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# GREEN TO BLUE: IMPROVEMENT OF SUSTAINABILITY COMPETENCES IN THE FIELD OF FISHERY & AQUACULTURE

## GLOBAL REPORT

Identified Good Practices and Competency Skill Framework



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## 1. INTRODUCTION

GREEN TO BLUE project focuses on workers in the professional fishing and aquaculture sector and intends to expand and develop the training offer with courses aimed at raising levels of competence and qualification in the environmental field, a field with multiple meanings such as: management of natural resources, prevention of marine pollution, water quality, sea-gathered waste management, etc....

Fishing and aquaculture sector is characterized by workers with low qualifications and with a high average age. The recent study of the Scientific, Technical and Economic Committee of the European Commission (STECF 2019), shows that 58% of the workforce in the sector has an average age between 40 and 64 years and 67% of workers in fishing and aquaculture has a low education, with weak skills. Although fishermen have an important working experience at sea, the category is fragile and it's difficult for them to adapt to the changes we are all subjected to.

The main objective of the GREEN TO BLUE project is to provide sector workers and sector stakeholders with an effective and functional training program, in order to IMPROVE THE ENVIRONMENTAL MANAGEMENT system and develop technical skills strongly centred on the SUSTAINABILITY OF ACTIVITIES RELATED TO THE SEA.

In this context academic articles, examples of good practice, and the contributions of partners were analyzed and identified as the most significant and deserving experiences.



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## 2. O1A1. STATE OF ART OF SCIENTIFIC RESEARCH AND HOW IT TALKS WITH FISHERY/AQUACULTURE SECTOR

This section seeks to answer the following questions. Analyse the type of relationship between the actual scientific research regarding sea health and the level of knowledge by sea workers; do workers know the evolution of research? Is there a dialogue between workers and researchers? Are there situations of exemplary collaborations that can be analysed and applied? If so, what skills workers need to develop?

The main objective at this stage was to select 15 European good practices. In addition to good practice examples mentioned below, well-known academic research databases scanned and bilateral meetings held with both scientists and employees of the fisheries sector to determine the status of the relationship between academics and the fisheries sector.

### 2.1. LITERATURE REVIEW

**Hartley and Robertson (2008)** This research begins to examine whether cooperative research integrates fishermen's and scientists' knowledge, particularly among highly engaged industry leaders and their science partners. In this study findings are presented from three surveys—individuals engaged in commercial fishing in northern New England (n¼295), and fishermen (n¼60), and scientists (n¼37) participating in Northeast Consortium projects—examining: (1) whether knowledge integration was considered important and achievable, and why; and (2) whether and how fishermen and scientists learned about the scientific process or fishermen and fishing, respectively, from participating in cooperative research. According to ramifications of the study; The three surveys present a comprehensive picture of the context, challenges, likelihood, and strategies for integrating fishermen's and scientists' information, experience, and knowledge among those most engaged and interested in participating in cooperative research. While the actively engaged commercial fishing industry in northern New England appeared to believe strongly that integrating fishermen's knowledge and scientists' knowledge is very important, they were more skeptical that it can be achieved. These fishermen believed that scientists did not respect or value their information, did not trust them, and may be actively seeking to eliminate fishing.



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**Heyman and Granados-Dieseldorff (2012)** According to this study artisanal fishers' knowledge can provide practical information for management, and when shared, can help build trust between fishers and managers. However, until recently, very few studies designed to support fisheries management have incorporated fishers' knowledge. This study was designed to characterize the geography of fishing in the Gulf of Honduras (GOH), shared by Belize, Guatemala, and Honduras, from the perspective of artisanal fishers. Data were compiled from semi-formal interviews with key informants, community meetings, mapping exercises, workshops with fishers in the GOH during 1998–1999, and participant observations through July 2011. Data were used to document fishery landings, status and trends in marine resources, the spatial and the temporal dynamic geography of fishing, and fishers' suggestions for improved conservation and management. Many of these suggestions have been implemented in the GOH between 1999 and 2011. This study offers a practical methodology that can be used in other artisanal, data-sparse fishing areas to document the geography of fishing, increase the participation of fishers in management, and lead to better participatory, ecosystem-based management.

**Dubois et al. (2014)** This article draws on a process of collaborative research associated with the brown crab fishery in Devon, UK. It charts the mobilisation of knowledge in the struggle over 'ownership' and influence in the coastal zone. Using methods from the social and behavioural sciences the article outlines different perspectives on a number of key contestations across the domains of sustainable use and a new conservation agenda ushered in by the introduction of European and UK national marine spatial planning tools for the South Coast of England. Along with their introduction and the 'opening up' of marine space, new opportunities emerge for fishers, who, by building alliances with scientists and managers, and by drawing upon the methods and materials of science, are better able to negotiate for their own interests over access and control of marine resources. The paper concludes by outlining the emergence of a new type of scientifically literate fisherman, a 'political actor with a new crew', better able to implement collective actions towards the sustainable use of brown crab resource.

**Duggan et al. (2014)** In this study they set out to explore some of the impediments which hinder effective communication among fishers, fisheries researchers and managers using detailed ethnographic research amongst commercial handline fishers from two sites— one on the southern Cape coast and the other on the west coast of South Africa. Rather than assuming that the knowledge of fishers and scientists is inherently divergent and



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incompatible, they discuss an emerging relational approach to working with multiple ways of knowing and suggest that this approach might benefit future collaborative endeavors. Three major themes arising from the ethnographic fieldwork findings are explored: different classifications of species and things; bringing enumerative approaches into dialogue with relational approaches; and the challenge of articulating embodied ways of relating to fish and the sea. Although disconcertments arise when apparently incommensurable approaches are brought into dialogue, they suggest that working with multiple ways of knowing is both productive and indeed necessary in the current South African fisheries research and management contexts. The research findings and discussion on opening dialogue offered in this work suggest a need to rethink contemporary approaches to fisheries research in order to mobilise otherwise stagnant conversations, bringing different ways of knowing into productive conversation.

