Lot 4: Impact Assessment Studies related to the CFP

Regional social and economic impacts of change in fisheries-dependent communities

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Regional social and economic impacts of change in fisheries-dependent communities

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Acronyms

ACFM	Advisory Committee on Fishery Management
AER	Annual Economic Report
CFP	Common Fisheries Policy
DG MARE	Directorate-General for Maritime Affairs and Fisheries
EFF	European Fisheries Fund
EEZ	Exclusive Economic Zone
EU	European Union
FIFG	Financial Instrument for Fisheries Guidance
FLAG	Fisheries Local Action Group
FTE	Full Time Equivalent
GDP	Gross Domestic Product
GFCM	General Fisheries Commission for the Mediterranean
GT	Gross Tonnage
GVA	Gross Value Added
ICES	International Council for the Exploration of the Sea
ITQ	Individual Transferable Quota
IUU	Illegal, Unregulated and unreported
KW	Kilowatt
LTMP	Long term management plan
MAGP	Multi-annual Guidance Programme
MAMP	Multi-annual management plan
MS	Member States
MSY	Maximum Sustainable Yield
PO	Producer Organisation
SSB	Spawning Stock Biomass
STECF	Scientific, Technical and economic Committee for Fisheries
TAC	Total Allowable Catch
VA	Value Added

1 Introduction

With Axis 4 of the EFF, Common Fisheries Policy has widened its scope to address socio-economic development of local and regional communities depending on the fisheries sector. However, there is currently a scarcity of knowledge about how policy changes (both within the sector and more widely) have affected coastal communities dependent on fisheries in recent years, how important other factors have been as drivers of change, or indeed how communities have adapted and responded to change. This study explores such issues.

The main aims of the study were:

- To review current statistical data and socio-economic indicators for EU fisheries regions.

- To support the discussion about the future CFP, in particular as regards future financial support for the purpose of coastal development.

In completing this the study team compiled existing statistical data and socio-economic indicators for 24 case study locations to provide a broad picture of economic and social impacts on local and regional coastal communities brought about by the fisheries sector, disaggregated into catching, processing, support services, and aquaculture sub-sectors. The case studies are interpreted within a coherent methodological framework to deliver a quantitative and qualitative assessment and description of the evolution over the last 10 years of a number of key social aspects.

The data collection exercise provides a basis for developing and delivering conclusions and recommendations related to the relative economic importance and profitability of fisheries, and for summarising and presenting information about the role of fisheries and other maritime-related activities, especially in areas highly dependent on the fisheries sector. Where it was possible to do so, the analysis identifies where there is potential for creating more value added in the fisheries sector and/or where there might be ongoing restructuring and/or diversification to other activities.

Further recommendations are drawn from the analysis that could inform policy initiatives, for example on public intervention.

Twenty-four case study locations were selected in agreement with the Commission to represent a diversity of communities within fisheries dependent areas across the maritime states of the European Union. This diversity includes differing conditions in the case study locations in terms of: development (increasing, decreasing and diversifying); size; population; dependency on the fisheries sector; and geography (e.g. mainland and island locations). While the deliberate selection of a diverse set of locations enhances the inclusion of different experiences and histories, to some extent it does reduce the ability to identify common elements and to draw conclusions that can be more widely applied. The final case studies that were selected are shown in Table 1 and their location is illustrated in Figure 1.

Table 1 Case studies selected for the assessment

No.	Region	Country	Specific location
1	Atlantic	United Kingdom	Stornoway
2	Atlantic	Ireland	Killybegs
3	Atlantic	France	Lorient
4	Atlantic	Spain	Celeiro
5	Atlantic	Spain	Costa da Morte
6	Atlantic	Portugal	Ria de Aveiro
7	Atlantic	Portugal	Peniche
8	Mediterranean	Spain	Carboneras
9	Mediterranean	France	Sète
10	Mediterranean	Italy	Oristano
11	Mediterranean	Italy	Mazara del Vallo
12	Mediterranean	Greece	Amvrakikos
13	Black Sea	Bulgaria	Burgas
14	Black Sea	Romania	Danube Delta
15	Baltic	Estonia	Lake Peipsi
16	Baltic	Latvia	Kolka
17	Baltic	Poland	Wladyslawowo
18	Baltic	Poland	Darlowo
19	Baltic	Germany	Rugen Island
20	North Sea	Denmark	Hirtshals
21	North Sea	Germany	Bremerhaven
22	North Sea	Netherlands	Urk
23	North Sea	Belgium	Ostende
24	North Sea	United Kingdom	Grimsby

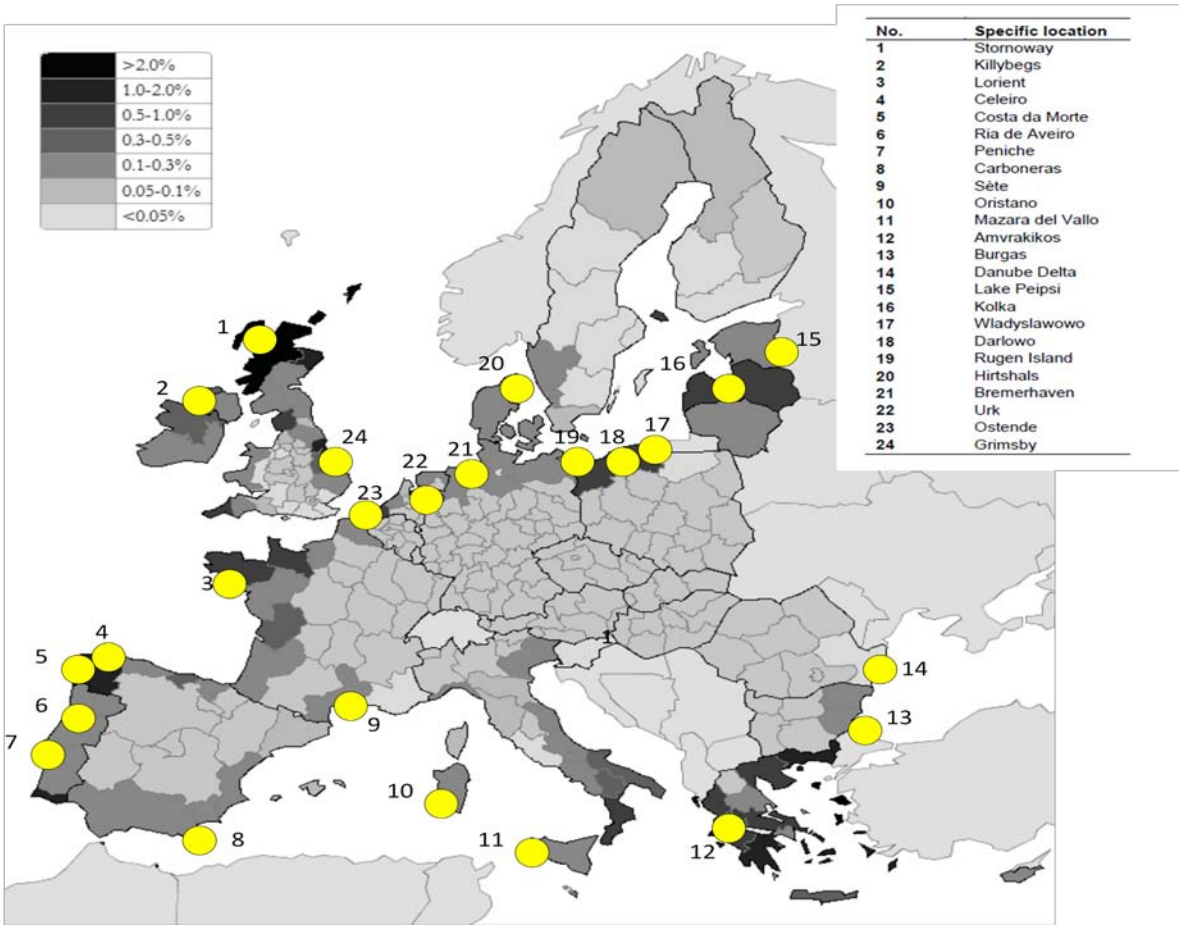

Figure 1 Case study locations and regional dependence on the fisheries sector.

Note: Throughout this report, maps presented use a base map sourced from analysis of fisheries dependency by Salz et al. (2006), showing different levels of dependency in shades of grey. We then add colour coded circles representing the case study locations.

1.1 Methodology

A challenge for this study was to find a consistent and robust approach to collecting information across 24 very diverse case study locations with varying levels of data availability, while at the same time ensuring consistent and robust outputs. This challenge was met through the development and testing of a framework and template for data and information collection to capture both quantitative and qualitative information (see Annex A). The methodology allowed for the collection of both quantitative data, as well as more qualitative elements through the use of interviews and focus group discussions with key informants.

The data collection template provided a checklist of issues to be covered with regard to local data collection, focussing specifically on recent trends and the current status of the case study locations. Stakeholders in the fisheries sector (e.g. POs, fishermen's associations and fish processors and exporters associations) and from the wider community were then consulted to explore perspectives and perceptions about reasons for these trends, and more qualitative issues around the development and diversification with the community over time, and the factors driving change. These focus groups sessions provided an opportunity to explore perceptions on the strengths and weaknesses of the community (and the local environment) that make the community (individually and collectively) more vulnerable or more able to adapt to change.

The framework and templates for data collection and reporting (see Annex A) were refined after testing in four of the case study locations (Stornoway, Costa da Morte, Lorient and Mazara del Vallo).

Data collection presented a number of challenges across the diverse set of communities, several of which did not correspond to statistical areas. Where this was the case alternative sources of data were sought. For the fisheries sector and economic data the figures provided in the report are for the most recent year (generally 2008 or more recent). For population and demographic data where there was a greater dependency on secondary sources the figures presented are the most recent available, which may vary between case study locations.

2 Results

This section summarises the results from across all the case studies. In terms of the degree to which these case studies contribute to EU fisheries as a whole, collectively the communities represent some 8% of the total EU fleet, landings and value, and around 11% of the total catching sub-sector employment (Table 2).

Table 2 Case study location contribution to EU catching sector

	Number of vessels	Catching sector employment	Volume of landings (tonnes)	Value of landings (Euro '000s)
Total from case study locations	6,610	16,196	337,615	529,823
EU Total	84,728	141,100	4,434,000	6,687,000
% of EU total	8%	11%	8%	8%

Source: Case study reports

The following sections provide a summary of the key similarities and differences across the case study communities. For more detail see the individual case study reports in Annexes B-F. Throughout this report trends will be presented using the map of fisheries dependency (Figure 1) to illustrate the trends in relation to dependency.

2.1 Comparison across the case study sites

The collection of quantitative information enabled cross-case study analysis of both situation and trends. These are provided below in sections that relate to the key characteristics of the selected communities.

2.1.1 Geography

Geographically the case study locations represent a diversity of situations. At the regional scale the locations include sites with access to more open ocean areas (e.g. Costa da Morte, Killybegs and Lorient) while others are situated in more enclosed areas such as the Mediterranean, Black and Baltic Seas. Four of the case study locations (Mazara del Vallo, Oristano, Stornoway and Rugen Island) were situated on islands and this has affected local development and history. The case study locations were selected for their diversity, and one aspect of this was the size of the locations to be included in the study. As the graph below indicates, the locations represented a range of sizes from 3,424 (Danube Delta) to 4 (Stornoway) square kilometres in area.

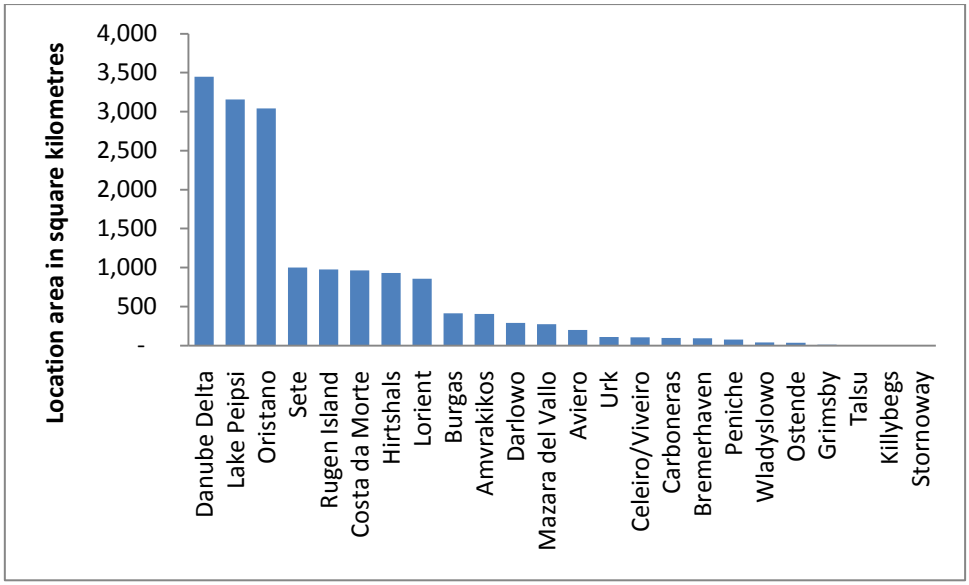

Figure 2 Area in km^2 of the selected case study locations.

The communities include a range of rural, peri-urban and urban locations. A number of the locations, such as Sète, Ostende and Lorient included a combination of urban and rural elements. The nature of the community is likely again to affect the employment opportunities and options for diversifying local economies.

While the majority of communities exploit marine resources (including shellfish, demersal, pelagic, migratory salmonids and other saltwater species), there are two communities (Lake Peipsi and the Danube Delta) where freshwater fisheries were more important than marine fisheries and freshwater fish made up part of the catch in Kolka as well. Overall, in relation to fish stocks, the location affects the opportunities to develop and diversify fishing activity, with some areas having a wider diversity and abundance of fish stocks than others.

In many cases the combination of political boundaries and migratory species mean that stocks are shared (e.g. some Mediterranean, Baltic and North Sea stocks). In the case of Lake Peipsi, the lake lies across the border between Russia and Estonia, requiring transboundary agreements. The nature of these stocks means that management requires collective action and cannot be addressed by the EU countries alone.

2.1.2 Demography

2.1.2.1 Population and population age structure

The communities selected for the study had an average population of just over 74,000, but varied considerably in size with the largest (Sete) having a population of 212,000 and the smallest, Kolka, a population of just 1,097 (Table 3). Only five communities (Carboneras, Killybegs, Stornoway, Hirtshals and Kolka) had fewer than 10,000 inhabitants. Figures on population density (see Table 3) also show considerable variations across case study locations, largely reflecting the different rural/urban nature of the locations, with more urban case study locations (e.g. Grimsby, Bremerhaven, Ostende and Stornoway) displaying higher population densities than other locations. The mean population density across all

case study locations was just 690 people/km^2, and demonstrates the generally rural or peri-urban nature of the case study locations[1].

Issues of ethnicity were also explored in the study, and the general finding across many case studies was one of relative homogeneity in each location, but with important small concentrations of 'foreign' populations in almost all communities. Typically in Northern European countries these immigrants come from Eastern European countries, while in Mediterranean countries they tend to originate from North Africa. In a number of cases these immigrant populations are finding employment in the fishing sector (e.g. Mazara del Vallo).

Table 3 Total population in the case study communities, and population density

Location	Total population (population density/km^2)	Location	Total population (population density/km^2)
Sète	246,539 (247)	Peniche	28,656 (370)
Lorient	212,000 (248)	Lake Peipsi	27,000 (9)
Oristano	167,941 (55)	Darlowo	21,698 (75)
Bremerhaven	114,177 (1,217)	Urk	18,318 (168)
Grimsby	87,400 (8,740)	Celeiro/Viveiro	16,234 (155)
Costa da Morte	82,734 (86)	Wladyslowo	15,059 (384)
Aveiro	72,919 (366)	Danube Delta	13,694 (4)
Ostende	69,000 (1,854)	Carboneras	7,964 (84)
Rugen Island	66,872 (69)	Hirtshals	6,268 (7)
Amvrakikos	60,097 (148)	Stornoway	5,740 (1,435)
Burgas	52,868 (128)	Killybegs	2,257 (376)
Mazara del Vallo	51,385 (187)	Kolka	1,097 (157)

Notes: Mediterranean case studies in blue, Atlantic in purple, Baltic in red, Black Sea in yellow, and North Sea in green.

The case study locations exhibited different population trends, even within nearby communities (e.g. Celeiro and Costa da Morte), as shown in Figure 3. Taking all 24 case study locations, roughly equal numbers of case studies display population trends that are increasing, decreasing and remaining static.

