

Executive summary

Introduction and methodology of the study

This study aims to analyse and collect economic and social data to assist DG MARE in assessing the impact of future policy orientations and to provide information for policymakers on the potential economic and social impact of different policy options, as well as the cost effectiveness of these. This will enable DG MARE to take more informed decisions about future policies.

In the European Union, both marine fishing and aquaculture are heavily regulated sectors. Consequently, a considerable amount of data is collected about the primary sector, e.g. the species caught or produced, employment, income generated and other sector-specific indicators. However, much less is known about the activities ancillary to marine fishing and aquaculture, including their contribution to the local and national economies. Therefore, this study aimed to analyse the economic importance of these activities, taking into account both upstream and downstream activities up to the first point of sale.

In addition, the study identifies the most important trends in this sector and places them in the context of the primary sectors of marine fishing and aquaculture. To obtain a better understanding of the underlying data, different segments¹ and subsectors of marine fishing and aquaculture were also considered, as were data and key trends in the sector complementary to marine fishing and aquaculture in order also to assess the economic importance of this sector. Finally, this study also researched the economic importance of other sectors closely related to marine fishing and aquaculture, namely shellfish gathering, inland fishing, ice fishing and the seaweed industry.

While the research into marine fishing and aquaculture focused on the economic importance of the sector ancillary and complementary to marine fishing and aquaculture, given the size of these sectors, the work on other sectors focused on the economic importance of the primary sector.

To fulfil the objectives of this study, different methods were used. First, desk research was carried out to collect all the available data published in literature, (commercial) databases and other relevant sources in all 28 Member States of the European Union. The desk research took into account all the official languages of the European Union. Second, a questionnaire was sent to relevant organisations in order to collect national and regional data. This ensured that data that is not publicly available (for instance in grey literature) was also collected. Third, 73 case studies were carried out to obtain quantitative data on employment, income and profit rates, as well as more qualitative data related to other socio-economic characteristics (e.g. male-female distribution, paid/unpaid labour, age levels, education levels, professional qualifications and working experience) and trends.

The data collected on the sector ancillary to marine fishing and aquaculture was extrapolated to estimate the economic importance of this sector at different levels: the European Union as a whole, individual Member States and at regional level. In addition, to the extent possible, estimates were made for each segment and subsector identified for both 2009 and 2014 to capture the evolution of these sectors over time.

Finally, the EU results were put in perspective by conducting desk research on six OECD countries outside the European Union.

Scope of the study and definitions used

Given the fact that many activities and sectors are either directly or indirectly linked to the primary fishing industry, it is important to clearly define the ancillary industry. In this study, all activities *up-to the first point of sale* that are directly linked to the primary sector are taken into account and therefore considered ancillary activities. Example activities are activities related to the servicing of equipment and/or vessels, activities related to the sale of fish, supplies for operations and R+D+I services. Processing industry is not included in the scope of the present study.

¹ For marine fishing, three segments have been defined: small-scale fishing, industrial fishing and long-distance fishing. For aquaculture four segments have been defined: marine finfish aquaculture, trout freshwater aquaculture, other freshwater aquaculture and bivalve aquaculture.

When looking at complementary activities, the activities taken into account are those that are undertaken by marine fishermen or fish farmers in addition to their core business as well as activities whom have replaced their core business and have no link to commercial marine fishing or aquaculture (e.g. pesca tourism, guardians of the sea, educational services, et cetera).

What is worth noting is that the ancillary services that companies provide themselves have not been taken into account in measuring the economic importance of the ancillary industry. In other words, when a company in addition to their activities in the primary sector also maintains its own equipment and vessels, sorts the fish and does its own management, data on these activities have not been included. Furthermore, data gathering was focused on specific regions or ports within the EU and therefore ancillary providers that are located outside the EU are out of scope of this study.

The sector ancillary to marine fishing

In marine fishing, the primary sector employed around 123,000 FTE and generated income of some EUR 6.8 billion in 2009 and around 109,000 FTE generating income of some EUR 7.0 billion in 2014. The sector ancillary to marine fishing – taking into account the activities in scope of this study – the corresponding figures were 35,000 FTE and EUR 2.8 billion of income in 2009 and 36,000 FTE and income of EUR 2.5 billion in 2014. In other words, the ancillary sector is around one-third of the size of the primary sector in terms of both employment and income generated.