**Massé et al. (2016)** In order to achieve a more frequent monitoring for anchovy & sardine in the Bay of Biscay, an innovative data collection strategy involving a partnership between fishermen and scientists, was developed in 2009 and 2010 called “pilot sentinel surveys”. This paper details the partnership, the information such a partnership can provide and how it can be useful for adaptively managing such resources. The method was based on short surveys undertaken by commercial vessels several times per year, in two spatially limited “key areas” known to be potential recruitment habitats. Acoustic surveys and fishing operations enabling biological sampling, were combined in each key area. Only one scientist was on board and an ad hoc sampling strategy was adopted during each survey by the Captain–Scientist team depending on the local conditions. This partnership allowed scientists to benefit from fishermen’s experience and therefore adopt a sampling strategy which was optimized in time and space.

**Barnett et al. (2016)** According to this study Public participation geographic information systems (PPGIS) can address these risks by integrating subjective and objective spatial data on human and environmental impacts and risks. They integrated fishermen's perceptions and experiences with marine debris with spatial data using PPGIS and they developed a georeferenced database of fishermen's experiences with marine debris, collected during focus groups and at various other meetings in Southwest New Brunswick. This layer was used to integrate baseline data with subjective perceptions of the ecological, economic, and navigational risks associated with marine debris in the Bay of Fundy, Canada. They also documented the physical, technical, political, and regulatory challenges to marine debris



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mitigation. These challenges highlight the social and environmental processes that complicate any projects that attempt to develop uncontested spatial representations of marine debris. Finally, they discuss the potential of PPGIS to address these challenges by fostering communication, coordinating various marine activities, helping stakeholders set priorities for clean-up, and implementing collaborative clean-up projects.

**Abreu et al. (2017)** The Paranagua Estuarine Complex (PEC), Parana State, southern Brazil, has rich biodiversity, marine protected areas and traditional extractive communities, such as fisherfolk. These coastal communities are dependent on local resources and are continually in contact with researchers working mainly on studies related to coastal environmental issues. However, the results generated in these studies realized in marine environment are rarely shared or discussed with these traditional communities before being taken to decision makers, which can result in conflicts between those involved, the acceptance of reduced management measures and the loss of research credibility. The objective of this study is to describe the perception of marine traditional fishermen from the village of Ilha das Peças (VIP) and the village of Ilha do Superagui (VIS), both located in the vicinity of the protected areas, regarding the scientific research conducted in the PEC. In 2012, ethnographic interviews were conducted through semi-structured questionnaires given to fisherfolk in the VIP (n = 40) and the VIS (n = 50). The level of education among the fishermen in the two villages is low, which can influence the perception of the research conducted in the region. All respondents in the VIP and VIS described not receiving reports from researchers regarding the results. Therefore, there is a feeling of dissatisfaction regarding the lines of research in general, which is extended to the funding agencies and the presence of researchers in the area, representing conflicts with the management of marine resources. According to the respondents, the research does not seek solutions to social and environmental problems but only evaluates and seeks to preserve the fauna and flora, excluding the human component of the broader ecological processes. Dialogue between scientific and traditional knowledge is essential in the joint search for effective solutions to social and environmental problems, especially in areas designated as priorities for biological conservation in the coastal environment.

**Giaretta et al. (2021)** According to this study the use of animals from commercial fishing for scientific purposes is a reality in Brazil, emphasizing the importance of a good relationship between researchers and fishermen. To assess the effectiveness of traditional communities' inclusion in research, this study provides comparative data on elasmobranch landing patterns



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and on-board processing before and after participatory activities. Through the inclusion of members of the fishing community, a change in behavior and recognition of the importance of elasmobranch research and conservation were detected in this study. They state that such a strategy is an effective empowerment tool, benefiting not only the management of coastal species, but also valuing traditional knowledge in research and creating a work environment based on trust and commitment.

**Gray and Catchpole (2021)** This study is an analysis of the relationship between the concepts of fisheries–science partnership (FSP) and fisheries co-management (FCM), using a case study of recent EU work on discard survival. Are FSP and FCM entirely different forms of joint activity, or is FSP a form of FCM or a means of preparing the ground for FCM? And is the recent EU work on discard survival a form of FSP, or of FCM, or both? A questionnaire was sent out by email in 2015 to 13 people who were involved in the discard survival work, and eight responses were received that covered eight projects in seven countries (Belgium, England, Denmark, France, Norway, Sweden, and the Netherlands). Their main findings are fourfold. First, while FSP and FCM are different forms of joint activity, they are both partnerships. Second, FSP may serve as a precursor or preparation for FCM. Third, the EU discard survival assessment work contains elements of both FSP and FCM, but is mainly a FSP exercise and falls far short of FCM. Nevertheless, fourth, this joint work alongside many other FSP initiatives undertaken under the auspices of the Common Fisheries Policy (CFP) (e.g., the GAP projects) has improved relations between fishers, scientists, and managers, and this may contribute to a modification of the CFP’s largely top-down decision-making system.

**Lomonico et al. (2021)** According to this study climate change poses unprecedented challenges for fisheries management systems. Increased environmental variability and uncertainty due to climate change are creating shifts in productivity and distribution of fished species, and subsequent social-ecological impacts that require timely implementation of adaptive management strategies. Yet many proposed “climate-ready” fisheries actions – such as integrating climate factors into stock assessments and increasing flexibility in decision-making – either complicate or add to existing responsibilities of fishery managers and strain existing institutions. In the United States, many fisheries management agencies have explicitly acknowledged certain capacity shortfalls and institutional limitations to addressing current and projected impacts of climate change on marine fisheries. Many resource and capacity gaps across the adaptive fisheries management cycle could be filled through more effective fishery partnerships among management agencies, fishing industries,





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private sector, and academia. Partnership approaches are key to unlocking capacity for achieving climate-ready fisheries yet expanded implementation may require a shift towards a model that empowers and obligates fishery stakeholders to take on expanded roles with appropriate guidelines and oversight, while establishing increased roles for agencies as facilitators and auditors for certain tasks. Building and institutionalizing more effective fishery partnerships to achieve climate-ready fisheries will require clear guidance and enabling conditions.

