relation to pollution and climate change.

The Communication on "Developing a European Union Policy towards the Arctic Region: progress since 2008 and next steps", called for stronger relations and engagement in the Arctic[26]. The involvement of the High Representative of the European Union for Foreign Affairs

[24] https://www.arctic-council.org/index.php/en/about-us
[25] EC 2008, The European Union and the Arctic Region, COM (2008) 763 final.
[26] European Commission and High Representative of the European Union for Foreign Affairs and Security Policy. Joint Communication, Brussels, 26 June 2012, JOIN (2012) 19 final.

and Security Policy is noteworthy and part of a general strategic interest in the Arctic both inside and outside the EU.

This process has recently culminated in the formulation of "An Integrated European Union Policy for the Arctic" in 2016 (EC 2016b)[27]. As part of its strategic commitment to the Arctic, EU engagement focuses on three priority areas:

- climate change and safeguarding the Arctic environment;
- promoting sustainable development in the region;
- supporting international cooperation on Arctic issues.

There are serious concerns about the effects of climate change, based on current observations that the Arctic is warming at almost twice the global average rate. This has resulted in phenomena such as decreasing sea ice coverage, thawing permafrost and the release of large amounts of carbon dioxide and methane, threatened habitats, damaging infrastructure, rising sea levels, etc.[28]. The involvement of the EU focuses on areas such as research (e.g. observation and monitoring networks), climate mitigation and adaptation strategies, and environmental protection[29]. Some examples of projects supported under Horizon 2020 are given in section 2.3.1, but financial support is also available through European Structural and Investment Funds (ESIF).

The European Parliament has just adopted a new resolution of 16 March 2017 on an integrated European Union policy for the Arctic. It supports the development of a network of Arctic conservation areas and the protection of the international sea area around the North Pole beyond the economic zones of the coastal states.

Arctic Ocean Governance

The United Nations Convention on the Law of the Sea (UNCLOS)[30] and its two Implementing Agreements, the Deep-Sea Mining Agreement and the Fish Stocks Agreement – set out the legal framework governing all activities in and uses of oceans and seas. This Convention establishes a number of rights and duties of states in the various maritime zones, guiding principles on economic and social development through the use of the oceans and their resources, as well as the need to protect and preserve the marine environment, and conserve and manage those resources[31]. On specific issues that transcend national boundaries and EEZs, there is a general requirement for global and regional cooperation in formulating actions and measures. There are provisions on navigation, conservation and management of marine living resources, exploration and exploitation of mineral resources, the protection and preservation of the marine environment, marine scientific research, transfer of marine technology, and dispute settlement mechanisms.

However, the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction continues to be a major gap. It was only in 2015 that the UN General Assembly adopted the resolution 69/292 on the development of an international legally binding instrument under UNCLOS.

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27 EC 2016b, An Integrated European Union Policy for the Arctic, European Commission and High Representative of the European Union for Foreign Affairs and Security Policy, JOIN (2016) 21 final.
28 Ibid.
29 Ibid.
30 http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf
31 UNEP 2016, Regional Oceans Governance. Making Regional Seas Programmes, Regional Fishery Bodies and Large Marine Ecosystem Mechanisms Work Better Together, UNEP Regional Seas Reports and Studies No. 197.

There are numerous regional instruments and institutions/bodies that have been developed/created in order to complement UNCLOS and other global agreements at the regional level. From the perspective of marine living resources and the environment, there are three main types of mechanisms that have been developed; a) Regional Seas Programmes/Conventions, many of which are supported by UNEP; b) Regional Fishery Bodies, some of which have been established under the framework of FAO; and c) Large Marine Ecosystem Projects supported by the Global Environmental Facility (GEF). The latter have a broader objective of ecosystem-based management involving all or most of the activities and uses of oceans (e.g. shipping, mining, oil/gas, energy, tourism, etc.), including an important capacity development component, but these have generally not yet resulted in mechanisms for effective management.

As stated by the EC, a framework for ocean governance is urgently needed in the Arctic, as large parts of the high seas areas beyond national jurisdiction are not covered by specific arrangements for managing economic activities and the available scientific knowledge is limited[32]. In relation to fisheries, the view has generally been that commercial fishing should not be allowed to start before the regulatory framework is in place. Discussions are still ongoing about finding a solution including the options of creating new agreements/conventions or alternatively, to extend the geographic areas of the following:

- OSPAR Commission in charge of implementing the Convention for the Protection of the Marine Environment of the North-East Atlantic;
- Northwest Atlantic Fisheries Commission (NAFO);
- North East Atlantic Fisheries Commission (NEAFC).

In 2015, Canada, the Kingdom of Denmark, the Kingdom of Norway, the Russian Federation and the United States of America adopted a declaration concerning the prevention of IUU fishing in the Central Arctic Ocean[33]. Although stating the commitment to abide by all principles and arrangements under the current and future international legal framework, it also implies the authorisation for commercial fishing. The EU has pointed out that the area concerned is beyond national jurisdiction and therefore, that all interested countries should work together to establish the appropriate international measures, and not only the coastal states behind the declaration (EC 2016b). From the EU perspective, this would include a new RFMO or Arrangement, combined with a new Regional Sea Convention (EC 2016b).

Blue Growth Potential in the Arctic

In the Arctic, new economic opportunities are envisaged as a result of climate change such as the opening of maritime shipping lanes, increasing access to hydrocarbon reserves and mineral resources, and increasing production in forestry and fisheries. It should be noted that there is large potential for growth and innovation in the fisheries sector, so we adopt a focus in this area in the following.

A recent study carried out a review of potential fishery resources in the Arctic in the context of climate change (Blomeyer *et al.* 2015). There is general agreement that climate is expected to result in increased productivity and that new fishing grounds will become accessible as ice cover decreases and water temperatures rise, but mostly in international waters not covered by RFMOs. Potential fishery catches are projected to increase by roughly 30% by 2050 and in the North Atlantic, countries such as Norway, Iceland, and Greenland are expected to be the 'big winners'. Thus, SSF are expected to benefit from this, considering also that coastal fisheries

[32] EC 2016b.
[33] https://www.regjeringen.no/globalassets/departementene/ud/vedlegg/folkerett/declaration-on-arctic-fisheries-16-july-2015.pdf

generally perform well in these countries as a result of favourable policies and arrangements (Viðarsson *et al.* 2015).

However, increasing fisheries productivity may be accompanied by changes in distribution and migration of straddling stocks, which creates the potential for conflicts by changing the balance of quota exchanges and access between countries. There are three large pelagic fish stocks in the North Atlantic – mackerel, Atlanto-scandian herring and blue whiting – which are of strategic importance to industrial fleets. In the case of mackerel, there is already an example of conflict resulting from the change in the distribution of this stock where some countries argue for greater shares as mackerel has shifted its migration and are now abundant in their waters ('Mackerel Wars'). Other coastal states have resisted to these changes in allocation and prefer the 'status quo'.

The Nordic perspective is particularly relevant to this study as it appears to focus on fisheries and marine biotechnology, which is also interesting as developments may proceed at a fast pace (Norden 2015). This concerns products that could be used as food, cleaning the environment, and improving health and nutrition. Considering the importance of the fishing industries in West Nordic countries, residues from the fish processing industry represent large amounts of biomass that could be used for various purposes - wastewater and waste disposal, pollution remediation, pharma, cosmetics, biocatalysts, biofuels, food. The harvesting and farming of macroalgae is also considered to be of high potential. Macroalgae are mostly harvested, but these can also be farmed to produce electricity, bio fuel, soil fertilisers, and food. Integrated multi-trophic aquaculture is another BG activity which could reduce environmental impacts, while also producing other seafood species. Algae, fish and shellfish are already used for medical human healthcare (dietary supplements) and cosmetics, etc. Various SME examples are documented showing ongoing developments, as well as recommendations for facilitating the process (Norden 2015).

There are generally large expectations for growth in the Arctic region. A recent report states that the most important Arctic economic sectors are extraction of natural resources, of which petroleum and fish are the most important, and the public sector[34]. Nonetheless, there is the view that economic developments will be driven, to a large extent, by global demand for natural resources (Stepien 2014). This is linked to the economic viability of activities carried out in remote areas under sometimes extreme conditions. Nonetheless, a recent document expects this region to become Europe's largest area of investment and there is an estimated EUR 140 billion investments planned for the Barents region alone[35]. There are opportunities in relation to infrastructure, mining, energy, technology, chemicals, maritime transport (as well as air and terrestrial), tourism and catering. Note that most of these relate to the BG strategy developed by the EU. The EU considers also that there are opportunities in sustainable multi-source energy systems (e.g. on- and off-shore wind power, ocean energy, geothermal energy and hydropower), eco-tourism and low emission food production, which are in line with the EU BG strategy and there is a commitment to facilitate the access to financial instruments and promote investment (EC 2016b).

[34] ECONOR III report (2017) quoted in WWF (2016), The Blue Economy, The Circle, WWF Magazine No. 4.
[35] Lipponen 2015, A Strategic Vision for the North, Confederation of Finnish Industries.

2.2 Overview of the Policy Framework

KEY FINDINGS

- The **Common Fisheries Policy (CFP) is the main EU policy governing SSF** and fisheries in general, but it is part of the broader Integrated Maritime Policy (IMP). It is important to note that the Blue Growth Strategy was developed under the IMP and should thus be coherent with other maritime policies including the CFP.
- The CFP presents general considerations and guiding principles that are relevant to SSF, but the relevant **'social objectives' are imprecise**. The CFP is not considered to be an instrument of social policy and few direct concessions have been given to the small-scale sector in providing protection from the effects of structural and geographical concentration in the commercial fishing industry.
- Achieving the CFP goal of maintaining or **achieving maximum sustainable yield (MSY) would lead to significant benefits**. There is a potential for lucrative and sustainable fisheries, for both LSF and SSF, but in order to achieve this a strong reduction in fishing capacity is required. These benefits are most evident in the Northeast Atlantic, North Sea and Baltic Sea, but achieving this in the Mediterranean and Black Sea will probably take longer. This is a strong argument for including fisheries in BG.
- **EU environmental policy and legislation is well developed**. The Marine Strategy Framework Directive (MSFD) is an ambitious piece of legislation and considered to be a major step forward in global and holistic marine environmental management, together with other legislation such as the Water Framework Directive, the Habitats and Birds Directives.
- EU has committed to ensuring the conservation of 10% of its coastal and marine areas under the **Convention on Biological Diversity**. This has direct implications on fisheries, which is potentially beneficial for SSF.
- It is still premature to see how the **linkages between CFP and MSFD** will affect fisheries, but it appears likely that stricter measures will be implemented in the near future (5-10 years) in relation to the establishment of protected areas, restoring the structure and functioning of food webs, and re-establishing seafloor integrity, which are expected to affect industrial fisheries most.
- The **Maritime Spatial Planning** (MSP) Directive was adopted in 2014, creating a common framework for maritime spatial planning in the EU. This is of great importance to maritime activities, facilitating the process of efficient management, to avoid conflicts, and fostering synergies.

2.2.1 Integrated Maritime Policy

Emphasis is placed on presenting the CFP in the following, as this is the main EU policy governing SSF and fisheries in general. However, the CFP is part of the broader Integrated Maritime Policy (IMP).

The IMP seeks to provide a more coherent approach to maritime issues through the coordination of different policy areas and the development of cross-cutting policies that affect various maritime sectors. The focus areas of the IMP concern: a) Blue growth (presented in the introduction), b) Marine data and knowledge, c) Maritime spatial planning, d) Integrated maritime surveillance, and e) Sea basin strategies. The IMP does not replace policies on specific

areas such as for example the CFP, but instead seeks to integrate and enhance the development and coordination of maritime activities[36].

The main funding mechanisms available for the implementation of maritime policy are:

- European Structural and Investment Funds which include the European Social Fund (ESF), the European Regional Development Fund (ERDF), the European Agricultural Fund for Rural Development (EAFRD), and the European Maritime and Fisheries Fund (EMFF);
- Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness;
- LIFE+ is the financial instrument supporting environmental, nature conservation and climate action projects throughout the EU;
- COSME supports small and medium-sized enterprises (SMEs) by providing finance in all phases of their lifecycle – creation, expansion, or business transfer.

2.2.2 The Common Fisheries Policy

The objectives of the reformed CFP are stated in Article 2[37], which in the first place is to ensure sustainable fisheries and that resources are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits, and of contributing to the availability of food supplies. There are obligations to apply the precautionary approach and maintaining/achieving maximum sustainable yield (MSY) in fisheries management. Furthermore, there is the objective of implementing the ecosystem-based approach to fisheries management to ensure that negative impacts of fishing activities on the marine ecosystem are minimised and to avoid the degradation of the marine environment.

Under Article 2, it is further specified that the MSY exploitation rate shall be achieved by 2015 where possible and, on a progressive, incremental basis at the latest by 2020 for all stocks. There has been steady progress towards achieving MSY, particularly in the Northeast Atlantic, North Sea and Baltic Sea. In 2014, about 50% of stocks in these seas are fished sustainably, up from about 30% in 2007 (EC 2016c). This improvement is expected to continue through a gradual reduction of fishing mortality so that exploitation rate is in line with MSY levels.

A recent study estimated the benefits of achieving maximum sustainable yield for EU Northeast Atlantic fisheries (Guillen *et al.* 2016). This would entail a reduction in fishing effort (proportional to fishing mortality) by 38%, which would result in the following:

- Value of landings would increase from EUR 4.52 billion to EUR 7.12 billion
- Costs of fishing would decrease from EUR 4.41 billion to EUR 2.73 billion
- GVA would increase from EUR 1.8 billion to EUR 5.76 billion
- Operating profit would increase from EUR 0.10 billion to EUR 4.91 billion.

The increase in profit is notable (by a factor of about 50), which presents the argument for the necessary reforms to create lucrative and sustainable fisheries. SSF could benefit greatly from this reform, if due consideration is given to its special socio-economic role.

[36] https://ec.europa.eu/maritimeaffairs/policy_en

[37] Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013.

The crucial issue is that it would take time for these positive benefits to materialise and that it implies a strong restructuring and reduction of the fleet. Guillen *et al*. (2016) estimate that it will take about 20 years for stocks to fully recover, but that large benefits (e.g. 90% of MSY yields) would be achievable already after the 6th year. An increase in profits would be almost immediate (about EUR 2 billion), even though this would be from reducing costs of fishing primarily. The authors estimate that EUR 2.25 billion are needed for a vessel buy-back scheme to reduce vessel numbers from 27,081 to 10,291.

This presents a strong argument for the inclusion of fisheries in BG, considering the potential for increases in value of landing and GVA, as well as creating the conditions for lucrative enterprises and sustainable fisheries.

Considering the Mediterranean and Black Sea, the situation of overexploitation continues to be a matter for concern and there are significant challenges to achieve MSY for most stocks by 2020. In the Mediterranean, the level of overfishing is about 2 to 3 times the desired fishing mortality at MSY, but it should be noted that this is based on the assessments of 15 stocks which is a small proportion of the total (EC 2016c). In the Black Sea, the situation appears even more serious as there are few commercially important stocks, and 6 out of 7 assessed stocks are overexploited (EC 2016c). The situation is complicated in these two seas by the fact that many of the stocks are fished by third countries and thus outside the control of the EU.

Although this is outside the scope of this study, there is a call for a new approach to fisheries management in the Mediterranean, using the so-called 'refugium paradigm' (Caddy 2012). This is based on the hypothesis that rocky, inaccessible areas to trawling in the Mediterranean constitute refugia for larger fish and secure recruitment to stocks. This would explain how recruitment to the juvenile bottom fish continued in spite of heavy trawling in the 1970s-1980s (Caddy 2012). It is implied that stock assessment methods developed for the Northeast Atlantic may not be appropriate and may overestimate exploitation levels, apart from the fact that these are applied in just a few cases. There is a call for change in emphasis to protect refugia, nursery areas, ban modification of trawls so that they can be used in these rocky areas, and the use of more simple statistical methods for management purposes (Caddy 2012).

The lack of reliable data on stock status in the Mediterranean makes it difficult to simulate what would be the benefits of achieving MSY. As indicated above, it may not be practical to attempt this, but there appears to be no doubt that effort needs to be reduced in order to achieve sustainability, both in the Mediterranean and the Black Sea.
Considering SSF, the CFP presents in its recitals various 'guiding principles' that are relevance to SSF: restricting access within the 12 nautical mile zone (Recital 19); use of transparent and objective criteria for the allocation of access and promote environmentally friendly fishing methods (Recital 33); take into account the particular needs of local communities (Recital 36). The following articles are particularly important:

- The specific objectives of the CFP (Article 2) include two points that can be classified as predominantly social objectives: (i) '*contribute to a fair standard of living for those who depend on fishing activities, bearing in mind coastal fisheries and socio-economic aspects*' (Article 2.5f); and (ii) '*promote coastal fishing activities, taking into account socio- economic aspects*' (Article 2.5i);
- Article 7 states that various types of conservation and technical measures may be used including: '*incentives, including those of an economic nature, such as fishing opportunities, to promote fishing methods that contribute to more selective fishing, to the avoidance and reduction, as far as possible, of unwanted catches, and to fishing with low impact on the marine ecosystem and fishery resources*' (Article 7, d).
- Article 17 states that when allocating fishing opportunities, '*MS shall use transparent and objective criteria including those of an environmental, social and economic nature*'.

Among the criteria proposed by the CFP, this includes contribution to the local economy and that, '*Member States shall endeavour to provide incentives to fishing vessels deploying selective fishing gear or using fishing techniques with reduced environmental impact, such as reduced energy consumption or habitat damage´*.

The Green Paper on the reform of the CFP included a proposal to introduce differentiated management regimes: one for large-scale fleets and another for small-scale fleets[38]. The rationale behind this proposal was that large-scale industrial fisheries should be managed in line with the objective of capacity adjustment and economic efficiency, while managing small-scale fleets in coastal communities should have a focus on social objectives, for example by using direct allocation of quotas or effort or through collective schemes. The introduction of transferrable fishing concessions was proposed for large-scale fisheries, but this was rejected by both the Council and the European Parliament. The differentiated management approach for SSF was also not adopted, as MS considered this as an issue best determined at the national level (Symes 2014). Another view is that the SSF sector did not have a strong enough voice to be able to influence the reform process (Wakefield 2016).

It should be noted that MS have a wide variety of arrangements in place for access to fishing opportunities and rights-based management, which illustrates the lack of common ground for building consensus (e.g. EC 2009b). Also, the relative importance of the SSF sector in the various MS differs significantly, where for example the Mediterranean is characterised by higher numbers of SSF vessels.

The CFP presents general considerations and rather imprecise objectives in relation to SSF, but it should be noted that SSF are viewed as a socio-cultural issue primarily, which is of relevance to coastal communities and peripheral fisheries-dependent regions (Symes 2014). The CFP is not seen as an instrument of social policy and few direct concessions have been given to the small-scale sector in providing protection from the effects of structural and geographical concentration in the commercial fishing industry (Gallizioli 2014; Symes 2014). Nonetheless, a strong reduction of fishing capacity would lead to significant benefits for both LSF and SSF. It would also be an opportunity to address various weaknesses in SSF and improve the conditions by favourable treatment, considering its importance for regional/local development, environmental impacts and other issues.

2.2.3 Marine Strategy Framework Directive

The Marine Strategy Framework Directive (MSFD) is an ambitious piece of legislation and considered to be a major step forward in global and holistic marine environmental management, covering marine waters out to the 200nm limit. It was adopted in 2008 with the aim of promoting the integration of environmental considerations into all relevant maritime policy areas and thus deliver the environmental pillar of the EU´s IMP. The MS are obliged to develop a marine strategy with the ultimate goal of achieving or maintaining Good Environmental Status (GES) of the EU's marine waters by 2020 and to protect the resource base upon which maritime-related economic and social activities depend[39]. The MSFD provides 11 qualitative descriptors for determining GES as well as characteristics, pressures and impacts to consider in the setting of environmental targets. This was followed up by a set of detailed criteria and indicators to assist in implementation[40].

Considering also international obligations, the MSFD includes the specific goal of halting biodiversity loss, ensuring the conservation and sustainable use of marine biodiversity, and the

[38] European Commission (2009), Green Paper on the Reform of the Common Fisheries Policy, COM (200)163 final.
[39] Directive 2008/56/EC of 17 June 2008.
[40] Commission Decision of 1 September 2010 (2010/477/EU).

creation of a global network of marine protected areas by 2012. This Directive enshrines in a legislative framework the ecosystem-based approach to the management of human activities while enabling a sustainable use of marine goods and services.

The scientific community and various advisory services (e.g. ICES) have made significant efforts and play a key role in providing guidance in relation to GES indicators and standards, which is still is ongoing with the specification of GES at the regional and national levels, initial assessments, monitoring, and programmes of measures[41]. Although the EC considers that there has been concrete progress towards the implementation of the ecosystem-based management of maritime activities, there is still room for improvement in MS in terms of adequacy of submissions on initial assessments and benchmarks, consistency in implementation, and coherence in regional cooperation[42]. Substantial support is being given to MS, providing scientific support and to facilitate harmonisation, coordination and implementation.

It is important to note that the MSFD sets out a regional approach to the management of the seas, requiring Member States to cooperate with their neighbours when developing their marine strategies. These are the Baltic Sea, the North-east Atlantic Ocean, the Mediterranean Sea and the Black Sea, which are located and managed within the geographical boundaries of the existing Regional Sea Conventions**.**

In Annex I of the MSFD, a list of eleven qualitative descriptors are specified to describe goals in achieving GES.

- Descriptor 1. Biodiversity is maintained
- Descriptor 2. Non-indigenous species do not adversely alter the ecosystem
- Descriptor 3. The population of commercial fish species is healthy
- Descriptor 4. Elements of food webs ensure long-term abundance and reproduction
- Descriptor 5. Eutrophication is minimised
- Descriptor 6. The sea floor integrity ensures functioning of the ecosystem
- Descriptor 7. Permanent alteration of hydrographical conditions does not adversely affect the ecosystem
- Descriptor 8. Concentrations of contaminants give no effects
- Descriptor 9. Contaminants in seafood are below safe levels
- Descriptor 10. Marine litter does not cause harm
- Descriptor 11. Introduction of energy (including underwater noise) does not adversely affect the ecosystem

From the perspective of fisheries, it should be stressed that fishing activities are particularly important in relation to descriptors 3, 4 and 6, as these concern the effects of fishing on the ecosystem[43]. Fishing activities have direct effects on fish stocks (D3), on parts of the food web (D4), and on sea floor integrity (D6), the latter being of concern in areas where trawl fishing is intensive. There are interactions between fisheries and the marine environment that concern all descriptors, as these describe the state of the marine environment. However, other maritime

[41] http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/implementation/scoreboard_en.htm
[42] EC 2014d. The first phase of implementation of the Marine Strategy Framework Directive (2008/56/EC). COM(2014) 97 final. 10p.
[43] http://www.ices.dk/explore-us/Action%20Areas/Pages/Marine-Strategy-Framework-Directive-(MSFD).aspx

or land-based activities may have more important effects in these descriptors compared to fisheries.

It is still premature to see how the linkages between CFP and MSFD will affect fisheries, as this involves all maritime activities as well as effects from land-based pollution. Descriptor 3 is already used in the context of the CFP to achieve/maintain sustainable exploitation of fish stocks. However, it appears likely that stricter fishery measures will be implemented in the coming years in relation to the establishment of protected areas, restoring the structure and functioning of food webs, and re-establishing seafloor integrity, which is expected to affect industrial fisheries most.

Another EU legislation which is related to the MSFD is the Water Framework Directive (WFD)[44]. The goal of WFD is to achieve Good Status for all EU surface and ground waters, which links up with the goal of Good Environmental Status under the MSFD. Specific objectives are to reduce marine pollution from land-based sources and protect ecosystems in coastal and transitional waters, as well as the development of River Basin Management Plans.

2.2.4 Conservation Policies

The Habitats and Birds Directives (1992[45] and 1979, codified 2009[46]) are the key legislation on nature conservation, providing special protection for key sites (the Natura 2000 network), animal species, plant species and habitat types of importance in the EU. This links up with objectives of marine protected areas in the MSFD. As stated in the MSFD (recital 5), '*the development and implementation of thematic strategies should be aimed at the conservation of the marine ecosystems. This approach should include protected areas and should address all human activities that have an impact on the marine environment*.'

At the international level, the EU has committed to ensuring the conservation of 10% of its coastal and marine areas under the Convention on Biological Diversity. The EU adopted its Biodiversity Strategy in 2011 to halt biodiversity loss and ecosystem services on its territory by 2020[47].

The EC has reported that the European MPA network has significantly expanded to cover almost 6% of European seas in 2012 and efforts are underway to ensure that at least 10% of Europe's seas are protected through coherent MPA networks[48]. It is noteworthy that the EU policy framework including the MSFD, Habitats and Birds Directives, MSP, and the reformed CFP all contain provisions which can foster the expansion of the European MPA networks[49].

Based on a 'Fitness Check' evaluation of the Birds and Habitats Directives (Dec. 2016), the EC has concluded that these regulations remain highly relevant and are fit for purpose as part of the EU Biodiversity policy framework[50]. There is however a need for substantial improvement in their implementation to deliver practical results on the ground and the EC has therefore decided to develop an Action Plan to address the shortcomings[51].

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44 Directive 2000/60/EC 14/89/EU of 23 October 2000 and the Groundwater Directive 2006/118/EC.
45 Directive 92/43/EEC of 21 May 1992.
46 Directive 2009/147/EC of 30 November 2009.
47 http://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm
48 Commission Report on the progress in establishing marine protected areas (as required by Article 21 of the Marine Strategy Framework Directive 2008/56/EC). 01 October 2015.
49 Ibid.
50 http://ec.europa.eu/environment/nature/legislation/fitness_check/index_en.htm
51 Ibid.

2.2.5 Maritime Spatial Planning

The Maritime Spatial Planning (MSP) Directive was adopted in 2014, creating a common framework for maritime spatial planning in the EU[52]. This is intended to facilitate the process of efficient management, to avoid conflict and create synergies between the different sectors and uses of the marine ecosystem. MS are obliged to consider economic, social and environmental aspects to support sustainable development and growth in the maritime sector, applying an ecosystem-based approach, and to promote the coexistence of relevant activities and uses. Under this framework each MS continues to plan its own maritime activities, but the MSP applies to planning and management of shared seas, where the overall outcome is expected to lead growth and investments due to improved planning and predictability[53].

MSP is seen as a key instrument for the IMP given the increasing competition between the various maritime sectors and the increasing environmental concerns. Various efforts are ongoing in applying MSP in shared seas such as in the Baltic, Atlantic, Adriatic and Ionian Seas[54]. This links up with the development of Sea Basin Strategies for BG growth and development in each of the European Seas, as well as for the Arctic Ocean and Europe's outermost regions[55].

Of particular relevance to coastal areas covered by MSP, including the activities of SSF, is the need for Integrated Coastal Zone Management (ICZM) to address the land-sea interactions. The recommendation concerning ICZM lists eight principles defining the essential characteristics of ICZM and the need for integration across sectors and levels of governance, as well as a participatory and knowledge-based approach (2002)[56]. It calls on MS to develop ICZM strategies and encourages cooperation between MS and neighbouring third countries.

2.2.6 Guiding Principles of an Environmental Focus

The sustainable development of the activities just described requires a thorough understanding of the environment, one that respects the environment and leads to actions that reduce their negative effects (FAO 2015). Toward that end, policy makers have advocated the adoption of production measures that are technically appropriate, economically viable, and socially accepted—but that do not degrade the environment. For instance, EU legislation and guidelines have an environmental focus and typically include widely acknowledged environmental principles that are applied at both the European and international level. Some of these principles are explicitly stipulated in EU legislation, while others are of a more implicit nature. The four environmental principles most often alluded to are sustainable development, inter- and intra-generational equity, the precautionary principle, and the "polluter pays" principle.

Although *sustainable development* is not defined consistently, it usually refers to development that meets present needs without compromising the satisfaction of future generations' needs. Thus, current development should not jeopardize future possibilities, and no development should result in irreversible damage to the environment. Closely linked to this principle is that of *equity* within and between generations. In other words, all members of the current generation—and all those of future generations—are entitled to the same fair access to Earth's natural resources and should be able to enjoy the environment to a similar extent. The

[52] Directive 2014/89/EU of 23 July 2014.
[53] http://ec.europa.eu/maritimeaffairs/policy/maritime_spatial_planning_en
[54] http://ec.europa.eu/maritimeaffairs/policy/maritime_spatial_planning_en
[55] https://ec.europa.eu/maritimeaffairs/policy/sea_basins_en
[56] European Parliament and Council Recommendation concerning the implementation of Integrated Coastal Zone Management in Europe of 30 May 2002 (2002/413/EC).

precautionary principle is another way of stating that development should "do no harm", a dictum central to several EU regulations and directives and also to national environmental legislation. Under this principle, activities that could harm the environment should be undertaken only as a last resort. So, if two measures yield the same end result, then policy makers should choose the one that is least damaging. Finally, the *polluter pays* principle is ubiquitous in EU environmental legislation; according to this principle, whoever causes pollution must also pay for ameliorating its consequences. The polluting in question need not be limited to a particular incident (e.g. an oil spill); it may also be a source of continuing pollution (e.g., the emission of exhaust gases).

2.3 Support provided for Blue Growth

KEY FINDINGS

- **Horizon 2020** is the EU Research and Innovation Programme for the period 2014-2020 with a total available funding of EUR 80 billion.
- The Horizon 2020 Call on '**Blue Growth - Demonstrating an ocean of opportunities**' is particularly relevant in promoting research in BG opportunities, but there are other funding possibilities under different headings: 'Secure, clean and efficient energy'; 'Smart, Green and Integrated Transport'; and 'Climate action, environment, resource efficiency and raw materials'.
- Various projects have been selected for funding, which cover a wide range of activities. Examples are given, including projects that are more directly related to the CFP under different headings.
- The **European Maritime and Fisheries Fund** (EMFF) is the financial instrument with the aim of supporting the EU's maritime and fisheries policies in the period 2014-2020 (EUR 6,400 million). SSF benefit primarily from the EMFF through Community-Led Local Development (CLLD) with a budget allocation of about EUR 514 million, which accounts for a relatively high 12% of EMFF funds.
- A new development is that the **bottom-up approach of CLLD** has become a common and shared concept of all European Structural and Investment Funds (ESIF) including the EMFF, thus facilitating access to significant funding and fostering a more integrated approach. This implies greater efforts in the development of regional/local strategies where fisheries may be a minor component. The total budget for CLLD is about EUR 9,600 million across all ESIF.