[1] Major European cities for example generally display population densities of between 2,000 and 5,000 per square kilometer

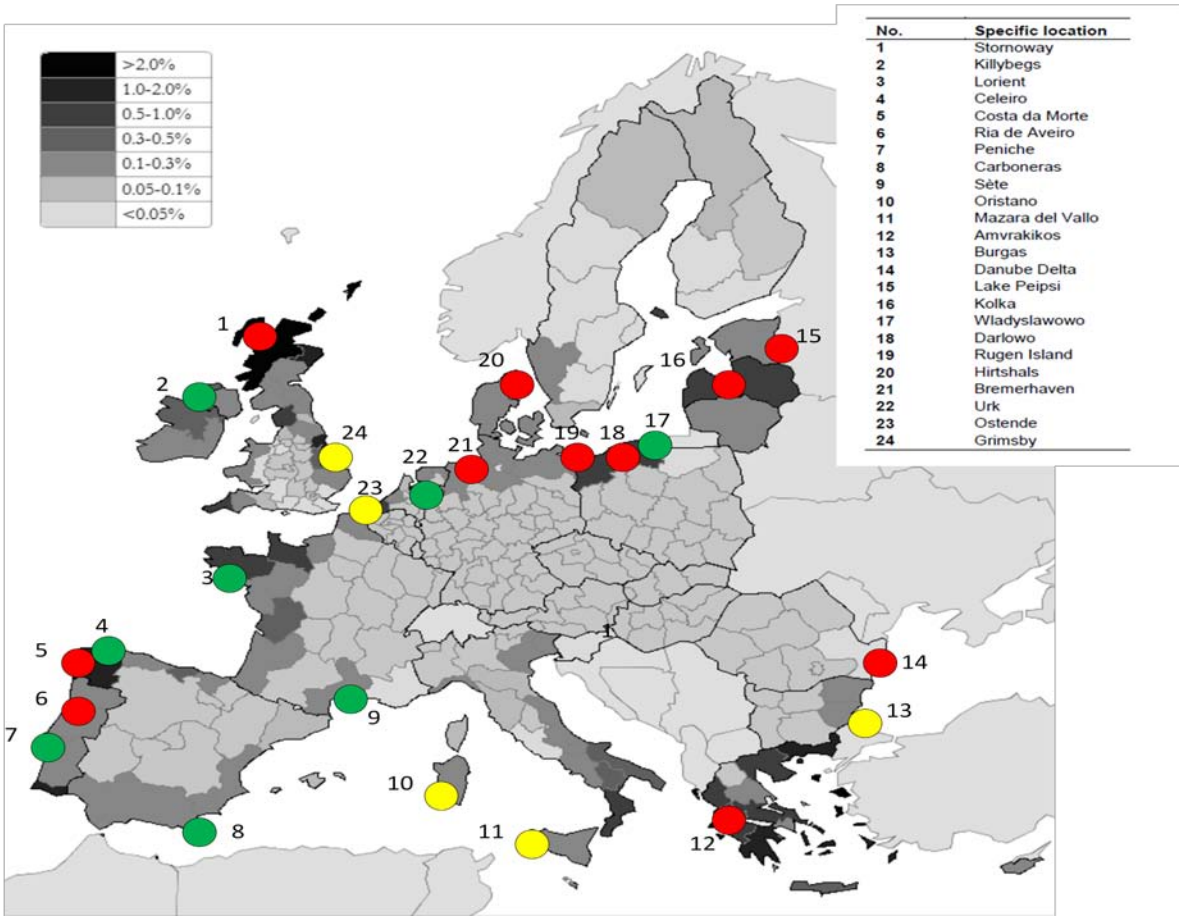

Figure 3 Trends in population over ten years within each of the case study locations. Red indicates declining, green increasing and yellow stable population numbers.

Where declines in population were experienced it was often the case that younger members of the communities were reported as leaving in search of greater and/or more rewarding employment opportunities. This movement of people of employable ages away from the community has in many cases contributed to a general aging of the population (e.g. Lake Peipsi), although such ageing trends are also reflective of national trends in most EU Member States. Across the case studies only three (Stornoway, Aveiro and Urk) identified anything other than an ageing local population.

One can also draw a tentative link between the size of the population and the population density, and population trends, with larger concentrated populations in more urban areas (e.g. Bremerhaven) tending to show more static or increasing population levels. This reflects that fact that in many isolated rural areas with small populations (e.g. Stornoway, Lake Peipsi and Kolka) there has been an incentive for those of employable age to move out of the case study locations towards urban areas providing alternative employment opportunities. This pattern was observed in several of the communities studied. In a number of cases (e.g. Kolka and Lake Peipsi) this trend of out migration was creating very real concerns about long-term community viability. As younger people move away and the number of births and children decreases, it becomes more difficult to maintain schools and other services and the employment these represent becomes less secure. An additional effect is that without these services the communities are concerned that they will be less able to attract the working age people and families essential to their viability.

At the same time, the driver for in-migration has been higher wages for such migrants compared to their home locations, and the willingness of such immigrants to take on low-paid jobs (e.g. in Aveiro). In the case of Northern EU case studies, the accession of Eastern European countries has greatly facilitated the movement of labour, while in southern/Mediterranean countries the proximity of the region to North Africa is the main driver for labour coming from such areas. Thus both out-migration and immigration from/to the case study locations has been an adaptive by individual households in response to available employment opportunities and services.

2.1.3 Overall levels of economic activity – income and employment

The average total income for all economic sectors across the 24 case study locations is just under Euro 3 billion, with a very wide range of between Euro 27 million (Danube Delta) and Euro 13 billion (Lorient). As shown in the figure below (Figure 4), the case study locations display a range of trends in terms of change in total income from all economic sectors, but far more studies show increases (e.g. Amvrakikos, Peniche, Sète to name a few) than decreases (only Mazara del Vallo, Władysławowo, Kolka, Lake Peipsi and Costa da Morte).

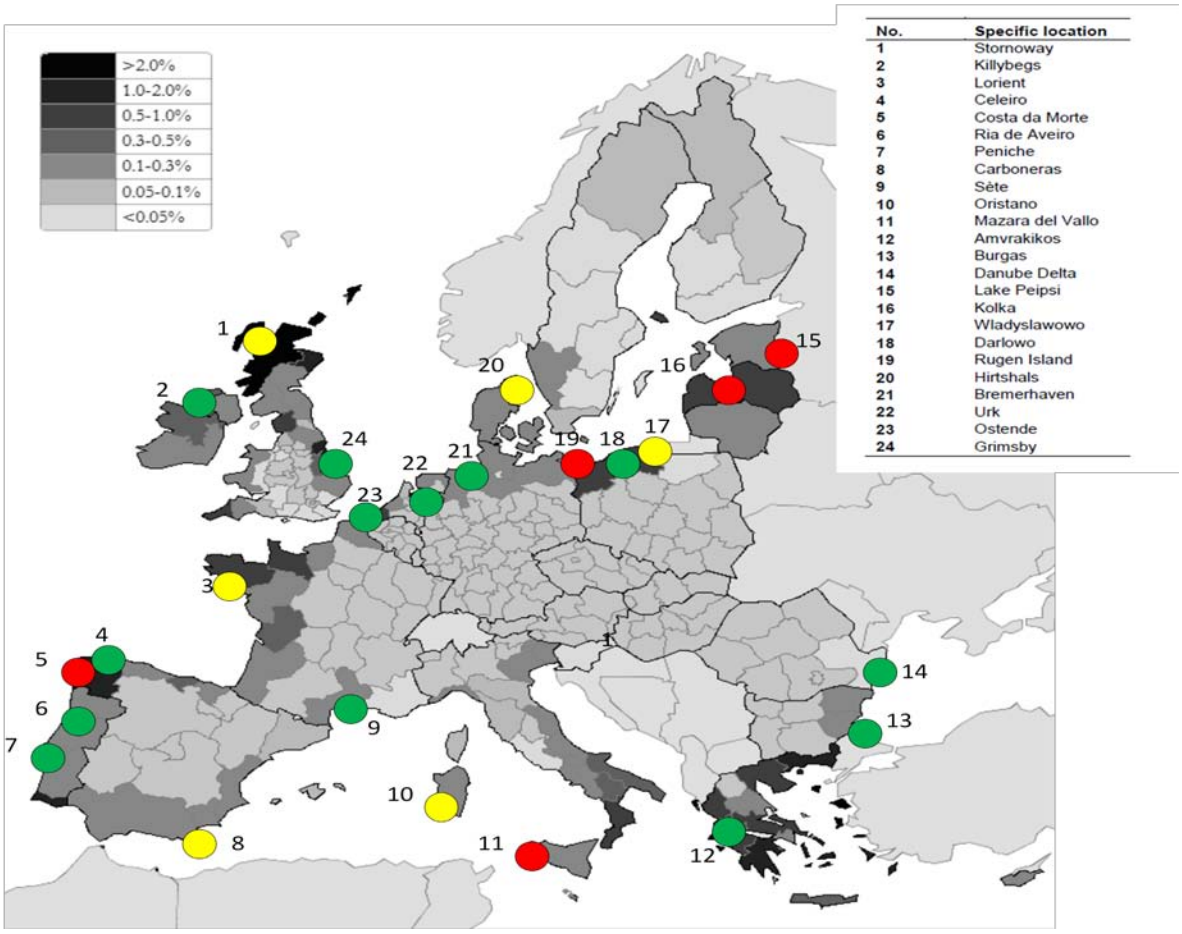

Figure 4 Trends in overall economic turnover since 2003 within each of the case study locations. Red indicates declining, green increasing and yellow stable trends.

Employment data also show wide variations between case studies, with a mean of 20,236 employed, but with a range between 523 (Kolka) and 82,850 (Lorient).Trends in employment across case study locations show a much stronger picture of static or declining employment in recent years than for income (see Figure 5). In only five cases (Bremerhaven, Darlowo, Amvrakikos, Sète and Urk) was it reported that employment had been increasing over time.

In the case of Kolka, while employment in the commercial fisheries has remained stable, there has been a large increase in the number of people operating small gears in a subsistence fashion. This is driven partly by the recent economic crisis.

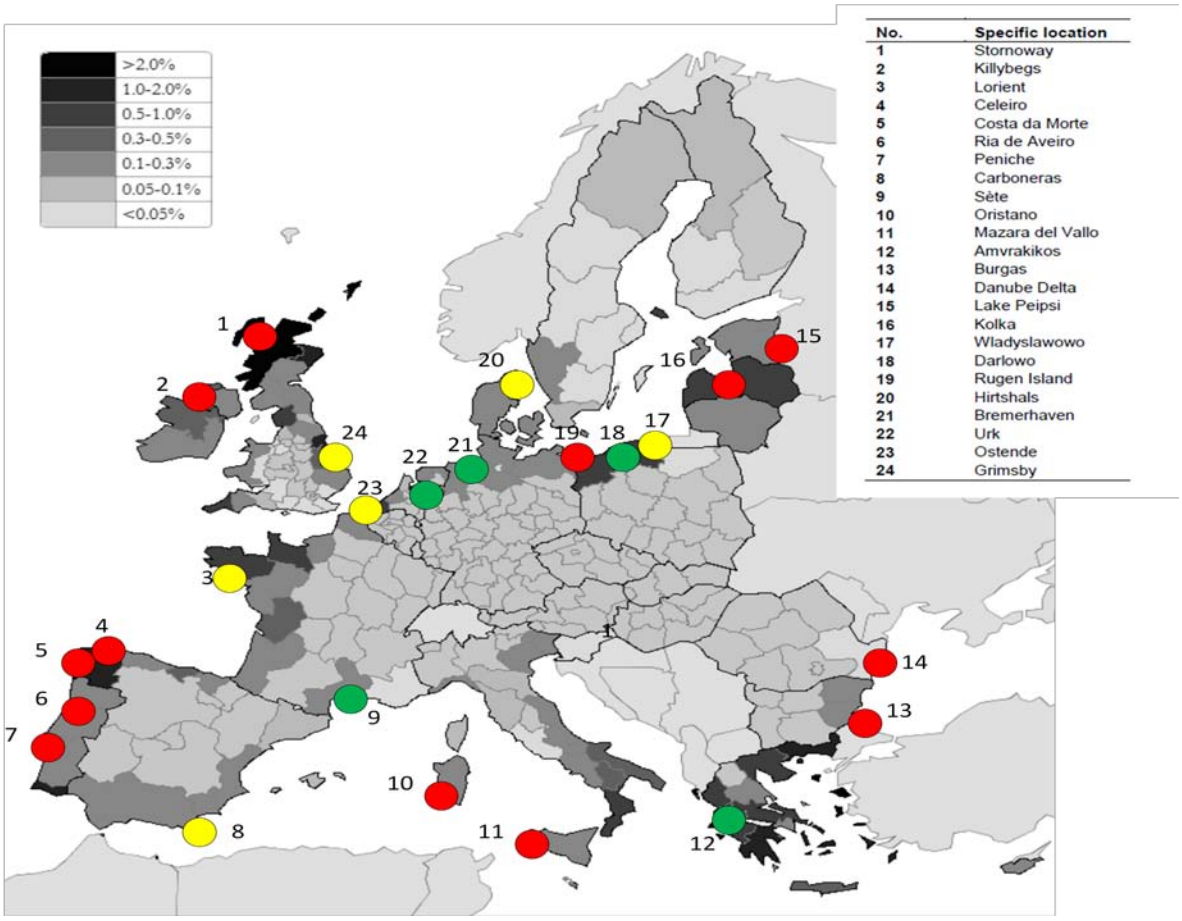

Figure 5 Employment trends over ten years within each of the case study locations. Red indicates declining, green increasing and yellow stable trends.

No clear picture emerged from the case studies about the most important type of non-fisheries sector activities, in part because of the large range of alternative activities included, but also due the fact that some studies were able to obtain data on specific economic activities, while for others it was only possible to obtain data by primary, secondary, or tertiary sector. Certainly, the tertiary sector (services, retail and tourism) has been growing in importance in many of the case study locations. In many case studies, due to their location on the coast, tourism is shown to be important (e.g. Danube Delta, Carboneras, Peniche and Sète), but in other areas (e.g. Killybegs, Mazara del Vallo), the relatively isolated location and poor infrastructure linkages, or other geographical characteristics, mean that tourism is not especially important.

The importance of non-fisheries sector activity may be expected to increase in many of the case study locations in the future (some examples include offshore oil and gas in Killybegs, renewable energy in Stornoway and Aveiro, and tourism in many case study locations[2]).

[2] Although the extent to which tourism development might be maritime-based and able to absorb labour from the fisheries sector is not clear, and may often be overstated.

Many of these alternatives are linked to the maritime location and often traditions of the communities and in some cases (e.g. Bremerhaven) there were attempts to capitalise on this history to develop maritime clusters that could attract investment. In terms of non-fisheries opportunities, Kolka represented an extreme case as it is backed by a National Park and this limits the scope for developing alternative activities (e.g. forestry and agriculture) that are important in other nearby communities.

With respect to fisheries sector dependency, mean dependency in the case study locations is 11%, far higher than national dependencies on fisheries (as would be expected given that the study areas were selected to focus on areas known to be dependent on fisheries – see figures). Dependency as expressed by the contribution of fisheries to local turnover is highest in the case of Killybegs (81%) and lowest in the case of Grimsby (0.1%). In contrast, as Figure 6 shows, fisheries sector employment dependency (including catching, processing, aquaculture and ancillary) averages 14% across all case study locations, with the highest dependency exhibited in Kolka (77%), largely as a result of the processing facility in the community (hence the low catch per fisher), followed by Killybegs (68%) and the lowest in Grimsby (<0.1%).

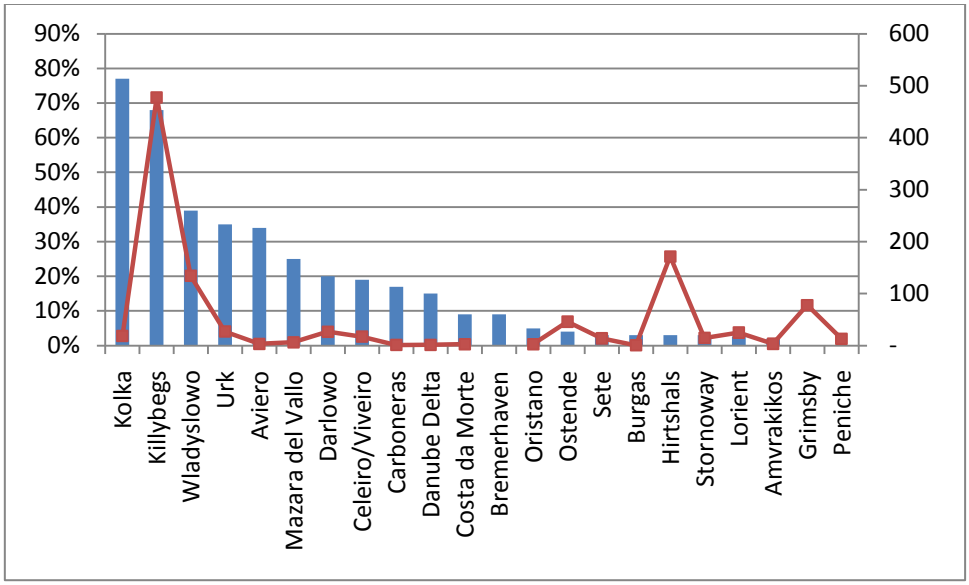

Figure 6 Level of dependency on fisheries employment (bars) and volume of catch in tonnes per fisher (line) across the case study locations

Data on turnover across all sectors (where available) and population in each case study location can also be used to examine per capita turnover. This generates some interesting findings on the overall economic well-being of the different study locations, as shown in the figure below (Figure 7). Given the level of analysis it was not always possible to collect or provide estimates for GDP. However, as can be seen from the figure, turnover/capita is particularly low in Baltic and Black Sea regions.

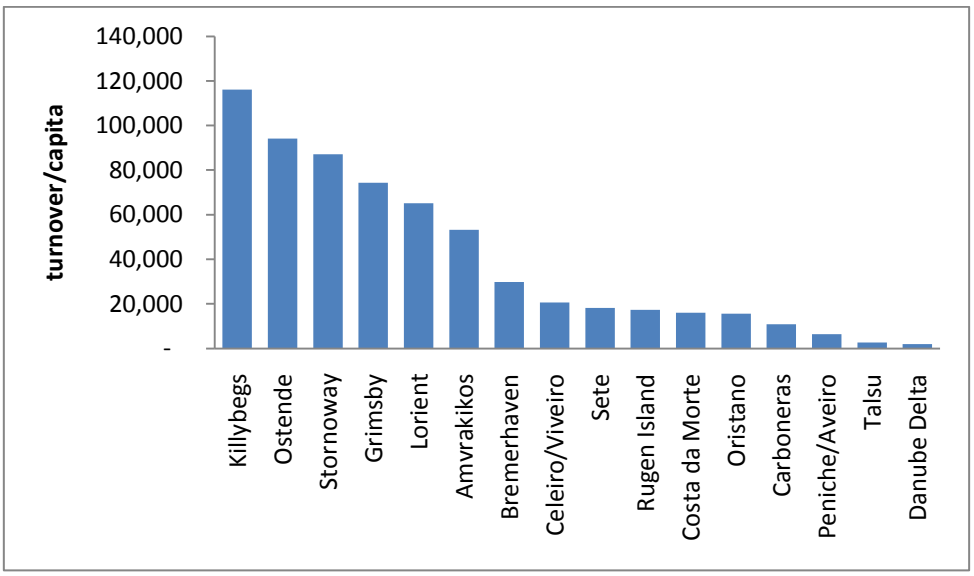

Figure 7 Turnover per capita in case study locations.