**Charbel et al. (2022)** According to this study transdisciplinary research challenges the divide between Indigenous and academic knowledge by bringing together epistemic resources of heterogeneous stakeholders. The aim of this article is to explore causal explanations in a traditional fishing community in Brazil that provide resources for transdisciplinary collaboration, without neglecting differences between Indigenous and academic experts. Semi-structured interviews were carried out in a fishing village in the North shore of Bahia and our findings show that community members often rely on causal explanations for local ecological phenomena with different degrees of complexity. While these results demonstrate the ecological expertise of local community members, they also argue that recognition of local expertise needs to reflect on differences between epistemic communities by developing a culturally sensitive model of transdisciplinary knowledge negotiation.

## 2.2 15 SUCCESSFUL COLLABORATION EXPERIENCES BETWEEN THE WORLD OF RESEARCH AND THE FISHERY SECTOR

1. **Fishermen-Scientist Collaborations** - THE PACIFIC COAST FEDERATION OF FISHERMEN'S ASSOCIATIONS THE ESSENTIAL COLLABORATION: PROTECTING STOCKS AND OUR INDUSTRY MEANS GREATER COOPERATION BETWEEN FISHERMEN AND SCIENTISTS - <https://pcffa.org/fishermen-scientist-collaborations/>

### 2. Fisheries Industry Science Partnership (FISP) Network

The newly formed Fisheries Industry Science Partnership (FISP) Network is encouraging people in the fishing industry to come forward with their ideas for scientific studies to improve knowledge on data deficient fisheries and develop



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industry ideas to support the science used in decision-making. - <https://fishmongers.org.uk/collaborative-fisheries-research/>

**3. Industry Science Partnerships - [The National Federation of Fishermen's Organisations](#)**

Marine science is a costly endeavor and we will never know everything, but scientists working together with industry, and vice versa, is critical to improving the evidence base and informing sound management decisions.

**4. Massachusetts Fishermen's Partnership - <http://mass-fish.org/organization-goals/>**

To promote research, education, and training within our communities so as to: facilitate collaborative research between fishermen and scientists.

**5. (SAFE) Scientists and Fishermen Exchange\* - <https://www.fisheries.noaa.gov/pacific-islands/habitat-conservation/scientists-and-fishermen-exchange>**

The mission of SAFE is to provide a safe and comfortable environment for a genuine exchange of information, helping to improve communication and collaboration, build positive relationships, encourage understanding, and foster respect and trust among scientists, managers, and fishermen.

**6. Cooperative Research in the Northeast\* - <https://www.fisheries.noaa.gov/new-england-mid-atlantic/science-data/cooperative-research-northeast>**

Cooperative research is the partnership between the fishing industry and the science community to improve understanding of ocean ecosystems and support sustainable fisheries management.

**7. Commercial Fisheries Research Foundation (CFRF) - <http://www.cfrfoundation.org/>**

The Commercial Fisheries Research Foundation (CFRF) is a non-profit, private foundation established by commercial fishermen to conduct collaborative fisheries research and education projects.



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\*The Cooperative Research Program is a competitive federal assistance program that funds projects seeking to increase and improve the working relationship between researchers from NOAA Fisheries, state fishery agencies, universities, and fishermen.

## 8. DEMETRA - Fish and Fishing Effort - <http://gap2.eu/gap2wordpress/wp-content/uploads/2015/03/Italy-CS8.pdf>

The case study's aim is to stimulate and support a bottom-up approach for the inclusion of fishers' proposals into the management discourse. To this aim, we have conducted participatory research, collecting data on the distribution of biological resources and fishing effort in the Northern Adriatic Sea. Data are integrated with fishers' experience-based knowledge in order to formulate joint proposals which contribute to local and regional fisheries management practices.

11 skippers and fishers from Chioggia's trawling fleet took part in the project's core activities, alongside 10 scientists from ISPRA institute and 3 researchers from the stakeholder partner UNIMAR. The stakeholder group also included personnel from the Veneto Region's fishery office, the Mediterranean Advisory Council and the FAO Adriamed project.

This project has established a truly collaborative group of fishermen and scientists, from which empirical and research based knowledge is transferred to the fishery's managers. In particular, the case study's main impacts are: its validation of both scientific and traditional knowledge; the involvement of fishermen in gathering data (self-sampling); the establishment of open meetings where scientific data are presented, discussed, and challenged. All this entails an on-going bottom-up participatory process, providing a broader, more credible and legitimate knowledge base, which is contributing to setting evidence-based management proposals. This case study has determined an approach to building trust and bridging gaps between scientists and fishermen and to a lesser extent between scientists, fishers and policy makers. In particular, this approach has enabled policy makers to better understand the nature of collaborative research. It has also furthered collaboration with the Veneto Region administration and enabled participation in meetings from which the group was previously excluded.

The case study's main impact upon management has been its contribution to the revision of the summer trawl-fishing ban, a typical management tool adopted in Italy. This process started thanks to the presentation of the GAP2 data (logbook,



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observers and survey data) to Adriamed FAO, instigating the establishment of an ad hoc working group on this topic. The case study also allowed both participatory research knowledge (data and expert knowledge) and fishermen themselves to enter into management discourse, contributing to the setting of its agenda. Knowledge developed in the project is being condensed in several formats, including among others, three natural science publications dealing with field work results and a social science paper representing the participatory process (all under revision). Meanwhile a book inspired by GAP2 and dealing with fisheries management and anthropology was published in Italian in 2013.

