Impact assessment of the FP4 and FP5 Research Programmes on Fisheries, Aquaculture and Seafood Processing Research Area and the Fisheries Industry

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FP6-2003-SSP3-513651

EUROPEAN AQUACULTURE SOCIETY ESTABLISHED 1976

OCEANIC DEVELOPPEMENT

Summary report and recommendations

Content table

Cover concept and document lay-out: E. Vanderperren

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"This publication has been carried out with financial support from the Commission of the European Communities, specific RTD programme "Specific Support to Policies, FP6-2003-SSP3-513651 — "IMPACT FISH - Impact Assessment of the FP4 and FP5 Research Programmes on Fisheries, Aquaculture and Seafood Processing Research Area and the Fisheries Industry". It does not necessarily reflect its views and in no way anticipates the commission's future policy in this area"

1 Goals of the assessment

European aquaculture, fisheries and seafood processing development has benefited from considerable efforts in EC RTD projects. Reforms in European policies and programmes, accompanied by changing public priorities, have affected the way in which the fisheries sector is perceived and hence its further development. The Fourth and Fifth Framework Programmes of the European Commission in aquaculture, fisheries and seafood processing RTD were built upon specific objectives for the continued development of the sector over the period 1994-2002.

As part of the integration and strengthening of the European Research Area, this specific support action (SSA) provides an impact assessment of RTD programmes on the research areas mentioned above and on the fishery industry (including aquaculture production systems). When evaluating policies, the utilisation of past experience to aid future choices is paramount. When applied to the aquaculture and fisheries sector, past experience is even more useful in supporting future policy, especially in the ongoing process of reform of the Common Fisheries Policy (CFP).

This study focuses on the following objectives:

I. To document the initial broad and task-related objectives of the Commission (in 1994 and in 1998) in the fisheries, aquaculture and seafood processing research area.

II. To bring together key elements of all the projects of both programmes, so as: into one database so as to provide comparison of focus and effort.
    a. To identify and compare project inputs, including consortia make-up and representation, management and planned dissemination activities.
    b. To identify and compare project outputs, including publications, technologies, protection of knowledge and actual dissemination.

III. To identify and consult stakeholders in the research area (including co-ordinators and partners) and in the industry (SMEs, producer organisations, fisheries development agencies, aquaculture associations, food sector stakeholders) on actual and perceived benefits, constraints, successes and failures.

IV. To present the findings of the stakeholder consultation, highlighting needs and requirements, and provide recommendations to the Commission, based on these findings.

V. There is a need for feedback in order to be able to further promote, prioritise and participate in calls for European collaborative RTD. There is an added value in terms of creating awareness of previous RTD project and programmes for non-participating SMEs, as well as for those who had not been previously targeted in dissemination of the project results.

This study has been prepared by the European Aquaculture Society (www.easonline.org) and Oceanic Développement (www.oceanic-dev.com).

The European Aquaculture Society is an international non-profit association (created in 1976 and related to international associations with philanthropic, religious, scientific, artistic or educational objectives) that promotes contacts and disseminates information among all involved or interested in aquaculture in Europe. EAS currently has members in more than 60 countries.

Oceanic Développement is an independent expertise company created in 1991, whose activity is centred on the fishing and fish processing industries, with assignments in France, Europe, Africa, America and Asia. Oceanic Développement has performed many studies for the European Commission in the area of fisheries, in the European Union, in many third countries throughout the world.

2 Introduction to the Framework Programmes

The objectives of the 4th and 5th Framework Programmes

The general objectives of the research programmes supported by the European Community are set out in legislative documents after adoption by the various European institutions involved. The objectives of the 4th Framework programme (1994-1998) have been adopted by Decision 1110/94/EC of the European Parliament and of the Council, while the objectives of the 5th Framework programme (1998-2002) are to be found in Decision 182/1999/EC of the European Parliament and of the Council. Objectives specific to research in the field of aquaculture, fisheries and seafood processing (FAIR for the 4th Framework Programme and Quality of Life or QoL for the 5th) are subject to specific Council Decisions[1]. These legal documents list the general objectives as well as the specific objectives assigned.

The general objectives of the FAIR programme were to increase the competitiveness, the efficiency and the sustainability of the agriculture; fishery and related industry sectors (including seafood processing and aquaculture), and to promote rural development.

For aquaculture and fisheries, the work was targeted on five areas, which form the specific objectives of FP4 in these sectors:

- Impact of environmental factors: objective to generate a better understanding of the influence of environmental factor and parameters.
- Ecological impact of fisheries and aquaculture: Research should provide a better understanding of the effects that fisheries and aquaculture have on the ecosystem, with an aim of limiting their impacts.
- Biology of species for optimisation of aquaculture: objective to contribute to a better understanding of the biology of aquatic species with a view of developing a economically profitable industry.
- Socio-economic aspects of the fishing industry: objective to generate a better knowledge and understanding of the operations and management of the sector
- Improved methodology: objective to improve existing methodologies for fish stock assessment (e.g. novel methods of data collection and analysis), and development of new instruments and techniques for fisheries and aquaculture research.

Under the QoL programme, European citizens were placed at the centre of the policy objectives. The general objective of QoL was to link the ability to discover to the ability to produce, in order to assess the needs of society and to meet the requirements of the consumers, leading to future wealth and job creation and improvement of the state of the environment.

As for specific objectives, fisheries and aquaculture related research priorities are new and sustainable systems of production including breeding methods, and exploitation in agriculture, fisheries and aquaculture, taking into account profitability, the sustainable management of resources, product quality and employment, as well as animal health and welfare. The RTD priorities assigned to the QoL programme were:

- For fisheries: Support to integrated fishery management linking resource conservation, means of capture, interactions with ecosystems, market requirements and socio-economic considerations; identification and characterisation of the quality of marine products and technologies; development of new concepts for the sustainable use of marine and aquatic living resources.
- For aquaculture: Sustainable production systems with the reduction of the impact on ecosystems and diversification of cultivated species (both plant and animals);

[1] Council Decision of 23 November 1994 adopting specific programme of research ; technological development and demonstration in the field of agriculture and fisheries for the 4th Framework Programme, and Council Decision of 25 January 1999 adopting a specific programme for research, technological development and demonstration on quality of life and management of living resources for the 5th Framework

improvement of production techniques, genetic improvement; disease resistance and control.

In addition to the specific objectives of FAIR and QoL, the European Community aimed, as a horizontal objective common to all research programmes, to foster cooperation and cooperation in research between Member States, as well as placing the Community as a focal point of scientific and technological excellence.

The Common Fisheries Policy and Research needs

The 1994-2002 period coincided with the Common Fisheries Policy as defined in Council regulation No3760/92 of 20 December 1992 establishing a Community system for fisheries and aquaculture. The main objectives of this policy (art. 2) were to protect and conserve available and accessible living marine aquatic resources, and to provide for rational and responsible exploitation on a sustainable basis, in appropriate economic and social conditions for the sector, taking account of its implications for the marine eco-system, and in particular taking account of the needs of both producers and consumers. The reform of the CFP adopted end 2002 subsequently changed the stock-based approach to an ecosystem-based approach to fisheries management in which environmental impacts are integrated as opposed to taken into account.

The 1994-2002 coincided with a period where most fish stocks were in a poor condition. The main challenge was to reduce the fishing fleet capacity to the resources available. Aquaculture and seafood processing were seen as means of creating wealth in coastal areas and supplying the Community market for seafood.

Prior to the implementation of the 5th Framework Programme, the DG in charge of Fisheries published a note detailing its priorities in terms of support to research. These were:

- Making more reliable or efficient the technologies on the basis of which scientists formulate their opinion and advices;
- Making the most out of limited fisheries resources by aiming at greater added value for catches and the development of alternative employment possibilities through an improvement of the quality of seafood products, including from farmed species;
- Supporting the development of European aquaculture as a complementary activity to fisheries, stimulating economic development in marginal areas where there are few opportunities for employment thus contributing to Community cohesion through improved knowledge on the biology of species interesting for aquaculture, mitigating the disease problems, improving their genetic basis and avoiding negative effects on the environment.

