



European
Commission

WORKSHOP ON RESEARCH GAPS IN FISHERIES TOPICS

23 March 2018, Brussels

Research and
Innovation

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EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR RESEARCH & INNOVATION

Directorate F - Bioeconomy
F.4 - Marine Resources

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WORKSHOP ON RESEARCH GAPS IN FISHERIES TOPICS

Highlights

Organised by: Directorate-General for Research and Innovation (DG RTD) and Directorate-General for Maritime Affairs and Fisheries (DG MARE).

Participants: Project coordinators, Members of the Horizon 2020 Committee on Societal Challenge 2 and Members of the SCAR-Fish Strategic Working Group, Executive Agencies and Commission services.

Main highlighted research gaps:

1. Scientific

- Survival rates of hitherto discarded fish and live holding for fish for fattening
- Waste caused by fisheries, e.g. ghost nets, litter, emissions
- Synergistic effects of human pressures and natural variability on fish stocks.
- Impact of marine litter on fish and shellfish

2. Economic

- Socio-economic issues related to seafood waste
- Supporting the improvement of market based management mechanisms.
- Macroeconomy, relating fisheries to the surrounding economy, cost-benefit analysis

3. Industrial

- On-board handling of unwanted catches
- Spatial-temporal explicit management to revolutionise fisheries management – both local and global.

4. Societal

- Whole value chain approach to elimination of waste
- Increase of consumers acceptance of products made and highlighting of their nutritional value from rest raw materials as part of ocean literacy
- Involvement of stakeholders in fisheries management and policy development

5. Support to policies

- Regulatory issues related to seafood waste
- Operationalise the Marine Strategy Framework Directive (MSFD) in a joint effort with the EU Data Collection framework

Impact on policy: Input to the development of European and national research programmes in fisheries.

Summary Note

The workshop on research gaps in fisheries topics brought together Commission services, Executive Agencies, project coordinators, Members of the Horizon 2020 Committee on Societal Challenge 2 and Members of the SCAR-Fish Strategic Working Group¹.

It was organised by Directorate-General Research and Innovation (DG RTD) and co-chaired by DG RTD and Directorate-General for Maritime Affairs and Fisheries (DG MARE). Ongoing and recently finished projects funded by Framework Programme 7 (FP7), Horizon 2020 and the European Maritime and Fisheries Fund (EMMF), pitched their results and their expected knowledge gaps.

Four breakout groups led by project coordinators discussed the research needs in four areas: zero-waste fisheries; social and economic aspects; innovation in fisheries; and sustainable fisheries.

Rationale

Fisheries-related research has been continuously funded in FP7 and Horizon 2020. Funded projects touched upon many aspects of fisheries science, such as deep-sea fisheries, bayesian modelling, results-based management, socioeconomics, benthic ecosystems, prey fish, Maximum Sustainable Yield (MSY), participatory approach, ecosystem-based approach, genomics etc. Additionally, DG MARE funded several studies in the field of fisheries, some of them dealing with similar aspects. However, the extent to which these aspects have been covered remains to be investigated. Moreover, the topic SFS-20-2017 on fisheries management regionalisation has not lead to any successful project being funded.

Highlighted research gaps during the workshop

1. Scientific

- Survival rates of hitherto discarded fish and live holding for fish for fattening.
- Waste caused by fisheries, e.g. ghost nets, litter, emissions.
- Develop social, cultural and economic indicators that can be used across European regions / communities. This includes, at the start, defining relevant data, data mining and analysis to create indicators.
- Develop processes to integrate data within science-based advice for fisheries management (scoping on how to combine economic and social indicators to support advisory needs).
- Current fisheries management is unrewarding. We are using data which is 18 months old to manage fisheries. Needs a redesign for purpose.
- New emphasis on spatial fisheries management.
- Synergistic effects of pressures and variability.
- Data on ecosystem effect of fisheries, also on aspects other than the target stock.

¹ The list of participants is not public in compliance with the legislation on data protection.

- Species interactions of relevance to specific questions.
- CO2 emissions of fish compared to animals farmed on land.
- Impact of marine litter on fish and shellfish.
- Growth of fish and environmental factors.
- Understanding of patterns at a small scale and how to integrate these patterns to larger scales.

2. Economic

- Socio-economic issues related to seafood waste.
- Focus on economic sustainability of fisheries. Which fisheries are economically feasible? A multi-species approach is needed.
- Current fisheries management is unrewarding. We are using data which is 18 months old to manage fisheries. Needs a redesign for purpose.
- Supporting the improvement of market-based management mechanisms.
- Macroeconomy, relating fisheries to the surrounding economy, cost-benefit analysis.

3. Industrial

- On-board handling of unwanted catches
- Connection between seafood and land-based food sectors
- Knowledge transfer from countries that are advanced in seafood waste utilisation
- Scale-up pilots and start-ups in production of pet food, nutraceuticals, collagen, gelatine etc.
- Integrated multispecies management.
- Spatial-temporal explicit management to revolutionise fisheries management – both local and global.
- Innovation in the management of fisheries itself. A better way of designing fisheries management that is fit-for-purpose.
- Implementing the ecosystem-based approach to management
- Understanding of patterns at a small scale and how to integrate these patterns to larger scales
- Involvement of industry in gathering data and information on response to management measures
- Innovation within the current framework of fisheries management in Europe – total allowable catches (TACs), quotas, landing obligation (LO) etc. This would encompass new data acquisition tools e.g. cameras, acoustics etc. to improve the quality and accuracy of the data that underpins stock assessment and hence management. This would also encompass better ways of carrying out stock assessment, and the advice from that.
- Acoustic listening stations and infrastructure for acoustic data?