#### 9. PPC - ALIGOSTA - <https://aligosta.jimdosite.com/>

ALIGOSTA (Amelioration of knowledge on the red lobster: age, sexual maturity and population structure) is a FEAMP project which aim is to improve the state of knowledge on red lobsters in Corsica in order to better understand the dynamics and the structure of these populations. The data collected by the leader STARESO (underwater and oceanographic research station) will then be used to assess the stocks and to model the population dynamics of this species in order to promote the management of sustainable fisheries.

#### 10. PPC - STELLA MARE - <https://stellamare.universita.corsica/>

STELLA MARE (Sustainable TEchnologies for Littoral Aquaculture and MARine REsearch) is a scientific platform of the Corsican University Pasquale Paoli whose the main objective is the control and the integrated management of the halieutic and littoral resources of Corsica to allow a transfer of the technological innovations towards the professionals of the sea in order to allow them to: develop and diversify their productions, on species resulting from the Corsican littoral; to manage their natural resources with a view to a sustainable exploitation; and to support a responsible fishing and a sustainable aquaculture.

#### 11. M.A.R.E. Soc. Coop. - CAMPIOBL - National Alieutic Data Collection Program (PNRDA)



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The module (CAMPBIOL) of the Italian national program (PNI), for the collection of fishery data, in application of the legislation envisaged by the community regulations n ° 1534/2000 and 1639/2001, aims to study landed fish, molluscs and crustaceans from commercial fishing to acquire information regarding the biological characteristics of the catch. This information concerns the composition in length and/or age of the Italian catch for the main fishing resources (small pelagic, large pelagic and demersal) and for the different types of fishing that make up the Italian fishing fleet (bottom trawling, bottom trawling “rapido”, pair trawling and fixed gear).

For the collection of these data, the collaboration of fishers is essential, both in welcoming the researchers on board, and also in collaborating for the communication of data on the total weight of the species caught during the day, number or length of gear used, fishing area and duration of fishing or hauling operations.

## 12. M.A.R.E. Soc. Coop. - ML-REPAIR <http://www.ml-repair.eu/en>

During the ML-REPAIR project, fishers actively collaborated with the researchers in order to collect data on the marine litter, by filling out paper forms that reported the weight and the type of marine litter collected or by downloading an Android Application on their mobile phone that allowed them to enter in real time pictures and data on the marine litter's catch-of-day and allowed the researchers to automatically view on their computer the pictures of the marine litter with the specified weight and type for each ones.

## 13. AGRRA - INVESTINFISH PROJECT <http://www.agrra.hr/en/project/investinfish/15>

“INVESTINFISH” project implemented pilot actions providing some Italian and Croatian F&A SMEs with a roadmap to innovation instruments & services, boosting creation of marketable innovative products and/or processes that improved the SMEs potential market positioning. By improving interaction processes and framework conditions among key players of F&A sector, project proposal also affected two other major challenges in those fields:

- Increased the quality of sea products and by-products by stimulating investments in marine biotechnology that can open up new opportunities for



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innovative foods areas, nutraceutical and pharmaceutical industries and of bio-economy in general;

- Improved the quality of sea water, by stimulating investments for more sustainable production and management processes of fishery and aquaculture sector, which can have a positive impact on sustainable management of coastal and marine areas.

This project provided assistance in the form of financial instruments, i. e. innovation vouchers for 48 SMEs (8 per each project partner). Expected benefits of these vouchers for SMEs are, among other, accelerated time to enter market, increased linkages with innovators, increased F&A enterprises' R&D expenditures in new & greener components/technologies/services. "INVESTINFISH" also offered to the F&A sector substitution of the value chain concept with value network, proposing a shift from traditional value chains towards more collaborative value networks.

#### 14. **AGRRA - ECOWAVES PROJECT** <https://ecowaves.adrioninterreg.eu/>

The area of the Adriatic, and whole Adrion sea is inhabited centuries ago, having an important role in history. Today the east coast of Adriatic is one of the most attractive coastal areas in Europe where millions of tourists come every year. Considering the fact that the quality of sea water and the water in general is one of the top challenges of 21st century, project ECOWAVES will contribute to saving and reducing the pollution of this area with the help of transnational approach.

In relation to the above mentioned, with this project two results will be accomplished:

- 1) Transnational strategy aiming to improve waste management systems and
- 2) Transnational network for environmental protection within the port area.

The fact is that the water quality problems remain unsolved and they are becoming serious in Programme countries due to poor wastewater management, lack of political will, underinvestment and limited awareness of environmental issues.

Therefore, ECOWAVES project results will be based on innovative models of waste management.



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**15. EUROPECHE - Fishing into the future <https://www.fishingintothefuture.co.uk/>**

Fishing into the future is an UK-wide charity acting for sustainable and prosperous UK fisheries. The goal is to sustain both fish and fishing by building viable futures for fishermen and fish stocks. Their vision is for a progressive, modern industry that harnesses the potential of fishermen to deliver long-term, sustainable and prosperous fisheries. One of the core challenges identified by Fishing into the Future is 'People and Skills' and Fishing into the future has piloted a Sustainable Fisheries Education Program since 2017.

**16. EUROPECHE - Sustainable Fisheries Education Program - Supporting collaboration, empowering fishermen <https://www.fishingintothefuture.co.uk/>**

The very best fisheries management relies heavily on collaboration and dialogue, but a lack of investment has left many fishermen without the tools and opportunities they need to navigate the complex fisheries science and management systems of modern fisheries. The Sustainable Fisheries Education Programme (SFEP) bridges this investment gap, bringing fishermen, scientists and managers together to build trust, share ideas and develop a common language about the issues in fisheries. A team of fishery professionals works directly with the UK fishing industry to give UK fishermen unparalleled opportunities to engage expertly with the regulatory processes that govern their livelihoods, giving them the tools they need to drive change, improve their prospects and participate in shaping a sustainable future.

Fishing into the Future organizes two different educational programs:

1. The program 'Business of Fishing (#BOF)' for quota fisheries.
2. The 'Introduction to Sustainable Fishing (#ISF)' for non-quota fisheries.