In the long run, DG Fisheries expectations were on research that would facilitate the evolution of the CFP, in particular by identifying and comparing alternative management strategies within the European context and according to specific situations. The research should also clarify for decision makers how their future choices with regard to these management strategies will affect the various objectives assigned by the Treaties to the CFP. What DG Fisheries did not expect was also clearly mentioned. In particular, any project that would potentially lead to increase fishing mortality by contributing to an increase of the catching capacity of fishing vessels would not be accepted. This can be easily understood given the general situation of exploited stock, but the point needed to be made as the FPs also encouraged an increase in competitiveness!

3 Evolution and RTD focus of the European aquaculture, fisheries and seafood processing sector during the period 1994 to 2002

Total aquaculture production from EU Member States[2] during the period covered by the two Framework Programmes grew continuously. Annual adjusted growth of the sector was 6,3% compared to a global production APR increase of 10,1%. The major species produced are Atlantic salmon (*Salmo salar*), rainbow trout (*Oncorhynchus mykiss),* Common carp (*Cyprinus carpio*)*,* sea bass (*Dicentrarchus labrax*) and sea bream (*Sparus aurata*). In salmon, sea bass and sea bream, considerable growth was accompanied by price erosion; in carp and trout, production was flatter, with less impact on prices.

Full information on volumes and prices can be found at the web site of the Federation of European Aquaculture Producers (FEAP) at www.feap.info.

European funded research in aquaculture over the two Framework Programmes was focussed on three principal areas: new species, health management and genetics.
Projects on **new species**, looked at a wide range of potential aquaculture candidate species) - not only finfish such as halibut, bluefin tuna, sole, wolfish, burbot, etc.; but also mollusc species including cuttlefish and octopus. These projects have generally focused on hatchery production technologies, including studies on nutritional requirements.
Projects in **health management** have addressed (among others), studies into the immune response of the major cultured species; the development of vaccines and vaccination strategies; and the control of parasites, such as sea lice in salmon. Studies have also helped increase knowledge on shellfish toxicity and the effects of harmful algal blooms.
Genetics research has furthered knowledge on the development of molecular tools, genetic variability in populations of cultured fish species, the genetic impact of aquaculture and the mapping of salmon and sea bass genome, so as to assist in various production improvements, notably in the area of broodstock management. Molluscan genetics also received focus - an example being the production of triploid oysters.

Specific RTD projects have addressed the underlying **environmental considerations** of the above research areas, especially with regard to issues relating to the impact of intensive cage farming; the genetic impact of escaped fish and the limitation of environmental impact through the use of recirculating technologies and through integrated aquaculture.

The situation of the European fishing industry is fairly different from that of the aquaculture industry. As early as 1990, the problem of overcapacity of the European fishing fleet versus the natural productivity of the exploited stocks was known, and addressed at the political level through the Multi-Annual Guidance Programme (MAGP), which imposed quantitative objectives to Member States for reducing their fishing fleet.

As a consequence, the number of fishing vessels (which can be roughly assimilated to the number of enterprises) decreased over the 1994-2002 period. Overall, the European fishing fleet lost more than 13.500 units (-13%) over the period, while the power of the fleet decreased by 11% simultaneously.
The evolution of the outputs of the fishing fleet did not match the evolution of the fishing fleet (the inputs) over the same period, with an overall decrease of only 2%. The production of the fleet even increased between 1994 and 1998 (+4%). The corresponding figures in terms of value of the production are not readily available, but it is known that the fishing fleet was able to maintain or slightly increase the total turnover of the industry due to landing prices following an upward trend.

[2] EU 15 countries, so excluding Norway and the New Member States.

The evolution of the state of the natural resource exploited in the European waters is an issue of concern for most of the stakeholders of the fishing industry. The annual reviews of the International Council for the Exploration of the Sea (ICES) show that the global trend is a decline of the status indicators, with many demersal stocks having reached a marked overexploitation level despite the measures taken to reduce the fishing pressure.

The European Commission recommendation was that research should focus on fish stocks showing a high degree of vulnerability to exploitation and should address environmental impacts of potential high magnitude. In order to promote research development on new topics, the focus was on research that would fill-in existing gaps, rather than devise further refinements to well studied domains or species, and the degree to which relevant fisheries research has already been supported by the EU. The intention was clearly to reduce the imbalance between research carried out in the Northern waters and fisheries research in the Mediterranean and Southern waters.

The evolution of the seafood processing sector over the past few years is difficult to appreciate. Traditionally, the seafood processing sector is amalgamated with the other components of the agro-food sector, with a socio-economic weight much lower than that of the agriculture products processing sector for example. As a consequence, there are no detailed statistics on this sector, and the information available originates mainly from specific studies undertaken by the European Commission.

The European processing sector remains for the most part in contraction and consolidation due to supply shortages and competition from cheaper imports. This situation may persist for some years to come as trade barriers such as tariffs and import licences, which to an extent currently protect intra-Community seafood trade, are reduced or stopped through international trade agreements. Third countries, such as China, previously suppliers of raw material only are increasingly taking advantage of their low labour costs and processing for export as processing units achieve EU quality standards.

As a consequence of shortage in supply of raw material and societal pressure for safe and innovative seafood products, the industry had to adapt towards increased production of high value-added products which would meet, as any other seafood products, the hygiene standards.

The research priorities adopted by the European Community were in line with this development strategy. RTD effort in both the FAIR and Quality of Life programmes was focussed on methodology and tools to measure fish quality and freshness; improved efficiency in processing and handling of waste and better traceability of seafood products.

Quality projects addressed issues such as better harvesting processes, raw material characteristics and smoking processes, quality monitoring of heat-processed fish and non-invasive quality assessment tools for rapid use through the value chain.

Research on the improvement in efficiency has also looked at the processing by-products, with initial research building knowledge on the availability of selenium from processed fishery products, and bioactive compounds in fish hydrolysates.

Finally, a significant number of projects have addressed traceability issues, most notably with regard to the formation of common standards for recording and exchange of traceability information within the seafood value chain.

4 Overview of the RTD effort in the European aquaculture, fisheries and seafood processing sector

4.1 General characteristics of RTD projects

The characteristics presented in this section have been extracted from the database of projects utilised by the services of the European Commission to follow-up the projects once they have been accepted for financial support.

The European Commission approved the funding of 389 research projects in the field of fisheries, aquaculture and seafood processing over the 1994-2002 period. A total of 231 research projects (59%) were funded under the FAIR programme of FP4 which extended over the period 1994-1998, while 158 research projects (41% of total), were funded under the QoL programme of FP5.This represents a decrease in the number of projects of 32%.

An analysis by main sector (fisheries, aquaculture or seafood processing) indicates that the number of projects on fisheries was the highest. As shown in the following graph, the number of fisheries projects under FAIR represented 45% of the total number, while the number of projects on aquaculture totalled 41% and seafood processing 14%. Under FP5, the number of fisheries-related research projects increased to 50% of the total number of projects funded, with aquaculture and seafood processing representing 45% and 5% respectively. Over the whole period, the number of fisheries projects represented 47% of the total, while aquaculture was 42% and seafood processing 11%.

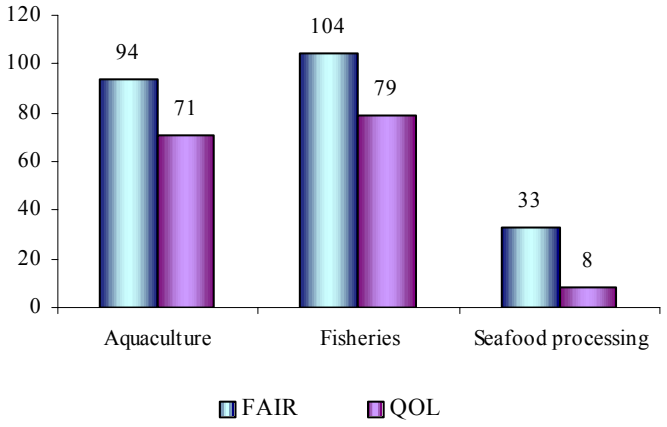

Figure 1: Number of projects funded by sector. Source: EC database.