4. Societal

- Whole value chain approach to the elimination of waste
- Socio-economic issues related to seafood waste
- Increase of consumers acceptance of products made and highlighting of their nutritional value from rest raw materials as part of marine literacy
- Regional approaches for seafood waste management based on different mentality and infrastructures.
- A project which acknowledges that fisheries management is indelibly linked to other aspects of the local / regional communities is needed.
- A project where its primary emphasis is on social science followed by fisheries economics and/or assessment as secondary components will likely be most successful. This research is inherently community based (at local / regional scale).
- Fully integrate the participatory process (develop best practice guide prior to project calls).
- There is a gap between accountability of fishers and the state's ultimate responsibility for managing the sea. Understand the logic of the management to improve the adherence to the rules. Co-creation is Okay.
- Involve fisherman in the collection of the data!
- Knowledge transfer/gaining impact/Social science/involving people in management
- Involvement of stakeholders in fisheries management and policy development

5. Support to policies

- Incentives to land and utilise of unwanted catches
- Regulatory issues related to seafood waste
- Operationalise the MSFD, preferably a joint effort with the EU Multiannual Plans (MAP) to collect the data
- Spatio-temporal dynamics of fisheries, other uses and management as basis for MSP, ecosystem and fisheries management
- Involvement of stakeholders in fisheries management and policy development
- Spatio-temporal dynamics of fisheries, other uses and management as basis for Marine Spatial Planning (MSP), ecosystem and fisheries management

6. Policy impact

The identified gaps can provide food for thought for example the development of the Horizon 2020 topics, for national research and innovation (R&I) programmes and for the EMMF programme.

Detailed report

The meeting was chaired by Sigi Gruber, Head of Marine Resources Unit, DG RTD and Joost Paardekooper Head of Scientific Advice Unit, DG MARE. The Chairs stressed that this is a unique opportunity to fill the gaps in the research agenda and not to provide shopping lists.

Selected projects funded under FP7 and Horizon 2020 were presented in a pitching style (see Annex 2).

Fisheries-related projects funded by the EMFF

Scientific advice is an essential tool both for decision-making and for assessing progress in implementing the Common Fisheries Policy (CFP).

The European Commission seeks scientific advice from appropriate scientific advisory bodies (STECF², ICES³ and the Scientific Advisory Committees of RFMOs⁴). In addition, knowledge gaps are covered through studies and projects funded by the Commission either under Horizon 2020⁵ or previous Framework Programmes for Research and Innovation, or under the EMFF⁶ direct management.

The Executive Agency for Small and Medium-sized Enterprises (EASME⁷) is implementing part of the EMFF budget for scientific advice for fisheries delegated by DG MARE. The EMFF annual work programmes⁸ provide details of the planned calls for tenders and proposals on maritime affairs and fisheries.

Around 30 studies related to fisheries were contracted since 2014 with a total budget of approximately EUR 10 million. 11 showed possible synergies with Horizon 2020 fisheries projects and were presented during the workshop (see Annex 3).

² Scientific, Technical and Economic Committee for Fisheries. <https://stecf.jrc.ec.europa.eu/>

³ International Council for the Exploration of the Sea. <http://www.ices.dk/Pages/default.aspx>

⁴ Regional Fisheries Management Organisations. <https://ec.europa.eu/fisheries/cfp/international/rfmo>

⁵ <http://ec.europa.eu/programmes/horizon2020/en>

⁶ https://ec.europa.eu/fisheries/cfp/emff_en

⁷ <https://ec.europa.eu/easme/en/european-maritime-and-fisheries-fund>

⁸ https://ec.europa.eu/fisheries/cfp/emff/annual-work-programme-grants-and-procurement_en

Information about the SFS-20-2017 topic on regionalisation of fisheries management

Nikos Zampoukas, Marine Resources Unit, DG RTD mentioned that in 2017 there was a topic on the scientific support of the regionalisation of the Common Fisheries Policy (CFP) with a focus on the Mediterranean Sea. The interest in this topic was low as only one proposal was submitted for the first stage evaluation. Additionally, this proposal did not meet the minimum quality criteria to go to the second phase. Participants were requested to consider the reasons behind this lack of interest and if there are indeed important related research needs. There was a common perception that the perceived focus on the Mediterranean discouraged consortia-led by North Europe organisations to apply.

Break out groups on different identified issues

Four areas were defined around which subgroups discussed how future fisheries research topics can contribute to them considering five questions.

1. Group 1 - Zero waste fisheries (e.g. discards, rest row materials, etc.)
2. Group 2 – Social and economic aspects of fisheries (e.g. ocean literacy, responsible research, breaking up silos between fisheries communities and other, etc.)
3. Group 3 –Innovation in fisheries management
4. Group 4 – Sustainable fisheries (MSY, ecosystem-based approach, etc.)

Questions guiding the discussion:

1. What are the issues to be addressed?
2. Why do we need to look at these issues?
3. Which are the knowledge gaps and research needs?
4. What has not been yet tackled by any project?
5. Recommendations/what and when can it be done?