Most of the employment and income generated in the ancillary sector relates to the servicing of equipment and/or vessels. This accounts for around 57% (53%) of employment (~19,500 FTE) and 41% (44%) of income (~EUR 1.1 billion) in 2009 (2014). Other large sources of income and employment are activities related to the sale of fish (about 20% (24%) in terms of employment and 23% (25%) in terms of income in 2009 (2014)) and supplies for operations (about 17% (16%) of employment and 34% (28%) of income in 2009 (2014)). R+D+I services are clearly the least represented subsector in marine fishing, accounting for around 7% (6%) of employment and only around 3% (3%) of income in 2009 (2014).

Looking at individual Member States, Spain, Italy and Greece seem to be the Member States where the ancillary sector is largest in terms of employment (about 65% of total estimated employment in the ancillary sector). Spain and Italy account for 45% of total estimated income in the ancillary sector². These Member States are followed closely by France and the United Kingdom.

Three different segments were identified in marine fishing, each with their own characteristics: i) small-scale fishing, ii) industrial fishing, and iii) long-distance fishing. Ancillary employment related to small-scale fishing is estimated to have been around 15,000 FTE in both 2009 and 2014, while income is estimated at EUR 206 million in 2009 and EUR 303 million in 2014. The ancillary employment estimate related to industrial fishing for both years is 18,500 FTE, generating around EUR 2.4 billion in income in 2009 and EUR 2.0 billion in income in 2014. For long-distance fishing the ancillary employment is estimated at 2,000 FTE in 2009 and 1,487 FTE in 2014, generating EUR 206 million and EUR 251 million respectively. Clearly, long-distance fishing is the smallest segment in the European Union, while the industrial segment seems to employ a slightly higher number of FTE compared to small-scale fishing.

Employment numbers in the ancillary sector were essentially stable between 2009 and 2014, even though employment in the primary sector decreased significantly in this period. This is clear evidence that employment in the ancillary sector was quite resilient relative to the primary industry, i.e. the ancillary sector does not seem to be affected by a decrease in the primary sector. The same is not true of income in the ancillary sector, where the main explanation in the decrease in income from some EUR 2.8 billion in 2009 to some EUR 2.5 billion in 2014 appears to lie in a combination of decreased fishing opportunities and increased running costs (mainly due to increasing fuel prices between 2009 and 2014). Moreover, the economic crisis in the EU as a whole has decreased access to finance and slowed investments.

Overall, this has put pressure on ancillary companies' income without this so far resulting in a decrease in the level of employment. Two key trends in the ancillary sector largely account for this. On the one hand, ancillary companies are trying to reduce their dependence on local marine fishing by providing services to other regions within the same Member State, to other Member States and to the rest of the world, and on the other, they are providing services to other sectors, such as agriculture and other land-based and offshore industries (e.g.

² No data on primary income was available for Greece, so no estimates on ancillary income could be made.

oil and gas). Overall, ancillary companies are nevertheless still influenced by the primary fishing industry, albeit to a smaller extent.

Another trend in the ancillary industry relates to innovation. Innovation has become of increasing importance to the primary sector; new legal requirements and the need for efficiency has increased the demand for new, safer, and more efficient technical equipment and vessels. This has also had a clear impact on ancillary companies as they are increasingly investing in new technologies to meet this evolving demand. This has also had an impact on the education level of the employees found in the more technically oriented positions in the ancillary sector.

Looking at other socio-economic characteristics, gender distribution is weighted towards males, reflecting the balance currently generally found in the type of most technical job profiles in the ancillary sector. The jobs seem mostly to involve paid labour. The only exceptions were found in companies providing ancillary services only to the local small-scale fishing fleet. These are family-owned business with active involvement of unpaid family members. While the use of foreign labour is quite significant in the primary sector, this seems to be less of a factor in the ancillary sector. Most employees are local people with years of experience working in the ancillary sector.

Both the primary and the ancillary sector seem to be facing a struggle with the ageing of the workforce. The fishing industry – the primary and ancillary sector – appear to have limited appeal to younger people. The work is physically demanding and the prospects for the sector as a whole are uncertain (e.g. falling fishing opportunities and economic uncertainty in general). Younger people prefer to seek employment in industries that provide ‘safer’ employment. This could change. Professional educational programmes are being established and the industry in general is becoming more technology-dependent. Thus, education levels in the industry are rising because it requires deeper knowledge of (new) technology.