The total level of sector turnover in the case study locations are clearly affected strongly by the size of the respective study areas. However, size is certainly not the only determining factor, and these figures are also strongly determined by relative levels of economic performance. Trends in local economies (mainly rising up to 2007/08) are driven by general economic growth rates in Member States[3], and thus might be expected to have declined or remained static over 2008 to 2010 due to the global economic crisis. The picture of trends in employment (more static or declining) over the same period is explained by a tendency for economic activities to shift over time towards higher levels of mechanisation/automation and from primary economic activities to secondary and tertiary sectors. Declining trends in employment up to 2008 are likely to have been further exacerbated during 2008-2010 due to the economic crisis. Declining or static trends in employment in the case study locations up to 2008 may also have been driven by the availability of employment opportunities in other areas. The adaptive response to declining employment opportunities has been out-migration resulting in the declining levels of population as described earlier.

[3] Data on income has generally been collected from 2003 up until 2008, meaning that the recent economic crisis is not reflected in the trend data. Estimates of trend increases may also be slightly over-estimated as data collected on total income has not been index-linked

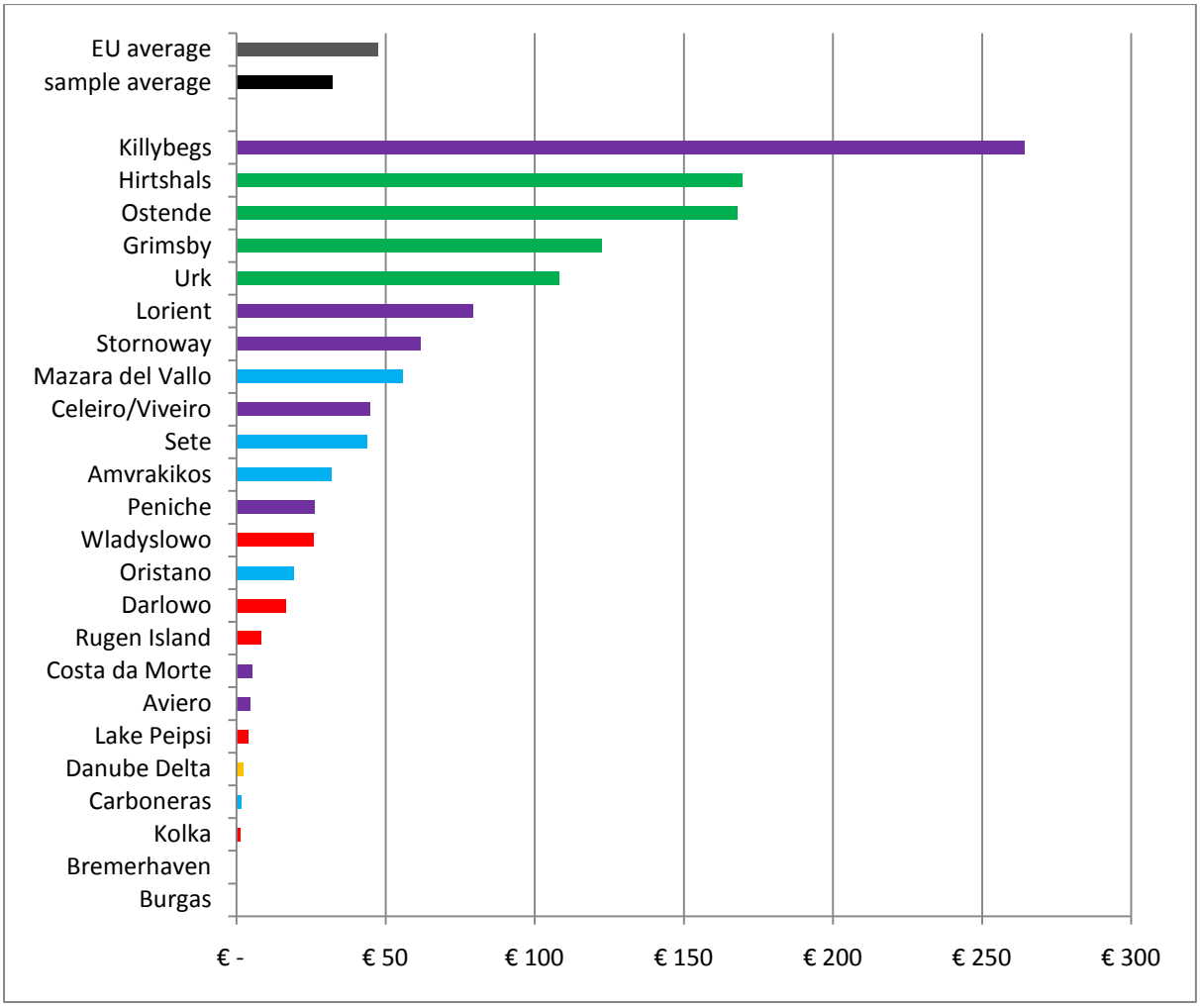

Figure 8 Graph showing value of landings per catching sub-sector employee (€ '000). Data were not available for Burgas, Bremerhaven and Talsu.
Note: Colour coding shows regions: purple = Atlantic, green = North Sea, light blue = Mediterranean, orange = Baltic.

Figure 8 presents the value of landings per catching sub-sector employee. The means at the top of the chart illustrate that the case study locations overall were less than the mean level across the EU.

Within the profile, the colour coding illustrates the regional differences in landed values with Atlantic and North Sea locations showing the highest returns, followed by the Mediterranean and Baltic states. This may reflect the generally larger sized vessels and higher catches and catch values of the fleets based in these areas compared to those from the smaller and vessels operating in the Mediterranean and Baltic. It should be noted that this analysis does not account for the costs of fishing associated with the different fleets, which will contribute to overall profitability of the fishing operations. In landed value per employee, Peniche, Aveiro and Costa da Morte sit below most Mediterranean case studies. This is due to the fleets based in these locations appearing more inshore and Mediterranean-like in nature, unlike the ports dominated by large-vessels in the other Atlantic case studies. Some exceptions include Carboneras which is also lower than might be expected due to employees working on the longliner fleet. This fleet generally does not land fish into the port, resulting in low landings per employee.

The contribution of fisheries to the local economies, and of fisheries sector employment to total employment in the case study locations, is also strongly affected by the size of the case study location, as well as by the availability of other economic activities. In some cases the selection of small study areas with a known focus on fisheries resulted in high levels of income and employment dependency on fisheries. The Killybegs case study for example, with the smallest size in terms of km^2, considers a small and well-defined fishing town and the study location thus displays a fisheries contribution to total economic turnover in the study area of more than 80%. Most of the larger areas e.g. Sète, Oristano, Danube Delta, display much lower contributions by fisheries to total area incomes and employment (generally between 2% and 5%), because as the case study locations grow in size it can be expected that more alternative economic activities are present. However the size of the area is certainly not the only driver of dependence on fisheries income and employment. Thus the Stornoway case study location has an area in km^2 even smaller than Killybegs but an income dependency on fisheries of only 2%.

2.1.4 Fisheries sector

2.1.4.1 Fleets

Figure 9 presents the total number of vessels at each case study location. This illustrates the general differences seen between regions with fewer, but larger vessels operating from the Atlantic, North Sea and Baltic ports and large numbers of small vessels operating in the Mediterranean and Black Sea locations. To some extent this reflects the differing geography of the regions in terms of sea. Peniche is exceptional in this respect as 700 of the 800 vessels operating from this Atlantic port are under 12m; while it is on the Atlantic coast, its coastline and location on a peninsula make it comparatively protected.

The differences between case studies in the scale of the industry are evidenced by the average volume of landings per vessel, which range from 3,405 tonnes in Killybegs with its pelagic fleet, many 40m+ in length, to 1.7 tonnes in the Danube Delta, with its single-handed small artisanal vessels.

Across the case study locations the number of fishing vessels is found to have decreased (true for most case studies) or remained relatively stable (see Figure 10). While the number of vessels is a crude definition of fishing capacity, it does reflect a significant decrease in fishing capacity seen across most of these locations. Exceptions to this trend result from changes in the fleet segments and methods of fishing (Lake Peipsi). For example Grimsby shows a major decrease in the number of larger vessels as these were decommissioned, but a slight increase in the small scale fleet as some reinvestment occurred leading to an overall rise in numbers of vessels. In Celeiro, where overall capacity in GT has increased, but where there has been a decrease in kW terms, this is due to a significant switch from the trawl metier to longliners and the introduction of smaller more efficient engines, which was driven by the need to reduce fuel costs. Similarly, Carboneras has seen a GT increase while numbers of vessels and total power have decreased with the switch from trawlers and bottom longliners to surface longliners. In the case of Lake Peipsi, there is no requirement to register vessels for the inland fishery. In part this reflects the fact that it is the numbers of gears deployed rather than the size and power of the vessel that affects fishing performance. However almost all vessels are registered as this is a precondition for accessing financial support.

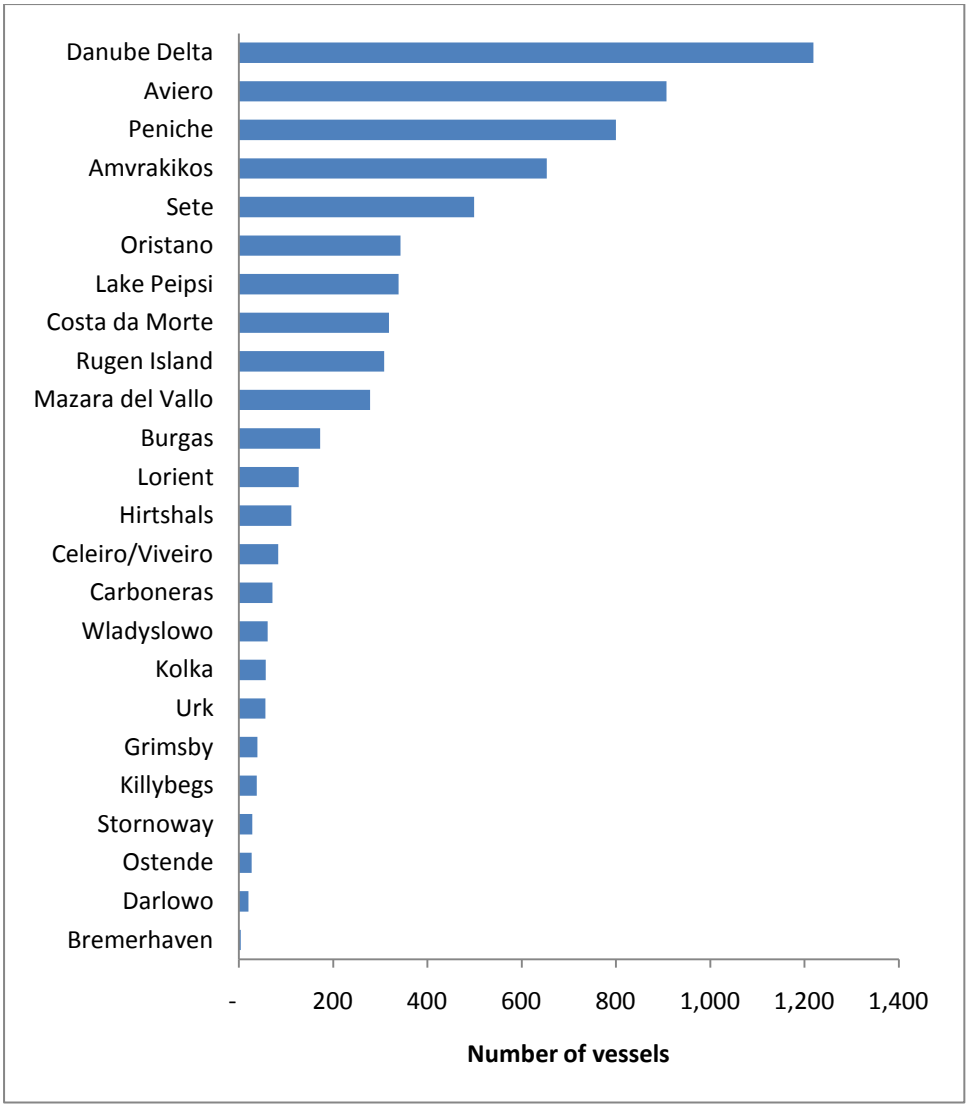

Figure 9: Total number of vessels by case study location

With an average decline in vessel numbers across the EU of around 2% per annum the average decline in numbers over the period would be expected to be in the region of 10%. The majority of case study locations showed larger declines in numbers than the average with the largest declines associated with the areas where there has been a pressing need to adjust capacity to stock sizes (Baltic and North Sea).

Despite the significant reductions seen in some fleets in recent years, the continuation of reduced catching opportunities indicates that even in these reduced fleets it could be argued that over capacity currently exists. Overcapacity is also identified in the small scale fleets of some Member States with calls for decommissioning schemes to address this.

The expectation that catching opportunities will improve as stocks recover under a number of long term management plans (LTMPs) recently put in place, coupled with the recent economic crisis severely limiting public funds, means that there is now a general reluctance on the part of many Member States to introduce further decommissioning. However, there are areas such as the accession states where fleet capacity adjustment is a more recent process and greater levels of political support may be evident.

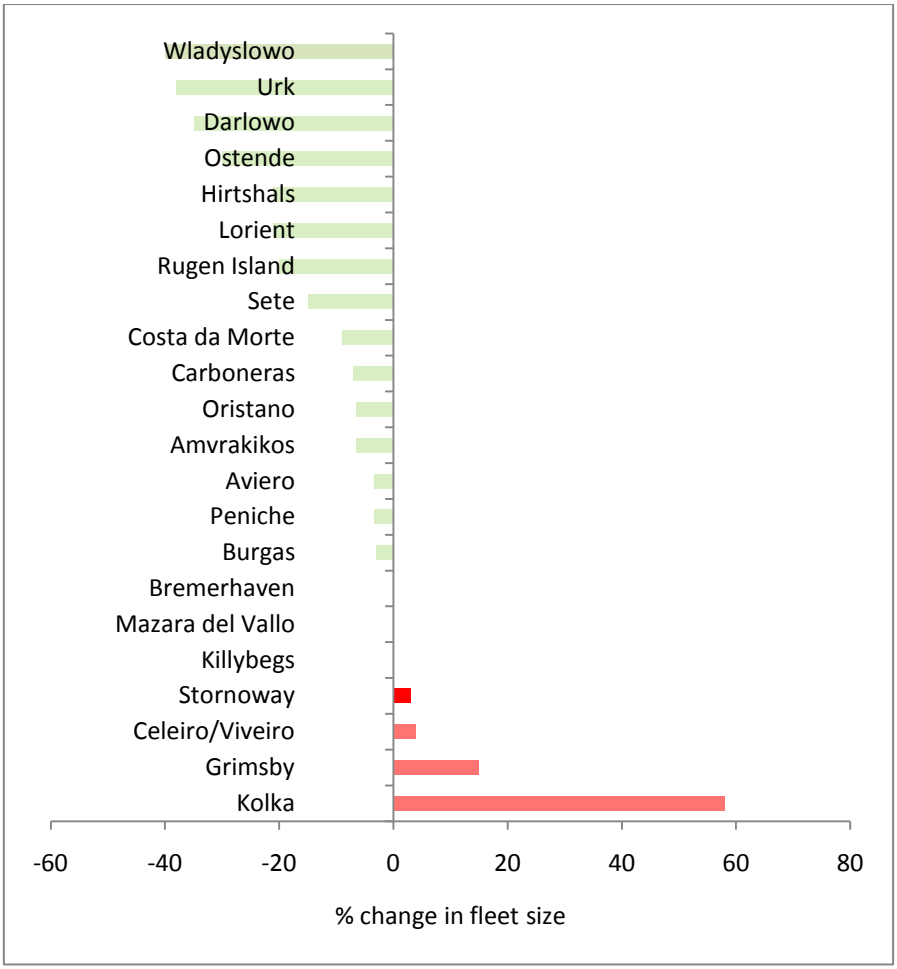

Figure 10 Percentage change in fleet size over past five years across the case study locations.

The changes in fleet numbers and fleet profile illustrate the varied adaptive capacities of these locations. In some locations such as Killybegs and Wladyslawowo, adaptation has been towards consolidation and reinvestment in fewer larger vessels within the same metiers or decommissioning. For other large vessel fleets such as in Urk, Celeiro and Mazara del Vallo, capacity decreases have been accompanied by significant changes in metier (e.g. beam trawl to twin-rigging and demersal trawling to longlining).

Recent pressures from high fuel prices, reduced catching opportunities, and increasing focus on environmental management are all encouraging an ongoing change towards more selective and fuel efficient catching methods as well as a move from larger gears that are more expensive to maintain and replace towards smaller or cheaper gears (e.g. Kolka).

For the small artisanal fleets in many locations, such as those based at Oristano, the Danube Delta and Sète, the increased management of inshore stocks are expected to restrict catching opportunities in these segments in the short- to medium-term. As catches by these fleets already tend to be more diverse in species terms and investment levels are low, the opportunity to further diversify into new fisheries is more limited. This is expected to continue to reduce fishing fleets overall and encourage diversification into non-fishing related sectors such as tourism and agriculture. The situation in Kolka is a response to economic hardships as more people are fishing for subsistence and this has led to an increase in the number of small vessels. However, the effect on effort levels has been low as the fishing is of low intensity.

2.1.4.2 Fish stock status

The majority of case studies report that key target species in terms of volume and value are below full reproductive capacity (Table 4). A number of small pelagic stocks such as mackerel, sprat, Atlanto-scandian herring and sardine are reported to be stable (Killybegs, Burgas, Aveiro, Peniche, Hirtshals, Rügen Island). The only ports reporting key stocks of demersal species in good health are those targeting the recently recovered North Sea plaice fishery (Oostende and Urk).