The main research gaps identified are presented hereunder:

GROUP 1 – ZERO WASTE FISHERIES

Main research gaps:

- Whole value chain approach to the elimination of waste
- Incentives to land and utilise unwanted catches
- On-board handling of unwanted catches
- Socio-economic issues related to seafood waste
- Regulatory issues related to seafood waste
- Connection between seafood and land-based food sectors
- Increase of consumers acceptance of products made and highlighting of their nutritional value from rest raw materials as part of ocean literacy
- Survival rates of hitherto discarded fish and live holding for fish for fattening
- Waste caused by fisheries, e.g. ghost nets, litter, emissions
- Knowledge transfer from countries that are advanced in seafood waste utilisation
- Scale-up pilots and start-ups in production of pet food, nutraceuticals, collagen, gelatine etc.
- Regional approaches for seafood waste management based on different mentality and infrastructures.

GROUP 2 – SOCIAL AND ECONOMIC ASPECTS OF FISHERIES (OCEAN LITERACY, RESPONSIBLE RESEARCH, BREAKING UP SILOS BETWEEN FISHERIES COMMUNITIES AND OTHER, ETC.)

Main research gaps:

- A project which acknowledges that fisheries management is indelibly linked to other aspects of the local / regional communities is needed.
- A project which has its primary emphasis on social science followed by fisheries economics and/or assessment as secondary components will likely be most successful. This research is inherently community based (at local / regional scale).
- Develop social, cultural and economic indicators that can be used across European regions / communities. This includes, at the start, defining relevant data, data mining and analysis to create indicators.
- Develop processes to integrate data within science-based advice for fisheries management (scoping on how to combine economic and social indicators to support advisory needs).
- Fully integrate the participatory process (develop best practice guide prior to project calls).

GROUP 3 - INNOVATION OF FISHERIES MANAGEMENT

Main research gaps:

- Focus on economic sustainability of fisheries. Which fisheries are economically feasible? A multi-species approach is needed.
- Current fisheries management is unrewarding. We are using data which is 18 months old to manage fisheries. Needs a redesign for purpose.
- There is a gap between accountability of fishers and the state's ultimate responsibility for managing the sea. Understand the logic of the management to improve the adherence to the rules. Co-creation is Okay.
- Integrated multispecies management.
- New emphasis on spatial fisheries management
- Involve fisherman in the collection of the data!
- Support the improvement of market based management mechanisms.
- Spatial-temporal explicit management to revolutionise the fisheries management – both local and global.
- Innovation within the current framework of fisheries management in Europe – TACs, quotas, LO etc. This would encompass new data acquisition tools e.g. cameras, acoustics etc. to improve the quality and accuracy of the data that underpins stock assessment and hence management. This would also encompass better ways of carrying out stock assessment and the advice from that.
- Innovation in the management of fisheries itself. A better way of designing fisheries management that is fit-for-purpose.

GROUP 4 - SUSTAINABILITY IN FISHERIES

Main research gaps:

- Understand patterns at a small scale and how to integrate these patterns to larger scales.
- Spatio-temporal dynamics of fisheries, other uses and management as basis for MSP, ecosystem and fisheries management.
- Knowledge transfer/gaining impact/Social science/involving people in management.
- Acoustic listening stations and infrastructure for acoustic data?
- Implement the ecosystem-based approach to management.
- Operationalise the MSFD, preferably a joint effort with the EU MAP to collect the data.
- Synergistic effects of pressures and variability.
- Data on ecosystem effect of fisheries, also on aspects other than the target stock.
- Species interactions of relevance to specific questions.
- Growth of fish and environmental factors.
- Involvement of industry in gathering data and information on response to management measures.

- Involvement of stakeholders in fisheries management and policy development
- Macroeconomy, relating fisheries to the surrounding economy, cost-benefit analysis.
- CO2 emissions of fish compared to animals farmed on land.
- Impact of marine litter on fish and shellfish.

Annex I

Agenda

WORKSHOP ON H2020 FISHERIES TOPICS

Friday 23 March 2018, 09:00 to 15:00,

Brussels, Commission's building COV2 Room 9/188

AGENDA

WORKSHOP ON RESEARCH GAPS IN FISHERIES TOPICS

Friday 23 March 2018, 09:00 to 15:00,

Brussels, Commission's building COV2 Room 9/188

Chairs: European Commission: Directorate General for Research and Innovation and
Directorate General for Maritime Affairs and Fisheries

09:00 – 09:20	Opening by DG RTD and DG MARE
09:20 -10:35	Presentations from the following Framework Programme 7/Horizon 2020 projects on main findings and main gaps: EcoKnows, EcoFishMan, FACTS, My Fish, BENTHIS, MareFrame, DiscardLess, MINOUW, ClimeFish, CERES, FarFish, JAKFISH, SmartFish, SAF21, UTOFIA
10:35 – 10:50	Coffee break
10:50 – 11:20	Fisheries-related projects funded by the EMFF
11:20 - 11:30	Information about the SFS-20-2017 topic on regionalisation of fisheries management
11:30 - 12:20	Break out groups on different identified issues
12:20-13:05	Sandwich lunch
13:05-14:15	Continuation of break out groups
14:15 – 15:00	Feed-back from the break out groups, next steps and conclusions

Annex II

Presentations of recent and ongoing FP7 and Horizon 2020 projects

BENTHIS https://cordis.europa.eu/project/rcn/105132_en.html

- BENTHIS developed an assessment framework to provide indicators of impact of bottom trawl fisheries on the benthic ecosystem and seafloor status on a continuous scale that can be applied in the context of the MSFD.
- BENTHIS quantified the footprint of the major European bottom trawl gears, mapped trawling intensity in European seas and estimated trawling impact by habitat.
- BENTHIS studied promising options for mitigation in collaboration with the fishing industry and gear manufacturers: (semi-) pelagic otter boards; replacing mechanical by electrical stimulation.
- BENTHIS indicators have been used by ICES (International Council for the Exploration of the Sea) to provide advice to the EU (DG ENV) on MSFD indicators.
- BENTHIS revealed the critical success factors for implementing technological innovations to mitigate trawling impact (economic profitability and social, regulatory, technological and environmental factors).