2.3.1 Horizon 2020

This section provides an analysis of 'Blue Growth' development at EU level in the context of the Horizon 2020 Strategy, especially those aspects with implications for the EU CFP. Horizon 2020 is the EU Research and Innovation Programme for the period 2014-2020 with a total available funding of EUR 80 billion. This support programme replaces the EU's 7th Framework Programme (FP7), which ran until the end of 2013.

The Horizon 2020 Call 'Blue Growth - Demonstrating an ocean of opportunities' is one of the four focus areas under the wider call 'Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bio-economy' (Social challenge 2) in the Horizon 2020 Work Programme 2016-2017.

The Blue Growth area has cross-cutting activities with other areas of Horizon 2020, including:

- Societal Challenge 3 – ‘Secure, clean and efficient energy’
- Societal Challenge 4 – ‘Smart, Green and Integrated Transport’
- Societal Challenge 5 – ‘Climate action, environment, resource efficiency and raw materials’

The call supports innovation and research infrastructures in order to create more jobs and growth as well as to tackle the challenges of scarcity of strategic resources, climate change and energy efficiency and has a total budget of EUR 130,40 million (EUR 82 million for 2016 and EUR 42.40 million for 2017). The call is divided in four different ‘Focus Area pillars’.

Boosting innovation for emerging Blue Growth activities

The goal is to test, support and bring up to market innovative products and services respecting marine ecosystem. This focus area includes five different topics and has a total budget of EUR 57 million. The following table presents an overview of the different topics:

Table 5: Focus area 'Boosting innovation for emerging Blue Growth activities'

CALL	MAIN OBJECTIVES	EXPECTED RESULTS	BUDGET 2016 (EUR MILLION)	BUDGET 2017 (EUR MILLION)
Large-scale algae biomass integrated biorefineries	To reduce the cost of biomass production; To increase its scale of production; To foster further development and scale-up of the algal bioeconomy sector; To ensure secure the sustainable development of integrated bio-refineries.	Bettered skills and competences of people working in the blue economy; New technologies and production systems brought to the market; Enhanced competitiveness of European industry; Ensured environmental sustainability.	22,00	
High value-added specialised vessel concepts enabling more efficient servicing of emerging coastal and offshore activities	To develop new environmentally friendly vessel concepts for coastal activities (2016) and off-shore activities (2017); To foster European growth and employment by development of blue economy.	Developed solutions[57] impacting on the creation of European marine and coastal economy; Decrease of costs (at least 20% in comparison to existing expenses); Improved skills of workers and SMEs' capability to produce and commercialise specialised vessels.	7,00	8,00
Multi-use of the oceans' marine space, offshore and near-shore: compatibility, regulations, environmental and legal issues	To identify the main barriers to multi use of the oceans; To analyse the regulatory, environmental, compatibility, societal and legal issues in the context of the maritime spatial planning directive; to understand how their impact on the combining of different marine and maritime activities.	Generated clear understanding of barriers to integration of different activities; Decrease of risks related to the commercial development of combined activities; Concentration of marine activities; Increased development of European offshore activities supporting Blue Growth; Better harmonized regulations.	2,00	

[57] to at least technology readiness level (TRL) 5

CALL	MAIN OBJECTIVES	EXPECTED RESULTS	BUDGET 2016 (EUR MILLION)	BUDGET 2017 (EUR MILLION)
Multi-use of the oceans marine space, offshore and near-shore: Enabling technologies	To decrease the costs of offshore operations; To combine different activities (e.g. renewable energy, aquaculture, maritime transport) in the same marine space)	Increased economic viability of multi-use platforms; Bettered safety and health in the platforms; Local communities’ acceptance of the new platforms; Contribution to the implementation of the Integrated Maritime Strategy; Bettered professional skills of people working in the blue economy		8,00
ERA-NET Cofund on marine technologies	To support partnerships between Member States and associated countries; To tackle the lack/scarcity of strategic resources.	Increased resource efficiency, safety and environmental compliance of maritime activities; Support to the implementation of the European strategy on Key Enabling Technologies; Support to research networks and reinforced synergies between different research programmes.	10,00	

Linking healthy oceans and seas with healthy people

The goal is to investigate the connections and interactions between three different components: the human dimension, the ocean health, and the marine ecosystem services. This focus area includes three different topics and has a total budget of EUR 21 million. The following table presents an overview of the different topics:

Table 6: Focus area 'Linking healthy oceans and seas with healthy people'

CALL	MAIN GOAL	EXPECTED RESULTS	BUDGET 2016 (EUR MILLION)	BUDGET 2017 (EUR MILLION)
Interaction between people, oceans and seas: a strategic approach towards healthcare and well-being	To better manage the interaction between oceans and people; To coordinate the existing multidisciplinary research knowledge and resources across Europe; To formulate evidence-based policies.	Set-up a forum of different stakeholders issuing a strategic research agenda for oceans and human health; Local communities from different regions are actively involved in data supply and knowledge generation; Improvement of global cooperation around oceans and human health.		2,00
Blue green innovation for clean coasts and seas	To remove different sources of pollution (e.g. debris, chemical and microbial pollution and algae jellyfish blooms); To transform the collected waste into a resource.	New innovative methods to clean costs and seas; Increased resource efficiency; Decreased pollution and debris in regional seas; Bettered skills and competences of people working in the blue economy.		12,00
Innovative sustainable solutions for improving the safety and dietary properties of seafood	To ensure the sustainability of the seafood processing industry; To increase consumer awareness of food quality and safety traceability.	Wider use of eco-innovative solutions; Increased competitiveness of the EU of the seafood sector; Improved consumer's diet and healthy.		7,00

The Arctic dimension

The goal is to foster innovative approaches to deal with climate change issue in the Arctic region. This is based on the fact that Arctic region is the area where climate change is happening fastest. This focus area includes three different topics and has a total budget of EUR 40 million. The following table presents an overview of the different topics:

Table 7: Focus area 'The Arctic dimension'

CALL	MAIN GOAL	EXPECTED RESULTS	BUDGET 2016 (EUR MILLION)	BUDGET 2017 (EUR MILLION)
An integrated Arctic observation system	To study, monitor and assess changes happening in the region; To improve understanding and knowledge of the Artic climate system.	Increased coverage of observational data in the region; Contribution to the long-term improvement of the Artic observation system; Integration with already existing Artic monitoring networks; More informed and documented decisions; Support to the EU strategy for the Arctic and related maritime and environmental policies	15,00	
Impact of Arctic changes on the weather and climate of the Northern Hemisphere	To better the predictability of weather and climate in the Northern Hemisphere, and of related risks.	Improved capability to forecast the weather and climate of the Northern Hemisphere; Strengthened capacity to respond to the impact of climatic change on the environment and human activities; Wider use of new Earth observation assets; Improved stakeholders' capacity to adapt to climate change.	15,00	
The effect of climate change on Arctic permafrost and its socio-economic impact, with a focus on coastal areas	To analyse the impact of permafrost thawing on climate change; To understand the deriving implications for environment and local communities.	Improved capability to forecast the impacts of permafrost; Increased capacity to manage risks; Increased engagement of and interaction with residents of Arctic coastal communities and indigenous societies; Contribution to OSPAR actions; Contribution to SDGs' implementation.		10,00

Valorising the Mediterranean Sea Basin

The goal is 'to deepen knowledge on the Mediterranean marine ecosystems and their services'[58] and to support the European ocean capabilities in terms of monitoring and surveying, as well as to facilitate the production of assessments and high-resolution maps. This focus area includes three different topics and has a total budget of EUR 12,40 million. The following table presents an overview of the different topics:

[58] Horizon 2020 Work Programme 2016 - 2017 - 9. Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy, page 97.

Table 8: Focus area 'Valorising the Mediterranean Sea Basin'

CALL	MAIN GOAL	EXPECTED RESULTS	BUDGET 2016 (EUR MILLION)	BUDGET 2017 (EUR MILLION)
Towards an integrated Mediterranean Sea Observing System	To understand and predict the progress of the ecological, social and economic processes in the region; To carry out researches in order to integrate the existing Earth observation facilities and networks in the Mediterranean Sea.	Contribution to the establishment of global observing systems; Identification of observational gaps; Observation data are less fragmented; Higher coordination between national marine programmes; Contribution to the implementation of the EU Integrated Maritime Policy the Common Fisheries Policy (CFP) and the Communication 'Blue Growth - opportunities for marine and maritime sustainable growth'.	8,00	
Support to the BLUEMED Initiative: Coordination of marine and maritime research and innovation activities in the Mediterranean	To contribute to the realisation of the BLUEMED Initiative; To create new synergies among different Member States and different stakeholders; To reach a more resilient and productive Mediterranean sea.	Blue economy is strengthened; Development of new technologies and services and for improving human and infrastructure capacity; Increased capacity of EU industry and SMEs in the marine and maritime sectors.	3,00	
Monitoring and assessing fish stocks, other pelagic species and habitats with an automated, non-invasive, opto-acoustic system.	To better the conventional marine monitoring using new technologies and making them more and less invasive for the targeted biota.	Data collection is more efficient and less expensive; Contribution to the implementation of the CFP and MSFD; the quality of measurement and monitoring techniques is improved; tock assessment and the related scientific advice offered to the EU is bettered.		1,40

It is worth noting that other topics under the call 'Sustainable Food Security- Resilient and resource-efficient value chain' are related to the CFP, which are listed in Annex III. Furthermore, 42 different projects have been awarded during the period 2014-2015 under the Blue Growth call 'Unlocking the potential of seas and oceans'. A selection of projects awarded for each topic are given in Annex III.

2.3.2 European Structural and Investment Funds

European Maritime and Fisheries Fund

The European Maritime and Fisheries Fund (EMFF) is one of the European Structural and Investment Funds (ESIF) with the aim of supporting the EU's maritime and fisheries policies in the period 2014-2020. Its objectives are to contribute to the following (Article 5[59]):

a) promoting competitive, environmentally sustainable, economically viable and socially responsible fisheries and aquaculture;

b) fostering the implementation of the CFP;

c) promoting a balanced and inclusive territorial development of fisheries and aquaculture areas;

d) fostering the development and implementation of the Union's IMP in a manner complementary to cohesion policy and to the CFP.

These objectives are generally applicable and do not distinguish SSF from other maritime activities, although the objective in Article 5c implies a more local/regional perspective referring to coastal communities. Furthermore, a number of Union priorities are specified, of which Union priority 4 (Article 6) states:

"*Increasing employment and territorial cohesion by pursuing the following specific objective: the promotion of economic growth, social inclusion and job creation, and providing support to employability and labour mobility in coastal and inland communities which depend on fishing and aquaculture, including the diversification of activities within fisheries and into other sectors of maritime economy*."

This is the natural continuation of the Community-Led Local Development (CLLD) area-based approach and a continuation of support provided by Axis 4 of the previous European Fisheries Fund (EFF; 2007-2013). This is a bottom-up approach where local public-private partnerships involving the fishing-related enterprises, local authorities, and civil society establish Fisheries Local Action Groups (FLAGs) and define a local strategy with specific goals and objectives. Funding is provided to selected projects which typically involve creating or maintaining jobs, added value to fishery products, innovation and diversification of economic activities. Under the EFF, more than 11,000 projects were supported involving 312 FLAGs (as of Feb. 2014)[60].

In order to assist in the implementation process of CLLD, the EC established the FARNET Support Unit (FSU) to provide technical assistance under the EFF and this is to continue under the EMFF. Other major tasks of FARNET is to build a 'learning network' based on accumulated knowledge and experience in CLLD, provide guidance to Managing Authorities in MS, FLAGs and other stakeholders, dissemination of results and best practices/examples.

A new development is that the bottom-up approach of CLLD has become a common and shared concept of all ESI Funds including the EMFF, thus facilitating a more integrated approach[61]. Regional/local communities are encouraged to develop integrated territorial strategies and to combine financing from the EMFF and other ESIF: the ESF, the ERDF and the EAFRD. A further new development is that there is now a much stronger focus on results and the monitoring according to clearly defined indicators. Chapter III of the EMFF Regulation is dedicated to 'sustainable development of fisheries and aquaculture areas', defining the

[59] Regulation (EU) No 508/2014 of 15 May 2014 on the European Maritime and Fisheries Fund.
[60] https://webgate.ec.europa.eu/fpfis/cms/farnet/tools/flags-2007-2013
[61] Common Provisions Regulation (EU) No 1303/2013.

scope and objectives, CLLD strategies, FLAGs, and cooperation activities[62]. Chapter IV refers to Marketing and processing related measures and includes possible support for the certification and the promotion of fishery products, including products from SSF, and of environmentally-friendly processing methods.

ESIF funds & CLLD

A total of EUR 6,400 million has been allocated to the EMFF for the period 2014-2020[63]. EUR 4,340 million are destined for 'sustainable fisheries', including local development and support to fisheries areas. Specific CLLD funds are EUR 514 million[64]. Other areas of investment are Control & Enforcement (EUR 580 million), Data Collection (EUR 520 million), and Blue Economy (EUR 70 million). These funds are available to MS, while an allocation of 11% (about EUR 700 million) are managed directly by the EC for EU-wide objectives such as international ocean governance, marine knowledge and spatial planning, and cooperation.

MS use the EMFF to co-finance projects, where each country is allocated a share of the total budget, based on the size of its fishing industry. MS formulate an operational programme (OP) for the development and investment in the fisheries sector, considering EU and national policy objectives (subject to approval by the EC. It is based on OPs and various criteria that MS decide which projects are selected for co-financing[65].

The total budget for CLLD is about EUR 9,600 million across all ESIF[66]. CLLD account for a relatively high 11.7% of EMFF funds, while this is 6.9% under the EAFRD, 1.2% under the ESF, and 0.6% under the ERDF[67]. It should, however, be noted that these other funds operate with higher budgets, for example the EAFRD has an indicative budget of EUR 9,700 million for CLLD[68].

The EU has provided funding for this type of local development during the last 20 years, starting with about 200 pilot rural development projects and this has now grown to around 2,600 partnerships, both in rural areas and in fisheries-dependent areas (LAGs and FLAGs). Total public and private investment supported by these partnerships has also grown from EUR 360 million in 1991-1994, to around EUR 8.6 billion in the 2007-2013[69]. In the case of the EFF (Axis 4), implementation has resulted in an estimated leverage factor of 1.06, meaning that one EFF euro has attracted another EUR 1.06 (private and public)[70]. The focus has been primarily financing small projects, leading to the creation or maintenance of jobs and improving local services and the environment. Many lessons have been learned to provide guidance on when and where CLLD approaches work well and which are the key challenges of implementing CLLD in certain areas[71].

SSF and Blue Growth in EMFF

Under the EMFF Regulation, MS are required to include an action plan for the development, competitiveness and sustainability of SSF (Article 18.1.j) to be included in fisheries operational programmes. This should consider the share of SSF in the overall fishing fleet

62 Regulation (EU) No 508/2014 on the European Maritime and Fisheries Fund.
63 https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/2015-cfp-funding_en.pdf
64 https://webgate.ec.europa.eu/fpfis/cms/farnet/tools/country-information-2014-2020
65 https://ec.europa.eu/fisheries/cfp/emff_en
66 https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/CLLD%20in%20EU_161215.pdf
67 Ibid.
68 https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/CLLD%20in%20EAFRD.pdf
69 https://ec.europa.eu/fisheries/cfp/emff/clld
70 EC (2014b). Study on the implementation of Axis 4 of the European Fisheries Fund MARE/2011/01. Capgemini Consulting, Wageningen, and Ramboll. 226 p.
71 https://ec.europa.eu/fisheries/cfp/emff/clld

(Article 16.1). Various types of support may be provided in the promotion of human capital, job creation and social dialogue, which can involve networking and include various types of SSF stakeholders (Article 29). Start-up support for young fishermen may be provided in the acquisition of a fishing vessel (Article 31). SSF may benefit from support to for the replacement or modernisation of main and ancillary engines (Article 41). SSF may receive a higher intensity of public aid (Article 95 – Annex I). Apart from these specific measures that target SSF, there are a number of support measures for fishermen in general such as support for diversification (Article 30) and compensation for cessation of fishing activity (Article 34 & 35). Diversification may entail investments on vessels (e.g. modifications), angling tourism, catering, environmental services related to fishing, and educational activities on fishing.

There are thus a number of support measures designed specifically for SSF and SSF can benefit from support measures intended for fishers in general. It should be noted that SSF can benefit from the EMFF according to other objectives stated in Article 5 and this is not limited to CLLD (Article 5c). However, when seeking support from the managing authorities in MS, SSF would have to approach this in a strategic and organised manner for this to be effective.

Specific mention of BG in the EMFF Regulation is limited to recital 56: “*In the fishery and aquaculture sector, community-led local development should encourage innovative approaches to create growth and jobs, in particular by adding value to fishery products and diversifying the local economy towards new economic activities, including those offered by ‘blue growth’ and the broader maritime sectors*.” These are further defined in diversification of fishermen's activities (Art 30) or CLLD strategies of FLAGS (Art 63(1)(b). This implies that there is not a specific budget to support SSF in BG activities, but there are a number of BG activities that would be funded; e.g. diversification into tourism, environmental services, monitoring platforms, data collection, aquaculture, climate mitigation, etc. Significant benefits are expected to come from a reduction of fishing effort and the achievement of MSY in fisheries, as stated in the CFP. As indicated in section 2.2.2, this is a strong argument for including fisheries in the BG strategy and address the investments/costs needed to bring fishing effort in line with sustainable levels.

There is however a specific budget for ‘Blue Economy’ (EUR 71 million) with the objective supporting enabling activities to support BG such as maritime surveillance, improved knowledge of the seas and ecosystems, enabling rational exploitation of new marine resources (e.g. energy, biotechnology), and creation of MPAs. This is specified in Article 13.7 which covers support to the IMP under shared management with the MS. Furthermore, 11% of funds (about EUR 65 million) are provided for support to the IMP under direct management under its Articles 81-83.

In summary, the EMFF was not specifically designed to support BG and the objectives are to support fisheries and aquaculture primarily, as well as support to the IMP. This does not mean however that BG activities and initiatives are not eligible, but the emphasis is on traditional fishing activity. There are other significant funding opportunities for BG such as the other ESIF (e.g. ERDF, ESF) which may benefit the blue economy/growth. The European Investment Bank is charged transform these funds under the European Structural and Investment Funds (ESIF) into financial products such as loans, guarantees, equity and other risk-bearing mechanisms, which are then used to support economically viable projects in BG and many other policy areas.

2.4 European Projects for SSF and Blue Growth

KEY FINDINGS

- The objective of the Blue Growth initiative is to **promote smart, sustainable and inclusive growth and employment opportunities for SSF** in the short-, medium- and long-term time frames.
- Various projects were selected as examples of best practice in supporting SSF in the context of BG. Some recommended approaches are:
  a) SSF **research and policy networking** to address a number of challenges;
  b) Research into increasing the **competitiveness** of fisheries, including SSF;
  c) **Conflict resolution and fostering synergies** with fisheries (including SSF) and the creation of MPAs;
  d) Development of **BG strategies** for specific regions and/or sea basins;
  e) **Improving knowledge** of SSF and developing useful indicators for management purposes;
  f) Strengthening SSF **stakeholder representation** and engagement;
  g) Using the **bottom-up approach to assist SMEs** in job creation/maintenance, adding value to fishery products, innovative solutions, new business opportunities and adopting smart, sustainable solutions.

The objective of the Blue Growth initiative is to promote smart, sustainable and inclusive growth and employment opportunities for SSF in the short-, medium- and long-term time frames. An inventory of existing projects and activities in European SSF meeting 'blue growth' criteria was compiled. The projects were identified and classified in three categories:

- Research programmes with the aim of better understanding the sector and improving decision-making: data collection framework, in-depth research, symposia etc.
- Projects with the aim of a policy development and implementation with access and representation in formal, national and/or regional organisations.
- Projects funded by EFF for a sustainable development and improvement of the quality of life of coastal fishing areas.

These projects are mainly financed by European funds and grants. The main projects are described in the following sections with a focus on the Mediterranean, where there are many initiatives.

2.4.1 International and European dimensions

Research network – “Too Big to Ignore”

The International Partnership for Small-Scale Fisheries Research, “Too Big to Ignore” (TBTI) has been established to rectify the marginalisation of small-scale fisheries in national and international policies, and to develop research and governance capacity to help address global fisheries challenges.

The TBTI is a research network and knowledge mobilisation partnership. It was created following the inaugural World Small-Scale Fisheries Congress, held in Bangkok, Thailand in

October 2010. It comprises 15 partners, 62 researchers from 27 countries, conducting activities around the world.

The main objectives are to:

- promote recognition and understanding of the importance of SSF;
- explore SSF potential contributions to economic growth and development, environmental sustainability, stewardship, and community resilience;
- assess SSF vulnerability to anthropogenic global change processes such as the growth of large-scale fishing operations, climate change, aquaculture development, tourism, marine protected areas, the private enclosure of coastal spaces, urbanisation and migration;
- encourage policy discussions and contribute information for improving decision-making about SSF;
- advance knowledge and build local and global capacity in research and governance for the future of SSF.

Findings from the global analysis of small-scale fisheries are based on:

- An information System for Small-Scale Fisheries (ISSF) developed to capture key parameters of SSF;
- In-depth research in multiple case studies to address the big questions that will be integrated, synthesised, and communicated to fisheries stakeholders and policy-makers;
- The development of a transdisciplinary fisheries courses: distance learning, online and off-line self-taught packages, field course training and other educational initiatives.

The activities are financed by the Social Sciences and Humanities Research Council of Canada, and with a contribution from team members and partners.

At European level, discussions at a policy day on SSF that took place at the MARE Conference in 2013 defined some research needs to meet future challenges:

- Improving the knowledge of SSF;
- Creating new market opportunities for SSF;
- Enhancing economic viability and resilience;
- Providing access to appropriate fishing rights and opportunities;
- Leadership from the bottom-up: developing access to decision-making.

In the same way, a TBTI Symposium on European Small-Scale Fisheries and Global Linkages was organized in 2016 in Santa Cruz de Tenerife, Spain. The objective of this Symposium was to highlight the diversity of European small-scale fisheries, and to present examples of how fishing communities show their strengths and develop adaptive strategies and synergies with other sectors, as well as illustrate cases of failure of collective action and policy.

SUCCESS

The SUCCESS (Strategic Use of Competitiveness towards Consolidating the Economic Sustainability of the European Seafood Sector) project is an EU research project financed for 3 years (2015-2018) and is part of the H2020 Strategy. The SUCCESS project received funding under grant agreement No 635188 after the Blue Growth Call implemented in 2014.

Included in the Blue Growth Strategy, SUCCESS specifically addresses topic BG-10-2014: 'consolidating the economic sustainability and competitiveness of European fisheries and aquaculture sectors to reap the potential of seafood markets'.

SUCCESS integrated a team of scientists from fisheries and aquaculture science, with industry partners and key stakeholders. One of the tasks involves a specific case study on Coastal fisheries and is carried out by IFREMER, NISEA, Fishor Consulting, Fish-Pass, UNIPA, UBO.

2.4.2 Focus on Mediterranean projects

FishMPABlue

FisMPABlue was a project co-funded by the European Territorial Cooperation Programme "Med" 2007-2013 and MAVA. Global budget was EUR 470,000 and the project was carried out during one year (July 1st 2014 – June 30th 2015)

The project aim was to analyse existing conflicts between fishery and ecosystem components, and proposing adequate measures to solve them. Since any MPA (marine protected areas) normally has a managing body, the solution is identified in an innovative approach, i.e. the involvement of the key actors in the planning (of conservation measures and fishery regulation) process and the enhancement of any potential socio-economic benefit coming from a sustainable governance of the fishery (Blue Economy). The results are presented in the scientific paper "Fishing governance in MPAs: potentialities for Blue Economy – FishMPABlue".

BLUEMED

BLUEMED is a European research project financed for four years (2016-2020) and is part of the H2020 Strategy. The project has received EUR 3 million under the call for proposals H2020-BG-2016-1. The project is a Coordination and Support Action for the exploitation of the BLUEMED Research and Innovation Initiative for blue jobs and growth in the Mediterranean area.

The BLUEMED initiative was developed under the Italian Presidency of the EU Council in 2014 together with Mediterranean EU MS and Portugal and with the support of the EC. It fosters integration of knowledge and efforts to develop the Blue Growth in the Mediterranean and promotes joint actions of relevant research and innovation priorities. In addition, it maximises the leverage effects of the research investments. BLUEMED has identified a number of Blue Growth related challenges, including "MSP and ICZM in the Mediterranean".

Develop appropriate monitoring, assessment, management and governance regimes for sustainable small-scale and recreational fisheries is one of actions expected.

FISHINMED

FISHINMED (Mediterranean Network of sustainable small-scale fishing communities) is a cross-border cooperation project funded by ENPI CBC MED Program (Total budget: EUR 1.4 million programme contribution) and implemented by public administrations and research institutions of Puglia, Sicily and Sardinia (Italy), Greece, Tunisia, Egypt, and Lebanon. It was launched in November 2011 and finished in November 2014 (three years duration).

FISHINMED aimed to favor the social and economic development of small fishing communities by promoting the diversification of economic activities and the integrated enhancement of coastal territories, thus increasing employment opportunities as well as preventing the uncontrolled exploitation of sea resources.

GFCM Projects

The GFCM has introduced significant changes in its institutional and legal framework to increase the focus on SSF and local communities. It organised, in collaboration with FAO and the Algerian Ministry for Agriculture, Rural Development and Fisheries, a Regional Conference on the main socio-economic and environmental challenges for the development of sustainable small-scale fisheries in 2016 in Algeria. 200 participants were present including policy-makers, scientists, practitioners, fishers’ representatives, fish workers, civil society organisations, NGOs, research institutions, international organisations.

A specific topic was conducted on the theme “Supporting the sustainable development of small-scale fisheries in the Mediterranean and the Black Sea under the Blue Growth perspective”. It was proposed to:

- Develop indicators to measure the economic and social impact of small-scale fishing, with an analysis of the interaction of small-scale fishing with other sectors, particularly those also engaged in Blue Growth strategies (i.e. marine transportation, oil and gas, tourism, etc.);
- Examine the economic impact of small-scale fishing under different exploitation arrangements;
- Identify relevant parameters for the classification of “small-scale fishing” in the Mediterranean and Black Sea, based on relevant regional characteristics and in relation to the harvested resources;
- Disseminate information on the effectiveness of the GFCM Data Collection Reference Framework (DCRF) and promote its use as a data collection tool for SSF. Provide technical assistance in the practical application of the DCRF in the collection of standardized data on small-scale fishing in the Mediterranean and the Black Sea;
- Produce a desk study on the social protection systems and national legislations in place and available to small-scale fishers;
- Identify policy interventions which facilitate income and livelihood diversification for small-scale fishers;
- Develop, in collaboration with GFCM members, a pilot programme that would test ways to both better integrate small-scale fisheries into a Blue Growth approach.

GOBAMP II Project

GOBAMP (governance analysis applied to the process of creating Marine Protected Areas) was a project implemented to analyse the situation of marine protected areas from the perspective of institutional design and governance conditions that facilitate its long term success. The project is funded by the Ministry of the Economy and Competitiveness - Spain and is a collaboration with University of La Laguna, Tenerife, Spain. GOBAMP II examines main challenges for sustainable small-scale fisheries, particularly those related to the valuation of its products, marine conservation, Marine Protected Areas (MPAs), recreational use, and development of coastal tourism, taking into account national and international policies.

The project GOBAMP II is ongoing until end of 2017. It does not currently have a deliverable summarizing the results.

2.4.3 Structural projects: DG MARE - Measures to support SSF

A call for proposal from DG MARE was organised in 2014 to support SSF in the Mediterranean. The total budget earmarked for the co-financing of projects was estimated at EUR 1.5 million. Between six and eight projects were selected. Four examples are presented into Table 9.

Another call for proposals was published in July 2015 (MARE/2014/04) concerning support measures for small-scale fishing with a view to supporting the participation of small scale fishermen (SSF) in the decision making process and, in particular, to facilitating the setting up of associations voicing the interest of SSF interests and their involvement in the Advisory Councils, including the new ones established by the new CFP. The call for proposals covered all EU Waters and was divided in three lots covering respectively: (a) the Atlantic, including Outmost regions, (b) the Mediterranean and the Black Sea and (c) the North Sea and the Baltic Sea.

In line with the call, eight (8) proposals were awarded a grant, covering all EU waters for a total amount of EUR 1.483.434 (out of EUR 1.500.000 initially available, i.e. almost 99% of the available budget!). This pilot project follows the co-funding principle, and the EC maximum contribution cannot exceed 90% of the total budget of each project.

A summary of all the successful proposals is provided in Annex IV, indicating the names of the beneficiaries and the allocated amount.