Both programmes are based on the highly successful Marine Resource Education Programme (MREP) from the United States and, in the pilot phase, have both been executed twice.

**17. EUROPECHE – FarFish <https://www.farfish.eu/>**



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FarFish has the goal to provide knowledge, tools and methods to support responsible, sustainable and profitable EU fisheries outside European waters, compatible with Maximum Sustainable Yield. To achieve this, FarFish will develop practical, achievable and cost-effective fisheries management tools and advice which can be applied immediately. The work will be done in collaboration with scientists, policy makers, resource users and other stakeholders aimed to improve fisheries management competences. This way, FarFish will provide a better knowledge base of these fisheries and encourage resource users to actively take part in the management, thus empowering them, generating a sense of ownership and enhancing compliance.

FarFish has the highly ambitious aim of addressing main limitations that are hindering full implementation of the reformed Common Fisheries Policy (CFP) in relation to fisheries in non-EU waters. By the end of the project, FarFish will offer a robust framework and guidelines towards increased cooperation between the EU and contracting countries, which will include a roadmap towards improved sustainability and responsible fisheries. These roadmaps will be robust and adaptable as they will be created and tested, not only in selected West African waters, but also in the Indian Ocean and selected international waters that are relevant for the EU fleet.





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### 3. O1A2.STATE OF ART OF PLASTIC COLLECTION ON SEA AND CIRCULAR ECONOMY APPROACH IN THE SECTOR

In this section, the state of art regarding the collection of plastics and waste, knowledge of procedures, knowledge of circular economy principles analysed and how fishery workers could become a link in this chain. Experiences of excellence analysed, collaboration projects between the fishery sector and other sectors to trigger virtuous processes in the field of recycling, reuse, conversion of materials into other products; the skills that fishermen should have in order to act with awareness also analysed.

The main objective at this stage was to select 8 European good practices.

#### 3.1. 8 SUCCESSFUL EXPERIENCES REGARDING THE COLLECTION OF PLASTICS AND THE ADOPTION OF CIRCULAR ECONOMY

##### 1. Ocean Cleanup - <https://theoceancleanup.com/>

Ocean Cleanup, a non-profit organization, is developing and scaling technologies to rid the world's oceans of plastic. Their AIM TO CLEAN UP 90% OF FLOATING OCEAN PLASTIC POLLUTION.

##### 2. ENALEIA – The Mediterranean CleanUp Project - <https://enaleia.com/>

ENALEIA is a social, nonprofit organization in Greece with the vision to make the marine ecosystem sustainable. It started in 2016 by creating the first school of professional fisheries in Greece and is now dedicated to the Mediterranean CleanUp project, a wide-scale cleanup of marine plastic in the Mediterranean region in



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collaboration with professional fishers. The marine plastic collected by fishermen and the used fishing equipment is recycled and upcycled, being integrated into the circular economy.

### 3. ENALEIA - KIMO INTERNATIONAL- <https://www.kimointernational.org/>

KIMO is an international not-for-profit environmental organization designed to give local authorities a political voice at regional, national, and international level. Following a successful test project in the Netherlands, KIMO created the Fishing for Litter project in 2004, a scheme that encourages fishers to take ashore litter and abandoned, lost, or discarded fishing gear (ALDFG) that they find during their normal fishing activities. Since being endorsed as a model project by the Regional Seas Convention for the Northeast Atlantic (OSPAR), Fishing for Litter has been launched by other organizations in Belgium, Germany, Ireland, Italy, and beyond.

### 4. ENALEIA - ECOALF FOUNDATION - <https://ecoalf.com/en/pages/fundacion-ecoalf>

The ECOALF FOUNDATION is a non-profit organization whose main objective is to promote the selective recovery of waste to recycle, valorize and avoid its harmful effects on the environment by developing and applying new scientific and technological knowledge. Currently, the ECOALF Foundation collaborates with local partners to carry out Upcycling the Oceans in Spain, Greece, Italy, and Thailand, likewise, it is working on its implementation in other parts of the world. It also collaborates on other projects in the fields of waste management, environmental awareness, or research and development with institutions with which it shares common values and objectives.

### 5. DEMETRA - The marGnet project – <https://www.margnet.eu/>

The 'marGnet' project, co-financed by the European Union's Maritime Fisheries Fund and ended in 2020, proposed an holistic approach, combining actions to tackle the phenomenon of Marine Litter at all phases, from reduction and prevention, through the monitoring and quantification and the removal and recycling. Thereby, merging together the whole production chain of ML management – from scientific research to the development of new technological solutions for recycling.



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Objectives of the 'marGnet' project were to set up and test multi-level solutions to monitor, map, prevent, remove and recycle ML from sea-based sources present on the sea-floor.

General aims of the 'marGnet' project were:

- Monitoring the presence of ML from sea-based sources especially from fisheries and aquaculture activities through combined multi-sensor high resolution acoustic mapping, data analysis, underwater surveys;
- Predicting accumulation hotspots of ML on the sea-floor, especially from fisheries and aquaculture activities, on a wide scale through the development of a predictive model, able to stimulate the dispersion of sinking ML;
- Promotion of the sustainable removal of marine litter from the sea-floor by capitalising and strengthening the removal protocols based on previous initiatives (the GHOST project);
- Improvement of the environmental sustainability and efficiency of the recycling process of ML by engineering a prototype that exploits low temperature pyrolysis method to transform the ML into an energy source with reasonable costs;
- Reduce the quantity of ML from fisheries and aquaculture activities by demonstrating the prototype in fishing port areas highlighting its usability, convenience and promoting an awareness and a change in the behaviour of fishermen towards sustainable practices;
- Improvement of the governance framework for the management of ML by providing decision supporting tools and best practise to policy makers.