CERES https://cordis.europa.eu/project/rcn/200289_en.html

- Increases in the skill of short-term (several months to several years) forecasting of climate variability will allow changes in the environment such as temperature to be incorporated in tactical fisheries management decisions.
- The uncertainty in medium-term (25-yr), physical and biogeochemical changes in marine habitats needs to be captured by targeted research incorporating estimates from multiple global climate models (ensemble uncertainty) and used in biological projections.
- Tools for projecting biological climate impacts can be improved by better understanding how interacting, abiotic factors (e.g. T x pH x O₂) impact on the survival, growth and reproduction of fish and shellfish and how these species-level effects translate to fish communities and ecosystems.
- European research projects working on fisheries have been top-down (based on changes in the resource). Bottom-up science focusing on social and economic aspects of human communities is also needed including better stakeholder engagement.

ClimeFish https://cordis.europa.eu/project/rcn/200477_en.html

ClimeFish impact generators and related challenges:

- Forecasting models for fish production have high uncertainty that needs to be communicated to stakeholders.

- Guidelines for making Climate Adaptation Plans for fisheries and aquaculture need to describe how to integrate adaptation in EU policies.
- Guidelines for establishing legal good practice when resources move are challenging to make due to relative stability and Brexit.
- The ClimeFish Decision Support Framework including a Decision Support System and need to have industry relevance.
- Recommendations for co-creation practices will take individual, cultural and institutional diversity into consideration.

DiscardLess https://cordis.europa.eu/project/rcn/193250_en.html

- Assess the impact of discards on the ecosystem, economy and society (WP1, WP2).
- Investigate the drivers of discarding, and identify how those can be abated (WP2, WP4).
- Develop user-based innovative tools and strategies to avoid unwanted catches (WP3, WP4).
- Develop innovative methods and new value chains to handle and use unavoidable unwanted catches (WP5, WP6).
- Enhance controllability of and compliance with the landing obligation policy via the development of operational and cost- effective tools for traceability and monitoring (WP5, WP6).
- Formulate policy guidelines to reduce incentives to discard and promote the adoption of alternative mitigation strategies, and support other maritime policies (WP7).
- Integrate the gathered knowledge on discard mitigation strategies and transfer it widely (WP8).

EcoKnows https://cordis.europa.eu/project/rcn/95519_en.html

Using other stocks and even species in the S/R parameter estimation is a cost effective way to decrease key uncertainties in stock assessment and in harvest control rule evaluations.

- Expert knowledge can be an important source of information for fisheries risk and management analysis, but it needs to be elicited in an appropriate way.
- Fisheries papers should report posterior probabilities in such a format, that they could be used as priors in the following analysis. This would improve the learning capacity of science, in a cost effective manner.
- To be able to efficiently improve the biological realism of stock-assessment models, fisheries scientists must go beyond the traditional stock-assessment data and explore the resources available in other fields of biological research, such as ecology, life history theory and evolutionary biology, in addition to utilising data available from other stocks of the same or comparable species.
- The value-of-information analysis can show, which potential information sources should be studied in more details than others, in order to support fisheries management decision making in a cost effect.

FACTS https://cordis.europa.eu/project/rcn/93618_en.html

- FACTS aimed to increase the sustainability of EU fisheries through improved knowledge and tools for managing forage fish stocks and their predators. The central questions were:
 - What are the consequences of forage fish fisheries on (a) predator growth and abundance; (b) economic output of fisheries on piscivorous species; and (c) ecosystem stability and the risk for regime shifts?
 - What are the consequences of changes in predator populations on forage fish populations and fisheries?
- FACTS produced:
 - 50+ scientific papers.
 - Participation in all relevant expert groups, vital parameters essential for assessing and managing the focal species (predation rates, growth rates).
 - Participation in defining MSY reference points for all focal species.
 - New mathematical models for use in multispecies-based stock assessment (Baltic/North Sea SMS, Barents Sea/ Bay of Biscay GADGET).
- FACTS communicated and discussed its results in stakeholder workshops, a dedicated ICES theme session and a symposium.

FarFish https://cordis.europa.eu/project/rcn/210502_en.html

- Over 20% of the EU fleets catches come from outside EU waters.
- Biological, ecological, social and economic information on these fisheries are often limited.
- The FarFish project will contribute to increasing biological and ecological knowledge on important fish stocks targeted by the EU fleet outside EU waters.
- FarFish will analyse value chains affected by EU fisheries in foreign waters.
- FarFish will identify, analyse and provide recommendation on potential improvements for stock assessment and management in waters outside EU.
- Develop new tools for decision support on fisheries management.
- Build capacities in fisheries management among stakeholders within the EU fishery and within the coastal states.

JAKFISH https://cordis.europa.eu/project/rcn/88412_en.html

Social Network Analysis can inform about context of Fishery Management

- Participatory modelling (engagement) can enhance legitimacy of fisheries science.
- Participatory Management Plans requires political awareness.