A number of the locations now citing small pelagic species as key stocks would previously have identified demersal species such as cod and hake or large pelagic species such as tuna and swordfish as the most significant species. In these instances the poor status of traditional stocks prompted a shift towards exploitation of alternatives. In a number of locations (e.g. Mazara del Vallo, Oristano and Lorient) these alternatives are themselves already showing signs of over-exploitation.

The Stornoway fleet now almost exclusively lands shellfish (Nephrops, crab, lobster and scallops) and shellfish now dominates landed value at others such as Lorient (Nephrops), Mazara del Vallo and Amvrakikos (rose shrimp). These shellfish stocks are either fully exploited or over-exploited. However, for a number of key shellfish and inshore fish stocks there are gaps in management and scientific assessment of stocks that prevents the clear determination of stock status (Peniche, Amvrakikos and Carboneras).

Table 4 Key species and their stock status

	Key species caught	Predominant species (volume)	Status	Predominant species (value)	Status
Killybegs	mackerel, horse mackerel, herring	mackerel	At full reproductive capacity	mackerel	At full reproductive capacity
Stornoway	nephrops, lobster, scallops	nephrops	recent decline	nephrops	recent decline
Lorient	Sole, bass, hake, crab, Nephrops, pollock, monkfish, grenadier, blue ling	Pollock	Not fully assessed	Nephrops	Over-exploited
Peniche	sardine, horse mackerel, octopus	sardine	Uncertain	sardine	Uncertain
Aveiro	horse mackerel, sardine, octopus, squid	sardine	Uncertain	sardine	Uncertain
Costa da Morte	hake, octopus, shrimp, crab, sardine, barnacle	hake	Reduced reproductive capacity	hake	Reduced reproductive capacity

Celeiro/Viveiro	hake, nephrops, monkfish, barnacle	hake	Reduced reproductive capacity	hake	Reduced reproductive capacity
Amvrakikos	Sardine, mullet, sole, cuttlefish, shrimp	mullet	unknown	shrimp	unknown
Oristano	Mullet, octopus, squid, lobster, hake, shrimp	Hake, mullet, octopus	Declining	Hake, mullet, octopus	Declining
Sète	Tuna, octopus, seabass, hake, sole, sardine, mackerel	sardine	Within safe biological limits	hake	Over-exploited
Mazara del Vallo	deepwater rose shrimp, red shrimp, nephrops	rose shrimp (-)	Over-exploited	rose shrimp (-)	Over-exploited
Carboneras	Melva, mackerel, sardine, swordfish	Swordfish	Over-exploited	Swordfish	Over-exploited
Danube Delta	gibel carp, bream, mackerel, zander	gibel carp (-)	Sustainably exploited	mackerel (-)	overexploited
Burgas	sprat, turbot, whelk	sprat	stable	sprat	stable
Ostende	Plaice, sole, cod, shrimp	plaice	Increasing SSB above pa	plaice	Increasing SSB above pa
Hirtshals	plaice, cod, haddock, herring, mackerel	herring	At full reproductive capacity	herring	At full reproductive capacity
Grimsby	cod, crab, lobster, whelk	cod	Below full reproductive capacity	cod	Below full reproductive capacity
Bremerhaven	Cod, herring	cod	Below full reproductive capacity	cod	Below full reproductive capacity
Urk	Sole, plaice, turbot, mullet, shrimp	plaice	Increasing SSB above pa	sole	Over-exploited
Lake Peipsi	European smelt, pike-perch, bream, perch and eel	Pike-perch	Strong cohorts of perch, pike and bream	perch and pike-perch	Strong cohorts of perch, pike and bream

Rügen Island	cod, flounder, herring	herring	At full reproductive capacity	herring	At full reproductive capacity
Talsu	Cod, sprat, herring		Improving but still at risk	cod	Improving but still at risk
Wladyslowo	sprat, herring, cod, salmon, trout	sprat	Fluctuating SSB	sprat	Fluctuating SSB
Darlowo	cod, salmon, trout	sprat	Fluctuating SSB	cod	Improving but still at risk

Notes: Colour coding in left-hand column = Mediterranean case studies in blue, Atlantic in purple, Baltic in red, Black Sea in yellow, and North Sea in green.

Trends in stock status vary between case study locations. For some key demersal and pelagic stocks in the Baltic, North Sea and Atlantic regions (species such as cod, flatfish, southern hake and herring) long term management plans are in place and stocks are showing signs of recovery, but fishing opportunities (e.g. for vessels in Urk, Bremerhaven, Wladyslawowo and Darlowo) remain highly constrained. For a number of stocks, particularly in the Mediterranean and Black Sea, they are either not fully assessed, and therefore trends cannot be determined, or have limited management controls in place (e.g. minimum landing sizes) and no long term management planning.

There are two main drivers influencing fish stock status: the fishing mortality exerted on the stock and environmental factors such as warming sea temperatures that may be affecting distribution and abundance (e.g. through lower recruitment levels). Separating the effects of these two factors is often hard as the case of Lake Peipsi illustrates. The catch composition from the fishery has shown a significant shift over time. Previously the fish assemblage of the lake was dominated by vendace and smelt (with catches of vendace in the thousands of tonnes). More recently there has been a shift in composition with the abundance of vendace declining and perch and pike-perch increasing in abundance and coming to dominate catches. Factors that have contributed to these changes include heavy fishing, changes in fishing gears used, changing climatic conditions and eutrophication. Warmer summers and milder winters in recent years have tended to favour the warmer water species (like the perch and pike-perch) and to reduce the abundance of colder water species like vendace, smelt and burbot. While these factors have contributed to a decrease in the overall volume of catch, this shift has been beneficial for the fishers as perch and pike-perch are the more valuable species.

The historic over-exploitation of demersal finfish and stocks of large pelagics has led to fleets switching to shellfish and/or small pelagic where available. In some examples, such as Grimsby where a large trawler fleet had already moved to targeting distant water cod due to the North Sea herring stock collapse, alternative fisheries opportunities could not sustain the fleet capacity and adaptation by all was not possible. A similar story appears to be unfolding in Mazara del Vallo where there are decreased opportunities in the distant shrimp fisheries and limited options for the fleet to diversify their fishing operations that have required reductions in fleet capacity. Elsewhere, in Stornoway, the decreased catching opportunities in finfish fisheries have been offset by a switch to shellfish. Subsequently, however, some reduction in capacity in these shellfish fleets has also been necessary.

For locations dominated by small scale fleets, key species have tended to be more diverse and variable year to year. With the limited geographical range of smaller vessels there is an inevitable vulnerability to changing local stock status, which necessitates swift adaptation. In larger fleets the levels of investment in specialised fishing vessels and gear have meant there is a longer transition period, which has often been supported by public sector intervention.

In terms of future developments, LTMPs are being introduced for an increasing proportion of key European stocks. LTMPs that are in place, such as for flatfish, herring and cod, are showing some encouraging results. There is also expected to be a transition to MSY-based targets in fisheries management informed by ICES assessments by 2015 (rather than use of the precautionary approach).

A number of key stocks associated with case study locations, particularly in the Mediterranean and the Black Sea, have limited management controls in place such as minimum landing sizes. In some instances further controls are being introduced such as closed seasons, but output controls are limited by the continued lack of scientific stock assessment.

In addition to the target stocks, fishers in several locations were reporting changes in non-target species that were affecting the fisheries. In the Baltic fishers reported increases in the number of seals and birds (e.g. cormorants) that consume fish and have concerns about their influence on stocks and stock recovery. Furthermore there are also reports of the effects of exotic species on the environment and on fishing activities. For example, in the Black Sea the introduction of the predatory jellyfish *Mnemiopsis leidyi* in the early1980s has affected several summer spawning fish species. In the Baltic increasing numbers of mitten crabs (*Eriocheir sinensis*) have created problems for fishers by taking and damaging herring from the gillnets.

2.1.4.3 Fisheries infrastructure

The case studies locations host a wide range of fisheries infrastructure from major ports that include other commercial operations (bulk cargo, ferries, oil infrastructure), smaller dedicated fishing ports that may share facilities with recreational vessels, and numerous less defined landings points/jetties e.g. the Danube Delta. Despite these varied scales of port infrastructure there are few reports that infrastructure is a constraining factor for the fishing sectors. There has been significant public expenditure, including the use of FIFG funds, over the last 10 years and it appears that the scale of port infrastructure is generally adequate. In the case of ports hosting fleets that have been significantly reduced (Grimsby, Hirtshals) the quayside infrastructure is now larger than fleet requirements. This may represent an opportunity for diversification.

A number of case study locations (e.g. Celeiro, Killybegs, Urk) now contain ‘state of the art’ landing and handling facilities. There has also been substantial investment in market halls, some of which are now under-used due to changed sales practices and target species. For example it is suggested that the auction hall at Mazara del Vallo is underutilised as it was constructed too late to avoid potential landings going elsewhere (they are now considering diversification of use into marketing of other food stuffs). For Costa da Morte several of the local auction halls are by-passed despite receiving public investment as better prices are achieved elsewhere. In Oristano a market is under construction in an attempt to improve the value of landings, but stakeholders suggest that due to existing sales channels the physical structure alone will not improve prices.

The increased amount of direct sales, particularly for pelagic and shellfish landings, means that the need for auction hall space is reduced. If already in place these structures are often used instead and adapted for handling and storage rather than for auctions (e.g. Stornoway). Locations such as Grimsby and Urk have adapted fish market structures towards accommodating over-landed fish rather than quayside landings and use electronic auction systems to allow remote purchasing. However, in some selected instances market infrastructure is still reported to be a constraint for the local fishing sector (Amvrakikos, Burgas, Danube Delta).

Future needs and support should be considered on a case by case basis. The construction of new ports and markets may be needed to a lesser level than in the recent past as:

a. For many those structures are now in place;

b. The need for hard structures is reduced through technology and changed sales patterns enabling remote buying (ahead of landing in some instances); and

c. Certain locations do not lend themselves to a single landings and sales point.

Instead future needs for public sector support towards infrastructure are likely to focus on the upkeep of existing infrastructure and new infrastructure that will improve hygiene and temperature control to ensure all EU landing points achieve the requisite standards.

2.1.4.4 Catching

As indicated in section 2.1.4.1, most fishing fleets at the case study locations have declined with a handful of fleets remaining stable in terms of vessel numbers. The overall reduction has been a reaction to the declining catches and catching opportunities seen in these ports.

In most instances, the declining volumes as seen in Figure 11 are mainly the result of reduced catching opportunities and overall effort by the home fleet. For Carboneras and Costa da Morte the altered fleet profile means much of the fleet choose to now land elsewhere. Therefore despite the reported stable production levels, local landings are down.

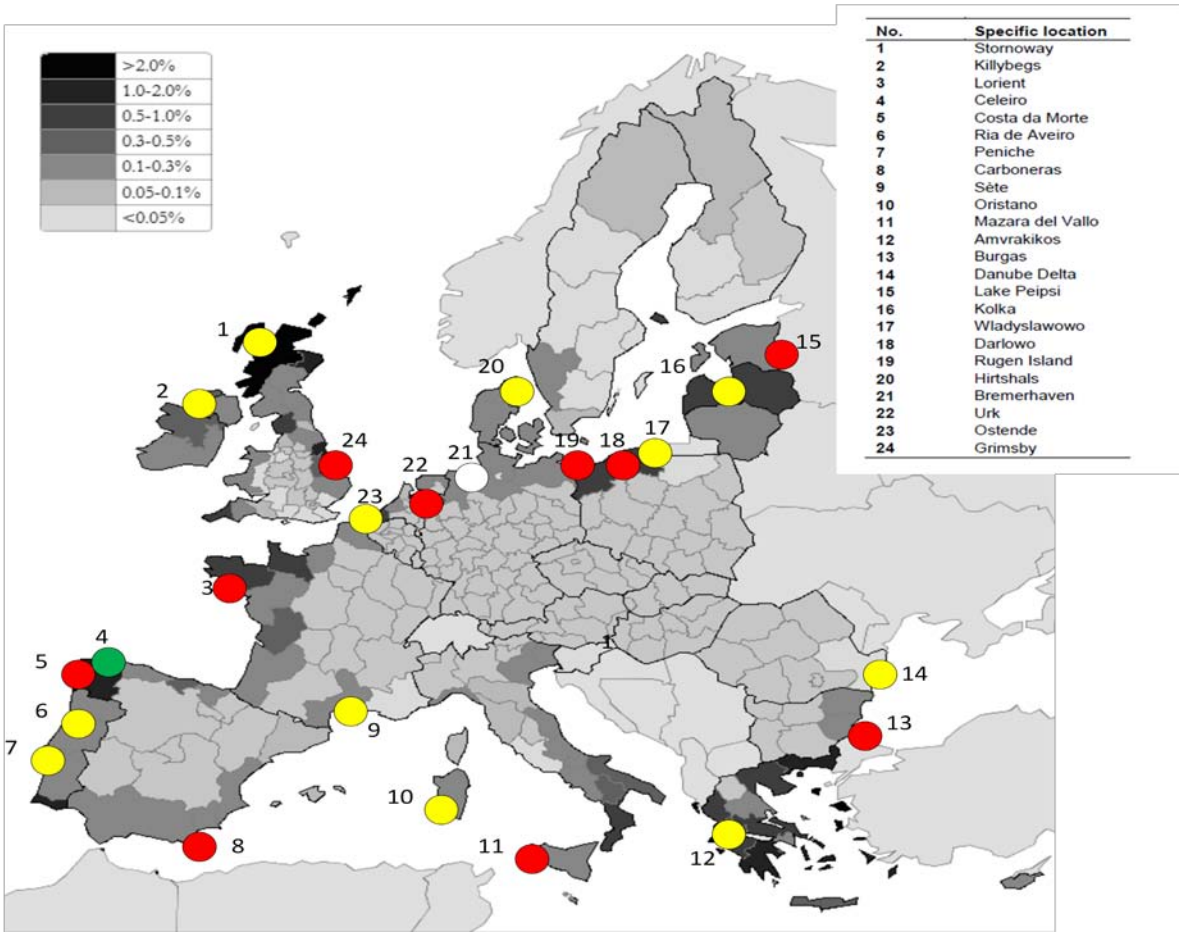

Figure 11 Map showing trends in landed volume of fish. Red indicates declining, green increasing and yellow stable production volumes. Data was not available for Bremerhaven.

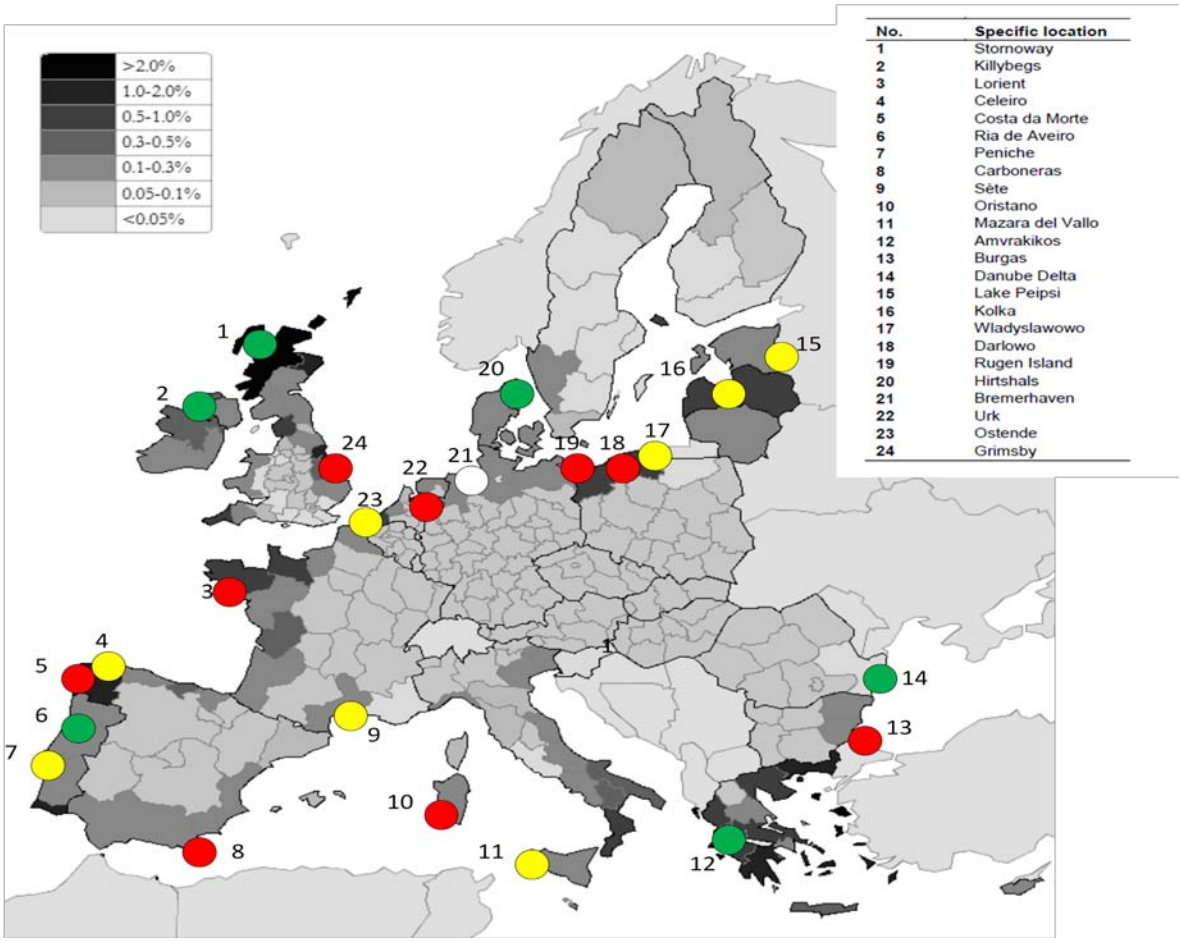

Figure 12 Map showing trends in landed value of fish. Red indicates declining, green increasing and yellow stable production values. Data was not available for Bremerhaven.