The decrease in the number of projects from FAIR to QoL affected all sectors. Fisheries and aquaculture research projects both decreased by some 24%, while the number of research projects on seafood processing decreased by 76%.

However, the total spend on these research projects did not follow the same pattern. The following table shows that the total costs of the research projects (Community contribution plus the research institutes contributions) increased from 168 M€ under the FAIR programme to 213 M€ under the QoL programme, a 27% increase. This indicates that between FAIR and QoL, fewer projects received higher funding. As a global benchmark, it can be noted that the average funding of a FAIR project as a whole was approximately 730 000 € while the average cost of a QoL project was 1,3 M€, an 85% increase between the two Framework Programmes. The fisheries and aquaculture sectors both benefited from this increase in total funding between FP4 and FP5 (+47% for aquaculture, +45% for fisheries). The data shows, however, that funding directed to research in the seafood sector decreased by 54%.

The average cost of an aquaculture research project rose from 0,64 M€ to 1,24 M€ (+94%) between FP4 and FP5, an average fisheries project budget increased from 0.74 M€ to 1.41 M€ (+91%) and a seafood related project from 0,95 M€ to 1,80 M€ (+89%). Therefore, the opposite trends noted for the number of projects and the budgets allocated reveals an increased research effort concentrated in larger projects, at least in terms of cost.

As stated earlier, the total budget of the research projects includes a financial contribution from the European Community and from the receiving institutes. The maximum level of the Community contribution in % of total costs is set by the legal instruments regulating the Framework contracts as well as by the Cost Models used by participants in the RTD consortia. On average, the Community contribution in fisheries, aquaculture and seafood processing represents 65% of the total research effort in budgetary terms, whether under FAIR or QoL. When considering each sector, it can be seen that aquaculture projects were funded up to an average of 68% of the total cost, while fisheries project received on average 64% of funding from the European Community and seafood processing research 61%.

Contracts are classified by the European Commission as "Actions"; sometimes also referred to as 'tools'. Generally, new frameworks will introduce new tools, and/or discontinue tools previously used. The introduction of Thematic Networks in the FP5 programme is an example of a new tool. Tools may also be broadened in terms of their scope, partner make-up etc, and therefore be renamed, such as the Combined RTD and Demonstration projects of FP5. While RTD projects still represent (in FP5) a little more than 50% of the total number of projects, the proportion of SME measures showed the highest increase in QoL, representing 15% of the total. Practically all of this increase occurred in the aquaculture sector, possibly indicating the desire of SMEs to contract research for specific needs (notably in the reduction of production cost) at a time when the ex-farm price for the most commonly cultured species was falling[3].

Small consortia of less than 5 contractors dominated the FAIR programme, representing two thirds of the total number of projects. The combined total of projects having less than 10 contractors was 90% of all FAIR projects. However, a marked increase in larger consortia was observed during QoL, where consortia of 6-10 were equally represented within the same combined total. This increase in consortium size would explain the observation that there were fewer projects in QoL, but which had higher per-project expenditure and received more Community funding. This increase in (and concentration of) research effort was an underlying objective of FP5. When compared across the sectors, the small consortia (1-5) represented 59% of aquaculture projects in the FAIR programme; 75% of fisheries projects and 52% of those in the seafood processing sector. The equivalent figures for this size of consortium in QoL were only 39%, 49% and 25%.

When the geographical balance (nationality of project coordinators) is analysed, the same dominant countries stand out. In both Framework Programmes, the UK stands alone as the leading country benefiting from EU contribution to research in aquaculture and fisheries. During the FAIR programme, France was a clear second, with Spain, The Netherlands and Norway behind. This changed in QoL, where Norway and France were in a clear position behind the UK.

Many factors potentially influence this dominance in leading EU RTD projects (including national strategies for the sectors, national financial support, financial support infrastructure, administrative constraints…) or help to explain the lack of coordination by certain countries (Finland, Poland, Israel, Sweden). Language may be a 'perceived' barrier, although in fact all European languages are acceptable for project proposals. However, the coordination of multi-national consortia would probably be practically made in English.

Despite considerable efforts by the Commission to encourage more gender-balanced consortia (especially with regard to proposal and evaluation guidelines), the sex ratio within project coordinators remained highly biased, with 84% males in FAIR and 83% in QoL. This ratio dropped by only 3% in each programme, when the ratio of *all* members (responsible persons) of project consortia were analysed.

[3] Price and volume data from the Federation of European Aquaculture Producers (FEAP).

4.2 Outputs of the research

The database of research projects maintained by the European Commission does not include details on the outputs of the research as measured, *inter alia*, in terms of number of publications, staff trained or dissemination events organised. These outputs, useful to gauge the productivity of the research projects co-funded by the European Commission, are usually collected through specific surveys of the scientific coordinators.

At its own initiative, the European Commission conducted in 2003 a survey of the outputs of the research projects co-funded under the FAIR programme on fisheries, aquaculture and seafood processing. It was found useful to carry out the same exercise under the Impact Fish project for research funded under the QoL programme to obtain similar benchmarks and compare the evolution of outputs between the two programmes. This survey has been carried out over the end of 2004 and most contributions received within a two month period.

As a result, a total of 158 questionnaires, similar to the questionnaire used for the EC survey of the FAIR outputs, were sent to the scientific coordinators of QoL research projects as identified with the monitoring database of the Commission. This survey yielded a response rate of 57%, while the previous FAIR output survey resulted in received contributions from 39% of the coordinators contacted.

The comparison of the results between the two output surveys is hampered by the fact that, at the time of the QoL survey, some projects were still ongoing and therefore all outputs still to be prepared. In addition, it may take several years after the completion of the research project to have some specific types of outputs like scientific publications formally accepted and actually published. This underestimates the number of publications recorded under the QoL output survey. Additionally, only average outputs per project between the two Framework Programmes can be compared due to the impossibility to reconcile the sampling strategies adopted for each survey.

Publications

Results of both surveys confirm that scientific coordinators place emphasis on the preparation of scientific papers published in peer reviewed scientific journals. Technical reports (non peer-reviewed) average approximately 2 per project, while the release of training material is less than 1 per project. The short delay between the survey and the completion of the Framework programme prevents any further analysis.

Human resources

The average number of scientists involved in an average research project decreased between FAIR and QoL (from 13 to 10 per project). However, the number of students and technicians trained remained at similar levels. The number of women involved in the research projects does not show any notable evolution between the two Frameworks, with an average of 34 to 35% of women in the scientific teams. This is higher than the ratio stated (app. 20%) in the previous section, as it includes the full teams and support staff and not just the responsible person for each organisation.

Patents / Innovation

It was found that the research projects funded in the fisheries, aquaculture or seafood processing sectors give rise to a very low number of patents, in particular in fisheries research. Only one project out of ten results in a patent application. This is not surprising as research in this sector is not suitable for such type of protection of intellectual property rights, as opposed to research in the health or electronic sectors. However, research programmes develop new protocols that are successfully implemented in equal proportion between the two Framework Programmes (1 to 1.5 per project).

Dissemination to end-users

The output surveys revealed that oral presentations or posters are the main dissemination vehicle used by the scientific teams. On average each project gives rise to 12 to 13 dissemination events of that kind, all mostly directed to the scientific community (scientific workshops or conferences). Participations to dissemination or technology transfer workshops, which usually mix a professional and scientific audience, are less numerous, averaging between 2 and 3 for both Frameworks. Dissemination of the results of the research programmes in the form of technical and practical manuals or in the form of consumer or user-friendly guides remained a low level for both Framework Programmes. The average numbers obtained from the survey are of 4 for every ten research projects, which is minimal. Although virtually all coordinators reported to have established a web site for their project, no further assessment can be made since a web site can vary from a one page static presentation to a dynamic multi page site with downloadable outputs.