MareFrame https://cordis.europa.eu/project/rcn/111485_en.html

- Holistic approach including environment, economic, social, government/policy aspects.

- Co-creation.
- Advanced ecosystem models.
- Decision Support Framework.
- Policy recommendations – roadmap.
- ICES and GFCM (General Fisheries Commission for the Mediterranean) already using the MareFrame outcomes.

MyFish https://cordis.europa.eu/project/rcn/101745_en.html

- The aim for fisheries is to have the MSY from fisheries.
- Ways to adapt fisheries management to successful implementation and subsequent development of the new CFP in the face of these challenges.
- A guide for policy makers to select operational targets and adopt appropriate management instruments.
- Main implementations:
 - Fisheries yield can be optimised (MSY and Maximum Economic Yield) while social and ecosystem objectives are best used as constraints on the biomass or economic optimisation.
 - Ranges defining the scope for flexibility in policy allows consideration of ecosystem, economic and social considerations.
 - Considerations such as stability and high yields benefit fishing and processing industry as well as local communities.
 - Healthier seas benefit the general public and potentially yield.
 - During the project, ranges were integrated in multiannual plans for fisheries.
 - The realised impact will depend on the balance between short and long term priorities when using the scope for flexibility

UTOFIA https://cordis.europa.eu/project/rcn/193162_en.html

- 3D images are an enabling factor for automatic monitoring and for quantitative assessment of fish and its environment.
- Research is necessary to:
 - Turn 3D images automatically into quantitative assessment of biomass, behaviour, species, seabed structure. Explore opportunities of complementary sensors to provide deeper insights in fish behaviour and also enable cost reduction of equipment.
- Possible impacts: More efficient fishing fleet, reduced environmental impact, better data towards Descriptors of Good Environmental Status.

SAF21 https://cordis.europa.eu/project/rcn/193883_en.html

Some conclusions:

- Fisheries models are not properly documented and the human dimension of fisheries is seldom included.
- We also find that social aspects of fisheries (e.g. trust, compliance) are modeled through economic (e.g. profit) and environmental (e.g. stock size) variables.
- We need to develop good ways to integrate social and ecological perspectives in models and identify good governance indicators.
- To facilitate communication between stakeholders we need interactive ways to visualise fisheries data.

SmartFish https://cordis.europa.eu/project/rcn/87346_en.html

The SMARTFISH systems will:

- Assist fishermen in making informed decisions during pre-catch, catching, and post-catch phases.
- Improves catch efficiencies and compositions in fisheries across the EU, leading to improved economic efficiency while reducing unintended fish mortality, unnecessary fishing pressure and ecosystem damage.
- Provide new data for stock assessment from commercial fishing and improve the quality and quantity of data that comes from traditional assessment surveys.
- Permit the automatic collection of catch data to ensure compliance with fisheries management regulations.

EcoFishMan https://cordis.europa.eu/project/rcn/97834_en.html

- Holistic approach including environment, economic, social and government/policy aspects.
- Co-creation.
- Responsive Fisheries Management Systems (RFMS).
- Decision Support Tables (DST).
- Agreed management plans and certified documentation systems.
- Roadmap to guide decision-makers to implement RFMS.

Annex III

Presentations of recent and ongoing EMFF funded projects

	WP Reference number	Title	Amount	Status
Scientific Advice for Fisheries - Actions presented at the workshop on H2020 on 23 March 2018				
1	EMFF/2014-1.3.2.4	Study on approaches to management for data-poor stocks in mixed fisheries	997.000,00	Open
2	EMFF/2015-1.3.2.1	Study on mitigation measures to minimise seabird bycatch in gillnets	149.978,00	Closed
3	EMFF/2015-1.3.2.3-05-SC01	Improving scientific advice for oceanic sharks and rays	264.328,00	Open
4	EMFF/2015-1.3.2.3-06-SC02	Selecting Ecosystem Indicators for Fisheries targeting Highly Migratory Species (HMS)	269.770,00	Open
5	EMFF/2015-1.3.2.5	Tagging study to determine mortality sources on cod in the Irish Sea	599.541,76	Open
6	EMFF/2016-1.3.2.5_01	Recovery of fisheries historical time series for the Mediterranean and Black Sea stock assessment	289.965,00	Open
7	EMFF/2016-1.3.2.5_02	Evaluation of the population status and specific management alternatives for the small pelagic fish stocks in the North-Western Mediterranean Sea	210.000,00	Open
8	EMFF/2016-1.3.2.7	Validating age-determination of anglerfish and hake	299.933,57	Open
9	EMFF/2017-1.3.2.1	Herring in Divisions 6.a, 7.b and 7.c: Scientific Assessment of the Identity of the Southern and Northern Stocks through Genetic and Morphometric Analysis	674.862,30	Open
10	EMFF/2017-1.3.2.5	The identification of measures to protect by-catch species in mixed-fisheries management plans	1.000.000,00	Open
11	EMFF/2017-1.3.2.6-03-SC08	Scientific approaches for the assessment and management of deep-sea fisheries and ecosystems in RFMOs and RFBs	100.000,00	Open
Scientific Advice for Fisheries – Other actions relevant				
12	EMFF/2017-1.3.2.6-01-SC06	Reference Points, Harvest Control Rules and Management Strategy Evaluation in tuna Regional Fisheries Management Organisations	149.998,00	Open
13	EMFF/2017-1.3.2.6-02-SC07	Testing designs and identify options to mitigate impacts of drifting FADs on the ecosystem	399.610,00	Open
14	EMFF/2017-1.3.2.6-04-SC09	Catch, effort, and ecosystem impacts of tropical tuna fisheries-CECOFAD II	349.790,00	Open
15	EMFF/2014-1.3.2.1-01-SC06	Discards Phase II - Specific Contract for the provision of advice on the management of discards in EU fisheries beyond EU waters	100.130,00	Closed
16	EMFF/2014-1.3.2.1-02-SC07	Specific Contract for the provision of advice on the conservation of pelagic sharks associated to fishing activity under EU Sustainable Fisheries Partnership Agreements in the Atlantic Ocean	212.389,40	Closed