To achieve the objectives, the 'marGnet' project worked on two pilot sites located in the Northern Adriatic – the Venice Lagoon in Italy, and the Cres-Lošinj Archipelago in Croatia. These locations were chosen as they are both listed as Sites of Community Importance (SCIs) within the EU Natura 2000 Network. Additionally, these sites have two different types of seafloor, so a range of field activities have been performed in both sandy and rocky bottoms, as well as in coastal and lagoon areas. Thus, improving the robustness and the replicability of the project.

6. PPC - 4ocean - <https://www.4ocean.com/>



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4ocean is a public benefit cooperation and certified B Corp committed to end the ocean plastic crisis. The non-profit cooperation is aiming to recover harmful marine debris that is polluting the ocean and educate people about the global crisis and empower them to end their use of single-use plastics. On their website, 4ocean is selling products (bracelets, bags, accessories, drinkware, beach gear, single-use alternatives, etc.) which come with a One Pound Promise when purchased, meaning that one pound of trash is getting pulled out of the ocean rivers and coastlines after sale. Furthermore, every purchase supports a growing movement to end the world's reliance on single-use plastic and helps funding their global cleanup operations.

#### 7. PPC - Mare Vivu - <https://mare-vivu.org/>

Mare Vivu is a Corsican association founded in 2016 by 2 Corsican students. This association is specialized in the fight against plastic pollution in the Mediterranean, it is today engaged in low-tech research, local recycling experiments and the promotion of zero waste. Each year, it organizes its scientific and educational eco-volunteering mission on marine plastic pollution in a trimaran kayak, which crisscrosses the Corsican coast for a month in search of testimonies on the health of marine ecosystems: the CorSeaCare Mission.

#### 8. PPC - StrongSea Life - <https://www.strongsealife.eu/en/>

STRONG SEA (Survey and TReatment ON Ghost nets SEA LIFE) is a project funded under the LIFE program and started in December 2021. The aim of the project is to improve the conservation status of the Posidonia oceanica grassland and Coralligenous reefs, endemic habitats of the Mediterranean sea, both threatened by ghostnets. Under this project, the partnership, including Petra Patrimonia Corsica, will develop ghost net removal techniques, according to the characteristics of the intervention site, and establish a system for the recovery and recycling of nets, raising awareness among the general public, fishermen and divers.

#### 9. PPC - ENSURE - <https://project-ensure.eu/>

ENSURE (EntrepreNeurs for plasticS' circUIaR Economy) is an European project funded by Erasmus + and started in 2020, with Petra Patrimonia Corsica as partner, to



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improve the skills of current and future entrepreneurs in the field of circular economy, more specifically on the reuse and recovery of plastic, in order to limit the ecological impact of their activities and save money. The project allows to change the design of the production process, integrating the circular economy of plastic, via a free e-learning platform.

#### 10. M.A.R.E. Soc. Coop. - ML-REPAIR <http://www.ml-repair.eu/en>

During the ML-REPAIR project, a marine litter collection chain was created starting from the fishing boats and reaching the municipal waste management body. The fishing boats were given bags or tanks where they could collect the marine litter during the fishing day. Once arrived in the port, the bags (or the tanks) were unloaded on the dock and the marine litter was disposed of in the municipal bins.

## 4. FOCUS GROUPS

Focus group sessions carried out with fishery Associations, Federations and workers for identifying competences / skills gap. 5 focus groups organized in FR, IT, TK, CR, GR .

Identify skills that associations and fishermen possess and the ones they must acquire, to structure a development program that puts sustainability at the centre, to understand the network of relationships are already active and which should be activated was the main purpose of focus groups.

- \*Annex 1 Focus Group Questions for Fisherman and \*Anex 2 Focus Group Questions for Representatives.

### 4.1 METHODOLOGY OF FOCUS GROUPS

The Focus Group Interviews questions were prepared for;

- to measure the communication skills of the participants.
- to test if they need skills determined by us.
- to determine what kind of new skills they need.
- to determine the desire level of the participants.



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QUESTIONNAIRE FOR FISHERMEN / FISH FARMERS				
The Focus Group Interviews questions were prepared for	• to measure the communication skills of the participants.	• to test if they need skills determined by us.	• to determine what kind of new skills they need.	• to determine the desire level of the participant.
GENERAL QUESTIONS	1	2,6		3,4,5
GENERATE AN OVERALL GREATER AWARENESS OF ALL THE ACTORS AROUND THE CONCEPT OF "PRESERVATION OF THE SEA"	2	1	4,5,6,7,8,9	3
2. GENERATE A NEW FIGURE OF FISHERMAN AND FISH FARMER, THAT OF "SENTINEL OF THE SEA".		3	4,5	1,2
3. CREATING SECTORAL DECISION-MAKING AND WORKING PRACTICES			1,2	3
FINAL QUESTIONS				1,2,3

**Table 1.** Questionnaire for fishermen / fish farmers

According to Onwuegbuzie et al. (2009), the history of focus group discussion goes back as much as 80 years, but there is no definitive framework agreed upon for analysis of focus group data. In the article "Qualitative Framework of Data Collection and Analysis in Focus Groups", Onwuegbuzie et al. (2009: 5) listed four basic data analysis methods that can be used in the focus group method.

These four methods are as follows:

- Fixed Comparison Analysis
- Classic Content Analysis
- Keyword Analysis
- Discourse Analysis (Gülcan, 2021)

The main purpose of the keyword analysis method is to determine how the words used in the interview are used together with other words. In other words, it looks at the cultural usage of the words used in the interview (Fielding & Lee, 1998).



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A statement made by any focus group participant should not be evaluated on its own but should be interpreted together with the statements made by other participants. (Gülcan, 2021)

## 4.2 TURKEY CASE

First focus group interviews were conducted with 9 fishermen and aquaculture sector divers who work at sea almost daily. All of the participants are male.