Table 9: Projects supported under the call "Measures to support small scale fisheries in the Mediterranean water"

Project Name	Objective	Expected results	Period	Country	Partners	Funding
Eastmedfishers	facilitate and increase the level of involvement of the small scale fishers in the advisory and decision-making processes by transfer of knowledge	informative education, and exchange of experiences, good practices and networking	January 2016 – March 2017	Greece, Cyprus, Malta	AP MARINE ENVIRONMENTAL CONSULTANCY LTD (Cyprus) AQUABIOTECH LIMITED (Malta)	159,632.55 EU contribution: 143,669.30
European Association of fishermen in the Black Sea	increase awareness and the role of SSF in the future policy making decisions on national and EU levels by integrating good ecologically-friendly practices in the Black Sea Region	Catalog of SSF organizations, training courses for representatives from SSF; study visit for , developed Interactive Internet Platform, guidebooks, science peppers.	2016-2018	Bulgaria and Romania	SP CONSULT BG	177,767; EU contribution: 159,990 EU
LIFE plateform (Low Impact Fishers of Europe)	Organization to represent the interests of small scale, low impact fishermen and women					EU contribution: 159,990
ArtFishMed	Enhance the participatory role of Mediterranean small-scale fishing in the decision making and advisory processes at national and EU level	A register of the organizations representing SSF A fleet database on Mediterranean EU SSF A pilot Web Portal on Mediterranean SSF, A report describing the representation of SSF in the Mediterranean	January 2016 March 2017	ITALY, SLOVENIA and CROATIA	Unimar (Italy), MEDAC	

2.4.4 EFF intervention for small-scale coastal fishing (2007-2013)

The European Fisheries Fund (EFF) was established for the 2007-2013 programming period. EFF integrated a territorial dimension that promotes "sustainable development and improvement of the quality of life of coastal fishing areas". Funding under the EFF provided opportunities to work towards enhanced economic, social and environmental development, develop links between coastal areas and increased the value of fisheries and aquaculture products. A specific measure 1.4 was specifically implemented for SSF. The objective of this measure was to co-fund projects or activities that:

- improve management and control of access conditions to certain fishing areas;
- promote the organisation of the production, processing and marketing chain of fisheries products;
- encourage voluntary steps to reduce fishing effort for the conservation of resources;
- encourage the use of technological innovations that do not increase fishing effort;
- improve professional skills and safety training.

The EFF commitment to small-scale coastal fishing was EUR 37 million (1% of the total EFF committed). 5,708 operations equating to around 8% of the EU small-scale fleet were funded. The average cost per operation suggests that MS implemented the measure in a variety of ways.

Employment across the EU in small-scale fleets increased during EFF implementation, suggesting that EFF investment did help to maintain the small-scale fleet. But limited information is available on these projects and it is uncertain if these projects have had a positive impact on the environmental sustainability of SSF.

This analysis highlights that it is difficult to assess the performance of EFF regards to the concept "blue growth". Some measures were intended for SSF without being able to evaluate effectively impacts on economic viability, environmental sustainability or synergies with other Blue Growth activities. The EMFF also recognises these objectives but it is too early to evaluate how it will play a role in these synergies. To ensure a larger interest for professionals, access to funding has been made easier, and under a higher co-financing rate of 75% (50% higher than the normal rate) apples to small vessels.

In conclusion, the analysis shows that there is a strong increase of initiatives or projects that relate more or less extensively to BG objectives for small-scale coastal fisheries in recent years which confirms the growing importance of this domain towards the future. The majority sources of funding or co-funding are European and come from different programmes: H2020 Strategy EU Research and Innovation Program, European Territorial Cooperation Program "Med", DG MARE funding or EFF.

Research and innovation holds the key to creating a future BG potential and establishing a strong competitive position of Europe. Data are not sufficiently available to assess the impact of these projects in terms of socio-economic outputs and development opportunities that they offer to SSF. The work carried out in the framework of the ex-post evaluation of the EFF clearly highlights this lack of information. It will be important to carry out an evaluation of the EMFF program with adequate indicators to assess the effectiveness of the measures implemented and the achievement of the expected objectives.

2.5 Global best practices in SSF

KEY FINDINGS

- The **concept of Blue Economy** differs depending on the context. The UN definition is grounded in a developing world context and fashioned to reflect the circumstances and needs of countries whose future resource base is marine. Fundamental to this approach is the principle of equity.
- The **EU Blue Growth Strategy** aims at supporting sustainable growth in all marine and maritime sectors as part of the Europe 2020 strategy for smart, sustainable and inclusive growth. Five sectors are highlighted as potential drivers of blue growth which include aquaculture, marine and coastal tourism, marine biotechnology, ocean energy and marine mineral mining.
- **Common criteria** were identified between the **Blue Economy and Blue Growth** in the EU. These are:

  1) Promote maritime Research & Development

  2) Boost access to finance

  3) Provide maritime cluster support

  4) Invest in smart infrastructure

  5) Anticipate maritime skills needs

  6) Promote maritime spatial planning

  7) Foster integrated local development

  8) Stimulate public engagement
- Three examples of **best practice** were selected involving initiatives in Iceland, Mexico and Australia

2.5.1 Concepts of Blue Growth and Blue Economy

The concept of Blue Economy promotes the same desired outcome as the Rio +20 Green Economy initiative namely; 'improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities' (UNEP 2013) and it endorses the same principles of low carbon, resource efficiency and social inclusion. However, it is grounded in a developing world context and fashioned to reflect the circumstances and needs of countries whose future resource base is marine. Fundamental to this approach is the principle of equity ensuring that developing countries:

- Optimise the benefits received from the development of their marine environments; e.g. fishery agreements, bio-prospecting, oil and mineral extraction.
- Promote national equity, including gender equality, and the generation of inclusive growth and decent jobs for all, in particular.
- Have their concerns and interests properly reflected in the development of seas beyond national jurisdiction; including the refinement of international governance mechanisms and their concerns as States proximate to seabed development.

On the other hand, the EU Blue Growth Strategy aims at supporting sustainable growth in all marine and maritime sectors as part of the Europe 2020 strategy for smart, sustainable and inclusive growth. The five sectors highlighted as potential drivers of blue growth include

aquaculture, marine and coastal tourism (including cruise and recreational boating), marine biotechnology, ocean energy and marine mineral mining. Oceans and seas are recognised as drivers in the EU economy with great potential for innovation and growth.

There are several analogies between European Blue Growth and the concept of Blue Economy that need to be identified before selecting non-EU projects meeting the European blue growth criteria. These common criteria are classified in Table 10.

Table 10: Common criteria between European Blue Growth and Blue Economy

Common criteria between European Blue Growth and Blue Economy
①Promote maritime Research & Development
②Boost access to finance
③Provide maritime cluster support
④Invest in smart infrastructure
⑤Anticipate maritime skills needs
⑥Promote maritime spatial planning
⑦Foster integrated local development
⑧ Stimulate public engagement

Source: "Blue Growth : Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts". DG MARE, 2012)

These main criteria were used for selecting three projects (cases) which illustrate global best practices in BG and fisheries, especially with regards to SSF and SMEs. The following section B. will present the selected projects and the assessment methodology against indicators meetings Blue Growth criteria.

2.5.2 Examples of Best practice

Three projects were selected to illustrate global blue growth best practices in fisheries and SMEs:

- **Project 1:** The Iceland Ocean Cluster, Iceland (Annex V)
- **Project 2:** The Fish Production Cooperative Societies of Cozumel and Vigía Chico, Mexico (Annex VI)
- **Project 3:** Environmental Management System for the Western Australian South Coast Estuarine Fishery, Australia (Annex VII)

The same methodology was used (section 1.3.4). Furthermore, the availability of easily accessible bibliographic information was a decisive criterion for the choice of projects.

The three projects chosen are presented in the form of a matrix where the scope of the project and several relevant features are described with regards to SSF and SMEs. Each selected project was assessed according to a specific matrix design (Table 11). The matrix was filled using the available bibliography, which includes mostly online documentation and project official website. Additional information (ex: granted funds, etc.) were requested by email from project managers, if necessary.

Table 12 compiles the results of this assessment of the three projects and highlights best practices considering BG.

Table 11: Design of the assessment matrix

Key facts / Presentation of the Project	Project Name
	Last of the project
	Start date
	Location
	Beneficiaries
	Environment (Main Keys Habitat / species targeted)
Context	Problem statement
	Issues categories
Intervention logic of the project	Objectives
	Inputs
	Outputs / Results (the entire value chain including capture, processing, trade,..)
	Local/External factors we need to consider (prevailing economic conditions and industry trends)
	Legal/administrative frameworks
Project's Impacts assessment	Biodiversity / Habitats Impacts
	Impacts on marine species, biodiversity
	Impacts on Interaction / Competition between marine activities
	Socio-economic Impacts (fishing organisation / industries / value chain)
	Policy / Institutional Impacts
	Sustainability incomes
	Synergies
Project's Supports	Financial and technical support / Patners
	Origin
	Funding amount
	Type of collaboration

Table 12: Synthesis of project assessment matrices highlighting best practices

	Project 1	Project 2	Project 3
Project Name	**The Iceland Ocean Cluster**	**The Fish Production Cooperative Societies of Cozumel and Vigía Chico**	**Environmental Management System for the Western Australian South Coast Estuarine Fishery**
Activity Sector directly involved	Small and Medium-sized enterprises	Small and Medium-sized enterprises Small scale fishery	Small scale fishery
Blue Growth criteria matching (cf. Table 11)	①②③④⑦⑧	①②③⑥⑦⑧	①⑤⑥⑦⑧
Main initial issues (problem statement)	- Very few networking in ocean industrial sectors - **Increase competitiveness** - International interest for clusters in business sectors.	- **Free-for-all manner fisheries (overharvesting, inefficiencies and resource conflicts)** - Organizational vacuum for the sale and marketing of marine products - High exposure to natural hazards (ex : Hurricane)	- **Use conflict increasing** - **Degradation of fishermen's image** - No coordination and planning between fishers and seafood industry - **Soaring fuel costs**
Main project's outputs	- Ocean Cluster House (70 companies) - **Startup incubator** - **Multisectorial projects** - Ocean Industry events	- **Fishing cooperative organization** - Appropriate fishing gear adopted - New resources management - **Consolidation of marketing** - **Environmental education and training** - **Diversification of activities (tourism)**	- Development of the **Code of Practice for fishery** - Book and Information brochure for **promoting fishery practices and her history** - Development of a discard chute to improve the survival rates - Promote the fishery in the Albany Seafood Festival

	Project 1	Project 2	Project 3
Main project’s impacts (Environment, job creation, added value, policy,…)	- Contribution to the national economy = approx. 26% of the GDP - **2.250 direct jobs created** - Ocean cluster directly or indirectly supports 15–20% of jobs in Iceland - **Better profits for traditional fisheries industry** - Competitiveness improved - **Innovation network**	- Positive effects on lobster populations and others species - **Reduction of bycatch** - Implementation of "seasonal no-take zones” - **Promotion marine biodiversity conservation** - Combination of cooperative interventions - **Co foundation of a collective platform for marketing** - **Implementation of a community trust fund** - Ecotourism = creation of 4 tourism cooperatives	- **Protection of commercial fishing access rights** - Reinstate transferability of commercial fishing licences (stop economic decline of the fishery) - **Extending fuel subsidies and rebates to the fishing industry** - Public image of the fishery improved through promotional activities - **Demonstration and promotion of environmental performance of the fishing industry**
Funding (type, partners, amount…)	Several funding sources: - Startup incubator renting (Ocean Cluster House) - Industrial sector (ex: MATIS, private companies) - Research sector (ex: AVS Fund) - Horizon 2020	- Independent grants from the UNDP implemented GEF-Small Grants Program (SGP) (USD $60 000) - individual cooperative members (payment of membership dues)	- OceanWatch Australia funds (the SEANET program) - Technical Partners : Pelagicus Fisheries Research and Compliance; Fisheries Research and Development Corporation ; Western Australian Fishing Industry Council (WAFIC) ; The Federal Government
Project’s Sustainability income and synergies	- **Strengthen Iceland marine Industries network** - Job offers + New services - Creating a forum for cooperation and development of new opportunities	- **Development of a direct market supply-chain** - Partnerships between cooperatives and several research centers in the region	With EMS approach = **Periodic consultation and action plan to improve of environmental performance of the fishing industry** and resources management , reduction of use

	Project 1	Project 2	Project 3
	-Developing projects with marine research Institutes - **Support the establishment and structuring North Atlantic Ocean Cluster Alliance**	- Consolidation of lobster marketing through Integradora de Pescadores de Quinana Roo - **Risk pooling + Cooperative organization = high resilience to natural disasters**	conflict, **revived attractiveness of fishing activity**

2.6 Impacts of rapid growth of ocean industries

KEY FINDINGS

- **EU fleet revenues have increased by about 1%** over the period 2008-2014, but the **SSF segment registers a continuous decline overall**, especially between 2011 and 2014.
- When comparing two socioeconomic variables - **GVA and number of jobs** - the contribution of BG sectors is far greater than that of the EU fishing fleet and the SSF sector. BG activities are responsible for ten times the GVA and 15 times the employment that fishing activities generate.
- The socioeconomic importance of BG industries is both substantial and dramatically greater than that of fishing. Of critical importance, however, is that further growth in these activities are expected to have **major environmental effects** on coastal and oceanic zones.
- By year 2020, the importance of maritime economic activities in Europe is expected to grow, at **3% per annum**, to an estimated GVA of EUR 590 billion and to 7 million persons employed; these figures include fisheries, shipbuilding and ship repair, cargo and ferry, and offshore oil and gas.
- **Positive synergies** were identified in relation to BG, primarily of a socio-economic nature such as jobs, GVA, food security, including positive synergies with fisheries.
- However, the **environmental impacts** are generally of a negative nature, involving changes in coastal dynamics, marine pollution, eutrophication, seabed morphology and integrity. Positive environmental effects are most evident in relation to climate change mitigation through the increasing use of alternative marine energy sources.
- There is concern that the **cumulative burden of environmental impacts becomes inimical to fisheries**, including SSF. There would then be extremely adverse effects on those coastal communities that depend heavily on artisanal fishing.

2.6.1 Blue Economy

In recent years the European coastline has undergone a transformation in becoming a significant sector of the economy. The economic importance of certain activities — including marine aquaculture, coastal and maritime tourism (especially in the Mediterranean), and industry based on wind and tidal energy — is crucial for explaining that transformation. The growth of this “blue economy” in Europe has generated many employment and economic opportunities, which have helped to mitigate the continuing economic crisis as well as the slower than desired recovery from its effects.

According to Eurostat data, BG activities represent more than 1% of the gross value added (GVA) and some 2.5% of the employment throughout European coastal regions in 2013 (the only year for which BG industry data are available). The figures reported in Table 13 reveal the importance, in terms of GVA and number of jobs (positions, not necessarily full-time), of the blue economy for each country in that year; European Union (EU) totals are also included. The greater significance of these activities for France, Greece, Italy, Slovenia, Spain, and the United Kingdom mainly reflects the contribution of coastal and maritime tourism. The economies of France and Spain derive considerable benefit also from the aquaculture sector, and in Germany there are a relatively high number of jobs due to ocean energy activity. There is a much shorter history of minerals exploitation and marine biotechnology, so these sectors are active in only a few countries. In fact, the information available when this report

was prepared indicates that only Ireland and Spain host companies with “blue technology” as the main focus. Yet all major pharmaceutical firms have marine biology divisions, and their economic importance is likely greater than Table 13 suggests. Only seven countries are known to engage in the economic exploitation of minerals in their territorial waters; most such activity occurs in France, Germany, and the Netherlands.

Tables 14 and 15 report the main socioeconomic indicators, by country, for (respectively) the European fishing fleet and the small-scale fishing (SSF) segment during 2008–2014. France, Italy, Portugal, Spain, and the United Kingdom are the major fishing countries in terms of GVA, and they have already become invested in some blue growth activities. We can see that SSF is important from an employment standpoint in France, Greece, Italy, Portugal, Spain, and the United Kingdom. Likewise, SSF accounts for 60% of the European fleet’s vessels and nearly half of the jobs—although full-time employment (FTE) seldom exceeds 30%. The revenues and GVA generated by this segment represent 15% of that generated by the total European fleet. In relative terms, the participation of SSF in the national fleet is especially significant (in terms of employment and number of vessels) for Cyprus, Estonia, Greece, Poland, and Romania, countries in which it accounts for 70% of the respective national totals; that figure is close to 60% in France, Italy, Latvia, and Malta.

Table 13: European blue economy, 2013

	Aquaculture		Coastal and maritime tourism		Marine biotechnology		Oceanic energy		Deep-sea mining		Total blue economy	
Country	GVA	Employ.	GVA	Employ.	GVA	Employ.	GVA	Employ.	GVA	Employ.	**GVA**	**Employ.**
Belgium	3	80	531	9,738			35	1,200	10	100	**579**	**11,118**
Bulgaria	0.2	218	771	112,794							**771**	**113,012**
Croatia	29	105	710	33,677							**739**	**33,782**
Cyprus	10	120	632	84,800							**642**	**84,920**
Denmark	10	190	1,016	20,835			70	330	10	100	**1,106**	**21,455**
Estonia			134	4,720							**134**	**4,720**
Finland	10	279	290	8,930							**300**	**9,209**
France	516	30,672	5,648	149,316					58	646	**6,222**	**180,634**
Germany	3	10	2,660	98,460			1,530	16,510	20	270	**4,213**	**115,250**
Greece	450	3,600	8,710	98,000							**9,160**	**101,600**
Ireland	37	1,705	498	6,636	9	185	5	151			**549**	**8,677**
Italy	150	4,200	7,170	206,580							**7,320**	**210,780**
Latvia			53	5,370							**53**	**5,370**
Lithuania			16	341							**16**	**341**
Malta	12	173	273	14,525							**285**	**14,698**
Netherlands	43	2,580	3,727	91,800			999	2,208	115	462	**4,884**	**97,050**
Poland	10	60	330	22,390					5	20	**345**	**22,470**
Portugal	6	2,085	943	44,913							**949**	**46,998**
Romania			402	47,730							**402**	**47,730**
Slovenia	0.07	30	54	2,150							**54**	**2,180**
Spain	246	43,222	12,986	351,304	12	287					**13,232**	**394,526**
Sweden	3	147	1,400	26,950			2	46			**1,405**	**27,143**
UK	95	988	2,280	173,009					10	436	**2,385**	**174,433**
Total EU	**1,633**	**90,464**	**51,234**	**1,614,968**	**21**	**472**	**2,641**	**20,445**	**228**	**2,034**	**55,745**	**1,728,096**

Notes: GVA (gross value added) in millions of euros, jobs in number of persons. Employ. = Employment; UK = United Kingdom.

Source: Authors' compilation from European Commission (2014) and "Study on Blue Growth and Maritime Policy within EU" (https://webgate.ec.europe.eu)

Table 14: Main socioeconomic indicators: European fishing fleet, 2008–2014

	Number of vessels			Total employed (persons)			Full-time employment (persons)			Revenues (€ millions)			Gross value added (€ millions)		
Country	2008	2011	2014	2008	2011	2014	2008	2011	2014	2008	2011	2014	2008	2011	2014
Belgium	102	90	80	472	382	345	353	312	293	87.0	87.1	85.4	23.6	37.8	36.6
Bulgaria	2,680	2,343	2,005	1,507	3,276	1,517	1,433	1,668	532	4.8	2.5	5.5	1.9	–1.7	2.7
Croatia	n.a.	n.a.	4,385	n.a.	n.a.	4,842	n.a.	n.a.	2,151	n.a.	n.a.	76.5	n.a.	n.a.	36.6
Cyprus	534	957	854	1,085	1,344	1,219	875	839	729	13.7	8.1	7.5	4.7	–0.5	0.8
Denmark	2,813	2,663	1,956	1,801	1,460	1,405	2,061	1,661	1,619	376.5	408.4	385.6	219.8	257.5	238.4
Estonia	954	928	1,514	3,002	1,993	2,070	699	524	497	18.4	15.2	14.7	11.3	8.3	9.3
Finland	3,240	3,365	3,144	1,613	1,722	1,847	263	337	355	29.7	38.7	39.3	12.3	15.0	15.5
France	7,919	7,211	7,069	11,140	10,945	10,056	7,793	8,056	7,545	1,099.6	1,197.0	1,171.7	587.5	603.2	579.7
Germany	1,849	1,654	1,508	2,068	1,639	1,605	1,615	1,258	1,253	165.8	135.7	134.6	66.2	60.5	71.0
Greece	17,248	16,542	15,769	n.a.	27,559	25,972	n.a.	23,945	n.a.	n.a.	n.a.	66.5*	n.a.	n.a.	–162*
Ireland	1,939	2,074	2,095	4,485	3,243	3,154	3,404	2,688	2,395	241.4	239.7	320.6	128.7	105.1	168.1
Italy	13,518	13,285	12,689	29,604	28,964	26,932	21,456	20,740	20,694	1,235.4	1,164.0	824.2	653.6	619.2	461.0
Latvia	858	407	365	1,621	712	607	664	378	362	26.9	23.2	20.3	15.6	10.9	7.2
Lithuania	250	171	143	1,046	768	750	617	574	573	92.2	48.8	100.3	19.4	13.4	14.4
Malta	1,316	1,087	1,045	1,009	933	1,418	824	734	1,116	9.1	12.1	11.7	1.9	6.5	5.3
Netherlands	727	737	735	2,211	2,054	2,024	1,883	1,705	1,680	432.0	367.6	380.9	164.1	114.8	178.4
Poland	868	793	838	3,026	2,548	2,703	2,822	2,400	2,550	40.9	47.8	48.1	15.1	23.0	21.7
Portugal	8,770	8,507	8,256	17,239	18,258	16,992	9,155	9,614	8,515	404.2	416.5	364.9	252.1	263.6	235.5

	Number of vessels			Total employed (persons)			Full-time employment (persons)			Revenues (€ millions)			Gross value added (€ millions)		
Romania	441	488	158	875	454	330	42	28	38	0.9	1.5	2.5	0.6	0.9	1.5
Slovenia	181	186	170	109	114	126	77	77	80	3.0	3.6	2.7	1.7	2.6	2.3
Spain	13,115	10,900	9,921	36,672	35,808	33,121	34,921	33,210	28,629	1,526.3	2,081.5	2,020.9	585.8	910.7	1,059.6
Sweden	1,507	1,359	1,266	1,980	1,679	1,568	1,133	974	845	125.7	134.4	112.0	61.3	62.1	53.9
UK	6,976	6,609	6,552	12,614	12,405	11,845	8,698	8,978	7,909	961.4	1,055.7	1,118	414.9	467.1	535.4
Total EU	**87,805**	**82,356**	**82,517**	**135,179**	**158,260**	**152,448**	**100,788**	**120,700**	**90,360**	**6,895**	**7,489**	**7,314**	**3,242**	**3,580**	**3,573**

Note: n.a. = not available; UK = United Kingdom; * = 2013.

Source: Authors’ compilation from STECF (2015, 2016)

Table 15: Main socioeconomic indicators: Small-scale fishing fleet, 2008–2014

	Number of vessels			Total employed (persons)			Full-time employment (persons)			Revenue (€ millions)			Gross value added (€ millions)		
Country	2008	2011	2014	2008	2011	2014	2008	2011	2014	2008	2011	2014	2008	2011	2014
Belgium															
Bulgaria	747	926	999	1,293	2,823	1,196	1,096	1,423	343	1.3	0.6	2.8	0.7	–0.8	1.9
Croatia	n.a.	n.a.	1,665	n.a.	n.a.	2,076	n.a.	n.a.	537	n.a.	n.a.	15.6	n.a.	n.a.	10.0
Cyprus	500	931	827	895	1,245	1,106	697	740	616	9.3	6.2	4.4	4.3	0.7	0.2
Denmark	1,228	1,102	1,004	420	342	307	379	276	225	32.8	25.8	23.1	16.6	12.8	10.9
Estonia	880	876	1,475	2,727	1,777	1,895	444	320	333	4.1	4.3	5.2	2.4	2.4	2.8
Finland	1,486	1,589	1,699	1,486	1,589	1,699	177	229	251	12.1	13.7	13.1	5.9	6.7	6.6
France	4,589	4,480	4,198	4,307	4,220	3,805	2,931	2,789	2,481	255.6	270.6	222.5	164.8	175.4	137.0
Germany	961	883	817	1,031	869	798	790	664	608	12.1	9.0	8.6	4.9	3.1	3.8
Greece	15,834	15,268	14,642	n.a.	21,780	20,642	n.a.	19,396	n.a.	n.a.	n.a.	38.0*	n.a.	n.a.	–85.0*
Ireland	1,030	786	898	2,425	1,372	1,140	1,667	1,067	763	12.9	29.6	29.3	9.1	11.6	19.0
Italy	7,885	7,866	7,611	13,722	14,050	13,114	9,385	1,036	9,379	290.2	317.0	203.6	188.2	199.7	142.3
Latvia	736	245	221	992	321	301	373	202	214	0.9	1.3	1.7	0.7	1.2	1.7
Lithuania	89	69	64	370	154	142	208	37	46	0.8	0.6	0.5	0.3	0.3	0.3
Malta	621	532	648	849	668	1,098	695	592	804	2.8	4.6	3.7	–0.1	2.2	1.2
Netherlands	155	163	178	350	301	362	132	73	99	8.9	4.5	4.9	5.6	2.9	2.6
Poland	563	518	595	1,379	1,301	1,519	1,201	1,163	1,420	10.7	11.4	11.2	6.4	7.5	6.9
Portugal	3,792	3,338	3,097	9,397	10,075	8,957	3,246	3,370	2,967	97.6	76.9	83.0	77.3	58.5	65.3
Romania	395	197	111	790	434	279	31	26	24	0.4	1.4	1.2	0.3	0.9	0.7
Slovenia	60	62	77	67	62	89	48	42	60	0.6	1.4	1.5	0.2	1.2	1.2
Spain	6,420	4,214	4,156	11,785	8,803	8,251	7,059	6,695	5,546	121.1	130.1	126.2	75.7	81.4	86.7
Sweden	819	754	731	1,073	925	914	470	367	332	21.2	20.7	16.2	12.1	9.4	7.0
UK	3,256	3,325	3,138	5,292	5,979	5,625	1,745	2,066	1,954	133.8	123.2	131.7	73.6	58.0	65.8
Total EU	**52,046**	**47,198**	**48,851**	**60,650**	**79,090**	**75,315**	**32,774**	**42,573**	**29,002**	**1,029**	**1,053**	**948**	**649**	**635**	**489**

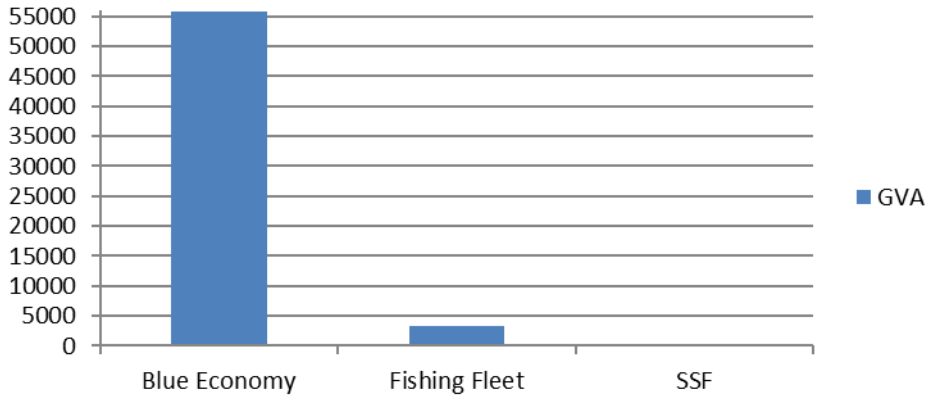
Notes: SSF fleet includes vessels less than 12 meters in length (of which Belgium has none). n.a. = not available; UK = United Kingdom; * = 2013.

Source: Authors' compilation from STECF (2015, 2016)

The total European fleet and the SSF fleet exhibit a similar trend over this period, both variables decreasing by 1% overall but with a slight increase from 2011 to 2014. There was a concurrent increase in employment—which was a bit stronger (approximately 4%) in the SSF segment, though it declined somewhat toward the period's end. Yet full-time employment, after increasing in the immediate aftermath of the economic crisis, declined by nearly 3% overall.

We observe that fleet revenues exhibit two different trends. While the EU fleet's revenues increase by about 1% over the period, the SSF segment registers a continuous decline overall and especially between 2011 and 2014. Gross value added exhibits similar but slightly more pronounced trends. The GVA generated by the European fleet as a whole increased by 2%, whereas that of the SSF segment declined by nearly 4% during this period.

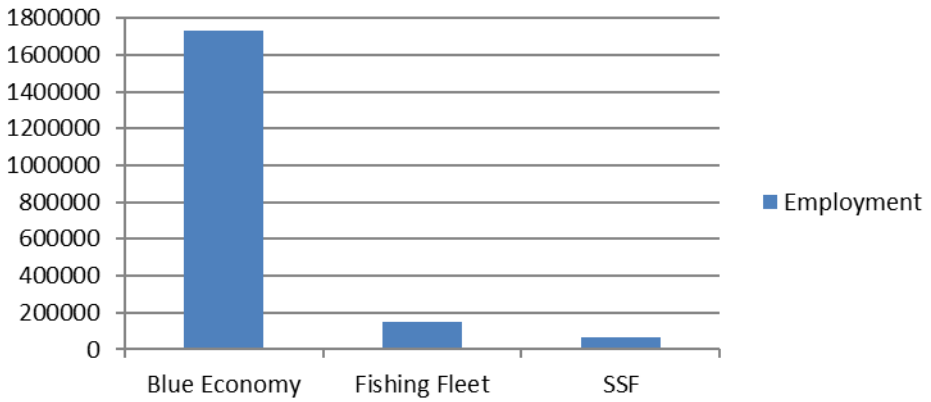
Figure 20: Gross value added (€ millions) by the European blue economy, the EU fishing fleet, and the SSF segment in 2013



Source: Authors' compilation based on Table 1 and STECF (2015)

When we compare the two main socioeconomic variables—GVA and number of jobs (not FTE, since that data is unavailable for BG activities)—in Figures 19 and 20, respectively, it is clear that the contribution of BG sectors is far greater than that of the EU fishing fleet and the SSF sector. This difference reflects a long-standing tradition of GVA and employment being generated by the blue economy (e.g., aquaculture and tourism) in coastal countries. In particular, BG activities are responsible for ten times the GVA and 15 times the employment that fishing activities generate.

Figure 21: Employment (number of jobs) in the European blue economy, the EU fishing fleet, and the SSF segment in 2013



Source: Authors' compilation based on Table 1 and STECF (2015)

Thus, when all of Europe is considered, the socioeconomic importance of BG industries is both substantial and dramatically greater than that of fishing. Of critical importance, however, is that further growth in these activities will have major environmental effects on coastal and oceanic zones. Unfortunately, there is little EU information available on the state of the marine environment (EEA 2016). The data that we do have—mainly for the northeast Atlantic Ocean and Baltic Sea—indicate that marine ecosystems, their biodiversity features, and their related ecosystem services remain under great pressure despite ongoing efforts to reverse downward trends in European zones. According to the EEA (2016), the seas already suffer from both past and current human activity that has resulted in various deleterious effects on coastal and oceanic zones: selective extraction of species (i.e., by fisheries), seafloor damage, pollution by nutrients and contaminants, the spread of non-indigenous species, and climate change. It is clear from these trends that Europe remains far from achieving a healthy marine environment.