Published studies (closed) are available following the links:

https://ec.europa.eu/fisheries/documentation/studies_en

<https://publications.europa.eu/en/web/general-publications/publications>

Annex IV

Detailed outcomes of the breakout groups:

GROUP 1 – ZERO WASTE FISHERIES

1.1. What are the issues to be addressed?

- If we are to have zero waste fisheries we need to look at the whole value chain, from the management of stocks, fisheries strategies, protected areas, selectivity of fishing gear, on-board handling, processing, marketing, market acceptance; all the way to Disposal.
- Priority should be on avoiding to catch unwanted fish in the first place
- We are missing the 'carrot and a stick' to ensure that the unwanted catches (UUC) is landed.
- Research into socio-economic issues are needed.
- Create incentives to land and utilise UUC.
- The regulation system is the weak point.
- The Circular Economy is key to solving this – need to connect with different sectors when utilising unwanted catches.
- Product development on rest raw materials that are considered of little or no value.
- Scaling up pilot and start-ups in production of pet-food, nutraceuticals, collagen, gelatine etc.
- Integration of the value chains into food sector rather than seafood (connection between land and sea / agri-food-fish-chain).
- Scoping of potentials for Rest Raw Materials. Bioactive compounds etc.
- Seafood and health to be linked better – zero waste by using rest raw material (RRM) for making healthy proteins should be emphasised.
- Increasing awareness of utilisation – part or ocean literacy.
- Survival rate of discarded fish is of relevance. This represents a knowledge gap. This is very important for the discard ban.
- Technological development and knowledge transfer is of importance. Countries and fisheries that are more advanced can help those lagging behind.
- Live holding of fish might be of interest. This is something that Norwegians have been looking into, but applicability in other fisheries is questioned. This is already done in crustaceans and blue fin tuna though. Might be expanded to other sectors.
- On-board handling of all catches is important so that they can all be used as valuable products as possible. UUC's that are to be used for pet food or nutraceuticals need to be fresh.
- Ghost fishing and marine litter. Fuel emissions etc. Waste caused by fishing practises. Systemic approach to take into consideration the whole process.

1.2. Recommendations:

- Researching socio-economic and legal aspects of how zero waste fisheries can be achieved is needed.
- Better understanding of the value chains by analysing the entire chain are needed. These RRM value chains can be much more diverse than traditional seafood value chains. Linking for example health benefits, utilisation, quality etc.
- Research on regionalisation approach to zero waste. Solutions depend on regions, mentality, infrastructure etc.
- Funding of pilot plants to demonstrate available alternatives and test in real life.
- Small biorefineries can be piloted. These can deal with different waste materials. This is probably most relevant to Bio-based industries. They should be incentivised in this direction.
- Scoping for potential products e.g. bioactive compounds, pharmaceuticals, nutraceuticals etc.
- Research on survival rate of discarded fish.
- Impacting mentality of people so that zero waste will be more “popular”.

GROUP 2 – SOCIAL AND ECONOMIC ASPECTS OF FISHERIES (OCEAN LITERACY, RESPONSIBLE RESEARCH, BREAKING UP SILOS BETWEEN FISHERIES COMMUNITIES AND OTHER, ETC.)

1. What are the issues to be addressed?

Inclusion of economic and social issues and data within fisheries and/or environmental programmes has steadily increasing. Economics are often applied but social and cultural information is often not well applied. This may be due to a variety of reasons (lack of common language between sociologists, economics and fisheries biologists, inability to translate and utilise metrics derived by social science within “traditional” fisheries models, etc.).

Stakeholder engagement is critical for project impact (and to break down pre-existing silos). Efforts made in terrestrial (agricultural) science, where stakeholders have property rights, have outpaced those in aquatic fisheries. Nonetheless, truly participatory stakeholder involvement in EU programs has been increasingly. This can be supported by a mission and goals of DG MARE that include not only research on the resources but also the end users (the European Commission’s clients). The success of participatory processes will largely impact on the salience, credibility and legitimacy of the outcomes.

2. Why do we need to look at these issues?

The ecosystem-based approach to management of marine systems and their fisheries requires both data on human impacts on the ecosystem and vice versa. As mentioned early in this workshop, we manage people not fisheries. Beyond this overarching statement, a commitment to strengthening the human dimension of fisheries research will help one to 1) understand tradeoffs of management decisions; 2) appreciate the full value of fisheries to society; 3) understand who you manage and their behavior (e.g.

compliance, architecture of tools used to communicate with stakeholders – ocean literacy).

3. Which are the knowledge gaps and research needs?

An important target of the CFP is sustainable fisheries (both economic and cultural). Cultural and institutional diversity need to be explored, clarified and mapped. This will be particularly important for the successful regionalisation of the CFP. Comparison of well-designed social and economic indicators among regions can help accomplish this.