Competitiveness and support to Community Policy

The last section of the survey did not address quantification of outputs, but attempted to get the perception of the scientific coordinators on the relevance of their project to some horizontal issues. The results indicate that, according to coordinators, most research projects funded were relevant to improve environmental and sustainability issues, with a proportion of positive opinions that tend to increase between FAIR and QoL. The perception by the research coordinators on the support of their projects on increasing knowledge for scientific advice and legislation is more balanced. While most coordinators of FAIR project had a neutral opinion, a majority of coordinators of QoL projects felt that that their projects did support scientific advice for the implementation of the Community policies, but did not contribute to the preparation of legislation.

Concerning competitiveness issues, a majority of scientific coordinators (66% under FAIR and 73% under QoL) felt that their research projects had no impact on the economy of the private sector in terms of turnover, market share or new customers. This somewhat logical for fisheries research for which an increase of catching capacity of vessels was clearly taken out the objectives. This is more surprising for research in aquaculture or seafood processing, and would suggest that the research done remains a theoretical / conceptual levels not readily transferable to the private sector.

These themes were developed within the main impact assessment questionnaire.

5 Methodology of the Impact assessment

The study targeted different stakeholders in the aquaculture, fisheries and seafood processing sectors. The scientific community, the professional associations, SMEs, policy makers and civil society were considered as major stakeholders.

In order to get valuable answers from all these stakeholders on the impact of EC funded research on their sector, a questionnaire was developed, pre-tested and finalised with the assistance of the Ghent University, Department of Agricultural Economics (Belgium). The self-administered questionnaire solicited respondents' perception on essential aspects of the impact of the assessed frameworks (such as Awareness, General Perception of impact, Better Understanding, Cooperation, Relevance, Outputs, Adaptation, Innovation, Jobs, Environment and Public Image, and finally Future Dissemination and Communication Tools). To quantify feedback, a 7 point scale was used. Respondents were also given the possibility to add specific and general comments.

An Access database was designed to be able to compile the contact details of the different targeted stakeholders and to monitor the whole implementation process. A respondent data pool reflecting the real balance between the different stakeholders, taking in account the statistical rules was the aim. Sampling efforts and needs were therefore evaluated and adapted during the whole sampling period (e.g. Target stakeholders – database content – contacted stakeholders – received questionnaires – re-evaluated sampling effort).

At the end of the implementation phase, 1143 individual contacts received the IMPACT FISH questionnaire, and 209 of them returned the completed questionnaires; resulting in an overall response rate of more than 18%. The return rates per sector are presented in the following tables, showing the highest return rate for the aquaculture sector (21,6%). The breakdown per organisation type shows that especially the scientific community is willing to communicate its perception (return rate 27,5%), the professional organisations and government agencies proved to be the most reluctant to cooperate. The addressees not able or willing to complete a questionnaire cited lack of knowledge on scientific policy of the EC, no time (or accompanied payment) or not in a position to respond in the name of their institute/company as main reasons.

Table 1: Return rate for the IMPACT FISH questionnaire per sector and per sector segment/organisation type.

	Return Rate
Aquaculture	**21,6%**
Aquaculture/fisheries*	**-**
Fisheries	**18,1%**
Seafood processing	**17,0%**
Cross sectorial	**19,7%**
Grand Total	**18,3%**

	Return Rate
Individual company	**15,3%**
Scientific community	**27,5%**
Professional association	**12,1%**
Government agency	**12,6%**
NGO	**14,1%**
Uncertain*	**-**
Grand Total	**18,3%**

* **Note:** Not all the original contacts could be categorised in these categories based on the available information. These contacts were grouped in the mailing database, upon receiving the completed questionnaire from this addressee the contact was assigned to the proper category.

The data from the received questionnaires was compiled in an Excel file and screened, validated and harmonised following strict rules. This final dataset was used to produce the (preliminary) overview tables, perform additional analyses (mainly extra selections, rankings and % calculations) and to create the final graphs of the report. Concurrently the Excel data set was recoded and transferred to SPSS 12.00 Windows for further statistical analyses. The questionnaire answers were submitted to the suitable tests described (*Descriptive statistics:* frequencies, descriptive cross tables; Compare means: One-way analysis of variance; Bivariate correlation; Data reduction - Factor analyses). Depending on the results, extra analyses of additional selections and regroupings were performed.

6 Findings of the study

Respondent characteristics

Out of the 209 respondents 43% are working in the aquaculture sector, 30% in fisheries, 15% in the seafood processing sector and 12% was considered as 'cross sectorial'.

The breakdown per organisation type shows that the respondent pool consists of 16% individual companies, 13% professional organisations, 9% government agencies and 4% non- governmental organisations (NGO). The scientific community represents the major part (58%), and includes the research institutes (37% of the total respondent pool) and education, mainly universities (21% of the total respondent pool).

Combining the sector and organisation type confirms the expected distribution; for each sector the most replies were received from the scientific community. However, seafood processing, in comparison with aquaculture and fisheries, shows a shift from the scientific community to the individual companies.

Table 2: Breakdown of the respondent pool based on sector and organisation type.

	Aquaculture	Fisheries	Seafood processing	Cross sectorial
Individual company	18,9%	7,9%	29,0%	8,0%
Scientific community	62,2%	58,7%	45,2%	56,0%
Professional association	12,2%	19,0%	12,9%	0,0%
Government agency	6,7%	9,5%	9,7%	16,0%
NGO	0,0%	4,8%	3,2%	20,0%

84% of the respondents represent a company/organisation with less than 500 employees or members.

In aquaculture, 84% of respondents were involved in projects funded under FP4 and/or FP5. The equivalent figure was 81% for fisheries, but only 65% for seafood processing. It is not clear if this difference is caused by the availability of specific calls within the programmes, or a preference to invest own capital in specific research. Overall, only 22% of the NGOs and 37% of the professional associations participated in a project funded under FP4 or FP5, compared to 95% of the respondents active in the scientific community. The participation rate for individual companies and government agencies is also high, respectively 76% and 84%. This percentage shows that most responses originate from organisations familiar to some extent with European research. The no-response rate observed for the other could indicate either no interest in assessing the research, or no tangible elements to comment on the research programme in the absence of feedback. This is especially true for professional associations and NGOs.

Awareness of how the European Commission supports research in aquaculture, fisheries and seafood processing.

The majority of responses (on average 50%) indicated some awareness on how the EC supports research in the fields of aquaculture, fisheries and seafood processing; as well as on the objectives and results of both Framework Programmes (scale 3 to 5). The following graph shows that the percentage of respondents that have either no or little knowledge (scale 1-2) or some good knowledge of research programmes (scale 6-7) varies. The respondents tend to know the most about how Europe supports research (38%), followed by the objectives FP5 (34,5%) and FP4 (23%). Only 15% for FP5 and 14% for FP4 of the respondents claim to know a lot about the results of the frameworks, while around 30% know nothing or very little about the results of either framework.
To expand further the knowledge of the industry sectors, **an analysis was made of those respondents that had not participated in EC research** (FP4 or FP5). This was 41 of the 209 respondents, representing almost 20% of the total. Although 61% of those

respondents that had not participated in EC research projects know something about how the EC supports research in the sectors concerned, just over half of them have little or no knowledge of the results of the two Framework Programmes (54% for FP4 and 55% for FP5). Only 5% of those that had not taken part in EC research claimed any significant knowledge about research results.

When analysed by sector, an interesting element arises: While non-participating respondents in both aquaculture and fisheries know something about how the Commission supports research, it is only the aquaculture sector (again, those that have not taken part in projects) that possess some knowledge of both the objectives and results of the two Framework Programmes. Across all sectors, a clear majority (63 to 71%) of the non-participants are SMEs. The reason for this clear distinction may be two-fold. Firstly, aquaculture SMEs are relatively well organised into National, regional or species-specific associations or groupings, and this may encourage information sharing. Secondly, pan-European dissemination initiatives (originally FAIR-FLOW) and then the much more targeted AquaFlow network (www.aquaflow.org) specifically targeted SMEs to provide them with simple summaries of EC RTD in their own language, with the objective of raising awareness. The positive impact of initiatives such as this may be indicated by these findings.