2.6.2 Environmental impacts of Blue Growth

Hence it is imperative to examine more closely the impact of expanding BG industries—in particular, if such outcomes as urban occupation of the territory, alteration of the coastal dynamic, reduced quality of water masses, degradation of marine ecosystems and habitats, and declines in (and loss of) coastal landscapes. The significant increase in such pressures and uses of the coastal system invariably increases environmental risks, of which there are three main types: risk of coastal area flooding, risk of coastal water pollution, and the geological risk of erosion. Low coast areas (deltas, wetlands, etc.) are increasingly threatened by the combination of a rising sea level and storms of greater strength and frequency, two factors that are related to climate change and whose ill effects are magnified when coastal zones have been compromised by the aforementioned human activities. Nevertheless, built-in coastal urban areas have generally failed to account for these factors (IPCC 2013). Greater volumes of sea-transported dangerous goods, especially chemical substances and oil, are another risk factor: not only of the marine pollution resulting from accidents but also of such deliberate actions as washing tankers and the flushing of bilge or ballast water. Finally, the increased building and infrastructure near the cost (and in geologically unstable areas) makes erosion and landslides more likely to occur.

At some point, the cumulative burden of such environmental effects becomes inimical to fisheries, including SSF; there would then be extremely adverse effects on those coastal communities that depend heavily on artisanal fishing. In recent years, numerous reports and studies have addressed the effects of activities related to the blue economy. We shall next summarise reported findings on the environmental impact of, in turn, the five principal BG activities.

Aquaculture

Aquaculture—the cultivation of fish and shellfish, mainly for food—has the potential to improve food security and alleviate poverty (FAO 2015; World Bank 2013). Technological advances have opened up new avenues for the development of this activity. So-called juvenile production can help re-populate the natural environment, and combining traditional with modern production modes can be broadly beneficial. Moreover, aquaculture is a proven way to obtain enormous added value in products; hence it is a solid foundation on which to base further economic development of the coast.

Special attention must be paid to the planning and management of aquaculture, especially with regard to its environmental impact and related sustainability issues. The environmental effects of a marine fish farm depend on a number of factors: species being raised, cultivation

method, stock density, power supply, and hydrographic conditions (Boyra *et al.* 2004; Dempster *et al.* 2006; Weber 2003). Both the water column and the seabed are susceptible to aquaculture's physical, chemical, and biological effects. The factors driving this BG segment's environmental impact can be grouped as follows: generation of waste products, escape of farmed species and the risk of genetic pollution, and use of chemicals (see Table 16).

In this context, it is important to distinguish between the types of aquaculture that are practiced in the EU. Shellfish aquaculture accounts for 40% of total EU aquaculture production (including freshwater aquaculture) and this type of production is generally considered an environmentally friendly method with no or very limited inputs in terms of feed and chemicals.

The use of chemicals in aquaculture is normally associated with intensive finfish production, mainly salmonids, and sea bass and sea bream, sectors which have experienced the highest growth rate in the EU in recent years (Tornero and Hanke 2016). These include a wide range of chemicals to enhance productivity and growth, including antibiotics to control disease, pesticides to control parasites and algae, and antifoulants (Tornero and Hanke 2016). In relation to marine fish aquaculture (35% of total aquaculture production), the use of antibiotics has to a large extent been substituted by vaccination of individual fish, particularly in salmon farming. It should also be noted that 90% of all aquaculture enterprises are micro-enterprises, normally family-owned, which use rather extensive production methods and systems (STECF 2016b). This implies more limited use of chemicals.

Table 16: Main effects of intensive fish farming on the environment

Factor	Environmental impact
Feed and faeces	Increase in the water's level of nutrients Phenomena of "blooms" of phytoplankton Reduction or elimination of perennial plants by other, fast-growing species Reduced diversity of flora and fauna Changes in the vertical distribution of benthic algae, reducing the amount of light entering the water column Increase in heterotrophic oxygen consumption and oxygen depletion combined with reduced system production of anoxic sulphate hydrogen; benthic animals and plants are then more likely (than others) to perish Reduced diversity of zooplankton and fish species
Escape of farmed species	Introduction of alien species Native species threatened by competition for food and habitat; introduces disease vectors Possible damage to genetic strength, since farm-adapted genes dilute the genes evolved and needed for living in the wild
Use of chemicals and antibiotics	Accumulation of toxins on the seabed May promote anaerobic conditions May increase the resistance of bacteria to antibiotics

Fish farms generate waste, both organic and inorganic, which can so saturate water with nutrients that eutrophication results. About 85% of the phosphorus, 80–88% of the carbon, and 52–95% of the nitrogen entering a farm's cages can pass to the marine environment as food waste and the respiration and excreta of fish (Molina 2004). Significant effects have been detected within a 1-km range of the cultivation cages, and the impact is generally greater at lower depths. Damaging effects of aquaculture on the marine environment include an increase in oxygen demand, increases in sediment levels of anoxic and toxic gases, changes in plant communities; reduced benthos diversity; and alterations to mixtures of species (Boyra *et al.* 2004; Dempster *et al.* 2006).

The escape of cultivated fish from the farm's cages to coastal waters is usually caused by extreme weather conditions, accidents, or marine mammals searching for food. Escaped species can have a harmful effect on both the health and genetics of wild populations. There is a large body of research that studies the negative environmental impact of escaped species on their environment (Weber 2003). The threat from escaped species extends beyond the resulting increased competition for habitat and food, since these consequences in turn have effects on the entire trophic chain of ecosystems. Escaped species may also carry diseases, and their mating with members of the wild population could have untoward consequences for the integrity of a wild species' genetic pool.

As pointed out by Tornero and Hanke (2016), the use of chemicals varies between different types of aquaculture farms, between countries and between individual operations within the same country. Reliable information on the amounts of chemicals used in the industry is generally not available and it is not clear which chemicals would be the most important to screen for in aquaculture environments and aquaculture products. More efforts are needed on quantifying the use of these chemicals and determining their effects, including possible limitations and/or prohibition of use.

Coastal and maritime tourism

Coastal and maritime tourism is one of the most economically significant maritime activities in the EU (EC 2016). The EC identified several actions that could build on the sector's capacity to contribute to a smart, sustainable, and inclusive economy that would stimulate development in coastal zones. Environmental protection is vital for nautical tourism in particular, since for boaters the main attraction of such tourism is a beautiful, clean, and well-preserved area. A marina is more attractive to tourists if it can offer options for swimming in open water or scuba diving. There are diverse other sporting activities suitable to marinas and other aquatic areas; these include diving, surfing, sport fishing, yachting, and windsurfing.

Table 17 - Coastal and maritime tourism's main effects on the environment

Factor	Environmental impact
Tourism proper	
Urbanised occupation of the coastal zone	Reduced flow of surface waters (rivers, lakes, reservoirs); increased water discharged into the ocean Alteration of coastal dynamics Negative effects on ecosystems and coastal habitats Increased consumption of water and other resources
Wastewater treatment plants	Increased consumption of energy; generation of sludge and other drilling wastes Eutrophication; alterations to oceanic biodiversity

Water treatment plants for human consumption	Generation of sludge and other drilling wastes Increased consumption of energy Alterations to oceanic biodiversity
Maritime transport of passengers	
Construction of marinas, cruise ports, docks, piers, and retaining walls; chartering; equipment manufacture; service provision	Alteration of coastal currents and dynamics Degradation of marine ecosystems Alteration of sea currents
Emptying of petrol tankers; maritime accidents	Reduced water quality. Eutrophication and degradation of marine ecosystems

However, the development of such activities increases environmental pressures on the littoral coast (FAO 2015). The greater population and urban occupation of the territory produce alterations in the coastal dynamic and may well degrade the coast and marine environment (see Table 17). Perhaps the most visible aspect of the transformation wrought by development along the European coast is the urban occupation of coastal areas. The density of such occupation varies among countries, but this phenomenon is widely viewed as having serious impact (EEA 2015)—especially where tourism has expanded rapidly.

Another important driver of environmental imbalance is the alteration in littoral dynamics due to extensive human activity on the waterfront. Thus ports, dikes, breakwaters, containment walls, and the like introduce discontinuities that can have a wide impact on coastal water dynamics. The growing demand for moorings has significantly increased the construction of ports along stretches of the coast. In addition, there are far-reaching consequences of certain activities carried out in river basins (e.g., dam construction, resource exploitation). Together these factors have resulted in a precipitous decline in the detrital material required to feed a viable coastal system. In short, there are high environmental costs to building such infrastructure.

Marine biotechnology

Querellou (2010) defines marine biotechnology (a.k.a. blue biotech) as “efforts that involve marine bio-resources, either as the source or the target of biotechnology applications”. Developing new uses of living marine resources consists of employing wild and farmed aquatic organisms, including micro and macro algae, as precursors of the biomolecules used in high-value products. The sectors that benefit most from marine biotech products are cosmetics, pharmaceuticals, food and nutrition, and some industries (mainly oil and plastics).

Previously unidentified marine organisms are still being found along European coastlines and in inshore waters. The further exploration of specific habitats—such as deep sea, mid-ocean, and cold waters—has high growth potential worldwide, and current research focuses on such diverse applications as (inter alia) anti-oxidants and anti-inflammatory molecules, artificial blood, antifouling molecules, bio-sourced plastics and polymers, glue that retains its adhesive properties even in wet environments, and biomarkers. In recent years, advances in molecular techniques and various marine technologies have yielded a large increase in the number of patents on genes derived from marine organisms (Arrieta *et al.* 2010).

The development of blue biotech activities is fairly recent, however, and we do not yet have reliable information on how such activities affect the marine environment. The progress being made in gene transfer technology indicates that it may be possible to manipulate the growth patterns of fish and shellfish via growth hormone genes (Baranski *et al.* 2010; Figueras *et al.* 2012; Gutierrez *et al.* 2012; Houston *et al.* 2008).

The problems with transgenic experimentation are not limited to the unknown outcomes vis-à-vis consumption by humans; in addition, there could be strong ecological effects on the oceans (see Table 6). Genetically modified species may have advantages over wild stocks and thereby eliminate them. That possibility could be reduced by growing transgenic species in land-based tanks that preclude their escape into marine ecosystems. Overharvesting of the molluscs, sponges, algae, and other organisms for the purposes described previously could likewise generate changes in marine biodiversity and thus have a negative effect on the marine environment. Yet the possible benefits of blue biotech include reducing greenhouse gas (GHG) emissions as well as both the recycling costs and the energy and water requirements of manufacturing chemical products (Table 18).

Table 18: Marine biotechnology's main effects on the environment

Factor	Environmental impact
Genetic modification	May lead to the introduction of alien species Threatens native species by increasing the competition for food and habitat Introduces disease vectors Reduces diversity of flora and fauna
Exploitation of marine sponges, molluscs, and other marine species	Alters the vertical distribution of benthic algae, which can reduce the amount of light entering the water column Reduces marine biodiversity; alters mix of species

Ocean energy

There is no longer any doubt that climate change is a preeminent threat to marine biodiversity worldwide, from which it follows that humans must use energy more efficiently and develop renewable sources. Like other renewable energies, harvested oceanic energy could help reduce GHG emissions—although the actual extent of that contribution depends on several factors, such as the carbon intensity of a country's mix of energy sources. With regard to a BG strategy, then, European seas and oceans are crucial for the EU's energy security and for diversifying its sources of energy and their supply routes (EC 2012). Ocean thermal energy as well as offshore wind, wave, and tidal energy all have high growth potential; they could not only reduce the emission of pollutants but also create steady jobs in coastal regions. These outcomes would help the EU achieve its energy objectives, in both the medium and long term, with regard to carbon emissions and renewable energy included in the "Europe 2020 Strategy" (and the new aim for 2030 –at least 40% reduction of CO2 emissions- included in the EC's recent proposal for a "Clean energy for all Europeans"). The EU already offers considerable support to ocean energy in the form of sponsoring research and development (R&D) through its "Horizon 2020 Programme". The most promising opportunities involve ocean energy (along the European Atlantic coast) and tidal steam energy (in Mediterranean countries).

More than a hundred different ocean energy technologies are currently under development in some 30 countries; most of these technologies are currently at the demonstration stage or the initial phase of commercialisation (EC 2014). Eight European countries (Finland, France, Ireland, Italy, the Netherlands, Portugal, Spain, and the United Kingdom) have included ocean energy in their National Renewable Energy Action Plans. It has been estimated that ocean wave energy is itself capable of generating 2,800 terawatt-hours annually, a figure that corresponds to about 80% of EU's 2010 EU electricity generation (EC 2012b). It is

noteworthy that ocean energy resources are less variable (and so more reliably predictable) than are such other renewable energy resources as solar and wind. Furthermore, whatever fluctuations that ocean resources do exhibit are largely independent of solar and wind patterns; hence ocean energy can be used to smooth out the electricity supply curve and facilitate network balancing.

Given the impending commercialisation of blue energy technologies, it is important to account for their effects on the marine environment. The available data on that impact is limited because (i) the technology is still being developed and (ii) the seabed remains relatively unexplored as compared with terrestrial ecosystems (EEA 2015). Even so, most negative environmental effects of exploiting ocean energy (including offshore wind) are equally relevant for all marine energy technologies and energy-related infrastructure (Sweeney, 2016). Table 19 summarizes the environmental effects stemming from this activity.

Table 19: Oceanic energy’s main effects on the environment

Factor	Environmental impact
Building of infrastructure in the sea	Destruction of marine habitats Alteration in the distribution of fish stocks Negative effects on marine mammals and birds Negative effects on seabed morphology Modification of marine biodiversity
Occupation of the coastal zone	Alteration of costal dynamics Increased pressure on ecosystems and coastal habitats Reduced diversity of flora and fauna

The most frequently cited environmental effects are the destruction of habitats and the killing of fish through direct blade strikes, underwater noise, and electromagnetic waves (Boehlert and Gill 2010; Langhamer *et al.* 2010). It is necessary to account also for the effects on seabed morphology, sediment transport, and species distribution that are due to disturbances resulting from the noise and vibration of turbines, the magnetic fields of power cables, entanglement of marine mammals in mooring lines and rotating turbines, and collisions of birds with infrastructure situated above sea level. In addition, one can reasonably expect negative consequences associated with the construction of access roads, channels, and connections to the electricity grid—since these activities have been shown to disturb, damage, and destroy natural habitats. However, the adverse environmental impact of blue energy deployment is anticipated to be much less than that of conventional energy sources, which are well known to exacerbate global environmental problems (e.g., climate change).

Deep-sea mining

Many countries have shown increased interest in deep-sea mining as a response to surges in the price of raw materials, concerns about securing a supply of critical minerals, technological developments, and new discoveries of mineral deposits. The oceans are believed to hold massive amounts of such valuable minerals as gold, copper, and cobalt. Mining for such minerals is still in its early stages, and the International Seabed Authority (ISA) has authorised few exploration projects (EC 2014c).

Much is known by scientists about seabed resources, which include sulphides, manganese nodules, and cobalt-rich ferromanganese crusts. However, the habitats, biodiversity, ecosystem structure, and resilience associated with the various mineral deposits are less well understood. A large number of studies have addressed the possible environmental impact of deep-sea mining (Baker *et al.* 2010; Billett *et al.* 2010; Boschen *et al.* 2013; Clark *et al.* 2010; Clark *et al.* 2012; Ebbe et at. 2010; Hoagland *et al.* 2010; Kvile *et al.* 2013; Pitcher *et al.* 2007; Schlacher *et al.* 2013; Smith 2013; Smith and Heydon 2013; Teixeira *et al.* 2013; Williams *et al.* 2010). Researchers have identified the following potential effects of such mining: loss of substrate; effects on the seabed of the operational plume and re-sedimentation; and effects of the discharge plume on pelagic or—depending on the plume's depth—benthic organisms. These effects are summarised in Table 20. Much as for the case of exploiting land-based resources, it is incumbent on scientists and commercial enterprises to assess consequences as a function the duration and scope of mining the seabed.

Table 20: Deep-sea mining's main effects on the environment

Factor	Environmental impact
Mining exploitation	Loss of substrate Reduction of plankton Destruction of marine habitats Alteration in the distribution of fish stocks Negative effects on seabed morphology Changes in marine biodiversity
Transportation	Damage to marine mammals Pollution of surface water Reduction of diversity in flora and fauna Introduction of alien species

A key driver of these environmental effects is the physical extraction of the minerals, since the seabed hosts a large number of species. The seafloor is believed capable of recovering quickly even from the massive extraction of sulphides based in active hydrothermal vents. However, relatively inactive seafloor sites likely take much longer to recover: from decades to centuries. Nodules can also take a very long time to recover from the removal of elements, especially in heavily mined areas (the recovery of nodule-dependent fauna may take millions of years). Mined segments of the earth's submerged crust are also expected to recover quite slowly. Another environmental impact is the spread of sediments, whose particular effects depend on the depth of mining, the technology employed, the surrounding ocean currents, and the types of deposits mined. Sediment-laden plumes can spread for kilometres beyond the mining site and smother seabed animals, and sediment in the water column can reduce the penetration of sunlight and thus the ocean's temperature. These outcomes combine to reduce plankton growth, which in turn affects the entire food chain; thus entire ecosystems can be altered by such seemingly inconsequential factors as a change on sediment grain size.

In addition, marine mammals can be disturbed by noise pollution from underwater equipment and its transport by ocean vessels. And as with all mining activities, the disposal of "tailings" has a far-reaching impact because such by-products remain long after the ore has been processed. Furthermore, the pollution from ships themselves (via discharges or accidents)

degrades seawater. Shipping operations can cause biological disturbances by translocating species; although most mining occurs far from the coastline, its effects can easily spread to small-scale fishing areas.

2.6.3 Future Directions, Costs and Benefits, and Synergies

We have dealt with the environmental effects of BG industries in the preceding sections. Any alteration in the ecosystems of coastal zones will have a negative effect on the species caught by the SSF fleet. Available data on the environmental impact of these industries are currently limited; in addition, much less is known about the ocean environment than about terrestrial ecosystems. For these reasons, more R&D is urgently needed.

The process of authorizing development is plagued by the conflict between uncertain outcomes and the need to protect the environment. Many of the environmental effects discussed here can be mitigated by strengthening regulations pertaining to the controls required of companies—and their agents—to avoid escapes of farmed species and discharges from vessels, restricting the number of visitors to sensitive coastal areas (especially sites that feature high levels of biodiversity), and raising the minimum acceptable quality level of marine waters. The impact of development could be reduced also by increasing both public and private support for research and innovation in wastewater treatment and for the development of vaccines to reduce or eliminate the use of antibiotics in farmed species. As deep-sea mining becomes more prevalent, environmental policies will need to be adjusted as new information and technologies emerge. Hence what is needed is an ongoing, collaborative approach among industry representatives, policy makers, field scientists and subject matter experts, environmental managers, government authorities, international agencies, and civil society.

Even though EU policies have helped reduce pollution while significantly improving environmental quality, continuous degradation of the ecosystem still threatens European economic production and welfare. Marine and coastal biodiversity is a special area of concern. Notable pressures include not only pollution but also invasive species, acidification, and deterioration of the seafloor. Moreover, the effects of climate change will almost certainly intensify these pressures and negative effects, even as the causes underlying declines in biodiversity persist. Thus, the rapid growth of blue industries could well accelerate degradation of the ocean environment.

Table 21: Comparison of effects of BG activities

	Aqua-culture	Coastal and maritime tourism	Marine bio-technology	Oceanic energy	Deep-sea mining
Socioeconomic effects					
EU production/GVA	+	+	+	+	+
Job creation	+	+	+	+	+
Food security	+	N.A.	+	N.A.	N.A.
Synergies with fishing	+	+	+	+	+
Synergies with other sectors	+	+	+	+	+
Environmental effects					
Alterations in coastal dynamics	–	–	–	–	–
Marine pollution	–	–	0	–	–
Eutrophication	–	–	0	–	–
Seabed morphology	0/–	0	0	–	–
Habitats/ecosystems/biodiversity	–	–	–	–	–

	Aqua-culture	Coastal and maritime tourism	Marine bio-technology	Oceanic energy	Deep-sea mining
Marine mammals and birds	N.A.	N.A.	N.A.	–	–
Climate change mitigation	0	–	+	+	–
Improved monitoring and understanding of marine ecosystems	+	+	+	+	+

Note: +, positive effect; –, negative effect; 0, no or small effect; N.A., not applicable (or unable to assess).

At the same time, BG activities offer socioeconomic benefits in terms of GVA, employment, and food security. We can also identify synergies with other economic sectors, including SSF, which could (partially) arrest climate change and its downsides. The goal should be to devise a sustainable development framework that balances positive and negative effects. Those effects are summarized in Table 21, and Table 22 provides a cost–benefit perspective on the consequences of BG for SSF and the fishing sector in general.

Table 22: Costs to and benefits for SSF and fishing in general from BG

Costs	Benefits
Building of infrastructure	Increased demand for fish due to rising incomes in coastal zones
Competition for use of space	Supply of young fish and crustaceans for aquaculture
Alterations in coastal dynamics	Collection of algae, sponges, molluscs, and other marine organisms for blue technology
Marine pollution	Use of fishing vessels for coastal tourism
Changes in seabed morphology	Technical innovations from BG activities (for industrial fishing)
Alterations to habitats/ecosystems/biodiversity	Engineering services from BG activities (for industrial fishing)
Changes in distribution of species	Juvenile production to re-populate fishing grounds
Possible extinction of fish species following deployment of sea-based infrastructure	Mitigation of climate change (i.e., slowing the increases in surface sea temperature and acidification)
Fish mortality due to rotating turbines	Better monitoring and understanding of marine ecosystems for sustainable fishing
Increased GHG emissions from maritime transport, which also contributes to rising sea temperatures	

The activities of BG industries currently provide high amounts of added value and employ substantial numbers of people. By year 2020, the importance of maritime economic activities in Europe is expected to grow, at 3% per annum, to an estimated GVA of EUR 590 billion and to 7 million persons employed; these figures include fisheries, shipbuilding and ship repair, cargo and ferry, and offshore oil and gas (EC 2012b). This expansion is likely to yield high-quality jobs in most of the associated sectors. Another positive effect is that aquaculture and blue technology should provide significant benefits to European society in terms of achieving greater security of food and nutrition.

We have mentioned various possible synergies between these activities and the fishing sector, as when one activity enables the development of another. For example, fishers may collect young fish for aquaculture and collect algae and other marine organisms for blue technology; they could also provide useful raw material (fish bones, fish scales, etc.) to blue technology for research. Similarly, technical innovations incorporated by ships exploring deep-sea or cold waters could be applied to the industrial fishing fleet, and the fishing sector may itself benefit from aquaculture’s juvenile production designed to re-populate fishing grounds. There are some activities that serve more than one maritime function: sustainable fishing could benefit from using exploration ships for oceanographic research, and engineering services related to ocean energy and seabed mining activities could prove useful also for industrial fishing fleets. Furthermore, shared input factors (as when fishers provide vessels and skills for coastal tourism) and shared use of infrastructure (including ports) constitute another form of synergy—notwithstanding tensions that may exist among different maritime economic activities. (Such tensions, which are primarily spatial in nature, are discussed in Section 2.6.2).

Several other types of synergies can be identified. Aquaculture may provide useful raw material (e.g., crustacean chitin, fish bones and scales) for research on and production of new molecules by the marine biotechnology sector; conversely, blue technology benefits from advances in fish medicaments developed by aquaculture research. In addition, marine biotechnology enables biological remediation of the pollution and spills caused by oil and gas fields. Engineering approaches developed in the offshore wind sector may have applications to offshore oil extraction, and vice versa.

On other hand, the environmental effects discussed above have been summarised as follows (Table 21 and Table 22): alterations in coastal dynamics, potential increase of marine pollution, eutrophication, alterations of seabed morphology, alterations in habitat, ecosystems and biodiversity, effects on mammals and birds, contribution to mitigate the climate change, and monitoring and understanding of marine environment. The coastal dynamic could be affected from a greater occupation and infrastructure building in coastlines. Most of BG industries could contribute to reduce the water quality due to the use of chemical products for farmed fish or (accidental) emptying of petrol tankers. The organic and inorganic nutrient loss through the effluents, the discharges of untreated waste water directly into the marine environment, and the sewage discharges from the ships lead to serious eutrophication. Most of them could also negatively impacts on sea-bed morphology, species distribution, and marine biodiversity and could therefore lead to unwanted alterations in fishing grounds (especially for SSF). In addition, disturbance through noise and vibration of turbines/engines or the magnetic fields for marine mammals, and collisions of birds with infrastructure above sea-level are other effects to consider in ocean energy and seabed mining cases; some of these effects could be a risk to target species of SSF (even extinction risk). The current intensive use of combustibles of fossil origin in maritime transport –mineral transport included- increases GHG emissions.

Finally, renewable oceanic energy can reduce greenhouse gas emissions. That potential takes on added importance when one considers that the EU policies implemented so far will not be sufficient to achieve the aim of reducing GHG emissions by 80–95% in the long term (EEA 2015). Any reduction in such emissions will have the further benefit of reducing acidification of not only the seas but also the atmosphere. Policy makers—indeed, all concerned citizens—should bear in mind that increased monitoring of and research on the environmental impact of BG industries could make a major contribution to minimizing their negative effects on marine ecosystems and to maximizing the blue economy’s benefits.

2.7 Small-scale fisheries and their needs for blue growth

KEY FINDINGS

- The results of consultations are generally in good agreement with the findings of the previous sections on the need to **include fisheries in BG** and the possible synergies between BG and SSF, as well as the environmental effects of emerging BG activities.
- A small-scale survey of Spanish fishers identified **potentially high synergies** with coastal and maritime tourism and positive interactions in other areas (aquaculture, marine biotechnology). Nonetheless, there is concern that BG may exacerbate environmental imbalances and competition for the use of shared spaces.
- A separate survey was carried out on the basis of interviews. The main concerns were generally in the area of the CFP and the current struggle of SSF (e.g. overexploited stocks and limited allocation of quota species), as well as a somewhat wary view on BG strategy and activities. The views can be summarised as:
  a) **Better implementation of CFP** guiding principles on SSF, preferential access to quotas;
  b) **Weak representation of SSF** at various levels (EU, national, regional) and limited participation in decision-making;
  c) Support for the **bottom-up approach of CLLD** and a somewhat ambiguous view on diversification from fisheries;
  d) The importance of **assessing the socio-economic contributions of SSF** to coastal communities and to determine whether BG activities can make such a contribution at local level, thus supporting these communities (and not exasperating the problem);
  e) **Poor knowledge of SSF** in general which has placed the sector at a disadvantage;
  f) Financial support is needed for specific needs such as the training of young fishers, maintaining specific skills, safety at sea, etc. but emphasis is placed on **creating a level playing field**, where unsustainable industrial fisheries are not subsidised (trawl fisheries often used as an example);
  g) **Fisheries should be at the heart of any BG strategy**, following the example of the FAO, and SSF can play a significant role in achieving sustainable fishing with the use of environmentally friendly gears;
  h) The **potential for positive synergies** with tourism were considered important, but this was not evident with other BG activities;
  i) Independently of the possible consequences of Brexit, which are still highly uncertain, , the proposal for a 'Blue New Deal' developed by the New Economic Foundation (UK) is a good example of the approach that could be used to **strengthen the role of SSF in synergy with BG**, thus benefiting coastal communities.

2.7.1 Interactions between Blue Growth and SSF

Few doubt the ability of blue growth industries to generate economic activity, provide professional employment, produce renewable and clean energy, and supply scarce minerals. In addition, these activities can generate positive effects on SSF (as was discussed in Section Table 22). Yet the individual BG sectors often compete among themselves for the use of ocean space. Blue growth activities also compete with small-scale and other fishing sectors,

and the use of common maritime coastal spaces by various agents and activities may lead to conflict. In Mediterranean countries, for instance, such conflicts have been observed between commercial and recreational fishers (EC 2013); on the French and Scottish coasts, use of the same marine space is sought by the oil and gas sector, wind and tidal power generation, fishing, and aquaculture (EC 2013). Such activities are in competition for the use not only of ocean spaces but also of ports, infrastructure, and coastal land.

Nonetheless, in such cases there may be synergies between BG activities and SSF. For example, the "Natura 2000" is a network of designated natural areas in EU coastal waters, whose goals are to support SSF and the sustainable exploitation of fishing resources. Sustainable coastal tourism depends on maintaining the natural landscape and on protecting nature and wildlife. Striving for such outcomes has a positive effect on conservation of the marine environment and hence on small-scale fishing.

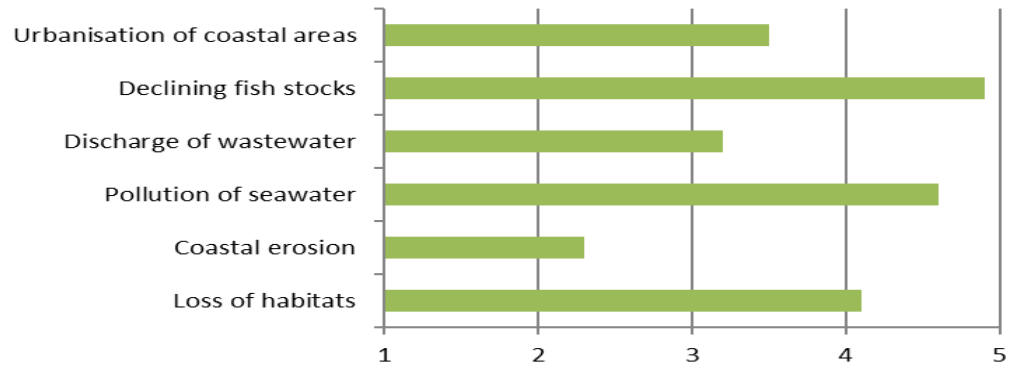
2.7.2 Survey of Spanish SSF

Accommodating the perspective of small-scale fishing—one of the sectors most affected by and thus most concerned with the development of BG industries—increases the likelihood that maritime policies will be effective. In particular, knowing how such fishers view their circumstances should make it easier to reduce conflict while increasing their personal investment in the preservation of marine resources. In this way, policy makers can increase both the perceived legitimacy of regulation and the extent of compliance with rules.