Where volumes have remained relatively stable in recent years, for a number of case study locations (Killybegs, Hirtshals, Peniche, Stornoway, Amvrakikos Kolka and Danube Delta) the value of landings have often shown an increase as prices have improved for key species (Figure 12). A particular exception is Oristano where landings remained stable but the value decreased. Stakeholders identify a lack of an organised market as being a key factor in the continued poor prices. For Celeiro the volume of landings has actually increased, but the value has decreased, particularly in the last couple of years. A key landing for this port is hake for "*Merluza Do Pincho*", which is a high quality hake product. Due to the recent economic crisis demand for this high-end product has reduced and with it prices.

In price terms the trend is generally a positive one with higher prices reported, particularly for small pelagics (sardine, mackerel and herring). This influences the fortunes of the case study locations; Hirtshals and Killybegs both see total value up as they are primarily dependent on mackerel and herring. An increase in prices has also occurred for some demersal species, but while most demersal prices are up, this has not compensated for the significant decrease in landed volumes. Additionally the market has seen an increased substitution of key demersal species such as cod and plaice with alternatives, often in the form of cheaper imports. Alaskan Pollack and *Pangasius* imports for example have increased to make up for shortfalls in supply from cod and plaice fisheries. The level of market substitution has increased further in the last couple of years with the economic crisis resulting in price driving demand and these cheaper imports pushing down the price for

these traditional species. For shellfish, price trends have generally been positive over the last 10 years, but more recently there has been a slump in prices due to the economic crisis reducing demand for high-value foodstuffs such as Costa da Morte's goose barnacle, Mazara del Vallo's Rose shrimp and Stornoway's Nephrops.

For all the regions the non-quota species remain important for the small-scale fleets (and may become more important in the case of Mazara del Vallo where the large scale fleet is expected to decline in number) and the trends in those non-quota stocks will continue to be important. In most instances the status of these non-quota species is unknown.

Figure 13 shows a clear trend towards reduced employment levels in the catching sub-sector. Only Amvrakikos and the Danube Delta report increases in fishing employment and Celeiro reports stable employment. This general reduction is a result of reductions in fleet numbers. Even where certain indicators of capacity show stability or an increase, such as the GT increases at Carboneras, employment is down.

For Amvrakikos and Danube Delta the increase in employment is not necessarily a positive development. Both locations target fisheries in lagoons and enclosed inland water bodies respectively. In the lagoons of Amvrakikos production from most fisheries is down and volumes are being artificially stabilised by stock enhancement of bream from commercial hatcheries. A lack of adequate management in these areas results in an open access situation. Both case studies report low earnings in the sub-sector, which will not be assisted by new entrants.

The ability of the case study regions to adapt to reduced employment depends on diversification creating alternative work opportunities. It should be noted that in most of these cases the alternative employment opportunities are not necessarily readily available or appropriate to the skill sets of fishers. In some instances, fishermen and their fishing vessels can be alternatively employed in fishing tourism (e.g. Aveiro, Peniche, Darlowo, Wladyslawowo and Danube Delta), but this opportunity tends to be more seasonal in nature and would only support a small fraction of commercial fishing operators. Instead the case study regions have seen a gradual reduction in catching sub-sector employment (mainly with fishermen retiring from fishing) that has been compensated for with increased employment opportunities in service sectors.

Many regions highlight the lack of recruitment into the catching sub-sector as a problem requiring urgent attention. Often this is associated with a negative perception of fisheries as hard work for small rewards and/or an uncertain income (see also CETMAR, 2005). School-leavers are choosing the regular income provided by shore-based work or further education opportunities. Even in isolated fishing communities such as Stornoway youngsters are moving to the mainland. Therefore despite the recent reductions in catching sub-sector employment, the average ages of employees is generally increasing and new entrants will still need to be attracted. As well as the general image, stability of income; a clearer entry point into fishing; and subsequent career path have to be provided to make the sub-sector more attractive to prospective entrants.

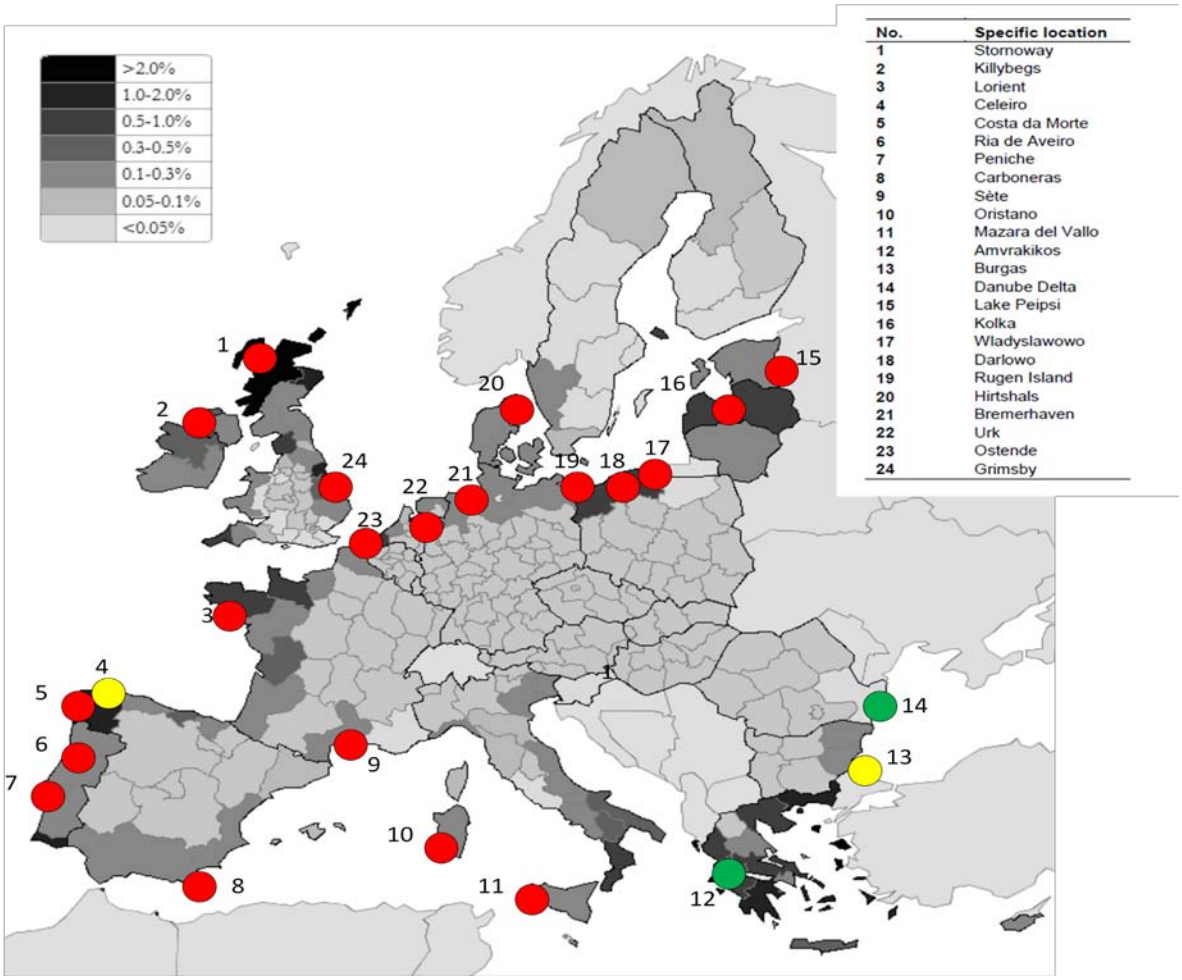

Figure 13 Map showing trends in catching sub-sector employment. Red indicates declining, green increasing and yellow stable numbers.

2.1.4.5 Processing

Grimsby, Bremerhaven, Peniche and Oristano all report increased volumes of material being processed in the area (Figure 14). Grimsby and Bremerhaven report reduced local landings and in Oristano landed volumes are stable. While the historical basis for establishment of processing was almost invariably the presence of local landings (and in the case of Aveiro the local salt production facilities), this is no longer the case for many areas. In many of the case study locations there is an increasing disconnect between the development of the processing sub-sector and that of the catching sub-sector and some evidence of consolidation in the processing sub-sector. Grimsby and Bremerhaven are two locations that have shown similar development trajectories in this respect with the fortunes of these two sub-sectors being very different with landings decreasing substantially and only a small fleet remaining, but the processing sub-sector has continued to expand in both cases. The result is that both Grimsby and Bremerhaven are now major fish processing centres in Europe, with increasing diversification into processing other types of food. On the other hand, in Carboneras, the trajectories have been the reverse with catching remaining important while many processing companies have closed down.

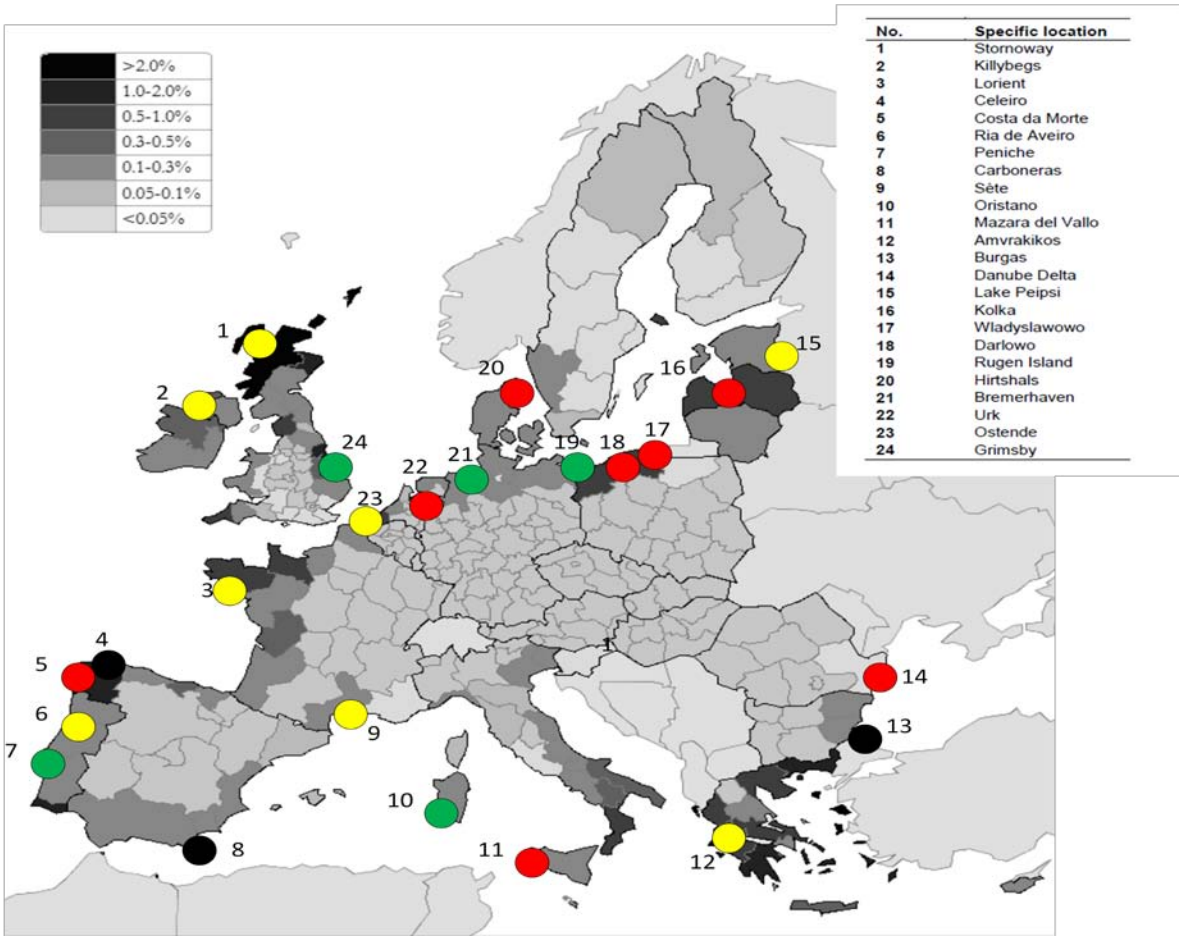

Figure 14 Map showing trends in processing sub-sector volumes. Red indicates declining, green increasing and yellow stable production volumes. Black indicates no processing.

In several cases (e.g. Aveiro, Bremerhaven, Darlowo, Wladyslowo, Grimsby and Ostende) there has been a trend towards increased processing of imported material. Increasing prices for local landings and the increased supply of these imported materials have contributed to the increased demand for substitute products, primarily *Pangasius* catfish farmed in Vietnam. EU imports of *Pangasius* rose by 40% in 2007 and a further 30% in 2008 (Globefish, 2009). Where there has been an established processing sub-sector (Ostende, Bremerhaven and Grimsby) these alternative and additional sources of materials represent additional opportunities for the sub-sector, and both Grimsby and Bremerhaven have become increasingly important locations for both fish as well as wider food processing. Similarly, links to aquaculture, e.g. Aveiro, Stornoway and Hirtshals (in the latter material imported from Norway and Faroes); processing of other foodstuffs, e.g. Grimsby represent examples of innovation within the processing sub-sector. In Ostende there have been efforts by processors to reduce costs by relocating out of the city to areas where the land is cheaper.

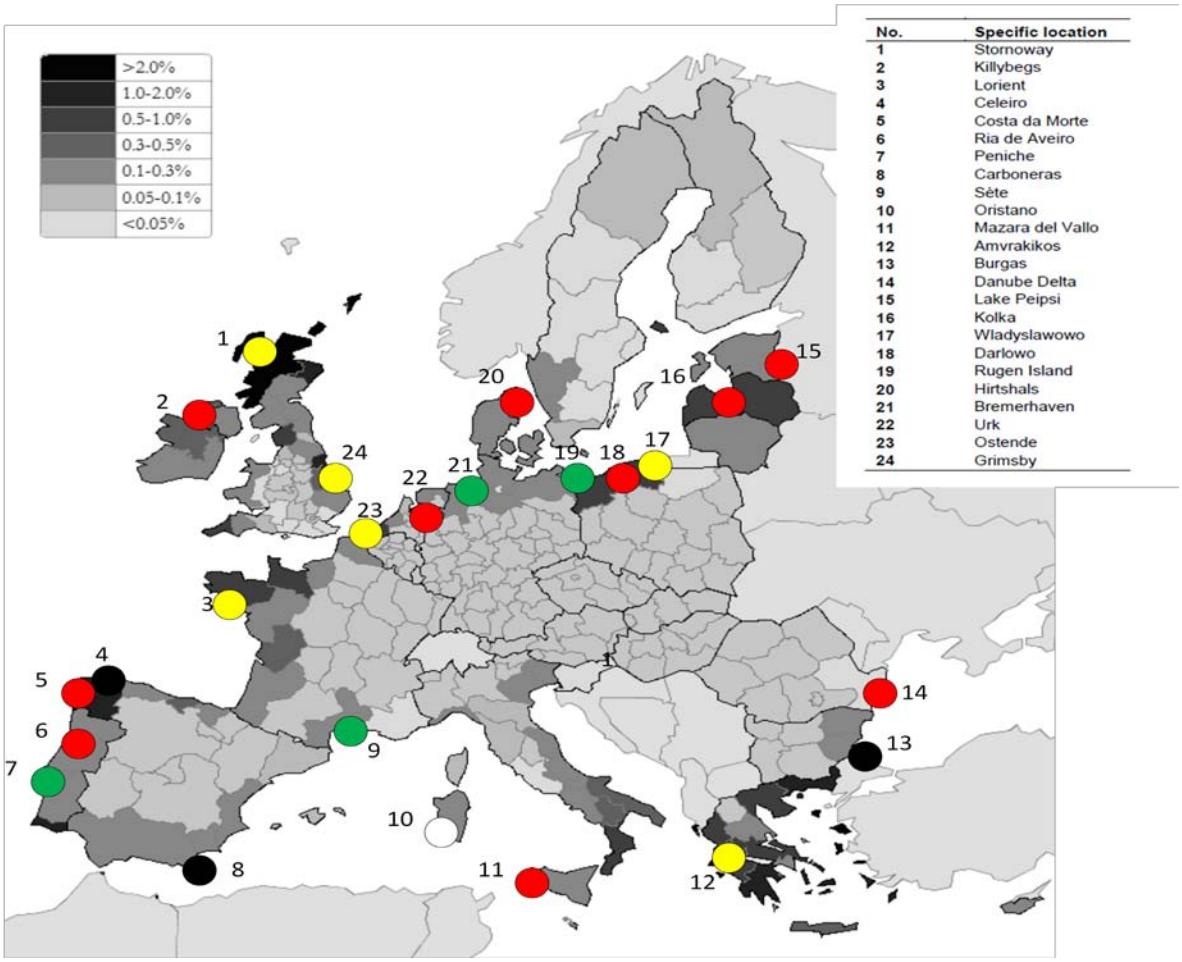

Figure 15 Map showing trends in processing sub-sector employment. Red indicates declining, green increasing and yellow stable numbers. Black indicates no processing.

2.1.4.6 Ancillary

The ancillary sub-sector comprises a set of both upstream services (e.g. gear manufacture and repair, boatbuilding maintenance of port infrastructure, etc.) and downstream activities (e.g. transport and marketing facilities). Representing a range of services that varies considerably in extent and nature across the case study locations, it proved difficult to get accurate and up to date information about the sub-sector from many locations (see Annexes B to F). Part of the difficulty in assessing the contributions of the sub-sector is that for some of the companies involved, the fishing industry represents only part of their market, although for some it may represent an important part. In scale, the level of development and the value of the sub-sector varied considerably across the case study locations, representing from 0.05 (Sète) to 1.24 (Celeiro) times the value of the catches landed and employing between 31 (Sète) and 700 (Lorient) people. In some places, e.g. Celeiro and Costa da Morte, associated activities, such as fishing gear repair represent particularly important sources of employment for women.

Where the fleets were predominantly small vessels operating as an artisanal or subsistence fleet (e.g. Amvrakikos, Lake Peipsi and Kolka) the level of ancillary support and availability of ancillary facilities is limited and vessel owners conduct most support functions themselves individually or in cooperatives e.g. engine repairs, vessel maintenance, additional sales etc.