General perception of the impact of EC research funding

EC RTD funding was generally perceived as having the highest impact on "Networking and information exchange" and "co-operation between European countries", whereas a moderate impact was perceived on "communication from science to the society", "Competitiveness of the European industry" and "Participation of the industry in research" (with the highest indication of no impact, even though this remained only about 10%).

Table 3: Perception of the impact of EC RTD support on various factors sorted by level of impact.

	No Impact	Moderate Impact	High Impact
Networking and information exchange	1,7%	31,7%	66,7%
Co-operation between European countries	2,2%	35,7%	62,1%
Training and mobility of young people	7,2%	53,0%	39,8%
Quality and safety of European produced seafood	2,7%	60,1%	37,2%
Support to policy/regulations/legislation	6,7%	58,9%	34,4%
Protection of the environment	7,2%	63,3%	29,5%
Communication from science to the industry	6,7%	70,4%	22,9%
Participation of the industry in research	9,3%	69,2%	21,5%
Competitiveness of the European industry	10,6%	70,2%	19,2%
Communication from science to the society	15,0%	67,1%	18,0%

Duncan's tests showed that the seafood processing sector has a consistently significant lower perception of the impact of EC RTD funding on the improvement in "co-operation between European countries", "communication from science to the industry" and "communication from science to society" than the other sectors.

In terms of the organisation type, the perception of the impact for all the factors requested was significantly lower by NGOs (that responded to this question) than the other sectors. Their non-response level was also higher than the other types of organisation, and a clear link can therefore be established between their perception of the impact, and their knowledge of how the Community supports research in the different sectors.

It is however interesting to conclude that all other organisation types (including professional organisations, individual companies) are not significantly different in their positive general perception of the impact of EC RTD.

Finally, it should be noted that the perception of impact is in constant evolution. It cannot be categorically stated that this perception is only based on FP4 and FP5, despite the fact that this was clearly stated in the question. It is therefore clear that a part of the expressed perception of impact is based on the present status of EC research – which is the end of FP6 (representing important changes from previous frameworks, especially in aquaculture), and the emergence of FP7, which has a significantly longer time frame than previous programmes.

The impact of EC funding on a better understanding of production systems, fisheries management, seafood quality and safety, environment and policy decisions

Most respondents agreed with the statements concerning contribution of research to a better understanding of aquaculture production systems, factors determining seafood safety and quality, and interactions with the environment. The contribution of research to policy decisions and fisheries management is felt to be less obvious; the majority of respondents having a neutral opinion on these two elements. Overall, the number of respondents who felt that research did not contribute to a better understanding is minimal, showing a general neutral or positive perception.

Table 4: The impact of EC funding on a better understanding of production systems, fisheries management, seafood quality and safety, environment and policy decisions (%).

	Strongly Disagree	Don't Agree – Don't Disagree	Strongly Agree
Aquaculture production systems	2,5%	49,4%	48,1%
Factors determining seafood safety	2,1%	50,3%	47,6%
Factors determining seafood quality	2,8%	51,4%	45,8%
Interactions with the environment	5,2%	50,9%	43,9%
Policy decisions	9,0%	61,5%	29,5%
Fisheries management	5,4%	67,1%	27,5%
EU research is not in focus with the industry needs	30,3%	57,0%	12,7%

The answers to the last question of this section indicate that respondents generally have a positive appreciation of the adequacy between research and industry needs with a majority disagreeing with the proposed statement. However, it should be noted that the question was posed as a *negative* statement!

By sector, the statistical analysis of the results indicates that the seafood industry has a slightly lower positive appreciation of the contribution of research to a better understanding of fisheries, aquaculture and seafood industry that the other sectors, even for the topics they cover (seafood quality and safety). The aquaculture sector shows a positive appreciation of the contribution of research on understanding of aquaculture systems, as do the fisheries and cross sectorial groups. Similarly, the fisheries sector has a global positive appreciation of contribution of research to fisheries management.

All organisation types have statistically a homogeneous positive appreciation of contribution of research to aquaculture production, seafood safety and quality. On fisheries management aspects, professional associations and individual companies are less positive on the contribution of research than government agencies or the scientific community. The

same applies to the contribution of research to policy decisions which is felt lower by the professional associations and individual companies that the other groups (except NGOs).

Finally professional associations tend to disagree on adequacy between research and industry needs, contrary to the other groups that believe that research is in focus with industry needs.

International cooperation and cooperation between science and industry

While respondents generally expressed no strong agreement or disagreement on better co-operation between research and industry, or the overlap between EU and MS research programmes, there was strong agreement on the increasing level of international co-operation during the two Framework Programmes, one of the principal objectives of each FP. As would be expected, the scientific community expressed this strong agreement to a significantly higher extent than the professional associations, across all sectors.

Relevance of the results of EC research to stakeholders

The grouped data on the relevancy of EC RTD funding to the different stakeholders reveals the expected high relevancy to the scientific community. EC research funding is also seen as moderate to highly relevant to both the aquaculture sector and policy makers, while remaining moderately relevant to the other stakeholders, including European citizens in general.

Table 5: Relevance of the results of EC research to stakeholders (%).

	Totally Irrelevant	Moderate Relevant	Highly Relevant
The scientific community	1,6%	25,8%	72,6%
The aquaculture industry	2,5%	49,4%	48,1%
The policy makers	4,2%	50,6%	45,2%
The fisheries industry	6,5%	53,2%	40,3%
The seafood processing industry	5,1%	57,7%	37,2%
European seafood consumers	5,4%	60,7%	33,9%
Other users of coastal and inland waters	10,2%	64,8%	25,0%
European citizens in general	15,8%	66,1%	18,2%

More detailed analysis shows statistically significant differences between the sectors, in their appreciation of relevancy:

- The seafood processing sector sees less relevance of EC funded research to policy makers and (maybe surprisingly) to the scientific community.
- This sector also varies significantly from the fisheries sector, in terms of the relevance to fisheries.
- They are also different to both aquaculture and the cross-sector respondents on the relevance to other users of coastal and inland waters.

Professional associations believe that the relevancy of research is lower for European citizens in general, compared to the scientific community. This difference in opinion is the same for European seafood consumers. However, both remain within the 'moderately relevant' group. The relevancy expressed by scientific community is also somewhat higher than that of the NGOs with regard to the industrial sectors – fisheries, aquaculture and seafood processing – as well as to the other users of coastal and inland waters; all again within the 'moderately relevant' group. However, 44% of the total NGO respondents were unable to express an opinion on the relevance of EC research to other users of coastal and inland waters.

Perceptions on the availability and ease of understanding of research outputs

This section of the questionnaire considered several types of outputs of research work (scientific papers, conferences, courses, training material, …) and asked the respondents to precise whether they felt that research outputs are easily available and easily understandable.

Most respondents agree that scientific papers/reports and conference/workshops constitute a moderately to highly available research output. Non-technical research outputs such as courses/lectures/seminars, books or training materials are felt to be only moderately available. The same applies to the other types of research outputs (norms/standards, new protocols, new modified processes, or software), which are thought to be only moderately available, although with a distinct trend towards being "not available" for the last two.

On ease of understanding, respondents from the fisheries and seafood sector find that research outputs are (on average) less understandable than respondents from the two other groups (aquaculture and cross-sectorial). For fisheries respondents, this is especially true for conferences/workshops and courses/seminars that are estimated to be only moderately understandable.

Not surprisingly, the scientific community find that research outputs are easily understandable. NGOs and representatives of professional associations find on the contrary that research outputs are not readily understandable, having a low to medium appreciation of the accessibility of research outputs. For professional associations, research outputs communicated through scientific publications or conference/workshops are only moderately understandable, while outputs communicated through courses/lectures or seminars appear to be more accessible. Government agencies and individual companies have a generally positive judgment, similar to that of the scientific community.