Toward these ends, we conducted meetings with and a small-scale survey of Spanish fishers. Participants responded to survey items using a 5-point Likert scale. The survey included questions about coastal problems, the contribution of BG industries to economic development, the effect of BG activities on the ocean environment, and the interaction between BG and SSF. Fishers were asked to assess how they viewed the importance of these topics as follows: 1 (very unimportant), 2 (unimportant), 3 (neutral), 4 (important), or 5 (very important). The list of coastal problems used for this assessment was based on EEA (2016). For the remaining survey questions, no response scale was employed; for these questions, results reflect subjects' spontaneous responses. In order to develop the pilot questionnaire, different fishers' organisations (guilds) were contacted with the aim of presenting the proposed survey and securing their collaboration. In the end, 243 questionnaires were completed. Given the sample's small size, our reported findings serve mainly for "orientation" purposes and should be interpreted with caution.

Figure 21 plots the surveyed fishers' views on the importance of current coastal problems. Declining fish stocks, marine pollution, loss or destruction of coastal habitats, and urbanization of coastal zones are considered by respondents to be the most important problems. Most of these fishers are neutral about the discharge of wastewater, and coastal erosion is viewed as being relatively unimportant.

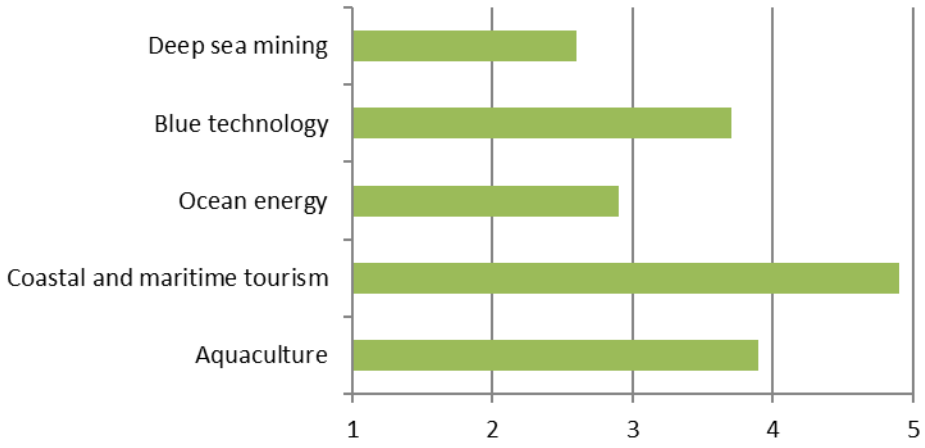
Figure 22: Small-scale fishers' views on the importance of various coastal problems



Source: Authors' compilation

With regard to the contribution of BG sectors to the socioeconomic development of coastal zones (Figure 23), respondents believe that the activities related to coastal and maritime tourism are very important for such development. At the same time, however, they are concerned about water and soil pollution, tourism's pressure on the environment, and how these factors could affect the natural habitats and fishing grounds located in coastal areas. Aquaculture and blue technology are viewed as important activities owing to their potential contribution to direct employment. Even so, most fishers stated that these sectors would have a negative effect on their catches of wild fish. A few respondents were concerned also about the effects of marine biotechnology on human health.

Figure 23: Small-scale fishers' views on the importance of BG activities for the socioeconomic development of coastal zones



Source: Authors' compilation

Most interviewees believed that oceanic energy and deep-sea mining would be unimportant for the socioeconomic development of coastal areas. The reasons they gave were that those activities generate few jobs, their environmental effects could deter tourists from visiting the area, and—in the case of deep-sea mining—the benefits of exploitation would accrue mostly to the industrial enterprises undertaking that activity.

Table 19 summarises respondents' opinions about BG effects on the ocean environment. These small-scale fishers rate the impact of deep-sea mining as very important. The reasons given are that this activity could damage the seabed and alter the entire marine ecosystem; also, pollution from support and transport ships could degrade surface seawater and hence their fishing grounds. Coastal and maritime tourism is viewed as having important effects on the ocean environment, which are attributed to increasing maritime traffic, the building of infrastructure, and potential seawater pollution. However, some of them declare that this impact can be reduced by improving wastewater treatment. Although aquaculture could have significant effects due to its associated chemical waste and the possibility that farmed fish could escape and compete with wild stocks, the surveyed fishers viewed this sector's impact as only somewhat important.[72]

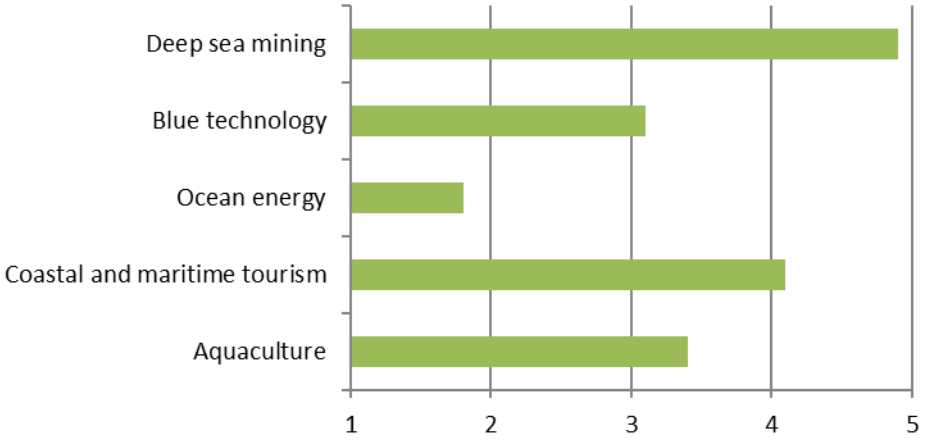
Most interviewees were essentially neutral about the exploitation of marine organisms by blue technology firms (i.e. marine biotechnology), although some mentioned that genetically

[72] Environmental effects vary greatly depending on aquaculture production methods. For example, various types of shellfish aquaculture are considered environmentally friendly. Chemical use is normally associated with intensive fish farming, but the view expressed does not take into consideration significant efforts of limiting the use of antibiotics and other chemicals in intensive fish farming.

modified fish could reduce marine biodiversity and possibly compromise human health. Few respondents considered activities of the oceanic energy sector to be important. However, some acknowledged that sea-based infrastructures could damage marine habitats and thus have a negative effect on their targeted fish stocks.

Finally, we asked fishers about their views on the possible effects, in coastal areas, of interactions between BG industries and SSF. Survey respondents were asked: "Do you think that there could be interaction between the BG sectors and small-scale fishing?" Interviewees who responded "Yes" were then asked to specify such interaction and classify it as positive or negative. The effects identified by fishers—who were not prompted with possible responses—are reported in Table 23. **Error! Reference source not found.**

Figure 24: Small-scale fishers' views regarding the importance of BG effects on the ocean environment



Source: Authors' compilation

Table 23: Fishers' views on potential effects of interaction between BG industries and SSF

	Aqua-culture	Coastal and maritime tourism	Marine bio-technology	Oceanic energy	Deep-sea mining
Environmental effect	–	–	–	0	–
Land space use	0	–	0	–	0
Maritime space use	–	–/+	0	–	–
Complementary activity	+	+	+	0	0
Building of infrastructure	+	+	+	+	+

Note: –, negative interaction; +, positive interaction; –/+, interaction could be negative and/or positive; 0, no interaction.

Respondents generally believe that there is some interaction between BG activities and small-scale fishing. The interaction effects identified include environmental impact, use of shared space, complementary activities, and infrastructure building. Opinions about the use of space differed depending on whether it was land facilities or maritime areas being shared.

The interaction with aquaculture was mainly viewed as a negative one because of possible effects on wild stocks and because of competition for maritime space with spawning and nursery zones. In fact, some regional plans to increase the number of fish farms have been stalled by opposition from coastal and artisanal fishing segments. Yet some fishers note that shellfish aquaculture could share marketing and distribution costs with SSF and thus achieve economies of scale in both sectors—and some pioneering, seasonal efforts along those lines were mentioned. As for coastal and maritime tourism, fishers report a generally negative interaction driven by the negative environmental effects of maritime traffic, marina building, and competition for the use of land- and sea-based infrastructure. In contrast, most fishers identify a positive interaction with seafaring tourism; such activities are viewed as being complementary to fishing—although some of them declare that the current experiences in this topic are showing problems basically regarding compatibility of fishing hours and tourism time.

Respondents identified no significant interaction between marine biotechnology and SSF, though some fishers indicate a possible complementary fishing activity: the collection of seaweeds for pharmaceutical products and unwanted bycatches and discarding—and not destined for charity— could be used for biotechnological research. Interviewees have a negative view of oceanic energy; it increases competition for space use, especially when wind- and wave-power installations are close to the coast (within their fishing zones) and when maritime traffic (to support those installations) subsequently increases. Interviewees look askance on deep-sea mining for similar reasons, and are concerned also about its potential for having strongly negative ecological effects on their fishing grounds. However, some respondents view the creation of facilities related to mining activities in a positive light because such infrastructure could boost the area's building sector in the short and medium term. Most of them highlight the improvement of port infrastructures and building of new infrastructures—linked with BG activities— as a positive interaction.

In summary: small-scale fishers believe that there could be positive interactions between SSF and some BG industries (aquaculture, sea-based tourism, and blue technology). Nonetheless, they are also aware that BG may exacerbate environmental imbalances and competition for the use of shared spaces.

2.7.3 SSF stakeholder views

This section presents the views of the sector, considering the current situation in the EU in light of the recent reform of the CFP and possible opportunities and/or threats that are perceived in relation to the BG strategy. This part of the study was based primarily on consultation with stakeholders, which was carried out through semi-structured interviews. Stakeholders were identified through LIFE[73], who provided the contact details of members. This survey presents a more general EU-wide perspective and is complementary to the survey on Spanish SSF in the preceding section. The following presents a summary of feedback, which has been structured around the survey questions.

1. Do you perceive an improvement for SSF fisheries with the new CFP?

Overall, stakeholders did not perceive any improvements or the improvements are not sufficient, and limited to theoretical considerations or principles.

There are positive developments with the new CFP. Article 17 of the CFP states that MS shall use transparent and objective criteria including those of an environmental, social and

[73] Low-impact Fishers of Europe.

economic nature in the allocation of fishing opportunities, which could potentially lead to important changes particularly when considering social-economic-cultural aspects of SSF. In reality, although the new CFP is an improvement, there is still no or limited change at MS level ("we won the battle but we are losing the war").

The fact that a differentiated regime for the management of large-scale and SSF was not adopted was a lost opportunity. It would have been desirable managing SSF through a stronger focus on socio-economic objectives, placing emphasis on contributions to the local economy (both direct and in-direct), local good quality food supplies, maintaining heritage and traditions, and preserving a way of life ("these independent, stubborn fishers should be allowed to carry on with their lives in this society").

2. How would you distinguish SSF from large-scale fisheries? Are there specific types of SSF that should be considered; e.g. ownership, company size, vertical integration?

This is a difficult question as it varies greatly from country to country in the EU, but basing this on the current definition (EMFF) is too restrictive. This is vessels < 12m using non-towed gears.

Ideally, a combination of factors should be used and these may be unique for specific countries/regions ("you know it when you see it"). Other factors to consider are ownership (owner onboard), working conditions, existence of crew share arrangements, short duration of fishing trips, short distance to fishing grounds, and specific gears. There appears to be a preference for traditional arrangements without vertical integration. There are strong negative views on "slipper skippers" and to a lesser extent, companies that are driven purely for profit ("make a living and not a killing").

The lower impact of SFF on the environment was often stated, referring in most cases to trawlers.

3. Are you getting better conditions from your country's fisheries administration in the allocation of fishing opportunities/access? More participation in decision-making?

In general, there is limited improvement regarding allocation of fishing opportunities / access. However, some interviewees reported an increased participation in decision-making.

One of the issues that surfaced during interviews is the poor representation of SSF in general. There was a general tendency for there to be one organisation in each country, representing all fishing interests, both industrial and small-scale. This is now seen as a tragedy as SSF were duped into believing that these organisations would look after their interests ("the forgotten fleet"). Time has shown that this was not the case and that this contributed to the current situation where SSF are struggling. Various SSF associations are being created as out breakers from these larger organisations. LIFE is an also example of this, as it is a very young organisation (created in 2012) representing SSF associations across Europe.

In the relation to industrial fisheries, this is seen as a war against economic interests that have been successful in securing access and financial support through effective and professional lobbying. Large-scale fishing interests generally have a well-established representation including full-time staff, consultants and lobbyists who work efficiently towards their goals.

SSF associations generally lack the capacity in terms of human and financial capacity to be able to effectively represent their interests. Most members (and chairmen/directors) are out fishing themselves and there are limited finances to hire staff to take care of representation. But at the same time, there appears to be a reluctance to expand too much and adopt the same approach as LSF. Notwithstanding, the situation is such that SSF fishers are forced to face the reality of the situation and stand up for themselves.

SSF associations are beginning to take their places in RACs, but there is still time to go before their efforts will make an impact difference. The available 'chairs' are limited, especially in working groups. There is also a tendency for discussions to involve industrial fisheries issues (e.g. trawl fisheries) and it takes time for other issues to be considered in the agenda.

4. What is your view on the establishment of producer organisations for SSF? What are key functions that you consider essential?

Interviewed showed different views about that and some of them had no view. Stakeholders referred that the existing organizations (for LSF and industrial fisheries) do not understand the needs of SSF. There is some interest in establishing specific SSF producer organisations (e.g. France, UK) but it is not clear what are the challenges involved.

On the other hand, there appear to be other initiatives that may be more appropriate and effective for SSF. Examples are internet/mobile phone platforms for the direct sale of fish to local consumers (e.g. Sweden, UK), thus expanding the consumer base and better sales prices for locally caught fresh fish. The issue of creating labels and certification schemes is another approach that is seen as desirable.

5. Do you or have you participated in projects (EMFF, FARNET, national projects Community-Led Local Development (CLLD)? Objectives and results?

The majority of interviewees did not or do not participate in projects – highlighting that they do not have the necessary background and knowledge to do that. Only some stakeholders referred to occasional participations in local/national projects and FLAGs.

There is however a generally positive view of FLAGs and the support that is being given in areas such as added value to fishery products, new business opportunities, creating/maintaining jobs. Opportunities for diversification are also acknowledged, but this is sometimes seen as a way to get fishermen out of fishing. In the particular case of the Mediterranean, where overexploitation of fish resources is more serious, the possibility of diversifying into other economic activity is seen more positively.

6. Do you see SSF as having a measurable impact in local communities: e.g. supporting coastal communities, diversifying coastal economies, creating jobs, improving quality of life, etc.?

The main impact seems to be in terms of job creation or maintenance and most importantly, the continuation of various related economic activities in small coastal communities where fisheries is often at the heart of the economy. Examples from Denmark show how declining SSF has led to the closure of many small fishing harbours, leading to general stagnation in local communities ("ghost towns"). SSF also have a positive impact in terms of maintaining and/or increasing tourism in these local communities, being in many cases part of the attraction for tourism and supplying fish to tourists and local restaurants. This implies that

there are many indirect impacts, which have not really been assessed properly in economic terms. In the case of Italy, SSF is also seen as having an important impact in terms of social inclusion among young people. In summary, the quality of life in these small local communities is very much linked to fisheries, which supports economic activity and the livelihood of the fishers and their community.

7. What are your needs to overcome major barriers/difficulties to improve economic performance and/or sustainability? E.g. technology, knowledge, skills, support for innovation -please explain.

The needs may vary from country to country. But there appears to be general agreement that a crucial issue is to improve access to fishing opportunities, which implies a review of the distribution of quotas to achieve better balance between SSF and LSF. Different criteria should be used in the allocation of quotas, taking into account the specificities of SSF and local development.

This refers back to the proper implementation of Article 17 of the CFP, but there is a major caveat in that one of the criteria that is commonly used in allocation is the catch history of the fishers. This is considered unfair because data reporting requirements for SSF have generally been lax in the past, which has resulted in poor information about catches and effort, placing SSF at a great disadvantage when the time comes to restricting access and allocating quota. SSF generally have access to small quotas of TAC-controlled species and many subsist on non-quota species, which place them at a disadvantage.

It is however important to point out that the situation in the Mediterranean is different, as fisheries are managed by effort and technical measures (not TACs). Here there is more concern about overexploitation and the need for reducing fishing pressure to make fisheries more sustainable in general.

Being aware of the data limitations in SSF, there is a need for greater efforts in data collection to remedy this situation of disadvantage and fishers are available to participate in this, for example by carrying out data collection tasks along with fishing. Stakeholders are also willing to participate in research efforts and monitoring tasks.

8. What types of support are needed? E.g. financial support, policy support, lobbying support, marketing support, research and innovation support – please explain

Most stakeholders pointed to the need for marketing support to promote their products. This can involve labels/certification, traceability, marketing channels, logistics, etc. This seems to be particularly true in countries where competition with industrial fisheries is relevant (e.g. France, Spain, The Netherlands), but this is called for in general. Financial support would be welcomed in some countries (e.g. Italy), but it is not needed in others. Also, many stakeholders indicated that there is no need in terms of support for innovation, which is interpreted as a desire to continue with fishing at which they are experts (not diversification).

It is noteworthy that the need for financial support is not rated high and it usually has to do with very specific needs such as training of young fishers, maintaining specific skills (e.g. net mending), safety at sea, etc. On the other hand, there is a call for the elimination of subsidies to industrial fisheries, as this creates unfair competition. Most of the available funding from fisheries funds benefit industrial fisheries and in many cases this is seen as support for unsustainable fisheries, trawl fisheries in particular.

Policy support is considered necessary according to the majority of interviews. Considering that there is limited or no change in the way of doing business at MS level, it is important that the EC and the EP provide support and apply pressure on MS to follow up on the issue of SSF and re-think their strategies and actions. One concrete step would be for MS to revise their Operational Programmes (OP) to take better account of SSF, instead of continuing with business as usual. SSF representation should be supported and strengthened and there is a specific call for continuing support to the LIFE platform from the EP.

9. What are your views on 'Blue Growth Strategy' of the EC and the opportunities and/or threats that this entails for SSF? Do you expect positive or negative spill-over effects from the growth of other maritime activities?

The general impression is that interviewees do not know / do not have a clear idea about the EU 'Blue Growth Strategy'.

Those that were better acquainted with this indicated that fisheries should be at the heart of any 'Blue Strategy', for example as in the initiative by the FAO for Blue Growth. Traditional activities such as fisheries should be taken into account and SSF can play a significant role in achieving sustainable fishing with the use of environmentally friendly gears. The view was that it remains to be seen how the EU will implement its BG strategy and how it will pass from the 'propaganda' stage ("buzz words") to something concrete. Stakeholders appear to be wary of what may come about as the result of BG and appear to see this as a potential threat and an encroachment on SSF.

Reference was made to the 'Blue New Deal' developed by the New Economic Foundation (UK) as a good example of the approach that should be used for SSF and coastal communities[74]. This was developed in the context of Brexit and prospects of taking back control of UK fishery resources. It places fisheries at the centre of the strategy but including other BG activities.

10. Do you see possible synergies between SSF and other 'Blue Growth' activities such as aquaculture, blue energy, tourism, blue biotechnology? Or other activities?

Stakeholders referred to potential / existing synergies with cultural activities and, mainly, with tourism. Pesca-tourism and recreational fisheries seem to work quite well and SSF would like to increase these activities. However, in some countries (i.e. France) the existing national laws related to commercial activities limit this possibility. Regarding aquaculture, synergies will be explored, even if there is an important 'cultural' gap between SSF and aquaculture. There are concerns about the effects of pollution, antibiotics, and spread of disease aquaculture, as these facilities normally share the same space as SSF.

There is also a need to change the perception of fishermen from "pirates of the sea" to "guardians of the sea". SSF can play an important role in data collection, compliance, improving knowledge, mediation and conflict-resolution concerning fisheries. SSF has to become more proactive in securing sustainable fisheries and get involved in other related areas such as marine protected areas. The latter opens up for a potential new role in relation to environmental protection and ecotourism.

[74] http://www.bluenewdeal.org/about/

The issue of the economic contributions of BG activities to local communities was also raised. If these do make a contribution, then they are welcome and considered beneficial. But if these activities involve multinational companies and pure profit/private interests that provide limited benefits to local communities, then this is seen as negative.

11. What would you like to see for the future of SSF and what is needed to achieve this? Is this through specific support, creating higher value added and markets, or through a different type of management? Where do you see the most potential for growth in terms of jobs and/or value?

Feedback varies from country to country. In Spain the main need is to promote the quality of SSF products. In the Netherlands, a better national management (e.g. for hand-line management and management of stocks) would be essential as well as a better regulation. The Italian and French SSF call for better regulations adapted to the local context.

There is also concern about the introduction of the landing obligation, which is expected to result in serious difficulties for SSF. There are various issues such as limited space and capacity to handle 'choke species', landing and storage facilities, and the view that the landing obligation should not have been introduced in SSF without proper knowledge of its importance.

2.7.4 SSF and Brexit

There was widespread support of Brexit in the UK fishing industry, which was considered an opportunity to take back control of UK fishery resources. Although the contribution of fisheries to the UK economy is limited, as in many other MS, the fisheries industry and the coastal communities that depend on fisheries were generally supporters of Brexit. In the words of the 'Fishing For Leave' campaign: "*Brexit creates a golden opportunity to regain 70% of the UK's fisheries resources and rejuvenate a multi-billion pound industry for the nation – becoming as sustainable and successful as Norway, Iceland and Faroe*.[75]"

The consequences for UK fisheries as a result of Brexit has been explored by the House of Lords, including the hearing of expert opinions on the matter[76]. It is stated that withdrawing from the EU will mean withdrawing from the CFP, but fish distribution and migration do not respect political borders and they may spend different stages of their life cycle in different EEZs. This shows a realisation that negotiating the sharing of fish stocks with neighbours will be complicated. Furthermore, the CFP provided a common framework for the management of fisheries in Devolved Nations, which raises the potential for conflict when this falls away[77].

It should be noted that the Prime Minister May has announced that the Government will introduce a Great Repeal Bill that will carry over existing EU law into domestic law as a temporary measure to avoid a 'regulatory deficit'. This gives time for the development of relevant domestic legislation, but it implies that the CFP and related legislation would be maintained. There is however general criticism of this from the fisheries sector (NUFTA, FFL).

In relation to SSF, it is clear that the UK Association representing the 'Under Ten Fishermen' support Brexit, seeing this as an opportunity to close UK waters to EU LSF vessels with access to the 6-12 mile zone around the UK coast, which has contributed significantly to the demise

[75] http://ffl.org.uk/objectives/
[76] Brexit: fisheries, EU Committee, House of Lords, UK. 2016.
[77] Ibid.

of many 'inshore' stocks as well as degradation of the marine environment more generally[78]. Furthermore, "…*a stepwise repatriation of UK quota is entirely feasible and would provide a massive windfall that could form the foundation for the rejuvenation of coastal communities devastated by the lack of quota, and underpin the social and economic regeneration of the inshore fleet*"[79]. There is recognition that negotiations with the EU are complex and may take a considerable amount of time, much more than a two-year period. NUFTA is against the Great Repeal Bill and against the adoption of the landing obligation adopted in the CFP, due to the problems associated with 'choke species' and the economic problems that this entails. Although aware of the difficulties that lie ahead for the UK LSF, NUFTA considers that the prospects for SSF are good. There may be some sectors that will suffer (e.g. SSF for shellfish that rely on export), but overall SSF are expected to benefit from Brexit[80].

An alternative view was presented by the IEEP, which published a report on the potential policy and environmental consequences for the UK of a departure from the EU, concluding that the management of UK fisheries under the CFP and related legislation is relatively beneficial compared to other alternatives[81]. It should be noted that the IEEP recommends carrying over EU law related to fisheries into domestic UK law, regardless of the Brexit scenario that should play out.

From the perspective of the EU, there are industrial fishing interests at stake, representing a gross annual value of EUR 1.739 billion, that are directly affected by Brexit[82] (NL Brexit Coalition 2017). This concerns fleets from Belgium, Denmark, France, Germany, Ireland, Netherlands, Poland, Spain and Sweden. Landings by EU fleets (non-UK) of fish taken in the UK EEZ were 687 thousand tonnes in 2015, representing about 37 % of the total volume and 25 % of the total value from these fleets[83]. The conclusion is that the EU is more dependent on access in the UK zone than vice versa (about 20%), particularly in the North Sea, although there are large differences between MS. More than 100 fish stocks are shared and managed through the sharing of TACs[84].

The potential losses in the EU seafood sector as a result of a 'hard' Brexit were estimated as follows[85]:

- 50% loss of net profit for the entire fleet involved
- 15% reduction of crew wages
- A reduction of the fleet by 500-600 vessels (15%)
- Loss of 2,500-3,000 full time jobs in the fleet
- Loss of 5,100-6,100 full time jobs in the entire seafood value chain

On the other hand, the UK has a high dependence on the EU market for the export of fishery products such as salmon, Norway lobster, scallops and crabs with an estimated value of EUR 1.34 billion[86]. Therefore, the proposed EU negotiating position is to include reciprocal access

78 http://www.nutfa.org/#/brexit/4593280478
79 Ibid.
80 Ibid.
81 IEEP (2016), The potential policy and environmental consequences for the UK of a departure from the European Union, Institute for European Environmental Policy.
82 NL Brexit Coalition 2017. Dutch Parliament, Round Table on Brexit, 1 February 2017. Redersvereniging voor de Zeevisserij, VisNed, Nederlandse Vissersbond.
83 Ibid.
84 Ibid.
85 Ibid.
86 Ibid.

to fishing grounds and maintain quota sharing arrangements, while providing EU market access to the UK[87].

In summary, there is great uncertainty about the way Brexit negotiations will go and how this will affect UK and EU fisheries. Although a 'hard Brexit' was announced by Prime Minister May, it now appears that the UK may adopt or maintain the CFP and related fisheries regulations through the Great Repeal Bill. This appears however to be a temporary solution, which is probably linked to the recognition that many, hard negotiations lie ahead both within the UK and outside. The UK fishing industry does not appear to be recognising the complexity of the matter, concerning the need for fisheries agreements with neighbouring countries. Although SSF may benefit from this whole process, this is highly uncertain. If LSF are confronted with a catastrophic situation or face serious difficulties in the EU and UK, it is very likely that SSF will be affected as well. The lack of agreement is likely to result in 'fish wars', resulting in unsustainable fishing for many fish stocks and jeopardising progress in relation to the CFP goal of MSY. This would certainly also affect SSF.

In the context of Brexit, a 'Blue New Deal' was proposed by the New Economic Foundation (UK)[88]. It places traditional activities such as fisheries at the centre of the strategy but in conjunction with BG activities with the overall aim of revitalising coastal communities. Brexit is being seen as a wakeup call from '*communities left behind by our economy and ignored by our politics are demanding to be heard*' and the urgent need for '*a new economy that benefits areas of the country whose potential is not being fulfilled*' (NEF 2016). Four objectives are defined:

Local people need to be in control, leading a new approach to regeneration;

1. Coastal communities need to work together to explore how different areas of the coastal economy – including tourism, energy, fisheries, and aquaculture – can help inspire and support each other, to turn again to the sea for jobs and economic prosperity;
2. More needs to be done to support coastal areas to plan for a changing coast. Proactive and innovative approaches are needed to help make the UK coast more resilient to climate change;
3. Government must build the capabilities of places, people, and communities; support projects, small or large; and ensure there is the digital and transport infrastructure that communities need to thrive.

This goes on to define 20 priorities involving CLLD and greater control at local level, developing relevant plans, investment, tourism, energy, fisheries, and aquaculture.

Independently of Brexit, the Blue New Deal appears to be a good example of the approach that could be used for integrating fisheries and BG activities for the benefit of coastal communities. This follows the calls from the sector to place traditional activities such as fishing at the centre of regional/local development strategies, but in conjunction with BG activities with the overall aim of revitalising coastal communities.

87 Ibid.
88 http://www.bluenewdeal.org/about/

3. CONCLUSIONS

3.1 Maritime and Coastal Zone Interactions

This study presents information on numerous traditional and emerging activities that take place in marine and coastal areas, albeit not an entirely complete picture, as we focus on the five focus areas of the BG strategy and SSF. All of these activities use, to a greater or lesser extent, a public good—maritime coastal space—that for decades has witnessed high levels of exploitation (EEA 2015).

Shipping and fishing have long been the traditional domains of the ocean economy but since the 1960s, new activities emerged which reshaped and diversified maritime industries. The turning point at the time was the emergence of offshore oil and gas industries. Today, ‘*a combination of population growth, rising incomes, dwindling natural resources, responses to climate change and pioneering technologies*’ (OECD 2016) reshape once again the ocean space in many regions of the world. A transition in Europe from offshore oil and gas to much broader ocean industry concepts has been driven by lower oil prices, high cost levels and falling productivity.

In addition, more than 40% of the European population lives in coastal areas (Eurostat 2016). Note that settlement in a coastal area requires infrastructure that also appropriates and transforms the natural environment. The associated generation of solid waste, discharges, and emissions, mainly from land-based activities, contributes to the degradation of coastal zones—which then suffer also from the disappearance of natural habitats, loss of biodiversity, eutrophication and the consequent deoxygenation of water, erosion, and increases in flooding (EEA 2015). These negative outcomes result in compromised ecological functions within marine ecosystems. It follows that the effects of rapidly expanding BG industries tied to the oceanic environment must be accounted for if development is to proceed in an orderly and sustainable fashion, as advocated by the guidelines laid down by such international bodies as the United Nations and OECD (UN 2012; OECD 2013, 2015, 2016).