In a number of locations where catching has been important, the ancillary sub-sector has seen an evolution parallel to that of the catching sub-sector (e.g. Mazara del Vallo, Grimsby and Ostende). These places have seen diversification in the ancillary sub-sector to support other sectors including food processing (Grimsby) and recreational/tourist (e.g. Sète). For example, some ancillary retailers providing services and equipment (e.g. radios and navigation equipment) that represent support to the recreational sector (e.g. Sète). Where there has been a significant decline in the catching sub-sector (e.g. Grimsby), for fisheries services the remaining vessels use other nearby ports. Where there is less dependency on fishing, the ancillary sub-sector may be dependent on other sectors including the military (Lorient) and shipping (Ostende).

In a number of cases (e.g. Celeiro and Costa da Morte), fishing has constituted a part of the activities of the ancillary sub-sector, albeit an important one and in others (e.g. Lorient) only a minor part. The decline in the catching sub-sector and catching activities in these areas has affected the ancillary sub-sector but these industries have generally been able to cope with the changes. In some locations, other opportunities for the ancillary sub-sector have developed including support to the aquaculture sub-sector, e.g. Stornoway and Carboneras, and tourist vessels and fishing related tourism, e.g. Aveiro, Peniche, Mazara del Vallo, Darlowo and Wladyslowo and food processing (e.g. Bremerhaven and Grimsby).

It is difficult to draw firm conclusions about the likely future development given the diversity of cases that were included in the study. However responses from local informants suggested that it was widely anticipated that the current trends in the sub-sector will continue. It was also suggested that if investments in tourism, aquaculture and offshore renewable energy increase, this would provide opportunities for the ancillary sub-sector. In Bremerhaven this was being recognised by the municipality who were active in promoting Bremerhaven as a hub for a cluster of maritime activities with a strong emphasis on skills, research and innovation. However, as with the fishing and fish processing sub-sectors, difficulties have been experienced in attracting skilled staff to work in the sub-sector (e.g. Danube Delta) and this may affect the ability of firms to take advantage of emerging opportunities.

2.1.4.7 Aquaculture

Globally, aquaculture is one of the fastest growing food sectors and within the EU production is estimated at approximately 1.3 million tonnes with a value of three billion Euros supporting in the region of 60,000 jobs. Overall aquaculture makes an important contribution to fish production, employment, income and food.

Aquaculture activities were present in 11 out of the 24 case study sites, with the majority of aquaculture operations sited around the Atlantic coast and in the Mediterranean. In terms of the species cultured, aquaculture activities across the locations have included shellfish (predominantly mussels and oysters) and finfish (mainly seabream and seabass) with limited production of other species – clams, carp, turbot and pike-perch (Table 5). The production shows some differentiation in the species produced as a result of environmental factors that are advantageous for particular species. Across the case study sites there was a wide variety of fish and shellfish farming practices ranging from extensive (e.g. Danube Delta) to more intensive (e.g. Amvrakikos).

Aquaculture-fisheries links are important in the Baltic with hatchery production of salmon in particular making important contributions to the coastal fisheries (e.g. in Kolka). Recent decreases in hatchery production are identified as a key reason for declines in salmon catches.

Table 5 Species used in aquaculture activities in the case study locations

Location	Finfish species	Shellfish species
Killybegs	Salmon, seatrout	Mussels, oysters
Lorient	Seabass	Mussels, oysters, clams
Costa da Morte	Turbot	
Aveiro	Seabream, seabass, turbot	Oysters
Carboneras	Seabream, seabass	
Sète		Mussels, oysters
Oristano	Seabream, seabass	Mussels, oysters
Amvrakikos	Seabass, seabream	
Danube Delta	Carp, bighead carp, silver carp	
Ostende		Oysters
Lake Peipsi		Crayfish

Notes: Mediterranean case studies in blue, Atlantic in purple, Black Sea in yellow, Baltic in red and North Sea in green.

Production and value of production varies considerably across the case study locations with the Mediterranean locations generally having higher levels of production and values of production (Figure 16). While there is currently no aquaculture in Bremerhaven, this is expected to change with the creation of the centre for aquaculture ("*Zentrum für Aquakultur*") funded by the Federal state of Bremen (financed through the economic stimulus package of the German government) as a means of stimulating aquaculture development in the region.

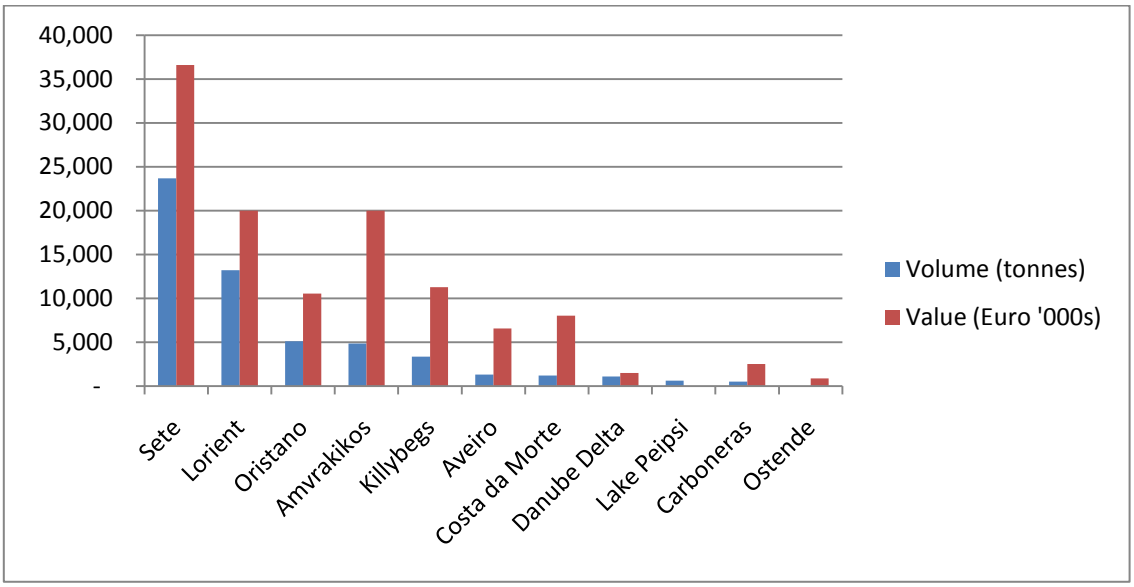

Figure 16 Volume and value of aquaculture production at the case study locations.

Overall the trend in aquaculture development has been generally positive with stable or increasing production and employment opportunities within the sub-sector in the majority of

locations with aquaculture operations (Figure 16). However, oyster farming in France is currently affected by disease outbreaks that have led to decreases in production.

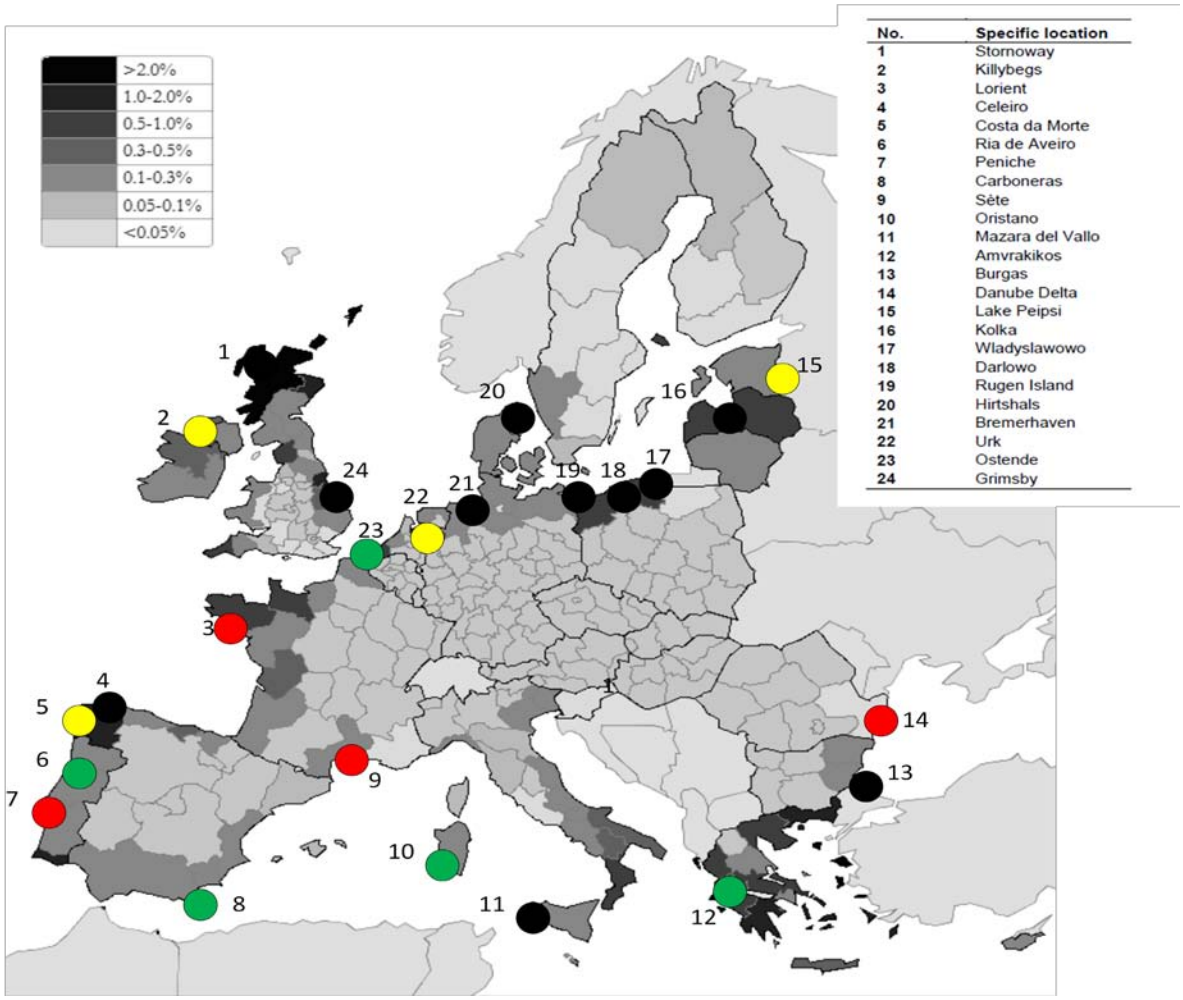

Figure 17 Trend in the volume of aquaculture production over five years within each of the case study locations. Red indicates declining, green increasing and yellow stable production volumes. Black indicates no aquaculture operations at the location.

Supporting the development of aquaculture across Europe is a high level of demand, a well developed high-level research base, a long history of the culture of inland and marine species, competitive technology and skilled and experienced operators, together with climatic conditions and sites that are suited to a range of species. These aspects have supported aquaculture development but the current situation is one of both opportunity and challenges. Within the Mediterranean (e.g. Carboneras, Oristano and Amvrakikos), these positive factors have lead to rapid increases in production, in particular of valuable sea bass and sea bream finfish species and exploration of the potential for other species such as sharpsnout seabream and to a lesser extent dentex and Pandora.

However, aquaculture is also being affected by certain constraints that affect production and development. Both coastal (in particular shellfish) and inland fisheries have been facing pressures from competition for water resources, space and land as well as issues of water quality (e.g. Lake Peipsi and Danube Delta). In addition to the direct impacts on production, it has also meant that some aquaculture operations have become uneconomic (in particular for low value products such as carp). Additionally there have been serious negative effects of disease that have (in these case study sites) affected French shellfish production (e.g.

Lorient and Sète). Aquaculture was trialled in Kolka during the Soviet period but the technology was not suitable for the conditions and the plant was closed.

In terms of the adaptive capacity and vulnerability of the sub-sector, the situation is potentially different for finfish and shellfish given the differences in production systems and requirements (finfish generally requiring higher levels of input and investment). Finfish aquaculture overall remains vulnerable to cheaper imports, particularly from Asia and South America (e.g. *Pangasius* and salmon) and potentially to improvements in the state of marine fish stocks. In response to these challenges the finfish segment of the aquaculture sub-sector is focused on increasing productivity of existing operations (e.g. through improved feeds and automated equipment) and exploring the potential for the development of new species (e.g. halibut) that offer improved returns. The response in inland fisheries has been similar and there has been an interest also in the potential for aquaculture in support of fisheries enhancements for recreational fisheries (e.g. Urk).

Conflict over sites for aquaculture locations may increase in the future, either directly (e.g. with the location for the siting of offshore wind farms) or more indirectly (e.g. with tourism activities) and this may restrict future development potential. This is particularly the case for shellfish farming (e.g. Oysters), which typically requires extensive areas for both growing and additional facilities for purification. These challenges over space for marine aquaculture may see the development of more offshore production facilities while inland aquaculture may generally focus on more high value species offering better returns, opportunities for restocking and recreational fishing and adding value to other water use (e.g. culture in reservoirs).

Overall the challenge will be to build upon the strengths that have underpinned European aquaculture development to date. While the representatives of the aquaculture sub-sector in Lorient are very pessimistic about the future due to the effects of disease, elsewhere there has been a more positive assessment of the opportunities that aquaculture development could represent. In Burgas, mussel beds that are currently unexploited have been identified and considerable interest in developing this resource while in Aveiro, Oristano, Carboneras and Amvrakikos there is interest and investment in further developing finfish aquaculture.

Development of aquaculture is likely to continue to exhibit similar features across Europe in terms of the focus on enhancing and improving productivity and increasing quality and value of production but there are also likely to be key regional differences in the relative importance of aquaculture (e.g. in Greece up to half of all fish produced is from aquaculture), species produced and potential volumes of production. As such, the particular challenges and constraints are likely to be different to some degree, requiring a regional approach to support and manage development.

2.1.5 Sector organisation and representation

Comments are made below in Section 2.2 about the main fisheries management arrangements by region, and for particular case study locations within those regions. This section therefore considers information of a qualitative nature on the types of local sector representative organisations, and on the establishment of Fisheries Local Action Groups (FLAGs) given their importance in accessing EFF axis 4 funds. All case study locations are to some extent represented and served by larger-scale administrative and/or developmental organisations of a non-sector basis e.g. Provincial and local government, regional development agencies, chambers of commerce, etc.

With regard to fisheries-specific sector representation, a wide range of types of organisation are in evidence across the study locations, as shown in the table below. An objective basis on which to determine the strengths or weaknesses of these organisations is not available, but some particularly strong organisations are known to be the producer organisation in

Killybegs, the *Prud'homies* in the French case study locations, and the *cofradias* in the Spanish case study locations.

Table 6: Types of representative fisheries sector organisations in case study locations

Case study location	Main type of representative organisations
Stornoway	Association, Cooperative, Inshore Fisheries Group
Killybegs	Producer organisation
Lorient	*Prud'homies* and fishing committees
Peniche	Associations and Producer Organisations
Aveiro	Associations and Producer Organisations
Costa da Morte	fishers' organisations (*cofradias*)
Celeiro/Viveiro	fishers' organisations (*cofradias*) and vessel owner associations
Amvrakikos	Associations and cooperatives
Oristano	Beach delegations and professional associations
Sète	*Prud'homies* and fishing committees
Mazara del Vallo	Association
Carboneras	fishers' organisations (*cofradias*) and vessel owner associations
Danube Delta	Federation
Burgas	Associations
Ostende	Associations
Hirtshals	Associations
Grimsby	Associations
Bremerhaven	Associations
Urk	Producer organisation, cooperative, association
Lake Peipsi	Associations
Rugen Island	Producer organisations and cooperatives
Kolka	Fisher and processor associations
Wladyslowo	Union of fish producers, local fishermens group
Darlowo	Chamber of fish producers

Notes: Mediterranean case studies in blue, Atlantic in purple, Baltic in red, Black Sea in yellow, and North Sea in green.

The status with regard to the establishment of FLAGs in EU Member States (as at Sept 2010[4]) is that there are active FLAGs as follows: 16 in Denmark, 8 in Estonia, 7 in Finland, 24 in Latvia, 11 in France, 23 in Germany, 6 in the Netherlands, 7 in Portugal, 10 in Lithuania, 15 in Spain, 10 in Sweden, and none in any other Member States. In other countries FLAGs are in various stages of being planned, selected and becoming active. With regard to the case study locations, the following Figure (Figure 18) shows the extent to

[4] Source: FARNET website

which the case study locations are covered by active FLAGs, and by selected FLAGs which are not yet active. It should be noted that the establishment of FLAGs is progressing rapidly, and is an ongoing process. The figure below therefore represents the state of play as at the time of writing (September 2010), and the fact that some case study locations are shown as not being covered by selected or active FLAGs, does not mean that they will not be represented by FLAGs in the future. More details of the progress in each of the case study locations is provided in the individual case study reports (Annexes B-F).