Adaptability of research results to stakeholders

In this section on adaptation, the respondents were asked to address the format, legibility and multilingual nature of the information provided to the different stakeholders. Compared to previous questions, the level of respondents saying that they didn't know was universally high, and slightly more than one third (35–42%) of the total pool.

NGOs had a lower opinion of the adaptation of information to the aquaculture sector compared to individual companies (many of which are in the sector) and they also expressed a lower opinion on adaptation compared with the scientific community on the adaptation of information to the seafood processing sector. Finally they had a lower opinion compared to all other organisation types when asked on the adaptation for policy makers. The majority (52%) of government agencies did not express an opinion on the adaptation of research information for the seafood processing industry and for consumers. Rather surprisingly, 48% of this class of stakeholder did not reply either to the adaptation of information to policy makers!

A majority of individual companies felt unable to reply on the adaptation of information for policy makers. More than two thirds of NGOs also felt unable to respond to the question for the fishing community and (interestingly) for consumers. Finally, a majority (69%) of the professional associations did not reply on the adaptation of information to the fishing community.

EC research and innovation in the sectors

In general, respondents that could formulate an opinion have a positive assessment on the extent to which EC research resulted in better scientific advice supporting policy decisions; innovative research tools and methodologies; better communication tools and improved quality of seafood products.

Table 6: Ranking of the statements dealing with innovation. Based on the highest level of agreement (%).

	Strongly Disagree	Don't Agree – Don't Disagree	Strongly Agree
E. Better scientific advice supporting policy decisions	5,4%	36,9%	57,7%
A. Innovative research tools/ methodologies	4,1%	44,4%	51,5%
D. Better communication tools	6,5%	53,2%	40,3%
G. Improved quality of existing seafood products placed on the market	8,2%	52,2%	39,6%
B. New technologies for the industry	8,2%	57,8%	34,0%
C. New marketable seafood products	9,8%	68,9%	21,3%
D. New marketable non-food products (e.g. equipment)	11,2%	68,1%	20,7%

The analysis of responses by sector indicates no great differences between them - each having a similar perception of the impact of research on innovation. The only variation is to be found for the question related to 'New technologies for the industry' with the aquaculture sector being more positive on the effect of research programmes than the other sectors.

The scientific community have a higher assessment of the impact of research on innovation compared to the other organisations for all the proposed statements. Both professional associations and government agencies have a lower than average perception of the result of EC funded research on scientific advice supporting policy decisions. Government agencies also show a lower than average assessment of the impact of research on innovation in new technologies for the industry.

This section of the questionnaire ended on a question seeking to find out whether the organisation interviewed benefited from one or several of the innovation proposed. Slightly more than 70% of all the respondents stated that their organisation actually benefited from one or several innovations. Across the list, innovative research tools/methodologies are the item that comes up the most frequently, followed by better scientific advice and better communication tools. At the bottom of the list, it can be noted that few organisations (around 10) declared having benefited from innovation in the field of new marketable products (seafood and equipment).

The scientific community appears to have benefited the most from innovation generated by the EC research programmes. The respondents from the private sector (including professional organisations and individual companies) did not declare having benefited from the panel of innovations proposed, with percentages as high as 85% and more of negative responses. However, approximately one third of the individual companies that responded declared having benefited from innovative research tools and new technologies for the industry. Those individual companies are active in the seafood and aquaculture sectors primarily. Government agencies did not mention benefits from innovation, even for some key areas, such as better scientific advice supporting policy decisions.

Impact of EC research on employment, working conditions and equal opportunities

Respondents were asked to what extent they agree with the impact of EC RTD is increasing direct and indirect employment; improving working conditions and providing more equal opportunities for men and women in the three sectors. Approximately half of the total pool of respondents were unable to reply on this particular issue.

Of those that did, all **aquaculture stakeholders** show general agreement on the impact of EC RTD funding in terms of increased direct and indirect employment in the sector. Individual companies mirror this fairly strong agreement, whilst aquaculture producer associations (PAs) remain neutral. Concerning the improvement of working conditions, the majority of all stakeholders, Pas and individual companies are within the neutral group; neither expressing a strong agreement or disagreement. The same trend was observed with respect to the equality of opportunity for men and women.

Contrary to the aquaculture sector, a general disagreement with the three statements is observed for all stakeholders and industry **in fisheries**. The majority of all stakeholders tend to strongly disagree on the impact of EC RTD funding in terms of increased direct and indirect employment in the sector. PAs remain, however, more neutral on their opinion, whilst the individual companies in the sector are divided between neutrality and strong disagreement. On the improvement of working conditions, the majority of all fisheries stakeholders and individual companies are neutral, while PAs remain in strong disagreement with the statement. This trend is mirrored in terms of equal opportunities, although this time, it is the majority of individual companies that show their strong disagreement.

The **seafood processing sector** generally reflects the opinions of the fisheries sector, although marked differences are observed between the majority of PAs and individual companies. Seafood processing PAs were in strong disagreement with the statement expressing increased employment in the sector, while the majority of individual companies remained neutral on the subject. The expression is the same concerning the improvement of working conditions, where the groups of all stakeholders and individual companies are much more in agreement on the impact of EC RTD funding on working conditions. Finally, the majority of all stakeholders and industry do not agree with better equality for men and women in the sector.

Impact of EC research on sustainability, environment and public image

Although the middle group of neither agreement nor disagreement remained the majority, strong agreement was observed for the positive effects of EC research on the sustainable use of natural resources; better environmental management and the provision of high quality, safe seafood for the consumer.

While no significant differences were observed between the sectors, sub groups emerged within the organisation types. NGOs were less in agreement with the beneficial effects of research on the sustainable use of natural resources and raw materials than were the subgroup comprising governmental agencies and the scientific community. NGOs were also statistically differentiated from the scientific community on the question of better environmental management.

All organisation types were more in agreement than the NGOs on the impact of research towards the provision of high quality, safe seafood for the consumer. On the statements related to public image, the scientific community remained more positive than the NGOs.

Future dissemination and communication tools

All respondents have quite similar types of answers for each means of communication. Two exceptions can be detected from the analysis of answers: the seafood industry would be less enthusiastic than the other for increased use of TV/radio, and the fishing industry is less keen than the other for an increased use of conference/workshops.

Table 7: Future dissemination and communication tools ranked based on the 'Use a lot more' responses.

	Don't use	Neutral	Use a lot more
Internet/electronic media	0,5%	32,3%	67,2%
TV/Radio	5,0%	34,2%	60,8%
Popular press	5,1%	34,2%	60,7%
Special events at industry exhibitions	4,1%	46,4%	49,5%
Associations	5,1%	45,9%	49,0%
Specialised printed publications/journals	4,1%	49,2%	46,7%
Conferences/Workshops	2,0%	53,8%	44,2%
Other forums for exchanging opinions	6,0%	60,3%	33,8%

There are also some variations in the answers by type of organisation. Professional associations have a neutral opinion on an increased use of popular press, while the NGOs would like to use this medium a lot more. Professional associations also have a neutral opinion about an increased use of conferences/workshops, while government agencies would like to have more events of this kind. Finally, the scientific community favours an increased use of TV/radio, while the professional associations do not see the need for an increased utilisation of this media.

- This section of the questionnaire left the opportunity to the respondents to provide free comments on the communication tools currently utilised and the one they would favour the most. Among the inputs received, most comments focused on the current communication strategy, with some degrees of convergence of findings between several respondents. In short, comments focused on the problem of language, on the imbalance between publications for specialised / non-specialised publics, and poor uptake of research results by policy makers.

On these communication aspects, one respondent from the scientific community indicated that the reporting workload imposed by the Commission on contractors is hardly manageable, and that it has a negative impact on the time that could be devoted to other types of reporting.

7 Key conclusions

1 Respondent characteristics

1.1 Of the 209 respondents 43% are working in the aquaculture sector, 30% in fisheries, 15% in the seafood processing sector and 12% were considered as 'cross sectorial'.