The sector ancillary to aquaculture

In 2009 and 2014, the sector ancillary to aquaculture employed some 19,000 and 24,500 FTE respectively, generating EUR 2.8 billion in 2014³. The largest segment in terms of employment was ‘other’ freshwater aquaculture (i.e. all freshwater aquaculture except trout). This provided more than half of all ancillary employment in 2014.

Looking at the division of employment over the different subsectors identified in aquaculture, three subsectors each provide around 30% of the ancillary employment, namely activities related to servicing of equipment and/or vessels, supplies for operations, and activities related to the sale of fish. Traditionally, feed is one of the most important ancillary activities in aquaculture. This is why activities related to the supplies for operations are so important, also in terms of income, where about half the total income generated is related to supplies for operations.

With respect to activities related to the servicing of equipment and/or vessels, employment seems to have more than doubled in 2014 compared to 2009. The explanation seems to be that more and more aquaculture firms want for specialised and highly technical equipment, leading to an increase in employment in this subsector.

Looking at individual Member States, it is clear that the United Kingdom, Italy and Spain are those with the highest employment and income levels in the sector ancillary to aquaculture, where in terms of income, also Greece is an important Member State. The overall part-time ratio in this sector is estimated to be between 0.1-0.2, indicating that there is much more full-time employment in the ancillary sector compared to the primary aquaculture sector, where the part-time ratio is around 0.5. Work in the ancillary sector is much less seasonal and it is therefore easier to plan and maintain a stable number of employees. As ancillary companies have diversified their activities into many other sectors, this also provides a more solid basis for full-time working opportunities.

The gender distribution in the ancillary sector, seems to have an equal distribution of male and female employees in activities related to R+D+I services and pre-sale activities, while for activities related to the servicing of equipment and/or vessels and activities related to supplies for the operation, the jobs are mostly done by men. This can largely be explained by the nature of the work. The servicing of equipment and/or vessels and activities related to supplies for operations are require more physical strength and therefore have

³ Unfortunately, too little data was available to make a reliable estimate for 2009.

traditionally been done by men. Most ancillary services are provided locally and, thus, the majority of the workforce in ancillary services is made up of local people.

Looking at the profitability of this sector, most services seem profitable. However, the extent of the profitability depends on the type of service. Production and provision of feed (where there is increased competition) and the supply of fuel (a commodity) have low profit rates of 2-4%. Far higher profit rates are seen in supplies of technical equipment, where companies show profit rates of 10-30%.

Historically, the majority of the employees in both the primary and ancillary sector have low levels of educational achievement. As the production process within aquaculture becomes more and more technologically sophisticated, with more technology needed in order both to comply with stricter (environmental) legal requirements and accommodate the desire to produce more efficiently, more technical know-how is required in the ancillary industry. This has already resulted in increasing education levels in recent years. Most jobs in this sector provide a great starting point for younger people with no or limited working experience. While most services are highly specialised, until recently, no educational programmes targeted the primary and ancillary aquaculture sector and thus learning and working experience could only be built on-the-job.

There are a number of important trends in this ancillary industry. First, there is more specialisation in services that require technical know-how, such as activities related to the servicing of aquaculture equipment and installations. It is mostly larger companies, often operating on a European or global scale, that provide these specialist services. They can afford to make ongoing investments and innovate. These companies have diversified the number of regions which they serve. Second, there is a tendency for ancillary providers of feed to be larger. Economies of scale drive growth and these companies also operate on a European or even global scale. Third, companies performing ancillary services that are provided locally, such as pre-sale activities, and maintenance and repair, are tending to diversify their activities to other sectors. They do this to decrease their overall dependency on the aquaculture industry, where many ancillary companies now seem to serve other sectors such as agriculture, the construction sector or even tourism. The end-effect of this diversification into other regions and sectors make the ancillary sector more resilient with respect to shocks in the primary aquaculture sector.

Complementary activities

Complementary activities are those undertaken by (ex-)fishermen or (ex-)fish farmers in addition to their core business and the activities of those who have replaced their core business and have no commercial link to commercial marine fishing or aquaculture. Many projects have received European Fisheries Fund (EFF) support to diversify out of the industry. Thirty projects funded under the EFF were identified that have generated at least 64 jobs⁴. There are thought to be far more projects in reality, since not all projects have communicated as widely as the projects included in this study. Hence, the impact of projects funded under the EFF can be thought to be greater than these figures suggest.