These social and economic indicators can be derived not only from the fisheries sector but also from the wealth of information available from fields outside fisheries (data mining of public databases is needed). We need to combine best practices in social science with best practices in ecology and fisheries management and this entails a more holistic approach. We can learn a lot from successful participatory approaches used in other fields.

4. What has not been yet been tackled by any project?

A project which acknowledges that fisheries management is indelibly linked to other aspects of the local / regional communities is needed. A project which has its primary emphasis on social science followed by fisheries economics and/or assessment as secondary components will likely be most successful. This research is inherently community based (at local / regional scale).

5. Recommendations

- 1) Develop social, cultural and economic indicators that can be used across European regions / communities. This includes, at the start, defining relevant data, data mining and analysis to create indicators.
- 2) Develop processes to integrate data (point 1) within science-based advice for fisheries management (scoping on how to combine economic and social indicators to support advisory needs).
- 3) Fully integrate the participatory process (develop best practice guide prior to project calls).

GROUP 3 - INNOVATION IN FISHERIES MANAGEMENT

1. What are the issues to be addressed?

First, instead of having a group discussion on question one, participants were asked to write down their suggestions for the main topics to discuss in relation to innovation in fisheries management. Below are some quotes from the feedback obtained:

- Important to move to a quantitative approach. New sensors allow for new content on how fisheries behave in the natural environment.
- Focus on economic sustainability of fisheries. Which fisheries are economically feasible? A multi-species approach is needed.
- Current fisheries management is unrewarding. We are using data which is 18 months old to manage fisheries. Needs a redesign for purpose.
- Innovation of management is not going to happen, we need revolutions.
- There are improvement in collecting the data, but there are huge uncertainties that need to be estimated. Improvement in acoustics and data interpretation are needed. We need to know what each vessel is catching.
- Low commitment to fisheries management by the fishermen. They cannot commit to data and models they cannot understand. Improve the learning capacity in fisheries science by using up to date methodology. Instead of collecting more data and trying to improve estimates only by this, assess where new data can make a difference.
- Fishers are not the only users at sea. There is a gap between accountability of fishers and the state's ultimate responsibility for managing the sea. Understand the logic of the management to improve the adherence to the rules. People that do not understand the rules often do not follow the rules or cannot find new ways to solve the problem. Management needs to listen to the stakeholders – co-creation is Okay.
- Fisheries management is still largely based on the single species stock assessment. Need to change the way how we evaluate the mixed systems: integrated multispecies management.
- New emphasis on spatial fisheries management.
- Innovations need to be more practical than theoretical. Involve fishermen in the collection of the data!
- Why does fisheries management need innovation? CFP's are the basis of the management – fit for 1980's. Need to accommodate the management to adopt to changing system and new requirements. Supporting the improvement of market based management mechanisms.

Main challenge: how to share the natural resources at sea in a system that is dynamic and changing and where new requirements, uses and actors are rapidly expanding? For example:

- the expansion in the distribution of mackerel (what is a legitimate and acceptable sharing arrangement?)

- the need to take bycatch of sensitive species into account (how to monitor? How to assess the risks for often data poor stocks, how to allocate fishing opportunities explicitly incorporate bycatch mitigation?)
- building windfarms / spatial planning

Innovative fisheries management to deal with changes in the ecosystem. Spatial-temporal explicit management is needed to revolutionise the fisheries management – both local and global.

Think of natural resources as a cake. How do we assess the size of the cake? How to share this cake in a situation where the cake is moving and different actors claim part of the cake?

What is still missing in the discussion: what is the goal of the fisheries management? What are you managing it for? Are oceans now referred to as a source of food? And if so, should you aim for maximum production (at low trophic levels?). “Increase productivity at sea while respecting boundaries”

In conclusion “Innovation in/of fisheries management” should be seen in two main ways.

- The first would be innovation within the current framework of fisheries management in Europe – TACs, quotas, LO etc. This would encompass new data acquisition tools e.g. cameras, acoustics etc. to improve the quality and accuracy of the data that underpins stock assessment and hence management. This would also encompass better ways of carrying out stock assessments, and the advice from that. For example, better understanding of Stock Recruit relationships, inclusion of ecosystem predictors, and information on gear and behavioural changes (e.g. from the LO) in assessment models.
- The second would be innovation in the management itself. The current paradigm is of TAC, quota etc. as the main management tools, plus a wide range of others, i.e. technical measures (TCM) e.g. gear and spatio-temporal TCM, plus derogations, exemptions, and occasional effort and capacity measures, plus now the LO. This has led to perceptions of a high level of micromanagement, difficulties in control and enforcement, poor compliance and credibility from the industry, and a very complex management framework. This is probably due to the gradual evolution of current management, with the steady addition of new aspects that are not always consistent with previous elements. At the same time, there are changes in ocean use e.g. oil and renewable energy, changes in our objectives e.g. in ecosystem, economic and social sustainability, and changes in the ecosystem itself e.g. climate change, leading to changes in our fish stock behaviour. “Innovation in/of fisheries management” should therefore include consideration of innovation in the management itself. Is there a better way of designing fisheries management that is fit-for-purpose, and that encompasses all the challenges outlined above, in a better way than the current paradigm?