### 4.2.1. 'GENERAL QUESTIONS'

- None of the participants declared that they have not contacted a scientist so far.
- All of the participants declared that they had received training on marine ecosystems before.
- Only one participant declared that he would take personal responsibility by photographing it, apart from informing the competent authorities for different situations encountered in the work area.
- Most say they don't personally throw garbage into the sea and warn those who do.
- Most of them say they are indifferent to the protected marine species because they don't know detailed information about these species.
- Only 2 participants declare that they contribute to the protection of fish stocks by hunting in accordance with the law.

### 4.2.2. '1.GENERATE AN OVERALL GREATER AWARENESS OF ALL THE ACTORS AROUND THE CONCEPT OF "PRESERVATION OF THE SEA"'

- While most respondents felt that the whole of society was equally responsible, a small portion of them thought that the greater responsibility lies with policy makers as main drivers for reduction of marine litters.
- The source of marine pollution and especially plastic pollutants are of interest to all participants.



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- All participants think that scientific research with the help of the fishers and aquaculture farmers can do something to protect fish stocks, safeguard marine biodiversity and protected marine species.
- Conservation of fish stocks and protected marine species is everyone's concern, but most do not hold any data on the sea, fish stocks or protected marine species.
- None of the participants knows exactly which plastics are recyclable.
- Participants want to receive training in the following areas;
- Responsible fishing, protected marine species, animal psychology, general maritime training, marine protection and cleaning, designing fishing gear, maritime law and our rights.

#### **4.2.3. '2. GENERATE A NEW FIGURE OF FISHERMAN AND FISH FARMER, THAT OF "SENTINEL OF THE SEA"**

- All of the participants believe that fishers should be sentinels of the sea.
- While 5 participants say that collecting marine litter/ waste will work, 4 participants argue that it will be a waste of time.
- Traditional methods is the easiest way to collect marine litter by fishers.
- Most of the participants argue that the collection of data related to marine species negatively impacts their daily routines.
- According to the fishers, technological methods (Mobile phone, Excel or Tablet Computer) is the easiest way to collect data.

#### **4.2.4. '3. CREATING SECTORAL DECISION-MAKING AND WORKING PRACTICES'**

- Communication problems, not valuing their opinions and scientists don't get down to the field enough are the potential barriers between scientific community and fisherman/ marine sector workers or representatives.
- According to the participants, the lack of professional development training, communication and respect problems between employees, occupational safety and biodiversity issues form the basis of skill deficiencies.





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- According to all participants, a process of creating policy indications is useful for the work of representation and in the dialogue with the policymakers.

#### 4.2.5. 'FINAL QUESTIONS'

- All of the participants stated that they were happy to contribute to such a study.
- In addition, some of the participants stated that they did not want to receive training and did not want the project team to contact them again.

- 

#### 4.2.6. 'After Keyword Analysis'

- The needs for a number of skills that we identified earlier have been confirmed.
- It was understood that they did not need to develop such skills because they thought that collecting data on any subject from the sea would negatively affect their daily routines.
- Particularly, it was emphasized by the participants that they should receive training on communication skills, protected marine species, and recyclable plastic types.

### 4.3. GREECE CASE

Focus group interviews were conducted with a group of 6 fishermen, half of which are small scale and half large scale.

#### 4.3.1 'GENERAL QUESTIONS'

- Only 2 of the participants stated that they had worked with a scientist or science group before.
- Only one of the participants declared that he had received a training on marine ecosystems before.
- All participants said that they will inform the competent authorities for different situations encountered in the work area. Some mentioned that if they see pollution, they will clean it up.



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- Most say they don't personally throw garbage into the sea and some of them have separate waste bins on their boat. One fisherman talks about personally participating in the coastal clean-up movement.
- All of the participants mentioned that they comply with legal regulations in order to protect fish stocks and protected marine species and that they return everything that is not targeted (by-catch) to the sea.

#### 4.3.2 '1. GENERATE AN OVERALL GREATER AWARENESS OF ALL THE ACTORS AROUND THE CONCEPT OF "PRESERVATION OF THE SEA"'

- While most respondents felt that the whole of society was equally responsible for this situation, so 'everyone' is main drivers for reduction of marine litters.
- It was emphasized by some fishermen that marine pollution should be personally prevented and that the authorized institutions should increase the penalties by making more frequent inspections.
- The source of marine pollution and especially plastic pollutants are of interest to all participants same as Turkish Fishermen.
- While most of the participants argue that the scientific community and fishermen can work together and this will be successful, but scientists should not stay in theory, they are worried that those who work in aquaculture farms will not be able to contribute to protect fish stocks, safeguard marine biodiversity and protected marine species.
- Conservation of fish stocks and protected marine species is everyone's concern, but most do not hold any data on the sea, \*fish stocks or protected marine species.
- \*Some of them give data for Comprehensive Fisheries Monitoring system about their monthly catches.
- Most of the participants don't know exactly which plastics are recyclable.
- Participants want to receive training in the following areas;
- Management of marine pollution, Fish bio-ecology, How to record data for general use not only for catted species.



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#### 4.3.3. '2. GENERATE A NEW FIGURE OF FISHERMAN AND FISH FARMER, THAT OF "SENTINEL OF THE SEA"'

- All of the participants believe that fishers should be sentinels of the sea.
- According to most of the participants, collecting marine litter is time consuming but not a waste of time.
- Participants mentioned that the easiest way to collect marine litter by fishermen could be technological or traditional. They mentioned that traditional methods can be used by fishermen with government subsidies since studies using technological methods will be expensive studies covering a limited area.
- Some of the participants argue that the collection of data related to marine species negatively impacts their daily routines and also some of them emphasize that it becomes tiring because they work same as both fishermen and accountants.
- According to the fishermen, which traditional or technological method will be used to collect data at sea varies according to the age of the fishermen. While young people prefer technological methods, it is emphasized that traditional methods are easier for the elderly.