1.2 The scientific community made of the majority of respondents, although individual companies, associations and NGOs were also well represented. However, many consumer organisations and some professional associations considered themselves not knowledgeable enough to reply.

1.3 The top responding countries for each of the sectors generally reflects their involvement in both research programmes (United Kingdom, Norway and France as main respondents).

2 Awareness of how the European Commission supports research in aquaculture, fisheries and seafood processing

2.1 There is a fair awareness of Commission research policy in research for fisheries and aquaculture, and a reasonable knowledge of objectives of both Framework Programmes in these fields.

2.2 However, there is a lower awareness of results of the Framework Programmes, especially for the respondents of the private sector (professional organisations and individual companies).

3 General perception of the impact of EC research funding

3.1 While the general perception of the impact of EC RTD funding on networking and cooperation between European countries is high (specifically for the science community), the seafood processing sector has a lower general perception on cooperation, communication from science to industry and communication from science to society, than the other sectors.

3.2 NGOs, although few in number (but high in member representation), were not generally able to comment on general perception, and where they were, their perception of the impact was lower than other stakeholders.

4 The impact of EC funding on a better understanding of production systems, fisheries management, seafood quality and safety, environment and policy decisions

4.1 Contribution of research to a better understanding of aquaculture systems and seafood quality and safety is acknowledged, but a more neutral opinion is given for contribution of research to fisheries management. This can be explained by the fact that research in the first two domains yields more tangible results than research in fisheries management.

4.2 The private sector (including professional organisations and individual companies) tends to show less enthusiasm than the institutional partners (scientific community and policy makers) on the extent to which research contributed to a better understanding of the main issues at stake.

5 International cooperation and cooperation between science and industry

5.1 It is predominantly the scientific community that believes in a high level of international cooperation generated by EC funding over the two Framework Programmes.

5.2 It appears from the free comments received, that the competition for EC funding in public institutes does not always match the national strategy and priorities for development of the sectors concerned. This is exacerbated by the fact the EC funding in the sectors often exceeds national budgets.

6 Relevance of the results of EC research to stakeholders

6.1 EC research funding is seen as being moderate to highly relevant to both the aquaculture sector and policy makers, while remaining moderately relevant to the other stakeholders, including European citizens in general.

6.2 The NGOs addressed in this study found it difficult to comment on relevancy.

6.3 Comments in this question addressed the often high relevancy of research in support to policy, but often low take-up by policy makers.

7 Perceptions on the availability and ease of understanding of research outputs

7.1 Scientific papers and reports on one hand, and conference / workshops on the other hand are perceived to provide easily available outputs. Courses, lectures or seminars are moderately to highly available for all respondents, except those from the fisheries sector, who estimate that this type of output is only moderately available. Not surprisingly, the scientific community has the highest perception of availability of outputs, while NGOs have the opposite assessment. Overall, availability of non-traditional research outputs (software, new processes) is estimated to be medium to low.

7.2 Respondents from the fishing sector estimate that outputs in their domains are not readily understandable. Across all organisation types, it can be noted that the private sector (individual companies and professional organisations) estimate the research output moderately understandable, with the exception of dedicated courses, lectures or seminars that are estimated to be accessible. The scientific community and government agencies find research outputs more easily understandable.

8 Adaptability of research results to stakeholders

8.1 The format, legibility and multilingual nature of the information provided to stakeholders in all sectors was difficult for stakeholders to assess. This may arise from the insufficiency of availability of the information, or a complete lack of knowledge of how and where to access it.

9 EC research and innovation in the sectors

9.1 Although it proved difficult for the respondents to give an opinion on all the possible types of innovation, the interviewees that could respond showed a generally medium to high perception of the contribution of EC research to innovation. However, respondents from the professional organisations and from government agencies have a more neutral perception and find, for example, that the impact of research on better scientific advice is neutral.

9.2 The analysis of uptake of innovation by the various organisation types indicates that the scientific community is the one that benefits the most from innovation in research, which they themselves generate. Government agencies

an the private sector did not estimate benefiting from innovation, except in the seafood and aquaculture sectors where innovation has been declared to be utilised by as much as one third of respondents.

10 Impact of EC research on employment, working conditions and equal opportunities

10.1 Stakeholders do not generally perceive tangible effects of EC research funding on social aspects related to their own, or other sectors.

10.2 The aquaculture sector (especially the scientific community and individual companies (producers, suppliers…)) does, however, retain general agreement on an optimistic assessment of this impact.

11 Impact of EC research on sustainability, environment and public image

11.1 The 'direct' beneficiaries of EC funding for research (the scientific community) have a higher belief in the positive sustainability effects of research (resources and environmental benefits). However, this is not mirrored by NGOs (both environmental and consumers) and this may be linked to the lack of adapted communication of research results to them.

12 Future dissemination and communication tools

12.1 All respondents felt that all the current communication tools should be used more in the future. There is, however, a global consensus on the increased use of internet, TV/radio or popular press. This said, each type of organisation has a slightly different approach on the means of communication to be used, according to their level of specialisation (for example NGOs would favour popular press, while government agencies would like more conferences or workshops).

12.2 Respondents provided several comments on factors that hamper efficient communication. These include the problem of language and the focus on communicating to scientific peers rather than the private sector.

8 General conclusions and recommendations

8.1 General conclusions

European aquaculture, fisheries and seafood processing development have benefited from considerable efforts in EC RTD projects. Reforms in European policies and programmes, accompanied by changing public priorities, have affected the way in which the seafood sector is perceived and hence its further development. The Fourth and Fifth Framework Programmes (FP4 and FP5) of the European Commission in aquaculture, fisheries and seafood processing RTD were built upon specific objectives for the continued development of the sector over the period 1994-2002.

Whilst previously published impact assessments have focussed on research areas across a wide scope (e.g. Agri-Food – QLAM-2000-30013), this Specific Support Action (SSA) covers the specific areas of aquaculture and fisheries across the two Framework Programmes. It has aimed to bring together the diverse sources of information on the projects, and to obtain direct feedback on RTD impact from a wide range of stakeholders who carry out and use the results of the projects/programmes.

Impact assessment is being built-in to RTD and especially policy development programmes as a tool to monitor the effects of the research and the need for policy change – especially the latter in accordance with COM(2002) 276 "Communication from the Commission on Impact Assessment" published in June 2002. This study provides elements of an ex-post evaluation of the two Framework Programmes in the field of fisheries and aquaculture.

The objective of obtaining quantifiable perceptions of the two Framework Programmes from a broad segment of stakeholders, including consumer associations and other NGOs and from government agencies has proven difficult to achieve. Despite a very close monitoring and follow-up strategy, the return rates (overall 19%, but significantly higher in the research community) are comparable to other studies (such as the 2005 EurActiv study on the Strategy and Governance of European Associations[4]) but lower than the ambitions of the partners undertaking this study. It can be noted however that the respondents who endeavoured to give dvice on scientific research are primarily those who have been involved to some extent in research projects. Correlatively, this would mean that organisations that did not respond were those that never participated in any research projects, and were unable (and/or unwilling) to give any opinion on the impact of research on their sectors of activity.
Logically from the above, most respondents claimed to have an awareness of Community programmes and objectives of EC RTD in the field of fisheries, aquaculture and seafood. Fewer, however, estimated to have good knowledge of the results of this research.

Many within the sectors, and within the wider group of stakeholders that were contacted had no desire to provide feedback, claiming a lack of awareness and knowledge of the subject. Some persuasion of the fact that 'don't know' is a valid response, was therefore required. This resulted in feedback from those that had not taken part on EC research, and representing 20% of the total respondents. Of these, half were Producer Associations.

The previous section provides key conclusions of the study and frequently shows a clear distinction of opinion between the scientific community, who have a generally high level of knowledge of EC research and NGOs, who generally have a low knowledge level. The conclusions presented in section 7 may be open to criticism on the weighting of comments provided by NGOs (especially consumer organisations) in the light of the low return rate from this group of stakeholders.