2. Why do we need to look at these issues?

Systems are changing and societal demands and objectives are changing. Fisheries management needs to innovate to be able to deal with these changing systems that take into account political, social, cultural, economic and ecological issues, as well as the changing values of the society. Society gives new challenges, and their solution requires new management approaches and new scientific approaches to support such revised management. This could be turned it in to a topic for the upcoming Work Programme.

If the challenge is to make the most optimal use of the cake and we want to feed an expanding world population, at which cost are we willing to or can we afford to do that?

3. Which are the knowledge gaps and research needs?

Can there be a part of social engineering within fisheries management, for example in the allocation or protection of fishing rights for certain coastal communities or fishing sectors? Example of Norwegian small scale fisheries which is 'supported' by the large scale fisheries. How does that relate to overall fisheries management objectives?

The fisheries management paradigm need to change as it is currently incapable of using the information supplied to the system. It is not great at adapting to new things and answering to new challenges. Bring down the system and build the new one. Scientific society is calling for a dialogue between the stakeholders. What is decision – preserve the ecosystem? Then we stop fishing, which is not going to happen. We need to aim at the relative stability, which is impossible with the international government negotiations playing the role.

4. Which has not been tackled by any other project?

Although a number of projects have already touched on better ways of managing fisheries (e.g. MareFrame, EcoKnows...), the challenge is really to come up with the set of rules that are working in a situation that is constantly changing. Different, potentially conflicting political and social perspectives and aims need to contribute to the solutions. The challenge is how can we quickly know the state of the oceans and how can we create solutions that work. This requires real-time estimation which could actively involve fishermen in data collection. This will help stakeholders why scientific information is needed to support policies.

5. Recommendations. What and when it can be done?

Changes in ways of utilising fishermen in data collection and management are already being incorporated in the FARFISH and PANDORA projects. This focusses on quickly assessing what is going on in the natural system. Developing innovative and efficient technologies and estimation techniques are a key aspect of that. The next challenge is develop tools for rapid decision making and the sharing of the cake. Simple, robust and understandable arbitration and decision rules. Rapid to perform, rapid to adapt, rapid to evaluate. Revolution not more evolution!

GROUP 4 - SUSTAINABLE FISHERIES

Why?

Providing the necessary knowledge base for:

- Global needs
- Societal needs
- Increasing benefits while minimising unacceptable effects
- Release added value by using technology from other sectors in fisheries management
- Enhancing co-creation of knowledge
- Solve competing interests related to use of the ecosystem, e.g. Blue Growth
- Implementation of legislation including MSP
- Future CFP and MSFD input

Spatial management

- Why: Spatio-temporal dynamics of fisheries, other users and management as basis for MSP, ecosystem and fisheries management.
- Reconciling different uses of space, multiuse effects and sustainability.
- How: Study the spatio-temporal dynamics of fish and fisheries: fish patterns are small scale but fishing decisions are on a large scale.
- Create an understanding of patterns at a small scale and how to integrate these patterns to larger scales.
- Use new technology.
- When: in time to provide input for MSP and revised CFP.

Implementing ecosystem approach to management

- Why: Operationalise Ecosystem Approach to Management (EAM) and MSY.
- How: Synergistic effects of pressures and variability.
- Data (EU Tenders Fishpi2 and Stream and others for EU MAP)
- Integrating knowledge on ecosystem effect of fisheries on commercial fish from projects Horizon 2020 Climefish and Ceres, Farfish and SFS-21.
- Knowledge on aspects other than large fish stocks from the BENTHIS project, likely lacking for some aspects?
- Specify case studies in the proposal.
- When: Can be started whenever, but should integrate results continuously.

Knowledge transfer/gaining impact/Social science/involving people in management

- Industry involvement to gather more data and information on response to management measures.

- Impact of research is key.
- Knowledge gaps from different projects: how do we ensure that these are available?
- Building on information from tenders as well as DG RTD.
- Impact depends on having everyone in the room. Making the calls capable of including co-creation.
- Problem of stakeholders in management/policy changing a lot and being generic.
- Projects need to be focused and their work reviewed by outside scientists.

How

- Better data accessibility?
- Acoustic listening stations and infrastructure for acoustic data?

What issues to be addresses?

- Spatial management
 - Spatial dimension of fisheries, other users and management.
 - Spatial aspects, fish distribution: patterns are small scale but fishing decisions are on a large scale.
 - Reconciling different uses, multiuse effects and sustainability.
 - Use of space, link to MSP and climate change, multiuse of one area.
- Implementing the Ecosystem approach to management
 - Operationalise MSFD, preferably a joint effort with the EU MAP to collect the data.
 - Synergistic effects of pressures and variability.
 - Data on ecosystem effect of fisheries, also on aspects other than the target stock.
 - Species interactions of relevance to specific questions.
 - Growth of fish and environmental factors.
 - Knowledge transfer/gaining impact/Social science/involving people in management.
 - Industry involvement to gather more data and information on response to management measures.

- Impact of research is key.
- Knowledge gaps from different projects: how do we ensure that these are available?
- Building on information from tenders as well as DG RTD.
- Impact depends on having everyone in the room. Making the calls capable of including co-creation.
- Problem of stakeholders in management/policy changing a lot and being generic.
- Projects need to be focused and their work reviewed by outside scientists.
- Macroeconomy, relating fisheries to the surrounding economy, cost-benefit analysis.
- CO2 emissions, why not more investigated? Fish is more CO2 friendly than beef.
- Link to other emerging issues, e.g. litter/plastic. Perhaps need more knowledge before launching a large scale project?

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