Overall, nevertheless, the sector complementary to marine fishing and aquaculture is only of limited economic significance relative to the primary sector and the ancillary sector. In fact, the activities are often not professionally organised. They do seem to be generating some income, but this is still marginal, both for aquaculture and for marine fishing. Employment is also limited, given that most activities are carried out by the fishermen or the fish farmers themselves without hiring additional employees. Nevertheless, these activities seem to be slowly growing over time, and some fish farmers and fishermen feel complementary activities are a welcome source of (additional) income.

Looking specifically at aquaculture, there is a tendency for complementary activities to be mainly initiated by the aquaculture companies themselves. These complementary activities mostly involve experiencing the product, via guided tours, tastings, restaurants and local shops. In marine fishing, most complementary activities involve guided tours and fishing trips.

⁴ However, not all projects report on jobs generated.

Other sectors

During this study, four other (smaller) sectors that have a close link to marine fishing and aquaculture were researched (i.e. inland fishing, ice fishing, shellfish gathering and the seaweed industry). Overall, this provides a better overview on the economic importance of the primary industry of these sectors to the European Union.

Inland fishing

Commercial inland fishing has been in decline since the 1980's. In 2015, there have been between 14,000 and 15,000 vessels operating in commercial inland fisheries. Total catch volumes are estimated at 35,000 tons (1% of the total production of EU fishery products), generating EUR 100-110 million (1-2% of the total value of EU landings). This sector employs some 17,100 commercial inland fishermen operating within the EU (the equivalent to approximately 13% of the total number of fishermen in the European Union).

Most inland fisheries seem to supply local traditional demand and niche markets, and often have cultural value for local communities. Romania, Bulgaria, Italy and the United Kingdom seem to have the highest levels of employment in this sector (based on 2011 data). Legal requirements can have a particularly significant impact on the attractiveness of the sector. Hungary is to ban inland fishing, while Finland is regulating the minimum length of the fish caught.

Ice fishing

Ice fishing is a popular activity when ice covers the usual fishing grounds of large lakes and rivers. Ice fishing is primarily practiced in the north of Europe, and more specifically in the Baltic States, Finland and Sweden from November to March. Ice fishing is both a commercial and tourism/recreational activity, but is most important for the latter; little significant commercial ice fishing activity has been found. However, the importance of ice fishing as a recreational activity is expected to increase in future.

The seaweed industry

Europe is only a small player in the seaweed industry. Production remained stable above 350,000 tons until 2000 and has been decreasing ever since.

The European seaweed industry consists of (mechanical and manual) harvesting of seaweed and seaweed aquaculture. France and Ireland dominate the European mechanical harvesting of seaweeds. In Spain, seaweed harvesting is manual. Seaweed aquaculture is in an experimental phase in the European Union, with low volumes and resistance from (local) communities.

Overall, however, there is potential for both wild harvesting and aquaculture to grow, as there is an undersupply of seaweed in Europe. Whether this increasing demand will in fact stimulate European production or imports is still unclear.

Shellfish gathering

Shellfish are gathered in intertidal areas (coastal zones), and rivers or lakes both for commercial and recreational purposes. This activity is mainly found in Spain, Portugal, France, the Netherlands, Denmark and the United Kingdom. The main species gathered are abalone, clams, cockles, crab, crayfish, lobster, mussels, oysters, and scallops. Looking at Spain specifically, the sector is estimated to employ some thousands of shellfish gatherers working on foot. In other countries, shellfish gathering generates much less employment.

In the Netherlands and Andalusia in Spain, the gatherers are mainly men. In the Spanish region of Galicia, more than 90% are women, often fishermen's wives, who gather on foot, while male shellfish gatherers work from small-scale vessels.

Overall, shellfish gathering is important for specific local communities, but the economic importance of this sector is limited, both in terms of income and employment generated.

Other OECD countries

To put findings about the ancillary sector in the European Union into perspective, a comparison was also made with six OECD countries (Canada, Iceland, Japan, New Zealand, Norway and the United States). The findings were in line with the findings from the desk research in the European Union; the ancillary employment and income multipliers seem to lie between 0.5 and 1.0, both in marine fishing and in aquaculture (i.e. one

fishermen or fish farmer active in the primary industry is estimated to generate between 0.5 and 1.0 FTE in the sectors ancillary to marine fishing and aquaculture). Although this is slightly higher than the multipliers found in the case studies, it is similar to the results of the desk research on the European Union. The difference seems to be mainly the result of differences in the method and definition applied during the collection of multipliers. This appears to be especially true of downstream activities, where the definition seems to go beyond the first point of sale (e.g. retail, secondary processing, etc.), while this study only goes up and until the first point of sale.