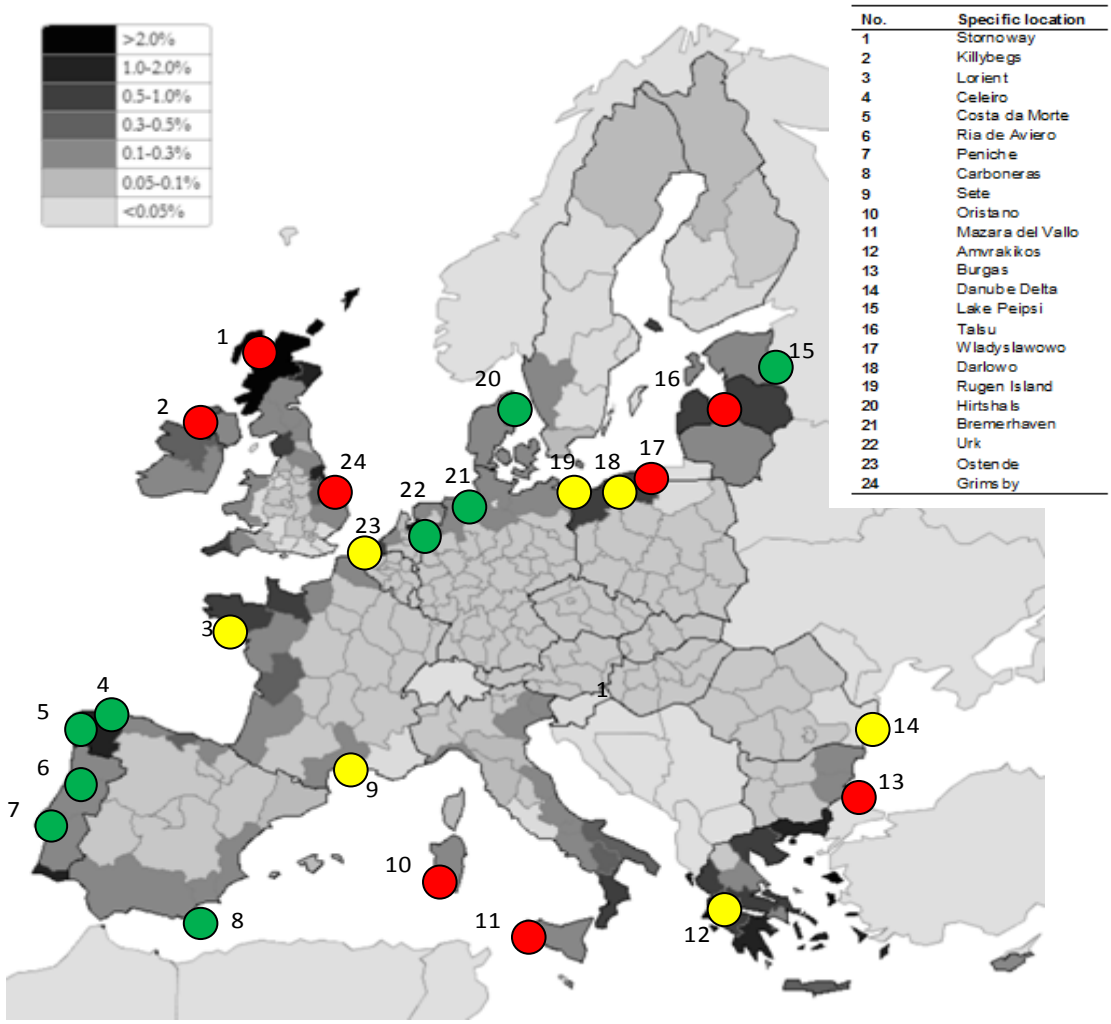

Figure 18: Extent to which case study locations correspond to FLAGs. Green shows case studies covered by active FLAGs, orange by selected FLAGs, and red case studies not covered yet covered by either active or selected FLAGs

2.1.6 Public intervention

The total FIFG expenditure over 2000-2006 was 4.9 billion Euro of EU and Member State subsidy. Of this, 32% of FIFG monies were allocated to fleets and the remaining 68% was allocated to non-fleet measures (including processing, aquaculture, marketing, port infrastructure and co-operative actions)[5]. Comparison of the balance of fleet and non-fleet allocations in the case study locations is provided in Table 7, along with an indication of the

[5] Source: www.fishsubsidy.org

level of subsidies as a proportion of the capture fisheries sector turnover in each study location. Note that the value of public intervention as a proportion of turnover for Carboneras does not account for the landings by the fleet based in Carboneras at other Mediterranean ports that represent a large part of the fish caught by the fleet.

Table 7: Levels of public intervention in the case study locations

	Total Value public sector support to fisheries (Euro '000s) 2000-2007/9	Fisheries public intervention/ catching sub-sector turnover	Fleet support as % of total sector support	Non fleet support as % of total sector support
Stornoway	3,200	9.50%	6.25%	93.75%
Killybegs	65,000	13.0%	3.85%	96.15%
Lorient	18,410	5.30%	47.11%	52.89%
Aveiro + Peniche	80,000	22.40%	36.20%	63.80%
Costa da Morte	19,500	23.60%	100.00%	0.00%
Celeiro/Viveiro	47,300	9.60%	85.62%	14.38%
Amvrakikos	47,883	16.80%	14.50%	85.50%
Oristano	2,018	38.20%	49.55%	50.45%
Sète	18,806	1.80%	67.81%	32.19%
Mazara del Vallo	59,000	8.40%	81.36%	18.64%
Carboneras	16,000	11.90%	60.00%	40.00%
Danube Delta	4,000	457.10%	0.00%	100.00%
Burgas	-		0.00%	100.00%
Ostende	-	-		
Hirtshals	7,100			
Grimsby	8,364	21.70%	97.32%	2.68%
Bremerhaven	-			
Urk	10,620	2.60%	61.21%	38.79%
Lake Peipsi	8,570		98.02%	1.98%
Rugen Island	-	-		
Kolka	185	7.71%	37.83%	62.16%
Wladyslowo	22,528	55.00%	64.84%	35.16%
Darlowo	12,832	305.50%	60.65%	39.35%
Mean	**23,753**		**51.16%**	**48.84%**

Notes:

1. *Interventions are expressed as a proportion of only landed catch value because these data are the most complete across all case studies. Additional information on processing, ancillary and aquaculture sub-sectors, where available, is presented in the individual case study reports.*
2. *Total sector subsidies reported in the case study reports covered various periods, most typically the 2000-2006 period of FIFG subsidies, but some also included subsidies over a period of up to 10 years. In the analysis of subsidies as a percentage of annual sector*

turnover, total subsidies are divided by 7 (2000-2006 inclusive) to generate an annual level of subsidy provision.

Despite the caveats about the data in the table above as indicated in the notes to the table, the data certainly allow for a number of strong conclusions to be drawn about the level and focus of public intervention in the case study locations.

- Total sector support in the case study locations was around Euro 50 million per year;
- Roughly half of public sector support was comprised of fleet support and half of non-fleet support;
- While most case study locations displayed a mix of fleet and non-fleet support, some (e.g. Grimsby) focussed almost solely on fleet support, while others focussed strongly or exclusively on non-fleet support (e.g. Burgas, Danube Delta, Amvrakikos, Stornoway, and Killybegs);
- There was no clear pattern in the type of fleet support provided. Some case study locations received support almost solely for decommissioning (e.g. Grimsby), while in others fleet funds covered a range of support for temporary cessation, modernisation, construction and decommissioning (e.g. Sète, Amvrakikos)
- Subsidies as a percentage of sector turnover varies from very small amounts (e.g. Grimsby, Lorient, Costa da Morte), to very significant proportions in some cases (e.g. Carboneras), and are generally higher in the Mediterranean, Baltic and Black Sea regions that in the North Sea and Atlantic regions. Given the very high proportion of total FIFG subsides attributable to Spain (almost 50%), it is interesting that the two case study locations in Northern Spain do not exhibit especially high levels of subsidies as a proportion of catching sector turnover;
- Where there has been an entrepreneurial drive in the development of the sector the results can be positive but this is highly dependent on the people involved. In Celeiro the Celeiro Port Group has facilitated important steps, such as the purchase of an important amount of fishing rights in Gran Sol fishery, the commercialisation and distribution project of Porto de Celeiro as well as the establishment of a technological and research centre with several innovative projects in the fields of energy, new products and technologies. Furthermore, this organisation has been the nucleus for integrating numerous ancillary activities in the area creating a strong economic cluster which is dynamising the whole community;
- Support for aquaculture was generally limited to Mediterranean case study locations; and
- In some cases public support is comprised of just one or two major infrastructure developments (e.g. the deepwater quay at Killybegs which represents more than 85% of total sector support), while in other case study locations support was distributed to larger numbers of smaller projects.

The drivers for different levels and focus of public support in case study locations has been the philosophical approaches to the use of subsidies in different Member States and, importantly, at the local level, as reflected in their FIFG/EFF Operational Programmes and the stated objectives of support. Within the present difficult economic climate and government sector budget constraints, it is also reported that many Member States (and the private sector) are now less able to provide the contributions necessary to match Commission funds, and that demand for, and uptake of subsidies, may therefore decline until national economic performance recovers.

Drawing firm conclusions from the case studies about the effectiveness of public support is difficult, given that it was not within the scope of the case studies to conduct full ex-post

impact assessments of such support. To the extent that such support has been intended to result in an environmentally, economically and sustainable fisheries sector, earlier data presented in this report on poor stock status and declining catch volumes, and on declining levels of employment in many locations, suggests that public support has not achieved its main objectives. It is certainly true that public support in some locations (e.g. Grimsby) has reduced fleet capacity, but such reductions may not have been sufficient to impact on the balance of capacity and fishing opportunities/stocks to the extent necessary. It is also difficult to firmly attribute any rises in sector turnover to subsidies focussing on infrastructure and justified in terms of their potential impacts on fish quality, as opposed to price increases as a result of supply (declining volumes) and demand (rising populations and purchasing power of consumers) factors. A number of locations display infrastructure developments that are not being fully utilised (e.g. the some of the market/auction facilities in Costa da Morte, the auction hall in Mazara del Vallo, and a large investment in a deepwater quay inn Killybegs). Demonstrating clear economic benefits of public support in the case study locations is therefore difficult.

A key question with regard to any public sector support is one of additionality i.e. the extent to which funds would or would not have been spent by the private sector in the absence of public sector provisions. The case studies show that large infrastructure projects generally show high levels of additionality, but that funds used on fleet measures often generate lower additionality. Some case studies (e.g. Killybegs) show how public sector support can be relatively unimportant compared to levels of private sector investment where the sector is sufficiently entrepreneurial and confident about the future to invest.

2.2 Situation within regions

The following sections provide a summary of some of the key features of the communities within each of the 23 regions. Further details can be found in Annexes B-F.

2.2.1 Atlantic

Communities along the Atlantic coast are strategically well positioned to access the offshore fisheries (including deep water fisheries) at the edge of the continental shelf with the associated fishing fleets being characterised by larger, more powerful vessels. These large vessel fleets have all declined in number as capacity reductions are sought (often using public support for decommissioning) or, in the case of pelagic fisheries the consolidation of quota amongst fewer operators. This has led to reduced employment opportunities in the catching and ancillary sub-sectors, but comparatively good income levels for those remaining within these large scale fisheries. In 2005 the Galicia and Bretagne regions accounted for 32% of the income from fishing in the Atlantic region. The recent poor status of many Northeast Atlantic stocks, other than small pelagics, means that overall landings has decreased leaving processors once dependent on local landings, now struggling to compete with processors better positioned to receive imports and serve European population centres. In certain locations along the Atlantic coast, the development of aquaculture has been enabled by the combination of good water movement and inlets protecting infrastructure.

Some of the Atlantic region case studies (Killybegs, Lorient and Celeiro) reflect the general trends in the region as described above with significant, but declining, large (24m+) vessel fleets. While others, such as Peniche, Costa da Morte and Stornoway rely on smaller vessels that target inshore stocks as a consequence of the more sheltered local geography. Catching sub-sector employment is decreasing in all case study locations other than Celeiro, which has attracted immigrant labour to maintain stable employment levels. For most case studies the services sector now dominates GVA, in the form of the private sector servicing tourism (Peniche and Celeiro), retail, or the public sector (Lorient and Stornoway).

Adaptations to reduced fisheries sectors remain linked to their maritime location with tourism (Peniche, Costa da Morte and Celeiro), shipbuilding (Lorient) and marine renewable energy (Stornoway and Aveiro) being targeted. Killybegs is a clear exception where the dependence and benefits from an efficient pelagic fleet remain high.

2.2.2 Mediterranean

The Mediterranean is a semi-enclosed sea that is bordered by numerous EU and non-EU states, which has contributed to many of its marine resources being over-exploited. The lack of strong international fisheries conservation and management measures in the Mediterranean remains an issue that affects in particular those communities where the fleets are fishing shared stocks. However, the situation is improving with measures adopted by ICCAT on tuna and related species, and GFCM having changed its status in 2002 and Regulation 1967/2006 now in force. Many coastal communities are characterised by large numbers of artisanal vessels targeting mixed demersal and shellfish stocks. This is evidenced by fisheries sector income in 2005 representing 0.2% of the regional total, but 0.4% in employment terms. In comparatively few ports are there are large vessel fleets targeting large pelagics (tuna and swordfish) and demersal stocks (hake) throughout the Med. These have had to be significantly reduced in recent years and a number of fleets have switched from trawling to static gear such as gillnets or longlines. Many areas show a growing, but ageing population with retirees being attracted to the coastal location and those from rural inland locations attracted to service sector opportunities in coastal towns.

The Mediterranean case studies reflect these regional characteristics with all showing an ageing population and only Amvrakikos showing growing employment due to its urbanisation, which is evident in the high GDP per capita compared to the other case studies in the region. For most case studies the contribution of fisheries to GDP and employment is comparatively modest at less than 5%; far less than the contribution of tourism. The exception is Mazara where fishing accounts for 25% of employment due to a large vessel fleet from, but not landing its catch to the port. Across all case studies landings have declined as stocks are over-exploited. Only Amvrakikos shows an increase in the value of landings and catching sub-sector employment, which is linked to the overall growth in its population. Despite the general decrease in landings, the trend in processing sub-sector volumes and employment is however more mixed with Oristano showing a growth in volume and Sete showing growth in processing employment. In both these locations the processing sub-sector is now dependent on imported raw material rather than local landings and is supplemented by aquaculture production. The culture of fin fish (bass and sea bream) and shellfish (oysters and mussels) has been an important addition to the maritime economy for several case studies, but there is little indication this employs displaced workers from the catching sub-sector. The Mediterranean case studies all received substantial amounts of public sector support with the focus on vessel scrapping, port infrastructure and aquaculture development. While aquaculture has certainly expanded in recent years as a result, and fleet sizes in the catching sub-sector have declined there appears to have been no resulting improvements in fish stock status as a result. As aquaculture is now stagnating and reducing in some areas due to pollution and market saturation, diversification out of the fisheries sector is a common strategy with tourism being an obvious focus.

The lack of international fisheries management in the Mediterranean remains an issue that affects in particular those communities where the fleets are fishing shared stocks. This can be seen most clearly with the case of Mazara del Vallo where the effect of reduced fishing opportunities arising from a combination of spatial restrictions, low target stock sizes and fuel price increases has been a decline in the fleet and fishing employment opportunities.

2.2.3 Black Sea

The Black Sea region shows similar traits to the Mediterranean with weak governance of this fully enclosed sea surrounded by accession states and non-EU states, which has exacerbated problems with industrial pollution, the effects of exotic species and over-exploitation of fisheries in this complex ecosystem. These may be worse but for the fact that coastal communities in the region tend to be smaller and less developed than in the Mediterranean. There has, however, been a recent wave of tourism development in many Black Sea resorts as Western European tourists seek cheap beach holidays in EU accession states. The fisheries sector contributed less than 0.1% of regional GDP in 2005 which is proportionally less than the other marine regions. Shipping and the petrochemical industry remain the most important sectors in the maritime economy of the region. About 14,000 people work in the fisheries sector, of whom 5,900 in catching, 1,600 in processing, 5,900 in aquaculture and about 600 in ancillary activities.

The two Black Sea case studies show the lower level of development compared to other case studies in terms of GDP etc. The Danube Delta case study reflects the greater focus on freshwater fisheries compared to other regions. This includes artisanal aquaculture such as pond culture of carp, which remains the most significant fisheries sub-sector employer in Romania. The Burgas coast line includes Black Sea tourism resorts such as Pomorie which like other resorts has show recent rapid development. The case studies show stable (Burgas) or increasing (Danube Delta) catching sub-sector employment. This however is not a positive development, as landed value has decreased in Burgas and the increased landings reported in the Danube Delta case study simply reflect an increase in effort as more enter the fishery sector to supplement income, despite income per fisher being very low. The case study areas still suffer from poorly developed transport links, which limit the expansion of the processing sub-sector as it remains dependent on local supplies. Development (commercial & transport) has increased recently, in the Burgas region as a result of tourism, but poorly planned and excessive development may ultimately be to the detriment of the tourism sector. Management of fish resources is gradually being addressed with necessary restrictions preventing growth in the short term.

2.2.4 Baltic

Fifteen million people live within ten kilometres of the coast of the Baltic Sea, with the bulk of the population being on its southern coastline (Poland, Russia and Sweden). In 2005 the fisheries sector contributed approximately 54,000 jobs, which represents 0.4% of the regional total and 0.1% of the regions income, with over 60% of this coming from fish processing (EP, 2007). Its complex hydrography, extensive ice cover and low salinity leads to a unique ecosystem that has been affected by eutrophication and other forms of pollution. The Baltic Sea Action Plan adopted by the Helsinki Commission in 2007 is looking to restore good ecological status to the Baltic and its fisheries by 2021. Among the six EU Member States that have the highest share of maritime activities in their national economy (+ 3% added value and + 5% maritime employment) three are in the Baltic Sea: Estonia, Latvia and Denmark The Baltic Sea has a low number of commercially exploited stocks and rather clean, single species fisheries of which about 90% are within the Community and with only one external partner (SEC 2009 712/2).

Overall there are estimated to be in the region of 12,000 vessels in the EU fishing fleet in the Baltic (2008 figures) and across the region efforts are being made to adjust fishing capacity to stock sizes. Economically the most important species of the Baltic Sea are cod and salmon. These two species are also at the centre of a number of disputes between countries in the region resulting in both being overfished. Sprat and herring are now caught in the largest amounts. This change is reflected in the Wladyslowo case study where the fleet

targets sprat rather than cod and is the only case study in the region where landed volume has increased and overall value of landings is stable. This is despite the significant reduction in its fleet of larger vessels, something that has occurred throughout the Baltic region in an effort to reduce overcapacity. Therefore, as reflected in the case studies, catching sub-sector employment in the region is reducing. The processing sub-sectors have also reduced as the shortfall in landings has not been replaced by more imports due to the isolated nature of many communities or by aquaculture production, which is limited in the region.