There is no doubt that BG industries generate economic activity, provide professional employment, produce renewable and clean energy, and supply scarce minerals. BG activities are responsible for ten times the GVA and 15 times the employment that fishing activities generate, considering both SSF and LSF. In addition, these BG activities could generate positive effects on SSF. This was most evident in relation to tourism, involving various types of activities, but also in the sharing of infrastructure and suppliers with other BG industries (Table 3, Table 4, Table 21, Table 22). Yet the individual BG sectors often compete among themselves for the use of ocean space. BG activities compete also with small-scale and other fishing sectors, and the use of common maritime coastal spaces by various agents and activities may lead to conflict. In Mediterranean countries, for instance, competition for resources has resulted in conflicts between commercial and recreational fishers (EC 2013); on the French and Scottish coasts, use of the same marine space is sought by the oil and gas sector, wind and tidal power generation, fishing, and aquaculture (EC 2013). Such activities are in competition for the use not only of ocean spaces but also of ports, infrastructure, and coastal land.

Nonetheless, there are possible synergies between BG activities and SSF of which several examples have been given. For example, the “Natura 2000” sites are designated natural areas in EU coastal waters whose goals are to support SSF and the sustainable exploitation of fishing resources. Sustainable coastal tourism depends on maintaining the natural

landscape and on protecting nature and wildlife. Striving for such outcomes has a positive effect on conservation of the marine environment and hence on SSF.

There are also potential negative environmental impacts of BG activities, which may compromise the resources that SSF depend on. These negative effects vary depending on the activity in question and these may be limited in time, for example during the construction of various types of infrastructure. The importance of mitigation measures and careful planning is crucial, together with constant monitoring efforts which serve to improve our knowledge on the impacts of human activities.

The main elements identified were the positive socioeconomic effects for coastal zones such as rising production, employment and food security. There are potential synergies such as for example, SSF may collect algae and other marine organisms and provide fish bones and scales for the biotechnology sector, aquaculture could also provide raw material to biotechnology activity. Biotechnology enables biological remediation of the pollution and spills caused by oil and gas fields, and engineering approaches developed in the offshore wind sector may be applied to offshore oil extraction. There are however potential conflicts from the use of shared coastal and maritime space, and environmental impacts such as alterations in coastal dynamics, increasing marine pollution, eutrophication, changes in seabed and alterations to habitats and biodiversity. The increasing multiple pressures affect coastal ecosystems and, consequently, SSF activity.

It is important to point out that the surveys of SSF stakeholders showed limited knowledge of the BG strategy. This can be considered a communication failure, considering that BG activities use the same space and its successful implementation will need cross-sector support. There was a clear call for a 'new' BG strategy that takes account of all activities, traditional and emerging. Devising measures to help achieve any sectoral policy objective depends on political, administrative, geographic, economic, and social factors. There are however clear advantages to policy making that incorporates the opinions and concerns of the affected fishers themselves. Among others, these advantages include an enhanced legitimacy of rule-promulgating institutions and improved fisheries and ocean governance overall.

3.2 The Need for Integrated Planning

Several factors contribute to environmental imbalances such as the lack of integrated knowledge about coastal areas, the undue influence of certain special interests, and the lack of coordination between governments and among levels of regulation. These circumstances have motivated the pursuit of Maritime Spatial Planning (MSP) and Integrated Coastal Zone Management (ICZM), which seek to improve coordination, effectiveness and identify and promote remedies for environmental and other coastal-specific problems with special emphasis on the organisation of the maritime space. These tools aim to ameliorate the deterioration of environmental, socioeconomic, and cultural resources. The community nature of the interest in these problems follows in large part from their shared aspect; because a coastline covers many EU MS, its problems have an international dimension and so cannot be solved by MS in isolation. Attention is driven also by the influence of EU policies—namely, regional, maritime, transport, fisheries, environment, agriculture, energy, and industry policies—on the sustainable development of coastal areas. Finally, there is a need for the exchange of knowledge and experience because the field is still nascent yet there is substantial demand for government policies.

MSP and ICZM must account for the effects of BG industries on the ocean environment. Regulation is also needed to address effects resulting from the interaction of BG activities with SSF. For these purposes, a flexible approach is required: one that can adjust management to reflect each area's particular problems even as it maintains an integrated approach to managing the coastal area. These tools can be seen as a management system based on applying principles of sustainability to the economic, social, and environmental dimensions of coastal areas. The goal is to achieve sustainable development in coastal areas—especially those in which SSF are of vital economic importance to the community. The EC's efforts in coordination with MS is commendable in this area, e.g. the elaboration of sea basin strategies and maritime spatial plans[89].

Another factor conducive to maritime planning and management success is creating a campaign to increase public awareness of and sensitivity to environmental concerns, but also for small-scale fishers—and fishermen in general. Such a strategy increases the likelihood that proposed plans are greeted favourably and socially accepted. Finally, any coastal zone management initiative could well flounder unless the SSF sector benefits in some way. Given the presence of BG industries, integrated management can succeed only if based on an interdisciplinary approach comprising all components and dynamics of the coastal zone and featuring cooperation among all parties to local and regional development; this process must also ensure that SSF — in particular, its economic contribution to coastal communities which are highly dependent on artisanal fishing—remains protected.

3.3 The Fisheries Management Perspective

Current legislation defines the SSF as 'fishing carried out by fishing vessels of an overall length of less than 12 metres and not using towed gear' (EMFF regulation). This definition for SSF is too restrictive and needs to include other characteristics, which could include size and type of enterprise, spatial–temporal dimension of operations, social organisation, economic behavior, dependence on local ecosystems, environmental impacts, and contributions to the local economy. SSF could and should be defined for each MS.

Although the current definition is a straightforward definition which captures a large proportion of the vessels involved, it does not appear to be useful in a policy context. SSF can span traditional fishers (small boats with owners onboard) to highly efficient smaller vessels (UK 'super under tens'). The rationale behind this fishing activity may range from subsistence or part-time occupation to the clear goal of making a profit, and participating in vertical and/or horizontal integration. These represent different 'life modes', as described in social science, which are characterised by different goals and objectives (Hojrup and Schriewer 2012). The situation varies between MS, including the relative importance of SSF and the approach that is used for rights-based fisheries management (EC 2009b). Thus, there is an urgent need to develop policy to address the specificities of SSF. For example, is the goal to maintain or preserve traditional fisheries in coastal communities or is it to work towards a modern and efficient SSF? Should both types be supported and how should this take place? This implies important policy decisions that have many and profound implications, but there appears to be an urgent need for action in this area, given the demise of SSF and coastal fisheries in Europe.

The focus of this study is on BG and the opportunities that this presents to SSF, but the fundamental problem of overexploitation or unsustainable fisheries has to be solved. The situation has improved in the Northeast Atlantic, North Sea and Baltic Sea, but

[89] https://ec.europa.eu/maritimeaffairs/policy/maritime_spatial_planning_en

overexploitation of fish stocks is still of serious concern in the Mediterranean and Black Sea. Achieving the CFP goal of MSY is expected to result in significant benefits in the Northeast Atlantic alone; e.g. an almost doubling of landed value and an increase of profitability by a factor 50. If the necessary restructuring is carried out (reduction of fishing capacity), GVA is expected to increase from EUR 1.8 million to EUR 5.76 billion in the Northeast Atlantic, thus a strong argument for including fisheries in the BG strategy due to its economic importance and potential for growth (Section 2.2.2). It should be noted that fisheries sector is comparable in importance with four of the five other BG activities (Table 13). For example, GVA in aquaculture was about EUR 1.6 billion in 2013 (Table 13), while GVA in fisheries was EUR 3.7 billion in 2014 (EC 2017). BG can be seen as an alternative to fishing, creating jobs for fishermen that are forced out of or decide to stop fishing. This may be needed to bring down fishing pressure, but it is not necessarily true that BG activities can take over the role of SSF in coastal communities. An assessment of the BG contributions to the economy in coastal communities is needed to determine this.

Achieving economic efficiency through the introduction of transferrable fishing concessions (TFC) has been actively promoted in recent years, which is also seen as a way of solving the chronic problem of overcapacity in the fleet. Some MS have adopted this approach, while others resist. In cases where TFCs are introduced, there are a number of issues that are of particular concern to SSF such as the concentration of rights in the hands of a few and the need to 'ringfence' the rights of SSF and their quota allocations. SSF will normally not be able to compete with market forces and economic interests to safeguard their rights unless there is some form of protection. Management according to different priorities and using criteria that take into account socio-cultural aspects and the local economic contribution is considered desirable, but the current definition of SSF has to be refined to make this feasible.

Data reporting requirements have generally been less stringent for SSF, which was seen as beneficial to avoid a disproportionate burden on small fishers. This has resulted in a lack of reliable or poor data, which has often placed SSF at a disadvantage in the allocation of fishing opportunities. This is because the documented catch history is normally the basis for the sharing of quota. Furthermore, SSF representation has been generally weak and their interests were not taken sufficiently into account. These are two issues that appear to be of crucial importance; the need for stronger representation of SSF interests at various levels (i.e. EU, national, regional and local) and the need for better data to develop policies and to improve management of SSF.

Available estimates on the economic contribution of SSF are generally very low and although the shortcomings in terms of data are evident, the results are used to make conclusions about inefficiency and poor economic contributions without considering the whole picture (MacFadyen *et al.* 2011). In contrast, a recent study estimated the economic impact of the SSF activity in Asturias, showing that it exerted higher multiplier effects in 2010 on regional employment and income than the whole economy and the rest of the fisheries sector (the industrial fleet) (García de la Fuente *et al.* 2016), as well as finding that the potential of the artisanal fleet to generate gross value added is particularly important. Methodologies for economic analysis should be strengthened and developed to adequately cover the impacts of SSF, including the ecosystem services that are provided or supported.

It is noteworthy that the need for financial support was not rated high by stakeholders and this usually referred to specific needs such as training of young fishers, maintaining specific skills (e.g. net mending), safety at sea, etc. The key issue is to implement the principle of preferential access for SSF as stated in the CFP, or in other words access to quotas and fishing opportunities. On the other hand, there is a call for the elimination of subsidies to

industrial fisheries, as this is seen as unfair competition and the support for unsustainable fisheries, trawl fisheries in particular. Providing preferential access to SSF is or will be contested by LSF, as this will likely entail losing current acquired rights and this will be presented as not being a level playing field. There are however historical wrongs that must be taken into account and the environmental perspective carries much more weight presently. It is difficult to see how some types of industrial fishing (and possibly some types of SSF) may be allowed to carry on when considering current environmental legislation in the EU.

3.4 Challenges and Opportunities

Sectors that ply their trade on ocean and inland waters benefit humans in many ways: food and nutrition security is enhanced by fisheries and aquaculture, which—along with ecotourism, shipping, energy, and mining—are sources of economic and social development as well. Furthermore, the synergies between SSF and tourism can take on various forms such as ecotourism and pesca-tourism, but there are other potential synergies between SSF and biotechnology and marine protected areas (Sections 2.1 and 2.6). Ecosystem services (i.e., the engineering tasks associated with these activities) have likewise proved valuable: a short list of such services includes carbon sequestration, water filtration, atmospheric and temperature regulation, and protection from erosion and extreme weather events; such marine ecosystem services are extremely valuable economically. However, the asset base of oceans and inland waters has rapidly become diminished by overfishing, pollution (mainly from land-based sources), deforestation, climate change, expanding “dead zones”, increased number and range of invasive species, and ocean acidification. The world faces multiple challenges that include climate change, degradation of (both marine and terrestrial) ecosystems and habitats, and slow economic growth. Resolving these problems requires an integrated response as well as greater urgency about the world economy’s transition to a more sustainable, inclusive, and resource-efficient path.

It is also well known that there is substantial risk of climate change having a severely detrimental effect on fishing and fish farming communities worldwide. Increasing numbers of people are at risk and none more so than those residing in coastal and low-lying areas and atolls. In particular, global warming will lead to the loss of livelihoods and to the migration of entire populations displaced by floods or storms—with some of that migration induced by the need to follow changes in fish distributions. These prospects become even more alarming when one considers that many fishing and coastal communities already live in vulnerable conditions and that their livelihoods are often undermined by overexploitation of marine resources and by compromised ecosystems. That vulnerability is magnified when a community has little or no capacity to adapt.

4. RECOMMENDATIONS

Each economic sector that uses oceans and inland waters (and its carbon footprint) directly affects—to at least some degree—the aquatic ecosystem and the fauna and flora it sustains. Hence the aims of an overarching BG strategy should be:

(i) to assess ways and means of **minimising the cumulative impact** of those sectors on living aquatic resources, biodiversity, small-scale fishers, and ecosystem services;
(ii) and to **develop and foster synergies** between BG and SSF sectors (and other activity branches).

This would also be in line with EU international commitments and in accordance with sustainable development goals, more specifically Goal 14: for all marine resources to be conserved and for all their development to be sustainable.

The FAO (2013) promotes BG industries as a viable means of ensuring food and nutrition security, alleviating poverty, and sustainably managing aquatic resources. In some developing coastal countries, these strategies have been adopted to promote food security, economic growth, and decent livelihoods. Although the initial implementations have included only fisheries, aquaculture, and tourism, their goal is to integrate ecosystem services and additional sectors depending on the context. Other organisations (e.g., OECD) have developed programmes that expand these activities to such marine and maritime sectors as shipping, tourism, and/or mining (OECD 2016).

A key message coming from this study is that **the EU should integrate all activities, including traditional activities such as fishing in the BG strategy**. This requires long-term strategies, one of which is the BG strategy that aims to support sustainable growth in all marine and maritime sectors. However, in the implementation of this strategy it is of utmost importance to ensure that the pressure from new ocean based industries is not perilous to the primary fisheries industry nor other traditional industries such as the shipping sector. From this perspective, this study confirms the relevance to consider recommendations that deal with the possible need for adaptation of the EU legislative framework with BG and good governance objectives while safeguarding the established ocean based industries.

This would follow best practice at international level and should be followed up by the development of policies at national and regional level. The Blue New Deal proposed by the New Economic Foundation (UK) is an example of the approach that could be used for SSF and coastal communities[90]. It **places traditional activities such as fisheries at the centre of the strategy but in conjunction with BG activities** with the overall aim of revitalising coastal communities. Although proposed in the specific context of Brexit, this can be used independently of the context as an example of best practice.

Potential key actors within this framework are the EU agencies set up to perform technical and scientific tasks to assist EU institutions with the implementation of policies. The Roadmap[91] on the follow-up to the Common Approach on EU decentralised agencies[92] serves as a political blueprint guiding horizontal initiatives and reform of EU agencies in order to achieve more **balanced governance, improved efficiency and accountability and**

[90] http://www.bluenewdeal.org/about/
[91] https://europa.eu/european-union/sites/europaeu/files/docs/body/2012-12-18_roadmap_on_the_follow_up_to_the_common_approach_on_eu_decentralised_agencies_en.pdfb
[92] https://europa.eu/european-union/sites/europaeu/files/docs/body/joint_statement_and_common_approach_2012_en.pdf

greater coherence. Within the objectives of the Roadmap, EU agencies could play a role in allowing to explore synergies between BG activities and SSF. The Common Approach allows for EU agencies to share services by policy areas. Examples in relation to the IMP inter-agency cooperation is found in joint activities between the European Fisheries Control Agency (EFCA) and the European Maritime Surveillance Agency (EMSA) through the development of user-defined data applications and exchange of data on vessel monitoring. A coordinated approach to maritime surveillance should go hand in hand with stronger cooperation between MS authorities such as fisheries control agencies, coastguards and customs authorities. Such cooperation lies at the basis of the recently established European Coast Guard.

Another area of the Common approach for decentralised agencies concerns the streamlining of international relations which allows Agencies to develop work programmes with third countries and/or international organisations. The governance relevance is branded in the thought that, in particular the environment challenges cannot be addressed by MS in isolation. Cooperation between Agencies, DGs and MS can ensure the need for exchange of knowledge and experience.

Although not the primary focus of this study, financial support for SSF and development of BG synergies appears to be adequate. There is an allocation of almost 12 % from the EMFF for CLLD, which is higher than in other ESIF. The funding provided by EMFF to FLAGs is not specifically targeted on SSF, but it is in fact mostly SSF that benefit from this bottom-up approach. Recent developments have facilitated access for CLLD across funds, thus creating a potential for more ambitious and coordinated efforts. But for SSF to benefit from this, there is a requirement for a much more coordinated approach across sectors and the development of local/regional strategies. Support is needed to facilitate this process, which is linked to the relatively weak representation of SSF and its limited capacity to engage.

As noted previously, **SSF representation is relatively weak** and their capacity in terms of human and financial resources is limited. In many cases, there is simply not enough time as the representatives are actively engaged in fishing themselves. The LIFE platform has made important impacts despite its young age and the support of the EP and EC are commendable in this respect. This support to the LIFE platform should continue, but SSF representation needs to be strengthened at various levels. Funding is available to facilitate the initial steps in this direction (e.g. EMFF), for example the creation and/or strengthening of a network of SSF associations that is supported by a unit/institution that is staffed with professionals to address the multiple issues involved. The SSF sector itself has to consider which is the preferred solution, but the EC and EP can contribute much by providing a forum, facilitating meetings and consultations.

The available data on SSF is not sufficient and this has had implications for the management of SSF fleets, access to fishing opportunities, and the definition of SSF themselves. More information is needed to support the development of policies addressing the specificities of SSF, to improve management and achieve sustainable fishing, and to assess the socio-economic contributions. This involves a revision of regulations (i.e. data collection, fisheries control, technical measures, etc.), but it is important to stress that the use of innovative solutions should be sought in order to avoid a disproportionate burden on SSF fishers (e.g. collaborations with science, simplified solutions, cheap technological solutions, automatic recording systems, co-responsibility, etc.). Improving the available knowledge will facilitate the development of appropriate policy objectives, which may depend on national perspectives. There are various examples of best practices that can be used as inspiration, some of which have been presented in this study, but there are more examples of coastal fisheries that are often favoured because of their importance for regional

development, environmental impacts and other issues (e.g. Iceland, Faroe Islands, Norway, Greenland, Canada; Viðarsson *et al.* 2015).

SSF (and shellfish aquaculture) make a significant contribution to the food security and livelihoods of many people in European coastal regions, especially in communities that are highly dependent on this activity. As detailed in Tables 14 and 15, the SSF segment represents more than half of total fishing employment in more than half of the EU coastal countries. In addition, the fishing harbours, landing sites, and associated processing facilities provide employment and significant economic benefits to those regions.

The fisheries sector (i.e., not just SSF) has a key role to play in the transition toward a European BG policy—given the sector’s interconnectivity with and reliance on aquatic ecosystems as well as the potential for those it employs to act not only as resource users but also as stewards of precious natural resources. Because “business as usual” is not a sustainable strategy, it would indeed be unwise to continue along that path. Moreover, doing so would constrain *future* economic growth and development while risking considerable human and environmental costs.

Hence the challenge for institutions and governments is to devise incentives—and to provide adequate resources—for adapting and implementing the framework described here at the local, regional, and national levels in order to secure political commitment and encourage governance reform. Achieving these goals will require building institutions capable of implementing ecosystem approaches to the management of fisheries and shellfish aquaculture, approaches that include fair and responsible tenure systems for fishermen currently involved in SSF—and in particular regarding the allocation of fishing possibilities among fishermen. European institutions could promote a greater partnership among SSF (and fishing sector in general), governments, and communities at all levels—the majority of respondents of the survey stated that they would like to increase their participation in the decision-making process about fishery regulations. It is essential to recognise the fundamental **role played by the private sector and by public–private partnerships in changing current behaviour and technologies** and also to accept that short-term economic losses will be compensated by more substantial long-term economic gains. This will require, once again, a particular effort from governmental bodies to raise awareness within the SSF sector about damaging consequences of “race for fish”.

The eight crucial and interrelated elements of a successful BG strategy are described next.

1. It is necessary to acknowledge, respect, and protect the various forms of legitimate tenure rights to aquatic resources currently enjoyed by SSF communities. Implementation of a BG strategy should proceed only through cooperation with regional advisory councils—with **wide participation from the SSF sector** for this proposal—, regional/national governments, academia, the private sector, and other stakeholders. Thus, governance is a critical issue that any BG strategy must address. Outcomes beneficial to SSF would include improved fisheries management, a reduced proportion of overfished stocks, reduced bycatch (unintentionally caught marine organisms), and improved aquatic ecosystems with habitats preserved for the species harvested by SSF.

2. Policy must strive to earn public support for the **development of science-based standards** for fish and fishery products as well as the support of MS and the private sector for adopting and implementing these standards, including market standards on eco-labelling, sustainability, and traceability. SSF should be assisted with building capacity to improve handling practices, reduce fish losses, and improve quality.

3. Activities that **promote ecotourism and recreational fishing** in coastal areas could also be targeted. Fisheries' local action groups (FLAGs) can help on this score—especially in communities that depend on SSF—by devising strategies tailored to a given area and proposing collective plans. Besides using SSF ships for sport fishing, other remunerative possibilities include boat trips to protected natural areas or other excursions, offering instruction on fishing activity and fishing gear, game fishing, "discovery" expeditions to explore the marine environment and its biodiversity, and providing guided visits to first-sale markets or to aquaculture and canning facilities. Other eco-friendly activities include managing museums, shops of sailor items, gastronomical spots, and so forth. This approach has been taken by several European countries (Belgium, France, Italy, the Netherlands, Portugal, Spain, and the United Kingdom), although the primary focus so far is on recreational fishing. In the Spanish case, some of the participants in the survey and meetings declared that the current seafaring tourism experiences are showing not very positive results for SSF due to the main tourism demand coinciding with fishing hours and the fishermen lacking the economic means to make the changes necessary in order to ensure safety on board. In this connection, FLAGs, guilds and regional governments could play an important role in managing and monitoring those recreational activities.

4. The **upgrading of fishing boats** is essential for diversification into tourism activities, as older vessels must find a way to comply with modern guidelines for passenger safety and comfort. Investment in capacity building is also urgently needed so that small-scale fishing households and other local villagers can acquire the necessary skills and knowledge. For this purpose, it may be useful to create a road map for those involved in the transformation and to agree on the structure of a work plan. In addition, a decent transport infrastructure and proper hospitality facilities are needed, and public spaces (parks and coastal zones) should be scrupulously maintained and free of litter. Such efforts will enjoy greater success if residents are educated about the importance of environmental conservation.

5. **The restoration of habitat and biodiversity in SSF grounds may require protective measures**. These may consist of creating new MPAs along European coasts as well as proscribing certain activities so that long-term goals—such as sustainability—can be realised. Note that these proposed MPAs would allow SSF fishing with environmentally friendly methods/gears. The BG policy should assist in developing regulatory regimes and approaches that include such economic instruments as taxes on marine pollution and payment for ecosystem services. It is also essential to implement programmes in order to increase the visibility and awareness of the threats to marine ecosystems.

6. A BG strategy should contribute to developing (or hiring) the expertise needed to conduct and **disseminate studies on the carbon-binding potential of**, for example seagrass beds and seaweed cultivation. This information could be used to increase employment options and income in coastal communities where SSF is an important economic activity, thus strengthening them by improving social conditions.

7. A plan to establish integrated management (i.e. MPA, ICZM) in the context of BG industries should be interdisciplinary, inclusive, and cooperative. As we have emphasised, it should seek to minimise negative effects on the coastal communities that depend heavily on SSF. **Not only fisheries and other maritime activities but also the BG industries themselves** should be included in **maritime spatial planning**; there is perhaps no more reliable way to reduce the possibility of conflict over use of maritime space.

8. The **marine environment must have strong protection** if communities are to realise the full economic and social potential of oceans and seas. A meaningful contribution to

sustainable development is therefore a key component of ICZM strategies that involve BG industries. Special attention must be paid to the possible effects of BG activities, especially with regard to those risks—coastline flooding, marine pollution, and geological erosion—most pertinent to small-scale fishing. The EU’s environmental policies could stand substantial strengthening on these counts.

Political processes are the key drivers of an egalitarian BG policy. Many past successes in strengthening marine tenure and rights originated with community engagement (e.g., through fishing associations and cooperatives, guilds, and other coastal community organisations) that influenced political processes. It follows that an effective BG strategy is facilitated by **raising environmental awareness, leadership training, and developing the socioeconomic case for *sustainable* SSF production** and for the preservation of coastal community lifestyles.

Community engagement and empowerment are likewise required to ensure that coastal communities share in the benefits of new technologies and marine industries, so the acquisition of training and skills by target communities is another important aspect of BG policy. **“Blue jobs”** are not limited to maritime production industries; they are also integral to ensuring the continued viability of marine ecosystems by such means as wastewater management, monitoring compliance with environmental and fisheries regulations, disaster preparedness, and managing the transition to a regime that includes BG industries. Hence education targeted to all levels would go a long way toward guaranteeing the sustainability of these activities for future generations.

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ANNEXES

ANNEX I: LIST OF PERSONS CONSULTED

Participating		
Name	**Organisation**	**Country**
Jay Shoesmith	Oceanwatch	Australia
Brian O'Riordan	LIFE - Deputy	Belgium
Dominique Levieil	DG MARE - Unit D3	Belgium
Gilles van de Walle	FARNET Coordinator	Belgium
Patrick DANIEL	DG MARE	Belgium
Hanne Lyng Winter	FSK Association	Denmark
Bertrand Cazalet	SPMLR Syndicate, Languedoc-Roussillon	France
Katia Frangoudes	UBO Brest	France
Ken Kawahara	Plateforme de la Petite Pêche Artisanale Française	France
Patrice Francour	ECOMERS laboratory	France
Pierre Scemama	Ifremer - Brest	France
Ivan Corea	ANAPI Pesca	Italy
Anna Salierno	Dept. Hunting & Fishing, Puglia	Itlay
Ger de Ruiter	LIFE Netherlands	Netherlands
Marcin Rucinski	LIFE – Baltic & North Sea	Poland
Belén López Cayón	Cofradía de Pescadores San Juan Bautista de Burela	Spain
Jesún Fernández Pérez	Cofradía de Pescadores San José de Cangas	Spain
Berta Berreiro Ríos	Cofradía de Pescadores San José de Cangas	Spain
Enrique González López	Cofradía de Pescadores Santa María del Puerto Marín	Spain
Luis Santiago	Cofradía de Pescadores Santa María del Puerto Marín	Spain
Adela Freire Gandarela	Cofradía de Pescadores San Bartolomé de Noia	Spain
Jesús Otero Mascato	Cofradía de Pescadores San Martiño de O Grove	Spain
Misael García del Campo	Cofradía de Pescadores San Francisco de Vigo	Spain
Isaac Moya Bofill	Arts Menors Costa Brava	Spain
Jose Mauricio Pulido	MedArtNet España	Spain
Jose Pascual-Fernández	Profesor, Univ La Laguna	Spain
Marta Cavallé	LIFE - Mediterranean	Spain
Bengt Larsson	SYEF Association	Sweden
Jeremy Percy	LIFE - Director	UK

Not participating		
	European Association Fishermen in the Black Sea	Bulgaria, Romania
Juan G. Lopez Serret	Asociación para la Defensa de la Pesca Artesanal del Mediterráneo (ADPAM)	Spain
Fernando Gutiérrez	Cofradía de Pescadores Nuestra Señora de Los Reyes	Spain
	Pescartes	Spain
Javier Garat Pérez	Confederación Española de Pesca (CEPESCA)	Spain
Francisco Javier Sanz	Fundación Lonxanet para la Pesca Sostenible	Spain
José Luis Rodríguez	ASOAR-ARMEGA	Spain
Gwen Penarun	Association des Ligneurs de la Pointe de Bretagne	France
	Union des Communautés des Prud'hommes Pêcheurs de Méditerranée (UCPPM)	France
Alistair Sinclair	Scottish Creel Fishermen's Association	Scotland
Arjan Heinen	netVISwerk	Netherlands
Rossella Lasi	Associazione dei Pescatori di Pantelleria	Italy
Antonello La Rocca	Federpesca	Italy
Gilberto Ferrari	Federcopesca	Italy
	UNCI-PESCA	Italy
Giampaolo Buonfiglio	Associazione Generale Cooperative Italiane (AGCI AGRITAL)	Italy
Angelo Petruzzella	Legacoop Agroalimentare Dipartimento Pesca	Italy
	ALPAA Pesca	Italy
Bogulsaw Szemioth	North Atlantic Producers Organization	Poland
	Darlowska Localna Grupa Rybacka	Poland
Marek Szypulsk	Darlowska Group of fish Producers and Shipowners	Poland
	Koperattivi Malta	Malta
Marja Bekendam	AKTEA - European Network of women's organisations in fisheries and aquaculture	EU
Michael Schütt	Fischereigenossenschaft Freest	Germany

ANNEX II: THE CASE OF THE MEDITERRANEAN

Characteristics of SSF in the Mediterranean and Black Sea

SSF fleet segments in the Mediterranean are defined by the General Fisheries Commission for the Mediterranean (GFCM) as presented in Figure 25, according to recommendation GFCM/33/2009/3.

Figure 25 - GFCM definitions of fleet segments in SSF

Polyvalent SS w/o engine < 12 m LOA. All vessels less than 12 m in LOA, without an engine (wind or propulsion), using different gear during the year without a clear predominance of any type of gear, or using gear not considered in this classification.
Main gear: gillnets and entangling nets, traps, hooks and lines.
Main target species: miscellaneous demersal fish and molluscs.

Polyvalent SS w/ engine < 6 m LOA. All vessels under 6 m LOA, with engine, using different gear during the year without a clear predominance of any type of gear, or using gear not considered in this classification.
Main gear: gillnets and entangling nets, hooks and lines, traps, surrounding nets.
Main target species: miscellaneous demersal fish, miscellaneous coastal fish, miscellaneous pelagic fish, tuna, bonito, billfish, molluscs and crustaceans.

Polyvalent SS w/ engine 6–12 m LOA. All vessels between 6 and 12 m LOA, with engine, using different gear during the year without a clear predominance of any type of gear, or using gear not considered in this classification.
Main gear: gillnets and entangling nets, hooks and lines, traps, surrounding nets.
Main target species: miscellaneous demersal fish, miscellaneous coastal fish, miscellaneous pelagic fish, tuna, bonito, billfish, molluscs and crustaceans.