This is arguable, although analyses showed their responses to be significant from a statistical point of view. In providing a balanced view of the impact of EC research, the

[4] See EurActiv, Public Affairs section: www.euractiv.com/en/pa

authors of this study felt it necessary to highlight the differences in opinion described above.

While the general perception of the impact of EC RTD funding on networking and cooperation between European countries is high (specifically for the science community), the seafood processing sector has a lower general perception on cooperation, communication from science to industry and communication from science to society, than the other sectors. In fact, the seafood processing sector has a generally lower perception of the impact of research in both fisheries and aquaculture. This may be a direct result of a communication gap in the dissemination of RTD results.

EC RTD funding has led to a better understanding of aquaculture systems and seafood quality and safety, but a more neutral opinion is given for contribution of research to fisheries management. Furthermore, the private sector (including professional organisations and individual companies) tends to show less enthusiasm than the institutional partners (scientific community and policy makers) on the extent to which research contributed to a better understanding of the main issues at stake.

The scientific community has a consistently higher belief in all aspects of impact addressed in this study and especially the positive sustainability effects of research (resources and environmental benefits). However, this is not mirrored by NGOs (both environmental and consumers) and this may be linked to the lack of adapted communication of research results to them.

Finally, all respondents felt that all the current communication tools, and especially the internet, should be used more in the future and that the level of communication (and perhaps who actually does the dissemination) needs to be better adapted to the target audience. At present, it appears that most dissemination initiatives taken by project coordinators target primarily the scientific community, with little, if any, effort to reach a wider non-scientific audience. This is confirmed by the results of the survey of the outputs of the research programmes with most dissemination material being in the form of peer-reviewed scientific papers.

One question that remains unanswered by this particular study, is the impact of EC RTD on what could be referred to as an 'intermediate' or 'associated' group of stakeholders. These include providers of scientific advice to the European institutes, such as the International Council for Exploration of the Seas (ICES) and the International Council for the Conservation of Atlantic Tunas (ICCAT); Committees responsible for international and/or regional development, such as the FAO committees and including notably the aquaculture sub-committee of the Committee on Fisheries (COFI:AQ) and the General Fisheries Commission for the Mediterranean (GFCM).

These organisations were of course contacted as part of this study, as well as for a more detailed qualitative assessment. No response, however, was forthcoming. It is probable that various units or departments within these large structures have a good knowledge of EC RTD results and are well informed of EU developments. A separate and expanded action is most probably required to assess the impact of RTD to this 'associated' group of stakeholders.

8.2 Specific recommendations arising from the main conclusions of this study

This study has highlighted various aspects of impact, relevance and adaptation of research outputs. In essence, the key word is communication. This is not a new finding in itself. The importance here is on the communication strategy, the communication tools, and the question of who should have the communication role.

The recommendations listed below are based on the findings of the current study. That is to say the impact of RTD in FP4 and FP5 (so up to 2002). As was commented previously on the fact that respondents may also be giving a perception based on the current FP6

programme, certain initiatives enacted by the Research and Scientific Analysis unit of DG Fisheries and Maritime Affairs also affect perception and merit mention in this report.

Two major initiatives representing a dramatic change from previous framework Programmes are the Scientific Support to Policy (SSP) programme and the stakeholder and coordinator consultations.

While the consultations provide good feedback and better cooperation, Scientific Support to Policy has identified areas where gaps exist in the current knowledge base for policy development and in the light of, for example, the Commission strategy for sustainable aquaculture development in Europe. Targeted research using the new tools, such as Specific Targeted Research Projects (STREPS) and Specific Support Actions (SSAs) is undeniably having an impact. A major new initiative called PROFET POLICY will be launched before the end of 2005 to disseminate RTD results in the fisheries and aquaculture to policy makers throughout Europe and provide forums for exchange with other stakeholders.

With regard to this particular report, the authors propose the following recommendations for consideration by DG Fisheries and Maritime Affairs.

1 Validation of proposed research

1.1 In order to improve the relevance of EC RTD, stakeholders should be able to have input in the formulation of the Work Programmes and RTD calls. The Scientific Community alone tends to have a more optimistic perception of RTD impacts than the other stakeholders, and this may bias the future orientations chosen. The current level of stakeholder consultation should be expanded to include industry, consumer and environmental organisations involved in fisheries, aquaculture and seafood processing at a European level. Recent examples of stakeholders outside the research community identifying research needs show the usefulness of this approach, and it should now be increased to address wider stakeholder groups and cross-sector issues.

1.2 The proposal stage is the first area where communication issues to stakeholders can and should be addressed. The guidelines for proposers have evolved significantly since FP4 and during the current Framework Programme (FP6), so that project consortia have to justify the impact of their research. Further developments could focus on the need to present communication strategies at the proposal stage, including how to position the research in the broader picture and to a non-expert target audience.

1.3 Consequently, while the scientific merits of the proposals should continue to be evaluated by selected panels of scientists, it could be envisaged that a panel of representatives of the industry is associated to evaluate, at the proposal stage, the dissemination strategy proposed. The results of this specific evaluation could lead to reject weak proposals on these particular dissemination aspects, or provide guidelines to the Commission services for negotiation of the contracts.

2 Dissemination strategies for different types of research project

2.1 The new types of project, introduced during FP6, are the Integrated Projects and Networks of Excellence. These are large initiatives, in terms of the number of sub-projects, the size of the consortia and the Community financial contribution. Although their dissemination and training budget should be maintained, dissemination activities are not generally funded at 100% of eligible costs (depending on the cost model adopted by contractors). Dissemination budgets for these larger research initiatives need to be fully funded in the same way as training.

2.2 The "smaller" RTD actions, notably Specific Targeted Research Projects (STREPS) and Specific Support Actions (SSAs) should not have a specific

dissemination activity, but should finish the project by the provision of results in different formats for the different stakeholders.

2.3 A clause for the provision of summaries in simple language as well as the final public deliverables in a "web-friendly format" should be built in the contract for these STREPS and SSAs.

2.4 These actions should then be clustered together, based on a thematic segmentation or specific policy area of the Common Fisheries Policy.

2.5 This 'clustered' information could then be passed on to groups or organisations that can carry out dissemination activities at a European level and for the different stakeholder groups. After identification of these organisations and networks within the fields of fisheries, aquaculture and seafood processing, sufficient financial resources should be provided from Community funds to support dissemination activities, using the media tools (internet, audiovisual…) most adapted to the audience. This will have the effect of providing a higher impact through a higher critical mass of information and a "proximity" to stakeholders. Furthermore, it will overcome the current situation where a high number of individual project web sites are created and then disappear once project funding ceases. Many useful reports and publications are lost in the process.

2.6 SME measures have shown increased participation in FP5 and certainly in FP6 in the sectors concerned, notably in aquaculture. However, broad dissemination is often against the interest of participants, especially for example in the CRAFT-type projects. Collective Research should therefore be further encouraged so that Industrial Associations and Groupings (IAGs) become the owners of research results and therefore more implied in their impact to the competitiveness of the sector.

3 Communication tools

3.1 Although both the objectives and results of the Community programmes in these sectors are important to provide, priority should be given to creating awareness in the wider stakeholder groups of the research results. The synopses of selected projects in the sectors, published by the EU publications office provide good basic information, although sometime outdated, but this should be expanded to better relate the research to the objectives (general and specific) for each Key Action.

3.2 These expanded synopses should be made available to all stakeholder groups, including all European producer or fisherman's associations and other organisations and federations representing environmental and consumer interests, and the general food and health sectors.

3.3 Synopses show the essence of the work done, and should be considered only as information notes on the basis of which the reader can decide whether the research is of interest or not for his organisation / enterprise. The Commission should make sure that more detailed published material is readily available on the project when releasing the synopses.

3.4 The current web resources, especially CORDIS, but also EUROPA, need to provide more results and less "scope and objectives". This may be extremely difficult to achieve for the sheer number of projects over all sectors, contained in these databases. Alternative approaches to the way in which the information is archived are needed, based on a common template.

3.5 Such databases could be maintained by the groups or organisations that carry out dissemination activities at a European level and for the different stakeholder groups.

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