2.2.5 North Sea

The North Sea region is bordered by the most prosperous Member States in the EU with above average GDP per capita and lower unemployment. Overall therefore, while the value of North Sea fisheries may high be compared to most of the other regions (other than Atlantic), their contribution to GDP is comparatively low. In many coastal communities, including some of the case studies such as Bremerhaven and Grimsby, other maritime sectors have overtaken fishing (shipping and food processing respectively). In addition, the catching sub-sector across the region has reduced substantially in recent years and this is reflected in the case studies. There are, however, communities such as Urk and Hirtshals that remain highly dependent on local landings and the large vessel fleets remaining in these ports have consolidated and modernised to adapt to reduced catching opportunities. Significantly the key species in these ports (plaice and herring respectively) are two species that are now relatively healthy.

For many of the fleets operating in the North Sea the high fuel price is exerting a continuous pressure. This is particularly the case for those gears, such as beam trawls, that have a high fuel consumption. The effects of this were seen in the performance of the fleets in the communities of Oostende and Urk where these vessels were operating. Within the processing sub-sectors (e.g. in Grimsby and Oostende) there is an increasing reliance on imported fish. While a large amount of this was sourced from within the EU there were also quantities sourced from outside including from Iceland (cod) and Vietnam (Pangasius). The processing sub-sector in the cases included in the study have been able to adjust to sourcing fish from non local sources and the effect has been that the processing sub-sector has maintained or increased production and diversified even where the catching sub-sector has been declining.

3 Conclusions

Overall the variation exhibited in the case studies makes it difficult to generalise for fisheries-dependent communities as a whole. The diversity across the case studies illustrates the richness of European coastal communities and the varied role that fisheries play within them. As such, aggregate numbers and indicators can obscure heterogeneity, and serve to simplify what is a complex and dynamic set of local realities.

We found that there are numerous drivers influencing the status and trends within the fisheries-dependent communities that were the focus of this study. These are explored in the following sections.

3.1 Development of communities in response to change

Some conclusions can be drawn about some of the factors that constrain or provide opportunities for community development. It has been possible to classify the case study locations into five categories of fisheries-related development based on the pattern of development and diversification that the communities exhibit (Table 8), and whether this was within or outside the fisheries sector.

Table 8 Development and diversification in fisheries-dependent communities

Increased efficiencies in existing fisheries	Diversification into new fisheries	Expansion of other fisheries subsectors	Diversification outside fisheries	Alternative sectors
Killybegs	Stonoway – shellfish	Amvrakikos - aquaculture	Lorient	Port facilities and logistics
Celeiro (purchasing fishing rights in Gran Sol fleet)	Killybegs - boarfish	Grimsby - processing	Grimsby Aveiro (existing fish processing units want to diversify their production)	Food processing
Sète (investment in structuring infrastructures to organise the fishing industry and other maritime sectors)		Ostende – processing	Carboneras Aveiro	Tourism and heavy industry
Urk (re-flagging vessels)		Bremerhaven – processing	Peniche Aveiro	Tourism
Aveiro – better organisation of small scale fishing operations to find mechanisms to increase final value of fresh fish		Wladyslowo - processing	Stornoway Aveiro (shipyards have now stated to produce parts for the wind and wave energy production)	Renewable energy
		Hirtshals - processing	Killybegs Aveiro	Oil and gas
			Danube Delta Aveiro	Eco-tourism
		Aveiro – processing	Aveiro	Manufacturing

In two of the Atlantic cases there was evidence of increased efficiencies within the fleets and of increased profitability of the sector. Similarly, in the North Sea case study locations, the potential for processing to make important contributions was highlighted.

This table helps to highlight the positive and significant regional development role that fisheries can play. While the term 'dependency' has somewhat negative connotations, fisheries can represent an important local resource. Furthermore, in remote locations (e.g. Stornoway and Kolka) fisheries have an important role as an 'indigenous industry' in contrast to other sectors such as tourism and manufacturing that may require resources from outside the locality. In these places there is a strong association with the sector and it plays a strong role in future visions of the community.

In a number of cases (including Celeiro, Burgas, Kolka, Costa da Morte, Peniche and Aveiro), the fisheries sector represents an important source of employment for women. In Costa da Morte, for example, some 85% of the processing sub-sector workforce are women, and the *mariscadoras* (shelfish gathers) of Costa da Morte, (numbering around 250), are mostly women. In these locations there was concern over what the effect of declines in processing employment opportunities would mean.

While the majority of locations exhibited diversification into other sectors, in many cases there was a link to the fishing sector through skills (e.g. in processing and ancillary services) that could be transferred. However, overall the case study locations have looked to adapt in very different ways. Some have shown greater success in adaptation than others, both within fisheries and beyond fisheries, though it is notable that fishing and fisheries continue to play an important role in many cases.

Other cases have sought to diversify out of fisheries, with many coastal locations favouring a move to tourism (e.g. Peniche, Burgas and Carboneras). Fish processing and storage capacity has diversified into other food stuffs (e.g. Bremerhaven and Grimsby). Elsewhere alternative sectors have been, or are in the process of being, introduced (heavy industry, ship building, renewable energy and transport) as a result of the coastal location. This was shown strongly in the case of Bremerhaven where the town is seeking to become a maritime hub, building on its position and history.

The ability of the catching sub-sector to diversify into other activities has been limited as new opportunities require very different skill sets and many fishers have significant capital tied up in their investments in fishing capacity. Exceptions to this, which provide useful additional income to the catching sub-sector, but not generally a full-time alternative source of income, include fishing tourism and guard vessel duty for offshore energy developments.

3.2 Drivers of change

The different histories and contexts of the case study locations have given rise to different trajectories and it is not possible to identify a single or dominant driver or matrix of drivers that can be used to determine the outcomes. It is clear, however, that the following are key drivers of change

- **Environment:** of location and targeted stocks – ability to switch stocks, level of isolation of the community, environmental conditions (space, water quality natural productivity etc). The natural characteristics of the area in terms of geography and species present has enabled adaptation within fisheries, including expansion into new primary sub-sectors such as aquaculture;
- **Economy**: affected by the diversity and performance of the local economy and performance of the national economy. Presence of other economic activities;
- **Public policy**: policy defined at EU level, particularly regarding capacity reduction, public intervention and stock management
- **Society**: people, relations between people, degree of freedom for action within local institutions that govern the way people can access and benefit from resources

These aspects contributed to opportunities and constraints to adaptation and to the vulnerability of the communities in the case study locations. An awareness of adaptability, as seen with diversification above, is important because it stands as a proxy for resilience in communities (e.g. Delaney 2009; Jepson and Jacob 2007). The inability of communities and individuals to adapt to changing conditions, or, in other words, to be resilient (economic, political, institutional), increases their vulnerability and, with it, the potential negative consequences of changing conditions. The 24 cases presented in this report represent a range of levels of vulnerability and successful adaptation in responding to the challenges facing the fisheries sector today (Table 8).

3.2.1 Environment and stock management

Management in the different areas has influenced the performance of different case study communities. Those with large scale fleets dependent on shared stocks have struggled in the enclosed sea areas of the Mediterranean and the Black Sea, while more localised fleets and management in these areas has enabled them to address management shortcomings themselves rather than being at the mercy of wider-scale management. There is a need to address the issue of shared stocks, particularly in the Mediterranean where the stock status is less well established and levels of exploitation are higher. But even for the more profitable and modern segments, where there is a high degree of capital investment, or investment required, as recent events with mackerel have illustrated, the risks can be significant.

Recent EU actions have started the recovery process for a number of key stocks, although in some cases this recovery is too recent to have had an impact on the communities. For North Sea and Atlantic areas the ports hosting larger fleets targeting small pelagics show the best economic performance. Those targeting demersal stocks remain constrained by poor stock status and recovery plans. For many stocks there is insufficient knowledge, even for key species in volume and value terms to determine the health of the fishery.

3.2.2 Economy

A key aspect to vulnerability is the existence of alternative activities, both within and without fisheries; another is economic vulnerability (Wilson 1998; Delaney 2009). Economic vulnerability refers to the amount and sources of pressure and competition faced by those in fishing enterprises as they run their operations and sell their products. For the catching sub-sector their economic vulnerability can be seen through increased operating costs such as through higher fuel prices (e.g. flatfish in Urk and Oostende, hake in Carbonaras and the shrimp fisheries in Mazara), needing to switch gears or alter equipment (Urk boats changing gears and locking engines and Carbonaras investing in smaller, more efficient engines), price limitations (e.g., due to *Pangasias* imports), limitations in switching species (Rügen Island), vulnerability to changes in quotas (and access to quotas), and loss of quayside space (e.g. Oostende), which once lost to other sectors, is difficult to get back.

There are also indirect costs to the catching sub-sector related to the poor state of stocks and the poor image of the fisheries sector in terms of the difficulty in finding crew (exacerbated in situations like Urk, where crew pay is based on a share of net income, not gross income as in Oostende) and ability to sell the catch. Fishers are also indirectly vulnerable during perceived crises as the sector is often seen as risky and many banks refuse to make loans to the sector, and thus they are unable to invest in their firms and boats. In some cases (e.g. Kolka) the combination with increased costs has meant that operators are unable to afford to replace lost or damaged gears and need to find more low-cost methods.

For the catching sub-sector, economic vulnerability can be seen where increased fuel prices have led to reduced fishing activity (e.g. Mazara del Vallo), and decreased landings from both foreign boats (e.g. Ostende) and vessels based in the community (Carboneras). The

practice of re-flagged vessels (e.g. Urk) can affect landings and impact auctions and harbours as these former local boats often no longer land or receive support services in the home port, though regulations can be introduced to ensure some fish is landed locally. An increase on the reliance of imported fish by processors can also impact auctions through the reduction in their earnings. In some areas, auctions are no longer viable with such decreased landings and consolidation for economic efficiency is taking place (e.g. Oostende with Zeebrugge) and auction halls are exploring opportunities for handling other products (e.g. Mazara del Vallo). For the catching sub-sector across almost all the case study locations the big challenges are to match capacity to resource productivity, increase the attractiveness of the sub-sector to workers and investors, and address costs and increasing international competition.

For the processing sub-sector in terms of economic viability, a stable supply of fish with low stock prices and low employee wages are important. The status of stocks in EU waters and measures to rebuild stocks directly impacts these businesses, and growth in importing fish is seen across Europe. For the processing sub-sector there are also challenges from international competition from countries with lower labour and production costs and possible rising prices of raw material (which may benefit the catching sub-sector). Where processing has been increasing in importance, such as Grimsby and Bremerhaven, the local view is fairly positive that investments in product innovation and development will be successful in ensuring the future of the industry and meeting changing consumer demands. Across the fisheries sector the low wage levels of employees is also important, and in many areas employees are now low educated and low skilled immigrants. Of course, in many processing sub-sectors skills are valued (e.g. filleting) and thus attempts are made to keep traditional sources of local labour.

Ancillary services facing economic vulnerability include fishing specific enterprises (chandlery, net-making) which cannot as easily diversify as others (e.g. engineering and shipbuilding) into other markets. They also face difficulties through decreasing numbers of customers: both through a decline in overall boats available (seen across almost all of the case study locations), as well as with boat skippers increasingly doing some of the work (e.g. painting) and repair themselves. With the overall decline in boat numbers, consolidation often takes place with larger firms in major ports managing to capture the market.

3.2.3 Public policy

EU policy on capacity reduction has had significant impacts on many communities, particularly those with important catching sectors. Reduction of fleet capacity has usually been attended by a reduction in catching sub-sector employment. For fishing-dependent communities a reduction in fleet numbers will therefore inevitably have some short-term negative consequences, particularly with regards to social impacts.

Such impacts have attended the MAGP/EFF capacity reductions, and are likely to also attend consolidation of fishing rights under transferrable rights based management systems. Although, as has been seen in Celeiro, consolidation and transfer of rights from one community to another will generate both winners and losers. The overall reduction in fleet size, which is projected to continue under either the existing EFF policy or future rights based management policies, will certainly have impacts on individual communities.

For upstream businesses (provision of vessels, gear, chandlery, fuel, repair and maintenance) the consequences of fleet consolidation, leading to there being fewer more efficient vessels in the fleet, is likely to reduce the overall demand for upstream services although there may be an increase in the technology level required. Lower demand makes it difficult for these businesses to remain profitable and may lead to a reduction in their number. In Oostende, for example, the qualitative analysis revealed the port is operating at a theoretical minimum number boats. Community members felt if it was to fall further, some of

these upstream businesses could no longer operate. Larger vessels require larger capacity facilities for repairs and also command greater buying power, making them more likely to look beyond the local provision of these upstream services. This was seen on Rügen Island, for example, where businesses are starting to concentrate in the larger port of Sassnitz-Mukran. This can also be seen elsewhere in cases where vessels are registered in smaller ports, but they actually operate from larger ports and receive the majority of their services there.

Downstream businesses (markets, sales, processing, transport, etc.) may, however, benefit from the increased efficiencies resulting from fewer vessels making fewer but larger landings. Fleet consolidation may, however, also result in fewer downstream operators as although the total amount of trade may not change, fewer individual transactions occur and consolidation in the downstream sector may be the result.

The effects of fleet consolidation may also include the distribution of wealth becoming less even as fleet consolidation leads to fewer, wealthier operators within a sector. While these wealthier individuals may remain within the local community, this has consequences for the wider community as the amount and type of household expenditure differs with income. In the UK for example, households in the lowest income quintile group spent a much larger proportion of their expenditure on housing, fuel and power than those in the highest income quintile groups (21 per cent and 7 per cent respectively). This was also the same for expenditure on food and non-alcoholic drink (17 per cent and 8 per cent respectively) (ONS, 2010). Those with lower incomes spend proportionally more of their income on consumables such as food and rent, generally local purchases compared with those with higher incomes. Such consolidations cause families to adjust their spending patterns towards more essential items (as was described in Urk). This alteration in consumption patterns in turn impacts the retail sector. Furthermore, households with un- or under-employed members will not only limit local purchases, but may be forced to move away from the community entirely and this pattern was seen in several of the case study locations.

Fleet overcapacity has been a significant driver for the changes seen in the last 10 years, which has been addressed by public intervention and more organically with retirements, etc. In these areas the effect of public investments on fleet size can be seen in the trends in vessel numbers.

A significant driver for fleet capacity reduction has been public intervention as well as public policy. Public intervention has not appeared to have such a significant impact on communities in non-fleet sub-sectors such as processing, marketing and aquaculture. It may be the case that given extensive infrastructure developments over the years in many locations, and declining fleet numbers (see earlier data), that many locations now have sufficient levels of fisheries infrastructure and that the need for public sector support for further investments is reduced, despite the generally high levels of additionality.

With regard to fleet capacity, while a number of studies are underway to assess the exact extent of fleet capacity, it seems likely that in many fisheries, and in many of our case study locations, a degree of overcapacity in the fleet still exists. This in turn implies that funds for decommissioning (rather than modernisation and construction) could be justified in the future, unless other market-based mechanisms such as rights-based mechanisms (e.g. transferable quotas) can be used effectively to address fleet capacity. In addition, it may be appropriate for subsidies to have a much stronger focus on innovation in terms of environmental objectives/benefits and economic objectives of increasing value-added.

3.2.4 Society

The degree and consequence of impacts of change, is a function of the characteristics of the individual location and community. While many of the adaptations to change are being taken at the household or individual level (migration, changes in occupation etc), these are

modified by the incentives, opportunities and constraints that are created within the particular location. A critical point therefore for our purposes in this study is the vulnerability of the communities to negative repercussions and their ability to cope with and absorb any negative impacts. In the more remote communities there was a great deal of concern over the effects of declines (e.g. due to increasing costs) and consolidation in the fisheries sector and a lack of alternative opportunities locally. Where this had led to working age people moving away from the location (e.g. Lake Peipsi and Kolka), this had affected local services (e.g. schools) and if the community is unable to maintain these then community networks are affected and the community begins to become less attractive as a place to live.

Previous studies have shown that a key to resilience is the amount of community support available. In some areas, community support may be seen in the form of informal social networks and kinship ties (e.g. the Kashubian subgroup in Poland); in others, it may additionally take the form of formal social support through local associations. Another critical factor is a willingness to be entrepreneurial (e.g. direct marketing in Urk and sector development in Celeiro) and a strong "never say die" attitude (e.g., Killlybegs). These aspects can be critical when allied to other support (e.g. from regional, national and EU levels through structural funds, which were very effective in the case of Celeiro). However, in some cases this sort of attitude and these sorts of support mechanisms may only be available to certain groups within the fisheries (for example North African labourers in the Italian fleets are able to relocate). These aspects are highly community-dependent and may also include conflicting attitudes (e.g. traditionalism in Urk) that may lead to conflict between different groups and associations at the local level. In addition to the collective culture within a community the study has identified that the role of individuals can be critical. Individuals are capable, even within severely restricted social spaces, of formulating decisions, acting upon them, and innovating or experimenting. This can result in very positive outcomes as a local innovator or entrepreneur creates opportunities for the wider community (e.g. Celeiro), but it can also be less positive. Individual actors will often work to advance their own cause and outcomes will reflect the political influence of those involved. Given this, policies and investments may be variously implemented, translated or resisted at the local level, but in ways that it can be almost impossible to predict.

Despite the challenge this may present, policies and investment are required to make the sector more attractive. Young people are not being attracted to the sector, in particular the catching sub-sector, and fishing operations in several areas have been sustained through the introduction of third-country workers into fishing activities. Addressing income levels; providing a clearer entry into the sector; and subsequent career path is required to make the sector more attractive to prospective entrants. At the same time, improved resource management and reductions in IUU fishing can contribute to more stable catches and make fisheries a more attractive proposition for private sector investment.

The diversity highlighted by the case studies suggests that there is no single investment or policy that can be highlighted as effective beyond others, partly as a result of the fact that these policies and investments are affected by the way in which they are translated into practice at the local level. However, much of the development and adaptation seen within the communities has emerged from the local level with local actors able to seize opportunities to adapt and diversify. This suggests that investments in the development and strengthening of local organisations and the linkages to resource management, including making these transparent and accountable, could provide an opportunity for more flexible and locally driven adaptation that allows for the particular local circumstances and history.

The very different roles that fisheries (and the different fisheries sub-sectors) play within communities and the very different development trajectories of these communities also suggests that supporting and developing local planning and investment could provide opportunities for development and diversification.

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