Source: GFCM, 2009

European fishing fleet operating in Mediterranean and Black Sea comprises some 43 000 vessels. SSF vessels are the predominant fleet segment with 34 024 vessels, accounting for 79 % of the total number of European vessels (Table 24).

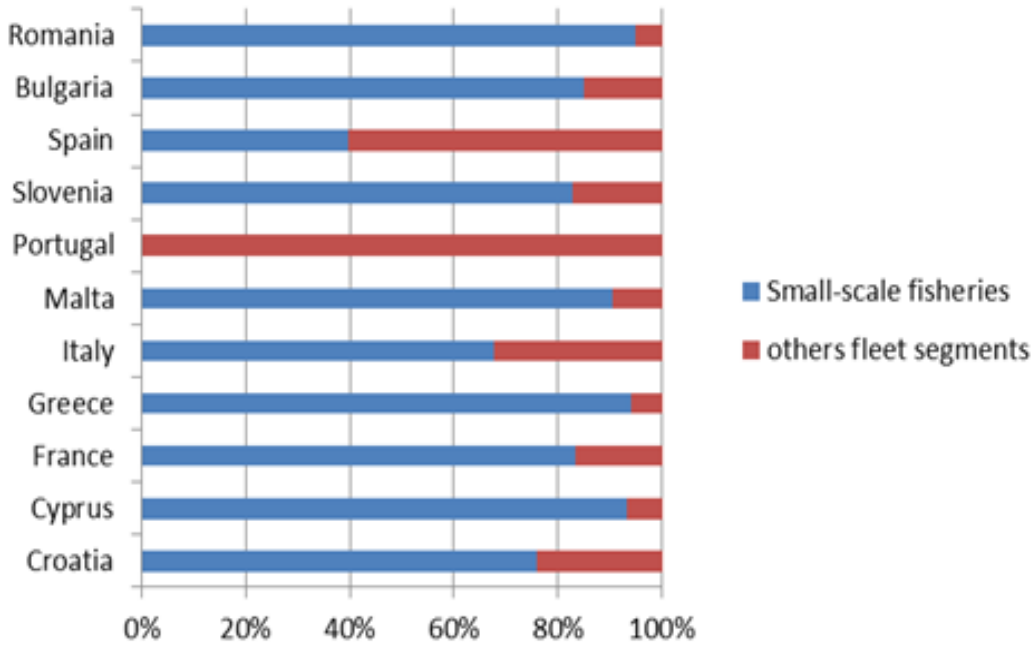
Table 24: Number of fishing vessels in SSF fleet segments and the total fleet

Name	Polyvalent SS w/o engine < 12 m	Polyvalent SS w/ engine < 6m	Polyvalent SS w/ engine 6-12 m	Total SSF fleet	% of total vessel	Reporting year
Croatia	117	2.513	3,233	**5,863**	**76**	2015
Cyprus		72	808	**880**	**93**	2015
France		361	856	**1.217**	**83**	2015
Greece	236	5,424	9,112	**14,772**	**94**	2015
Italy		2,608	5,819	**8,427**	**68**	2015
Malta		504	413	**917**	**90**	2015
Portugal					**0**	2014
Slovenia		67	73	**140**	**83**	2015
Spain		113	946	**1,059**	**40**	2015
Bulgaria	51	190	358	**599**	**85**	2015
Romania	27	21	102	**150**	**95**	2015
Total	**431**	**11,873**	**21,720**	**34,024**	**79**	

Source: GFCM and FAO, 2016

At country level, SSF fleets normally exceed 65 % of the total of fleet size, except for Spain (40%) (Figure 26). Portugal is in fact not a Mediterranean country and reports only a few larger vessels that operate in the Mediterranean. The MS that contribute most to SSF fleets in the Mediterranean and Black Sea are Greece (43%), Italy (25%) and Croatia (17%). Polyvalent SSF vessels between 6 and 12 m LOA with engine predominate (64 %) in the EU fleet. Only 1% of SSF vessels in EU fleet of the Mediterranean and Black Sea do not have an engine.

Figure 26: Composition of EU fleets in Mediterranean and the Black Sea



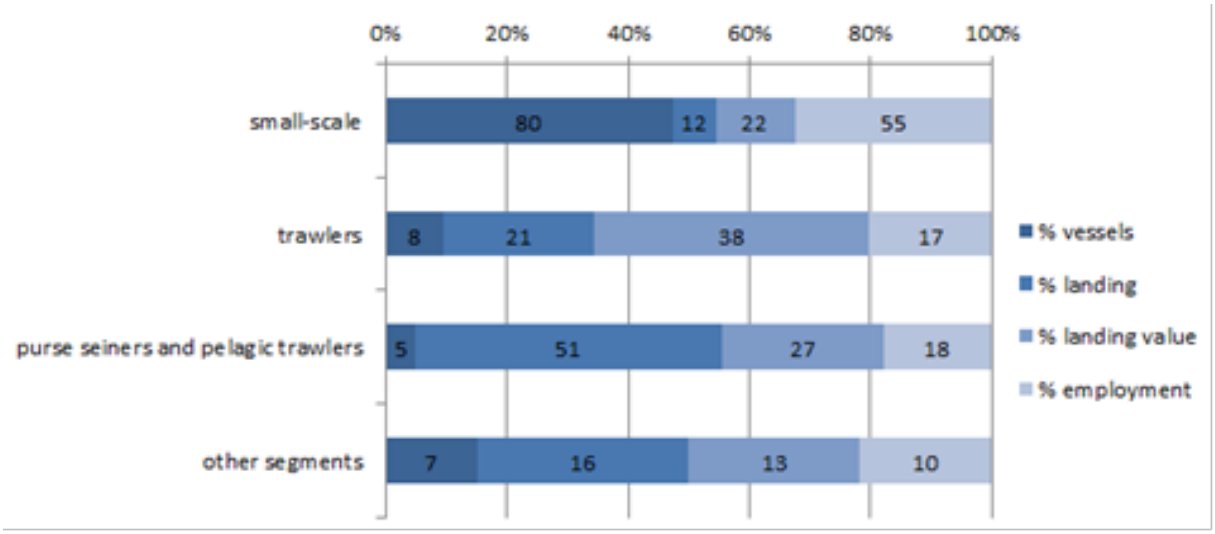
Source: GFCM and FAO, 2016

The above concerns the EU SSF fleet in Mediterranean and Black Sea, but this is only a part of the picture and the analysis should integrate all countries operating in GFCM area of competence. SSF in the Mediterranean and Black Sea encompass a large number of fishing techniques, using more than 50 types of fishing gear, and they target numerous species, adapting to fishing seasons based on a rotational system. However, the most common fishing gear used in the Mediterranean SSF is static nets, particularly trammel nets and gillnets. These gillnets and trammel nets are usually set before sunset and hauled after dawn, generally remaining for less than 10 hours at sea (Farrugio *et al.* 2013). The species targeted depend on the distance from the coast of the fishing grounds, depth, bottom characteristics, and the different periods of the year (Farrugio *et al.* 2013).

Small-scale fleets operate generally from small ports and landing sites close to the resources which are targeted. The fishing grounds are inshore areas and areas that would be difficult to access by trawlers, e.g. rocky bottoms or canyons in the continental shelves. The fishing grounds are generally limited in area and correspond to the exploitation of a species or a group of species by a local or regional group of fishermen, using the same fishing technique during a certain period of the year. In many countries, SSF rely also on coastal lagoons, separated or connected with the sea, where typically specialized SSF take place. Furthermore, it is important to note that landing sites are not restricted to fishing ports, but are usually widely distributed along the coasts, making it extremely challenging to perform monitoring, control and surveillance activities.

Total landings in the Mediterranean and Black Sea in 2013 are 1,163 thousand tons, of which 787 thousand tons are from the Mediterranean Sea and 376 thousand tons are from the Black Sea. SSF landings amount to 12 % of the total (Figure 27), which is the lowest compared to other fleet segments. On the other hand, SSF accounts for 22% of landed value and 55% of employment.

Figure 27: Relative importance of FCM fleet segments in terms of percentage of total number of fishing vessels, landings, landing values and employment



Source: GFCM and FAO, 2016

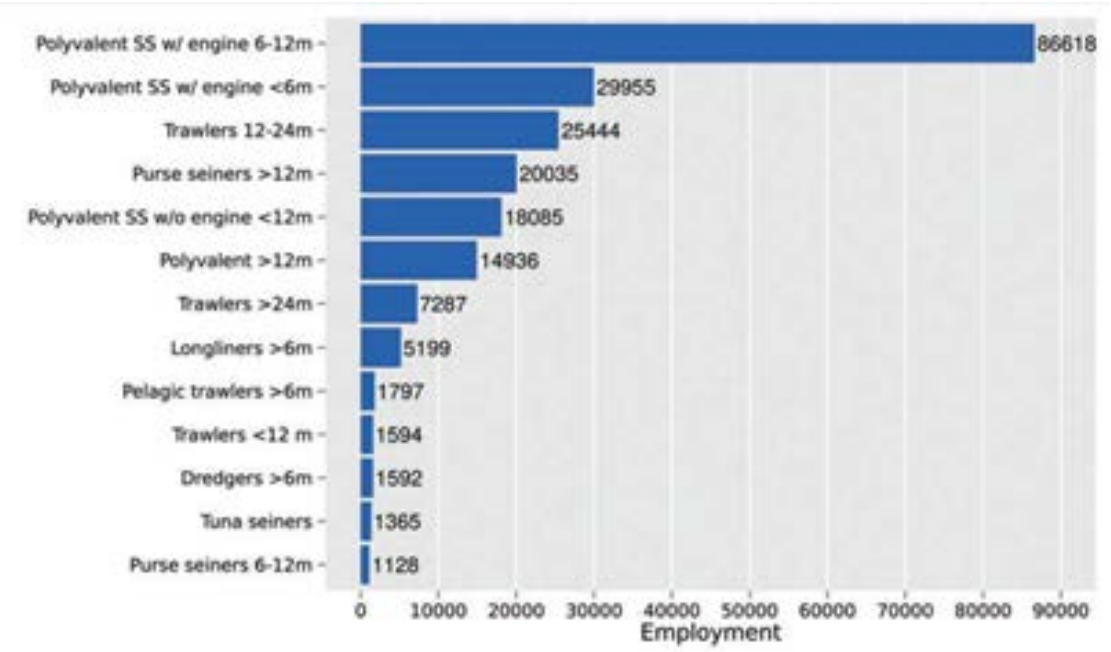
The total value at first sale of fish landings across Mediterranean and the Black Sea region is approximately US$ 3.09 billion[93]. Polyvalent SSF vessels from 6 to 12 m LOA (w/ engines) are the fleet segment with the 3rd highest landed value ($438 million USD), coming after trawlers from 12 to 24 m LOA and purse seiners more than 12m LOA. At the other end of the spectrum, polyvalent small-scale vessels less than 12 m LOA (w/o engine) account for the lowest landed value ($29 million USD) in the region.

According to GFCM and FAO data in "the State of Mediterranean and Black Sea fisheries" report, 221,797 persons are directly employed on fishing vessels in the GFCM area[94]. SSF plays a significant social role, employing more than 60 % of those workers directly engaged in fishing activities (Figure 28). Polyvalent vessels between 6 and 12 m LOA is of particular importance, accounting for 40 % of total employment in the sector.

[93] Data are primarily from the Task 1 statistical matrix. Data for Egypt come from FAO EastMed (2014), data for Greece come from the OECD database (2012) and data for Black Sea riparian countries that are cooperating non-contracting parties or non-contracting parties (Georgia, Ukraine and the Russian Federation) come from the FAO Fishery Commodities Global Production and Trade database (2012). Information from Bosnia and Herzegovina, Israel, Libya, Monaco, Portugal and the Syrian Arab Republic have not been reported, but they are expected to have a low contribution to the total.

[94] The Task 1 reporting year for employment data is 2012, except in the case of Libya and Romania (for which the reporting year is 2013) as well as Algeria, Egypt and Lebanon (for which the reporting year is 2011).

Figure 28: Total employment on fishing vessels per fleet segment



Source: GFCM and FAO 2016

Maritime activities and their potential for sustainable blue growth

Aquaculture

As in many parts of the world, aquaculture production in the Mediterranean has been expanding rapidly over recent years. During the decade 1997-2007, there was a recorded growth of 70 % in the aquaculture sector in the region, which was accompanied population growth, raising demand for fishery products, and declining of fisheries catches (Plan bleu 2014).
The share of aquaculture in relation to total fisheries production is much higher in the Mediterranean than at the global scale. Aquaculture production in Mediterranean region accounts for more than 50% of total fisheries, compared to 13 % (in 2000) at global level.

Traditionally, the Mediterranean aquaculture used to produce mostly shellfish, but in the recent years the farming of high value finfish species like turbot, gilthead sea bream and European sea bass has substantially increased in the region (Plan bleu 2014). In 2012, approximately 60 % of the production of aquaculture is based on shellfish and 40 % on fish. Mussel has one of the highest production rates of any farmed fish or shellfish in the Mediterranean countries. Mussel production has remained relatively high but decreased slightly between 2002 and 2012. Spain, Italy, France, and Greece are the largest producers of mussel. Concerning finfish, seabass and seabream, production is most important in Greece, Turkey, Spain, Egypt, and Italy (Eurofish 2014).

The total aquaculture production (freshwater, brackish and marine species) in the Mediterranean region accounts more than 1.6 million tons in 2011, which represents 2 % of the world aquaculture production. This production is mostly due to marine and brackish production, which corresponds to 74 % of the total production. More than half of aquaculture production in the Mediterranean comes from western European countries (58 %), (UNEP-MAP 2012). Furthermore, the aquaculture production is mainly concentrated in six countries:

Spain, Greece, Italy, France, Egypt and Turkey jointly supply 95 % of the total production in the region (Plan Bleu 2014).

Total aquaculture production in Mediterranean countries generated more than EUR 3.5 billion, which represents 4 % of revenues at the global scale (Plan Bleu 2014). The direct and indirect contribution of the aquaculture sector to employment amounted to 122,820 and 765,900 jobs, respectively (Sacchi 2011).

Tourism and recreational activities

The Mediterranean region is by far the largest global tourism destination of the world, with more than 850 million visitors recorded in 2012, which represents 14% of world tourism statistics (UNWTO 2014). Mediterranean tourism has been in constant growth during the last decades (with 58 million of international arrivals in 1970 and 290 million in 2011), attracting at present almost a third of the world's international tourist. A discontinuation of the trend was observed in 2009 due to the global economic crisis. At present, the situation has recovered to pre-crisis levels and even exceeded these.

This sector is a vital part of the Mediterranean economy and an extremely important source of employment and foreign currency for all the states bordering the Mediterranean Sea. While western EU countries (France, Italy and Spain) are today well-consolidated tourist destinations, eastern and southern Mediterranean countries have recorded the world's highest growth rates in international tourism during the last twenty years. Tourism in the region is spatially and seasonally concentrated, occurring in Mediterranean coastal areas during the summer holiday months (Plan bleu 2014).

Table 25: Turnover, direct and total contribution to GDP of tourism and recreational activities in the Mediterranean basin in 2012

Region	Turnover (Million EUR)		GDP Direct Contribution Gross Value Added (Million EUR)		GDP Total Contribution (all façades) (Million EUR)
	Coastal areas	Total	Coastal areas	Total	Total
Mediterranean Sea	250 786	522 260	135 233	282 580	729 271
% World	6%	12%	7%	14%	11%
World		4 239 300		2 056 600	6 630 400

Data extracted from the WTTC country fact sheets (2013) referring to the year 2012, except for Bosnia and Herzegovina (data from 2011). Coastal shares have been calculated based on Plan Bleu estimations (Plan Bleu, 2005).

Note: data for Bosnia and Herzegovina from 2011

Source: Plan bleu 2014

From an economic point of view, total turnover tourism and recreational activities in the Mediterranean countries amount to about EUR 520 billion in 2012, which represent 12 % of total turnover at global scale (Table 25). Coastal tourism reached 250 billion Euros in turnover, which corresponds to 48 % of total turnover of tourism and recreational activities in the Mediterranean countries.

The Gross Value Added (GVA) in the Mediterranean countries is close to EUR 300 billion, which is approximately 14 % of tourist GVA at global scale. In coastal areas, direct contribution to GDP (gross domestic product) attains 135 billion Euros, representing almost 50 % of tourism GVA at the regional scale. When considering the total contribution to GDP (i.e. direct, indirect and induced effects), this value exceeds EUR 700 billion (Plan bleu 2014).

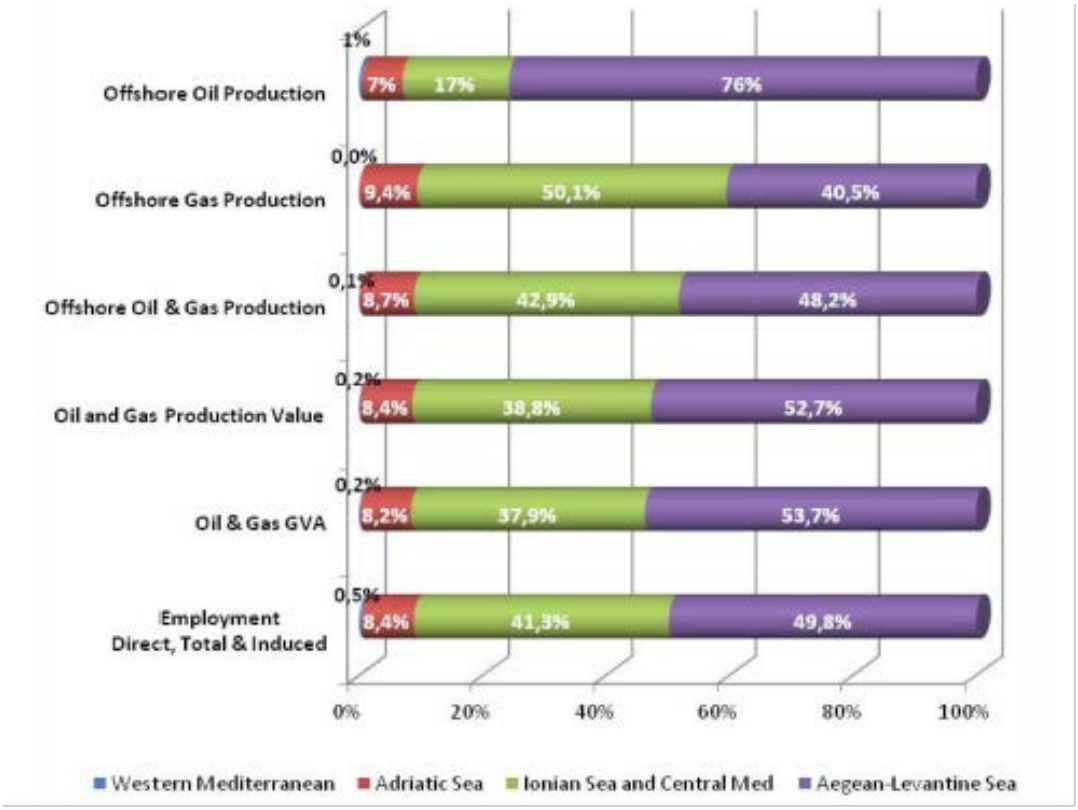
For comparison, in 2015, the direct contribution to GDP in the Mediterranean countries is close to EUR 355 billion and the total contribution to GDP is EUR 901.4 billion (World Travel and Tourism Council 2016).

In 2015, direct and contribution of tourism to employment in the Mediterranean was 7.7 and 19.8 million jobs, respectively (WTTC 2016). A decrease in employment was observed in the period 2011-2013, but the trend is increasing since then. Growth in employment is slower than the increase in international tourist arrivals and in domestic tourism (WTTC 2013). However, direct and indirect employment generated by the tourism and recreational activities sector contribute significantly to overall employment in Mediterranean countries (Plan Bleu 2014).

Oil and gas activities

Most of the Mediterranean countries have been relatively well explored for hydrocarbons. However, many areas in the south Mediterranean, especially offshore, are underexplored or even unexplored.

Figure 29: Overview of offshore oil and gas extraction in Mediterranean regions in 2011



Source: Plan bleu, 2014

The offshore oil production in the Mediterranean Sea has been estimated to 19 million toe for the year 2011, or 12% of the total oil production for the same year in this region. This is less than the world ratio which was 30% in 2010 (Serbutoviez 2012). Offshore oil production is concentrated in the Agean Levantine Sea, mostly in Egyptian waters (Figure 29).

The natural gas production in the Mediterranean Sea has been estimated to 68 million toe, or 32% of the total gas production for the same year in this region. It is slightly more than

the world ratio, which was 27% in 2010 (Serbutoviez 2012). Offshore gas production is mostly shared between Ionian Sea and Central Mediterranean and Aegean-Levantine Sea. The latter should increase its share in the coming years with the start of the Levant basin province production. Offshore natural gas production is three times greater than offshore crude oil.

Production value of the offshore oil and gas produced in the Mediterranean Sea, which amounted approximately to 32 billion Euros in 2011 and 53 % to Aegean-Levantine Sea (because one toe of gas is 40% cheaper than one toe of oil). The GVA generated would have reached 23 billion euros. The sector provided an estimated 29,000 direct jobs, rising to 400,000 jobs when considering also indirect and induced employment. The rate of employment is the highest in Aegean-Levantine Sea and Ionian Sea and Central Mediterranean.

New exploration operations for oil and gas production are under study or currently in process in the coasts of Spain, Croatia, Egypt, Israel, Lebanon, Libya, Tunisia, Malta, Cyprus, and Turkey. Algeria is preparing to expand its exploration program to offshore areas. Large natural gas reserves could be located off the southeastern Mediterranean shore, especially in the Levantine basin. However, the development of the offshore oil and gas production in the eastern Mediterranean will be conditioned by the evolution of the regional territorial conflicts together with the development of technological advances allowing the exploitation of deep resources (Plan Bleu 2014).

Maritime transports

At present, more than 90% of global trade in volume is carried by sea and the Mediterranean Sea is amongst the world’s busiest waterways. It offers a route for exchanges of manufactured products between Europe and Asia (with the strait of Gibraltar on its western side and the Suez canal on the eastern side), Asia being EU’s chief trade partner, as well as for the supply of energy products to Europe from the Gulf countries, and for the transfer of passenger transfers between and within Mediterranean countries. About 25% of the Asiatic traffic enters Europe through Mediterranean ports after passing through the Suez Canal, while 75% of freight continues through Gibraltar up to Northern European ports. Thus, Mediterranean ports are vital for the flow of goods into the region as in the majority of cases these ports handle a greater volume of inbound than outbound cargo (Piante and Ody 2015).

Moreover, total Mediterranean traffic is largely dominated by international fluxes, intra-Mediterranean fluxes account for less than a quarter of total Mediterranean maritime traffic. Major traffic routes are dominated by crude oil shipments, that originate from the eastern Black Sea, Northern Egypt, or from the Persian Gulf via the Suez Canal, and by container ship traffic.

There are more than 600 commercial ports and terminals in the Mediterranean Sea (50 % are in Greece and Italy), like for example Barcelona, Gibraltar, Algeciras, Valencia, Tanger, and Marseille, which are part of the 100 world top ports (Piante and Ody 2015). Statistics show that the Mediterranean merchant fleet is composed of almost 8,000 vessels.

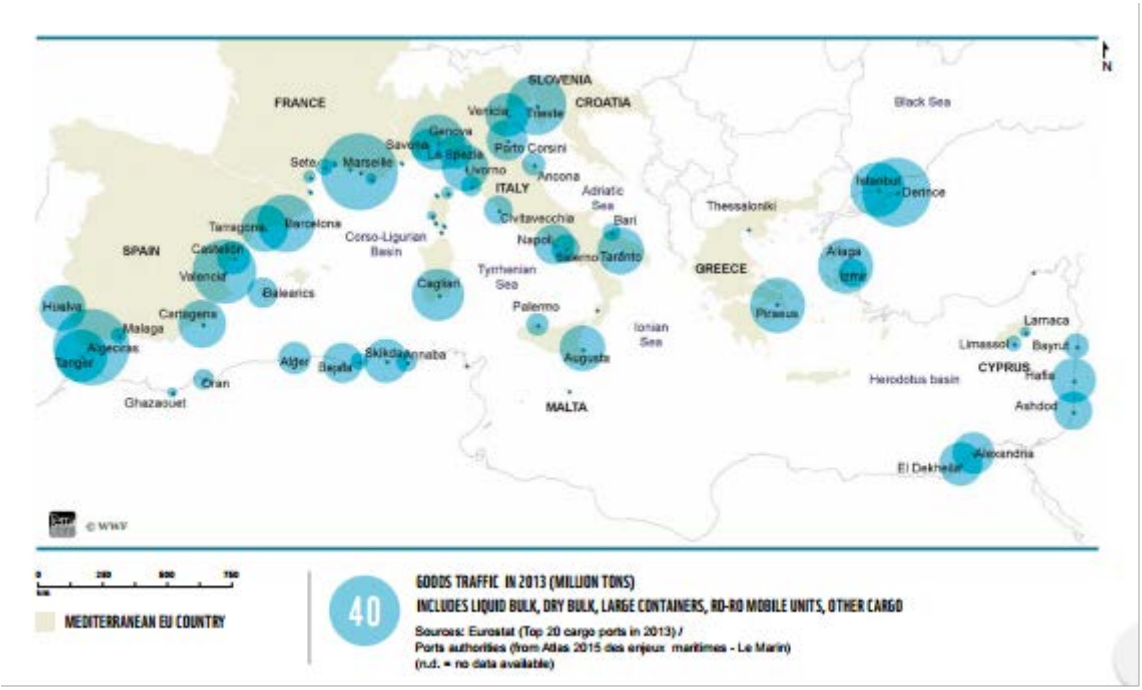
In 2010, total revenues from maritime transport amounted to more than 70 billion Euro in the Mediterranean Sea (5% of the total revenues worldwide), which generate a Gross Value Added (GVA) of 27 billion Euro. Around 550,000 jobs are created directly by the maritime transport sector (Plan bleu 2014).

Two maritime transports types are differentiated in the Mediterranean Sea: freight transports and passengers transports.

Freight transports

The Mediterranean Sea receives all types of goods with a predominance of energy (24%) and non-bulk products for 36 % (mainly by container shipping). There are three types of freight transports: liquid bulk transport, dry bulk transport and non-bulk transport (Figure 30). Most maritime transport of goods is concentrated in the Western Mediterranean Sea and in the Aegean-Levantine Sea.

Figure 30: Port traffic in the transport of goods in the Mediterranean Sea, 2013



Source: Piante and Ody 2015

Passengers transports:

The Mediterranean Sea is one of the busiest regions in the world in terms of passenger transport. In 2010, 170 million passengers embarked or disembarked in a Mediterranean port (excluding cruise passengers). In 2012, the main ports where passengers embark and disembark are in Greece and in Italy (Piante and Ody 2015).

In 2014, 47 different companies, accounting for 138 vessels with a capacity of 3.8 million passengers, operated in the Mediterranean region. According to MedCruise, the association representing cruise ports in the Mediterranean and its adjoining seas, the 70 member ports hosted 25.8 million passenger movements, representing 80% of cruise traffic in the region. These ports hosted over 25 million passengers per year during the 2010s (Pallis 2015). The main ports of departure and destination for cruises in the Mediterranean Sea are: Barcelona (Spain), Napoli (Italy), and Genoa (Italy). Total expenditures by cruise passengers in the Mediterranean terminals are estimated at almost 1.7 billion Euro, representing an added value of around 750 million Euros (Piante and Ody 2015).

ANNEX III: HORIZON PROJECTS

It is worth noting that other topics under the call ‘**Sustainable Food Security- Resilient and resource-efficient value chain**’ are related to the CFP. These are listed in the following:

- SFS-20-2017: Towards a science-based regionalisation of the Common Fisheries Policy

  The topic has a budget of 6 million EUR. The aims of the topic is to help the implementation of the CFP, promoting and combining innovative approaches to fisheries management, taking into account the regional-based approach of the new CFP. This challenge is particularly relevant for fisheries in the Mediterranean waters, where there are a narrow bands of EU waters with larger areas outside national jurisdictions, a high number of small fishing vessels as well as a poor state of fish stocks.

- SFS-21-2016-2017: Advancing basic biological knowledge and improving management tools for commercially important fish and other seafood species

  The topic has a budget of 5 million EUR and aims to address the priorities of Regional Fisheries Management Organisations (RFMOs) and of the CFP, by increasing the knowledge of the biology and ecology of fish and other seafood species. The main goal of the topic is to improve the efficiency of fisheries management under the CFP (including outside of EU waters - where EU fleets fish).

- SFS-22-2017: Smart fisheries technologies for an efficient, compliant and environmentally friendly fishing sector

  The topic has a budget of 6 million EUR. The topic aims to improve resource efficiency in the fishing sector, with particular regards to: the extraction sector that could limit its environmental impact (e.g. avoiding unnecessary fish mortality, and damage to other marine resources and ecosystems) by taking advantage of innovative technologies; and the scientific assessment of resources and monitoring for scientific or surveillance purposes could similarly benefit from an increased utilization of modern technologies. Indeed, fishing, control and data collection are often underperforming and too expensive. Among other things, projects under this topic are expected to support the implementation of the EU CFP

- SFS-23-2016: Improving the technical performance of the Mediterranean aquaculture

  The topic has a budget of 7 million EUR. The topic aims to ensure sustainable growth of the Mediterranean aquaculture industry and to improve the competitiveness of EU Mediterranean aquaculture production, shifting from its production-oriented growth to a consumer responsive and market-oriented approach. Expected impact under this topic include: increased Mediterranean aquaculture production for key species; foster jobs and trade in the region; contribute to the implementation of the EU CFP; and support the implementation of the Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area.

Furthermore, during the period 2014-2015, 42 different projects were successful under the Blue Growth call **‘Unlocking the potential of seas and oceans’**. We present examples of projects awarded for each topic below:

Topic: Improving the preservation and sustainable exploitation of Atlantic marine ecosystems
Project title: ATLAS (http://www.eu-atlas.org/)
Project description: ATLAS is creating a dynamic new partnership between multinational industries, SMEs, governments and academia to assess the Atlantic's deep-sea ecosystems and Marine Genetic Resources to create the integrated and adaptive planning products needed for sustainable Blue Growth. ATLAS is gathering diverse new information on sensitive Atlantic ecosystems (incl. VMEs and EBSAs) to produce a step-change in our understanding of their connectivity, functioning and responses to future changes in human use and ocean climate.