The multipliers in aquaculture seem to be higher than those found in marine fishing, albeit marginally. This finding is also consistent with the findings collected in the European Union. In terms of the dependence on and overall resilience of the ancillary sector relative to the primary sector, the findings also seem to be in line with the findings collected in the European Union. In some local communities, dependence on the primary industry can be quite significant, but dependency decreases when services can be easily transferred to other sectors and regions or countries.

Usability of findings of the study and recommendations

This study provides insights into the economic importance of the *sector ancillary to marine fishing and aquaculture*. It provided estimates on the size of employment and income generated in this sector, as well as its subsectors and segments, at EU, Member State and regional level. Overall, these quantitative figures can be used to improve assessments of the effectiveness of European Maritime and Fisheries Fund subsidies in relation to marine fishing and aquaculture.

In relation to the other four (smaller) sectors (i.e. ice fishing, inland fishing, the seaweed industry and shellfish gathering), this study provides insight into the economic importance of the *primary sector*. Although not much quantitative and qualitative data is available for these sectors, this study provides some estimates. It has identified potential for the seaweed industry to develop as demand for seaweed is increasing in the EU.

Finally, this study also researched the economic importance of activities complementary to marine fishing and aquaculture undertaken by (ex-)fishermen and (ex-)fish farmers. It proved difficult to collect data on this industry, since data is mostly collected within wider tourism statistics with little or no link made with marine fishing and aquaculture. Nevertheless, based on the anecdotal evidence collected, this complementary sector seems to be expanding. More fishermen see the potential of tourism trips as an adjunct to their fishing activities. In aquaculture as well, more and more fish farmers are engaging in activities promoting the fish or in tourism, albeit on a small scale. Overall, these activities still do not seem to be generating much additional employment or income, as they are mainly carried out as promotional activities by the fishermen or aquaculture firms themselves. Hence, although the industry has potential, its economic importance is still limited.

In general, ancillary activities related to fishing – marine fishing and aquaculture – are still for a large part dependent on the primary sectors in scope of this study. Therefore, it is recommended that policy makers should always include ancillary activities when decisions are made that impact the primary sector. In this way, the total effects of a decision on the complete supply chain are taken into account. In the same sense, it would also be recommended to collect data about the ancillary sectors on a more structural basis. Overall, data collection on the ancillary sector is still limited, while it can thus add significant value to policy-making. Therefore, data gathering by local or regional governments should be better equipped to facilitate the process of decision-making on data collected from both the primary and the ancillary sector.

In addition to the above, some more specific recommendations can be made as a result of this study:

- The sector complementary to fishing and aquaculture shows significant potential. Some local initiatives, especially related to tourism, have already created significant value for local communities. Some of these initiatives have been financed by the EFF in the 2007-2013 period, but the EC can strengthen the use of EMFF to these initiatives for the 2014-2020 period and to consider them on future financial instruments if possible. Complementary activities create work and income opportunities for women, whom are mainly active in this industry. At the same time, these complementary activities also provide more income and employment in other (touristic) sectors. An example is found in ice fishing. Although this is still a small-scale activity in terms of income and employment, it is an important activity to attract tourists to specific regions. The same applies for complementary activities in for example France, where local gastronomy in ports attracts many tourists to certain regions.

- The seaweeds aquaculture industry also has significant potential. Seaweeds aquaculture is still in the experimental phase while the demand for seaweeds products is increasing. Further stimulation from the EC via for instance the EMFF can speed up developments and increase the maturity of this industry, providing more income and employment opportunities.
- Technology and innovation already play an important role in the fishing industry, where it is increasingly being used to increase the effectiveness and the efficiency of primary activities. This is also seen as an opportunity for the ancillary sector, delivering much of these equipments to fishermen and fish farmers. The EC has the opportunity to further increase the level of technology and innovation by stimulating its use via for instance the EMFF. In the end, this will create opportunities for ancillary companies and will benefit the primary sector significantly.
- Furthermore, the EC can also stimulate the development of initiative related to education. Since the fishing industry – the primary sector and the ancillary sector – is increasingly becoming technology-dependent, higher education levels are being required by companies active in the industry. However, education opportunities that are directly related to fisheries are only available to a limited extent. Investing in these kinds of initiatives, will also attract more younger people to the industry, which is vital given the relatively old age of the workforce in the primary and ancillary industry.