Topic: Forecasting and anticipating effects of climate change on fisheries and aquaculture
Project title: ClimeFish (http://climefish.eu/)
Project description: The overall goal of ClimeFish is to help ensure that the increase in seafood production comes in areas and for species where there is a potential for sustainable growth, given the expected developments in climate, thus contributing to robust employment and sustainable development of rural and coastal communities.

Topic: Novel marine derived biomolecules and industrial biomaterials
Project title: MARISURF (http://www.marisurf.eu/)
Project description: The projects objectives are to develop (1) innovative approaches in discovering, characterizing and producing novel marine-derived bio-surfactants from a large bacterial collection (greater than 500 strains) housed at Heriot Watt University, originally isolated from various coastal and open ocean waters around the world, (2) novel, economic, and eco-friendly end-products with commercial applications in order to replace synthetic counterparts, and (3) to demonstrate the functionality of new product development for commercial exploitation. The relevance of the project is underlined by its expected impact in increasing efficiency of discovery pipelines, the development of more economic and eco-friendly end-products and finally in contributing to the implementation of the objectives of the EU Blue Growth.

Topic: Enhancing the industrial exploitation potential of marine-derived enzymes
Project title: INMARE (http://www.inmare-h2020.eu/)
Project description: INMARE stands for "Industrial Applications of Marine Enzymes: Innovative screening and expression platforms to discover and use the functional protein diversity from the sea". It is a collaborative Innovation Action to streamline the pathways of discovery and industrial applications of new marine enzymes and bioactives for targeted production of fine chemicals, drugs and in environmental clean-up applications.

Topic: Preparing for the future innovative offshore economy
Project title: MARIBE (https://maribe.eu/)
Project description: MARIBE is a Horizon 2020 project that aims to unlock the potential of multi-use of space in the offshore economy (also referred to as Blue Economy). This forms part of the long-term Blue Growth (BG) strategy to support sustainable growth in the marine and maritime sectors as a whole; something which is at the heart of the Integrated Maritime Policy, the EU Innovation Union, and the Europe 2020 strategy for smart, sustainable growth.

Topic: Delivering the sub-sea technologies for new services at sea
Project title: BRIDGES (http://www.bridges-h2020.eu/)
Project description: BRIDGES (Bringing together Research and Industry for the Development of Glider Environmental Services) is providing a necessary tool for further understanding, improved monitoring, and responsible exploitation of the marine environment while assuring its long-term preservation. This new tool, a robust, cost-effective, re-locatable, versatile and

easily-deployed ocean glider, will support autonomous, long-term in-situ exploration of the deep ocean at large spatio-temporal scales.

Topic: Response capacities to oil spills and marine pollutions
Project title: GRACE (http://www.grace-oil-project.eu/)
Project description: The project aims: 1) to improve the observation and predictions of oil spreading in the sea using novel on-line sensors on-board vessels, fixed structures or gliders, and smart data transfer into operational awareness systems; 2) to examine the true environmental impacts and benefits of a suite of marine oil spill response methods (mechanical collection in water and below ice, in situ burning, use of chemical dispersants, bioremediation, electro-kinetics, and combinations of these) in cold climate and ice-infested areas; 3) to assess the impacts on biota of naturally and chemically dispersed oil, in situ burning residues and non-collected oil using biomarker methods and to develop specific methods for the rapid detection of the effects of oil pollution; 4) to develop a strategic Net Environmental Benefit Analysis tool (sNEBA) for oil spill response strategy decision making.

Topic: Developing in-situ Atlantic Ocean Observations for a better management and sustainable exploitation of the maritime resources
Project title: AtlantOS (https://www.atlantos-h2020.eu/)
Project description: objectives: The overarching objective of AtlantOS is to achieve a transition from a loosely-coordinated set of existing ocean observing activities to a sustainable, efficient, and fit-for-purpose Integrated Atlantic Ocean Observing System (IAOOS), by defining requirements and systems design, improving the readiness of observing networks and data systems, and engaging stakeholders around the Atlantic; and leaving a legacy and strengthened contribution to the Global Ocean Observing System (GOOS) and the Global Earth Observation System of Systems (GEOSS).

Topic: Acoustic and imaging technologies
Project title: LAkHsMI
Project description: LAkHsMI is developing a new bio-inspired technology to make continuous and cost-effective measurements of the near-field, large-scale hydrodynamic situation, for environmental monitoring in cabled ocean observatories, marine renewable energy and port/harbor security. LAkHsMI is designing, manufacture, and field test prototype smart sensor cables that measure differential pressure and temperature on the ocean floor and enable high resolution imaging of the surrounding volume in space and time, is simple, inexpensive and has very low power consumption The cables can be connecting with existing cabled ocean observatories.

Topic: Consolidating the economic sustainability and competitiveness of European fisheries and aquaculture sectors to reap the potential of seafood markets
Project title: SUCCESS (http://www.success-h2020.eu/)
Project description: SUCCESS is bringing together an integrated team of scientists from all fields of fisheries and aquaculture science with industry partners and key stakeholders to work on solutions which shall improve the competitiveness of the European fisheries and aquaculture sector. The supply-side of seafood markets is limited from both sea fisheries and aquaculture. At the same time demand for seafood products is increasing. In a globalised economy, the conjunction of these two trends should generate high opportunities for any seafood production activity.

Topic: Monitoring, dissemination and uptake of marine and maritime research
Project title: COLUMBUS (http://www.columbusproject.eu/)
Project description: Marine and maritime research has a critical role to play in developing the understanding of the seas and advance technology so that the project aims to develop their economic potential in a sustainable manner. The COLUMBUS project intends to capitalise on the European Commission's significant investment in marine and maritime research by ensuring accessibility and uptake of research knowledge / outputs by end-users: policy, industry, science and wider society. COLUMBUS will ensure measurable value creation from research investments contributing to sustainable Blue Growth within the timeframe of the project.

Topic: Ocean literacy – Engaging with society – Social Innovation
Project title: SeaChange (http://www.seachangeproject.eu/)
Project description: The overarching goals of the Sea Change project are to bring about a fundamental "Sea Change" in the way European citizens view their relationship with the sea, by empowering them – as 'Ocean Literate' citizens - to take direct and sustainable action towards healthy seas and ocean, healthy communities and ultimately - a healthy planet.

Topic: Supporting international cooperation initiatives: Atlantic Ocean Cooperation Research Alliance
Project title: AORAC-CSA (http://www.atlanticresource.org/aora/)
Project description: The Atlantic Ocean Research Alliance Coordination and Support Action (AORAC-CSA) is designed to provide scientific, technical and logistical support to the European Commission in developing and implementing trans-Atlantic Marine Research Cooperation between the European Union, the United States of America and Canada.

Topic: European polar research cooperation
Project title: EU-PolarNet (http://www.eu-polarnet.eu/)
Project description: The objectives of EU-PolarNet are to establish an ongoing dialogue between policymakers, business and industry leaders, local communities and scientists to increase mutual understanding and identify new ways of working that will deliver economic and societal benefits. The results of this dialogue will be brought together in a plan for an Integrated European Research Programme that will be co-designed with all relevant stakeholders and coordinated with the activities of many other polar research nations beyond Europe, including Canada and the United States, with which consortium partners already have productive links.

Topic: Coordination action in support of the implementation of the Joint Programming Initiative on 'Healthy and Productive Seas and Oceans'
Project title: CSA Oceans (http://www.jpi-oceans.eu/csa-oceans-2)
Project description: CSA Oceans 2 is a 36 months' project with the general aim to facilitate and support the implementation of the Strategic Research and Innovation Agenda (SRIA) of JPI Oceans. JPI Oceans is a coordination platform that mainly aims to enable the advent of a knowledge based maritime economy, maximizing its value in a sustainable way; to ensure Good Environmental Status of the seas and optimize planning of activities in the marine space, and to optimise the response to climate change and mitigate human impacts on the marine environment.

ANNEX IV: SUPPORT MEASURES FOR SSF

MARE/2014/04 – selected projects

I. North Western and South Western Waters, including the waters around Azores, Madeira, Canary Islands and outmost regions under the Treaty

Three (3) grants were awarded for a total amount of 533.828 € as follows:

1. Title: *Enhancing Small Scale Fishing Sector's Participation in Decision Making*
Applicant/coordinator: Fundacion AZTI,Txatxarramendi Ugartea Z/G, 48395, Sukarrieata, Spain (info@azti.es)
Other participants: Fundacion Loxanet Para la Pesca Sostenible (miriam.montero@fundacionlonxant.org); South Western Waters AC (info@cc-sur.eu); Javier Sarobe Iturregui (javialai@yahoo.com)
Geographical scope: South Western Waters with emphasis on Waters around Azores, Madeira and Canary Islands
Main activities: Mapping of SSF associations within the areas concerned; identification of barriers to the participation of SSF in the decision making process; strengthening of existing organisations; formulation of concrete recommendations and organisation of a high level round table.
Duration: 24 months **Allocated amount:** 263.733 €

2. Title: *Setting the scene to reinforce Small-Scale fishing in SWWAC area*
Applicant/coordinator: Benoît GUERIN, 2045 avenue du Grand Défends – Les Genévriers C9, 83700, Saint Raphaël, FRANCE (bguerin80@yahoo.fr)
Other participants: N/A
Geographical scope: South Western Waters
Main activities: Mapping of SSF associations within the areas concerned; assessment of the participation of SSF in the SWWAC; preparation of a Blue print of trainings and a guide of procedures for SSF; communication of the results and network
Duration: 18 months **Allocated amount:** 156.845 €

3. Title: *Enabling the small scale fishing sector of the North Western Waters to engage in the fisheries decision-making process*
Applicant/coordinator: National Federation of Fishermen's Organisations (NFFO), 30 Monkgate, YO31 7PF, York, UK (barrie@nffo.org.uk)
Other participants: N/A
Geographical scope: North Western Waters
Main activities: Mapping of SSF associations within the areas concerned; identification of barriers; improvement of communication among SFF, using low cost solutions where possible; facilitation of their participation in NWWAC meetings
Duration: 22 months **Allocated amount:** 113.250 €

II. Mediterranean Sea and Black Sea

Three (3) grants were awarded for a total amount of 513.135 € as follows:

1. Title: *To increase awareness and the role of SSF in the future policy-making decisions on national and EU level, by integrating good practices suitable for the region of Black Sea Basin*
Applicant / coordinator: SP CONSULT BG Ltd., Valsil Levski n° 29, 9700, Shumen, Bulgaria (sp_consult@abv.bg)
Other participants: N/A
Geographical scope: Black Sea
Main activities: Mapping of existing SSF associations in BG and RO; facilitation of their involvement in the new Black Sea Advisory Council and LIFE project; exchange of good practices on the participation in decision making
Duration: 24 months **Allocated amount:** 160.000 €

2. Title: *Actions aimed to enhance the participatory role of Mediterranean small-scale fishing in the decision making and advisory processes at national and EU level*
Applicant / coordinator: Consortio UNIMAR, Via Nazionale 243, Rome, Italy (a.mariani@unimar.it)
Other participants: MEDAC (segreteria@med-ac.eu)
Geographical scope: Mediterranean EU countries, with emphasis on the Northern Adriatic (Italy, Croatia, Slovenia)
Main activities: Mapping of existing SSF associations; assessment of their participation in MEDAC; strengthening of existing SSF associations and setting up of new associations, if necessary; creation of SSF networks; communication and support training
Duration: 15 months **Allocated amount:** 193.135 €

3. Title: *Measures to support small-scale fisheries in the EU Mediterranean water*
Applicant / coordinator: APC SA, Mnisikleous 2, 10556, Athens, Greece (apc@apc.gr)
Other participants: Mably Società Cooperativa (mably@pec.it); AP Marine (apmarine@valicom.com.cy); AquaBioTech Limited (info@aquabt.com)
Geographical scope: Eastern Mediterranean – Greece, Malta and Cyprus
Main activities: Mapping of existing SSF associations at local, national, EU level; conduct of a survey involving SFF directly; study of the results of the survey; dissemination activities to increase awareness of SSF (website, newsletters, pocket guide of procedures); training seminars
Duration: 15 months **Allocated amount:** 160.000 €

III. North Sea and Baltic Sea

Two (2) grants were awarded for a total amount of 436.471 € as follows:

1. Title: *Baltijos kranto saliu smulkiosios žvejybos sektoriaus bendradarbiavimo […]*
Applicant / coordinator: Šilutės Žuvininkystes Vietos Veiklos Grupe
Other participants: N/A
Geographical scope: Eastern Baltic – LT, EE, LV and PL
Main activities: dissemination of information to raise the awareness of applicable rules among SSF; explanatory visits to the four countries and meetings with small scale fishermen to identify the main problems encountered; exchange of best practices; creation of a virtual database
Duration: 24 months **Allocated amount:** 137.920 €

2. Title: *Support measures for small-scale fishing sector of the North Sea and Baltic*
Applicant / coordinator: LIFE Ltd, 21 St Thomas Street, BS1 6JS, Bristol UK (director@lifeplatform.eu)
Other participants: N/A
Geographical scope: North Sea and Baltic Sea
Main activities: appointment of a regional coordinator to build SSF capacity to participate to the ACs; support SSF to prepare common positions to be transmitted to the ACs and other relevant fora; information sharing and exchange of good practices workshops; creation of new SSF representative bodies and development of networks
Duration: 24 months **Allocated amount:** 298.551 €

ANNEX V: PROJECT 1 - ICELAND

		PROJECT 1
Key facts / Presentation of the	**Project Name :**	**The ICELAND OCEAN CLUSTER**
	Last of the project :	Still in progress
	Founded date :	2012
	Location :	**Iceland (EUROPE)**
	Beneficiaries :	Seafood industry (incl. SME), fishing companies
	Environment (Main Keys Habitat / species targeted)	North Atlantic Ocean
Context	**Problem statement**	Fishing industry is a base industry in Iceland, but : - Lack of services in Iceland linked to Fishing industry and further processing, transportation and distribution of seafood products, and services for employees of the fishing industry and related sectors. - Iceland’s competitors (Canada, Norway) in the northern areas have established policies to be leaders in fields connected with the sea, including IT, biotechnology, continental shelf research and aquaculture. Nowadays, there is a considerable international interest as regards research into clusters in business sectors.
	Issues categories	Very few networking between companies dealing with ocean industrial sectors Increase competitiveness in seafood market
Intervention logic of the project	**Objective**	Main mission : Create value in the ocean industry by connecting people and businesses
	Inputs	The scope of this project : - Networking ocean industry companies (fishery, seafood processing, Fishing gear manufacture, Shipping/haulage, Packaging industry, Public administration, etc) - Creating or adding value to fishery products (direct sales and/or short circuits, new products, startup incubator, processing, new marketing strategies, support to businesses)
	Outputs (the entire value chain including capture, processing, trade,..) / **Results**	Main achievements : - 2012 : Establishment of an Ocean Cluster House (today, 70 companies involved + 2 incubation center in 2700 m²) - Startups incubator, helping for creation of new seafood companies (ex : CODLAND, Ocean Excellence), - Establishment of cluster groups (networking) and management of multisectorial projects (ex : Green marine technology) - Implementation of seafood events - Media communication and promotion of Iceland seafood products and blue technologies

	Local/External factors we need to consider (prevailing economic conditions and industry trends)	2016: The economy depends heavily on the fishing industry, which provides 40% of merchandise export earnings, more than 12% of GDP, and employs nearly 5% of the work force. According to Statistics Iceland, the fisheries sector directly employs around 9,000 people. The fisheries sector is responsible for 50% of the total turnover in the textile industry, which includes net making and various other fishing gear manufacture.
	Legal/administrative frameworks	
Project's Impacts assessment	**Biodiversity / Habitats Impacts**	NA
	Impacts on marine species, biodiversity	NA
	Impacts on Interaction /Competition between marine activities	Networking provide more opportunities to Iceland companies to develop synergies, reducing conflict
	Socioeconomic Impacts (fishing organisation / industries / value chain)	Main measurable impacts : - The ocean cluster's direct and indirect contribution to the national economy may be approximately 26% of the GDP (Gross domestic product) - Wage terms in the ocean cluster are typically better than the national average and therefore fewer jobs support the wage aspect of the added value (traditional fisheries industry, profits are typically much greater than in other industries in the economy) - the ocean cluster directly or indirectly supports 15–20% of jobs in Iceland, or 25,000 to 35,000 jobs. - 2.250 direct jobs have been created due to the operations of companies connected with the fisheries sector thanks to the ocean cluster
	Policy Impacts	No direct policy impact
	Sustainability incomes	Direct and indirect jobs created, new companies and new services
	Synergies	Iceland Ocean Cluster helps companies from fishing and processing industry
Project's Supports	**Financial and technical support / Partners**	Several funding sources : Startup incubator renting (Ocean Cluster House), Industrial sector (ex : MATIS, private companies), R&D sector (ex : AVS Fund) ; "Horizon 2020" funds
	Origin	NC
	Funding amount	NC, variable
	Type of collaboration	NC, variable
	Additional commentary	
	Bibliographic Resources	Iceland Ocean Cluster, 2013. *The Importance of the Ocean Cluster for the Icelandic Economy.* Íslandsbanki, Kirkjusandi, 155 Reykjavík, Iceland.Tel.: 440 4500 Cluster official website : http://www.sjavarklasinn.is/en/

ANNEX VI: PROJECT 2 - MEXICO

		PROJECT 2
Key facts / Presentation of the Project	**Project Name :**	**The Fish Production Cooperative Societies of Cozumel and Vigía Chico**
	Last of the project :	Still in progress
	Founded date :	1960's
	Location :	**Cozumel, Mexico (AMERICA)**
	Beneficiaries :	Cooperative members (128 members) and their families
	Environment (Main Keys Habitat / species targeted)	Sian Ka'an Biosphere Reserve -a national park and UNESCO World Heritage Site- (focus on Caribbean spiny lobster -Panulirus argus- and Lionfish).
Context	**Problem statement**	Prior to formation of the cooperatives : - No clear rules were in place to regulate marine resource access and use - Free-for-all manner fisheries (often leading to overharvesting, inefficiencies and resource conflicts) - Competition between lobster fishermen for the most productive 'shadows' - No method in place for subdividing fishing areas in an equitable manner (led to conflict and disharmony in the fishermen community) - a similar organizational vacuum for the sale and marketing of marine products
	Issues categories	
Intervention logic of the project	**Objectives**	General operating objectives : - develop sustainable fishing practices in the state of Quintana Roo (introduce new adequate fishing gear/technology, involve fishermen in marine ressources management) - improve market supply chains in a manner that benefits local fishermen, - strengthen the fishing sector by bringing local fishermen together, - increase the abundance and diversity of endemic marine species, - raise awareness of internal and external fishing regulations (Develop environmental education, organize fishermen activities in cooperatives)
	Inputs	The scope of this project : - Adding value to fishery products (direct sales and/or short circuits, new products, processing, new marketing strategies, support to businesses) - Fishery Management improvement (involvement/promotion of management plans, synergies with FLAGS, Producers Organizations)

	Outputs (the entire value chain including capture, processing, trade,..) / **Results**	Main achievements : - Fishermen are organized in two cooperatives; - Fishermen adopt appropriate technology; - Fishermen are involved in resources management and in group decision-making (creation of designated lobster fields) - Members of each cooperative society have access to capacity building and training on marine resource management, financial planning and running a profitable fishery (consolidation of lobster marketing through Integradora de Pescadores de Quinana Roo) - Environmental education and training are also provided to local youth on the functioning and governance of the cooperative and the principles of responsible environmental stewardship.
	Local/External factors we need to consider (prevailing economic conditions and industry trends)	- Small scale fisheries - High risk of environmental disaster (like hurricane) - Highly dependent on the local market, very few abroad exportation - Tourism has a key economic role for both cooperatives communities
	Legal/administrative frameworks	
Project's Impacts assessment	**Biodiversity / Habitats Impacts**	By preventing overfishing and allowing marine species to reach adulthood = Positive effects on lobster populations and the wide variety of scaled fish that inhabit the waters of the Bay of the Holy Spirit and Ascension Bay
	Impacts on marine species, biodiversity	Main measurable impacts: - Reduction of bycatch (juvenil catch) with the creation of artificial shelters called lobster "shadows" to capture and keep alive the lobsters. - Additional benefit of protecting the lobster population from some of their predators. - Size limits are regulated to ensure only mature adult lobsters - Implementation of closed seasons / "seasonal no-take zones" (from March to June fishermen are prohibited from fishing for lobsters) - New targeted species (ex : Lionfish) : Promote marine biodiversity conservation by fishing overpopulate Lionfish species which has no predator to naturally control the population
	Impacts on Interaction /Competition between marine activities	NA

	Socioeconomic Impacts (fishing organisation / industries / value chain)	Main measurable impacts : - Combination of cooperative interventions (ex : harmonization of fishing regulations, collective marketing activities, and the adoption of locally appropriate technology) - obligation for fishers members to deliver their catch to the cooperative collection center for measurement and merchandizing = ensured uniformity in lobster and other marine resource prices, helped eliminate the practice of illegal lobster sales - Co foundation (with 4 others cooperatives) of a collective platform for marketing sustainably harvested lobster to retailers in the hospitality industry - Both cooperative fishing societies operate a rotating fund (a "community trust fund" endowed by individual cooperative members and external donors). These funds allow individual fishermen to purchase upgraded equipment and technology (ex : lobster "shadows") and also provide a social service function, giving fishermen a financial buffer in times of financial difficulty, resource scarcity, and natural disasters. - Workshops cooperative implementation : emphasize the biological and economic importance of respecting closed seasons and sanctuaries, and educate community members on the legal size lobsters must be when they are caught - The cooperatives have been active in promoting the lionfish as an edible species that can be sold in local markets and which can provide local fishermen with a viable economic alternative - Diversifying local and economic activities = Ecotourism, with the creation of 4 tourism cooperatives (source of employment and income) directly linked to the fishing cooperatives
	Policy Impacts	Lobster fields and resource mapping: - assignation of a territory (exclusive rights to fish) for individual or small groups of fishermen (community based regulatory systems that control and administer access and use) = increased efficiency and reduced conflicts. - Information collected through community mapping is inputted into a central database, which helps to harmonize fishing practices in the Bay of the Holy Spirit and Ascension Bay
	Sustainability incomes	- High resilience face of natural disasters (ex : Hurricane Wilma in 2005) thanks to cooperative organisation and collective abylity to react and help local fishermen. - The cooperatives source out management of their incomes and expenses to a private accounting firm to ensure the sound and effective handling of its financial affairs. - Consolidation of lobster marketing through Integradora de Pescadores de Quinana Roo has provided an additional mechanism for ensuring the long-term sustainability - Development of a direct market supply-chain link to the ecotourism and hospitality industries, providing a predictable and consistent demand for lobster products.
	Synergies	Good practices are exchanged between both cooperatives members Cooperatives have fomented partnerships with several research centers in the region (ex : monitoring and evaluation and ecological assessments) : Fisheries Department of the Southern Frontier School College, CINVESTAV, …

Project's Supports	**Financial and technical support/Partners**	Fish Production Cooperative Societies of Cozumel and Vigía Chico Equator Initiative Environment and Energy Group (technic support) United Nations Development Programme (funding via GEF-Small Grants Programme)
	Origin	1960's : Cooperatives foundation 2001 : independent grants from the UNDP implemented GEF-Small Grants Programme (SGP) to expand upon and improve their lobster fishing practices within the Sian Ka'an Biosphere Reserve 2005 : grant from SGP (for USD 30,000) to implement similar marine resource management tools: lobster shelters, fields and a comprehensive database
	Funding amount	GEF-Small Grants Program = USD 30 000 (2001) + USD 30 000 (2005)
	Type of collaboration	NC
	Additional commentary	
	Bibliographic Resources	United Nations Development Programme. 2012. *Fish Production Cooperative Societies of Cozumel and Vigia Chico. Equator Initiative Case Study Series*. New York, NY. FISHINMED, 2013. *SMALL SCALE FISHERIES MULTI-FUNCTIONALITY BEST-PRACTICES. Part I.* The GEF-Small Grants Programme *(http://94.126.173.140/index.cfm)*

ANNEX VII: PROJECT 3 - AUSTRALIA

		PROJECT 3
Key facts/Presentation of the Project	**Project Name :**	**Environmental Management System for the Western Australian South Coast Estuarine Fishery**
	Last of the project :	Still in progress
	Founded date :	Since 2005
	Location :	**South Coast Natural Resource Management, Western Australia (OCEANIA)**
	Beneficiaries :	South Coast Licensed Fishermen’s Association
	Environment (Main Keys Habitat / species targeted)	Thirteen estuaries found along the south coast of Western Australia
Context	**Problem statement**	The South Coast Estuarine Fishery (SCEF) is one of the oldest fisheries in Australia (late 1800‘s). - Commercial fishers have come under increasing pressure from other resource stakeholders, including recreational and conservation groups, in relation to their use and access rights to Western Australia‘s southern estuaries. - Degradation of fishermen's image
	Issues categories	Commercial fishers have failed to properly educate and involve the broader community on issues relating to their fishing practices. Absence of a coordinated and planned approach at an industry level
Intervention logic of the project	**Objectives**	Action Plan : - Objective 1. Protect and preserve south coast estuarine fishing activity to maintain a viable and environmentally sound fishery. - Objective 2. Ongoing maintenance of fish stocks through continual improvement, assessment and development of sustainable fishing practices. - Objective 3. Protection and enhancement of South Coast estuaries and their catchments - Objective 4. Improve and maintain public image and community relations.
	Inputs	The scope of this EMS is limited to : 1. Environmental aspects of commercial fishing operations of WA‘s South Coast Estuarine fishers. 2. Social aspects of commercial fishing operations of WA‘s South Coast Estuarine fishers.
	Outputs (the entire value chain including capture, processing, trade,..) / **Results**	Main achievements: - 2012 : Publication of "The Estuarine and Beach Fisheries of the Western Australian South Coast: Culture, History and Management". - 2008 : The development and implementation of the "Fishute" (discard chute, improved the survival rates of discarded fish) - Ongoing : Association representation on catchment groups (fishers have been involved on the South Coast NRM committee about resource management) - Ongoing : Participation at local community fairs with informational displays (promote the fishery in the Albany Seafood Festival) - 2006 : Development of the Code of Practice for South Coast Estuarine Fishery, and information brochure (useful tool in promoting how the South Coast Estuarine Fishery operates)
	Local/External factors we need to consider (prevailing economic conditions and industry trends)	Small fishing activity : The total reported landings from the south coast estuaries in 2010 season was 223 t fin fish. The SCEF is currently managed under the South Coast Estuarine Fishery Management Plan 2005 (Fish Resources Management Act 1994). Catch and effort in the fishery is managed by input controls including limited entry, gear controls and spatial and temporal restrictions. Spatial and Temporal Restrictions for fishing in the 13 estuaries Commercial fishermen of the SCEF have in place a Voluntary Code of Practice.
	Legal/administrative frameworks	

Project's Impacts assessment	**Biodiversity / Habitats Impacts**	Stakeholders Workshops action plan results : - public awareness campaign to reduce the impact of other "estuary" users
	Impacts on marine species, biodiversity	Stakeholders Workshops action plan results : - Development and implementation of discard chute/swim tank to improve the survival rates of discarded - Maintenance of current low level bycatch, on-going monitoring and develop communication response in the event there is an unusual circumstance evolving
	Impacts on Interaction /Competition between marine activities	Industry and stakeholders Workshops action plan results : - Develop a Code of Conduct as part of a broader Code of Practice detailing public engagement protocols - Community engagement and education program - Better management of recreational fishing effort (develop a joint approach to managing the resource) - Better control upstream water flows and water access rights.
	Socioeconomic Impacts (fishing organisation / industries / value chain)	Industry and stakeholders Workshops action plan results : - action to protect commercial fishing access rights from further reductions - action to reinstate transferability of commercial fishing licences to help arrest the economic decline of the fishery - action to to provide economic relief to fishermen in relation to soaring fuel costs (extending fuel subsidies and rebates to the fishing industry) - Action to demonstrate the economic, social and historical importance of the fishery to the south coast region (creation of a "Industry Heritage" Book) - Improving public image of the fishery through educational brochures distributed to the public and through promotional activities
	Policy Impacts	Industry and stakeholders Workshops action plan results : - Better management of recreational fishing effort (develop a joint approach to managing the resource) - Better control upstream water flows and water access rights
	Sustainability incomes	The benefit for commercial fisheries in developing an Environmental Management System (EMS) : providing an organised, documented and coordinated approach to improving and demonstrating the environmental performance of the industry
	Synergies	
Project's Supports	**Financial and technical support / Partners**	EMS Developer : SCEF fishermen EMS financial and technic support : - OceanWatch Australia (co funding) via the SEANET program - Pelagicus Fisheries Research and Compliance (technical assistance) - Fisheries Research and Development Corporation (technical assistance) - Western Australian Fishing Industry Council (WAFIC) - The Federal Government
	Origin	OceanWatch Australia (national not-for-profit environmental company) was initially responsible for securing and funding these EMS program (2007), helping fishers develop action plans to address high-risk activities impacting on sustainability.
	Funding amount	NC
	Type of collaboration	NC

Additional commentary	EMS will achieve two primary objectives : - SCEF fishermen will able to show the community exactly what it is that they do thus dispelling any myths or misunderstandings which decry their fishing practices, - this EMS will provide the fishery with a platform from which it can improve its practices and procedure so that its impacts on the environment can be further minimised. EMS is an adaptive tool that responds to environmental, social and economic perturbations in the fishery, and requires periodic review to ensure its relevance to the fishery and local community.EMS operates beyond an ecological context to include the economic and social dynamics affecting industry.
Bibliographic Resources	WAFIC, 2013. *A Four Part Project to Improve Management Practices to Optimise Sustainability of Commercial Fishers in the South Coast NRM Region.* http://www.oceanwatch.org.au/

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