#### 4.3.4. '3. CREATING SECTORAL DECISION-MAKING AND WORKING PRACTICES'

- The potential barriers between scientific community and fisherman/ marine sector workers or representatives are;
  - Scientists' communication methods and being away from the field are drowning in theory.
  - Not including real fishermen in the decision-making process.
  - Lack of motivation and no certificate at the end of their efforts
  - Additional workload due to busy and tired fishermen.
- Responses from participants do not identify any skill gaps.
- According to all participants, a process of creating policy indications is useful for the work of representation and in the dialogue with the policymakers.
- And fishermen demand that they always have a representative in such environments. They also think that problems and solutions should be discussed together in order to find a common ground.



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#### 4.3.5. 'FINAL QUESTIONS'

- All of the participants stated that they were happy to contribute to such a study.
- In addition, all of the participants want to receive training and the project team to contact them again.

#### 4.3.6 'After Keyword Analysis'

- The needs for a number of skills that we identified earlier have been confirmed.
- Particularly, it was emphasized by the participants that they should receive training on management of marine pollution, fish bio-ecology, how to record data for general use not only for cathered species.

### 4.4. ITALY CASE

Focus group interviews were conducted with 4 fisherman and 1 director in the fishing port of Cesenatico where some fishers and fishing vessels work and collaborate with some research centers in the area.

#### 4.4.1. 'GENERAL QUESTIONS'

- All participants declared that they had worked with a scientist before. In fact, fishermen fill out the logbook on the tablet every fishing day and send their catch data to the ministry.
- All of the participants declared that they have not received training on marine ecosystems before.
- All participants mentioned that they had notified the authorized institutions. (harbor master's office or research center/university in case of pollution warning)
- While most of the participants stated that they actively observed the marine environment and collected plastic litter, one of the participants said that he went to fishing even just to collect plastic litter.
- If the protected species emerging from fishing gear are alive, fishers prefer the release-back method. If not alive participants notify the authorities. They also



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declared that fishermen cooperate with marine mammal, shark and turtle conservation centers.

- All participants declared that they had collected data on the fish logbook and one participant additionally cooperated with the Cesenatico marine research center.

#### **4.4.2. '1. GENERATE AN OVERALL GREATER AWARENESS OF ALL THE ACTORS AROUND THE CONCEPT OF "PRESERVATION OF THE SEA"'**

- According to participants 'Fishing boats that practice fishing for litter' is main drivers for reduction of marine litters. Good legislation to be applied to ports is also required.
- The source of marine pollution and especially plastic pollutants are of interest to all participants.
- All participants think that scientific research with the help of the fishers and aquaculture farmers can do something to protect fish stocks, safeguard marine biodiversity and protected marine species.
- Conservation of fish stocks and protected marine species is everyone's concern.
- Only one of the participants stated that he did not collect data on the species. Only one of the participants said that he was following the water temperature data out of curiosity.
- None of the participants knows exactly which plastics are recyclable.
- Participants stated that they wanted to receive training, but did not specify on which subjects they wanted training.

#### **4.4.3. '2. GENERATE A NEW FIGURE OF FISHERMAN AND FISH FARMER, THAT OF "SENTINEL OF THE SEA"'**

- All of the participants believe that fishers should be sentinels of the sea.
- The participants stated that it would definitely affect the time they will spend on fishing, but that it was a useful job.
- Participants mentioned that the easiest way to collect marine litter by fishermen could be technological.



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- Participants argue that the collection of data related to marine species impacts their daily routines by only 5-10 minutes.
- The fishermen prefers technological methods via an APP to collect data at sea.

#### 4.4.4. '3. CREATING SECTORAL DECISION-MAKING AND WORKING PRACTICES'

- Participants state that the major obstacles are lack of communication, time constraints, and bureaucracy and politics that do not work properly.
- According to the participants basic skill gaps are;
  - Basic biology,
  - how to sample (in the case of pollutant patches or algal blooms) and How to preserve the samples proper conditions,
  - how to manipulate protected species,
  - how to report dangerous/alien species,
  - use of tablets/smartphones
- According to all participants, a process of creating policy indications is useful for the work of representation and in the dialogue with the policymakers.

#### 4.4.5. 'FINAL QUESTIONS'

- All of the participants stated that they were happy to contribute to such a study.
- In addition, all of the participants want to receive training and the project team to contact them again.

#### 4.4.6. 'After Keyword Analysis'

- The needs for a number of skills that we identified earlier have been confirmed.
- Particularly, it was emphasized by the participants that they should receive training on basic biology, basic research methodology, using technology, and recyclable plastic types.



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#### 4.5. FRANCE CASE

Focus group interviews were conducted with 2 fishermen and 1 research director.

##### 4.5.1. 'GENERAL QUESTIONS'

- All participants declared that they had worked with a scientist several times before.
- All of the participants declared that they have not received training on marine ecosystems before.
- Fishermen stated that they also suffer from pollution and that they personally collect garbage from the sea and throw it into garbage bins in the ports.
- Participants stated that they participated in studies and projects aimed at the protection of certain species (ousrin, common dentex, lobster, corbe, hake, swordfish, tuna) by research centers.
- All participants stated that professional fishing organizations have adopted regulations to protect fishing resources.
- Participants declared that the increase in water temperature, the emergence of invaders such as blue crab and the pollution of plastic waste are becoming more and more noticeable. However, they did not share any information about how they behaved.

##### 4.5.2. '1. GENERATE AN OVERALL GREATER AWARENESS OF ALL THE ACTORS AROUND THE CONCEPT OF "PRESERVATION OF THE SEA"'

- Participants stated that plastic reduction requires a change in economic and consumption patterns.
- The source of marine pollution and especially plastic pollutants are the major concern of the island at both the corporate and citizen level.
- Participants stated that a scientist-fisherman cooperation would be beneficial by giving an example from a research program carried out in Corsica.
- Conservation of fish stocks and protected marine species is everyone's concern.



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- Participants stated that the fishermen provided their catch data to the research station and also fishermen report to the research centers the by-catch they have (mainly for longline fishing). Turtles (nets), sharks and others are autopsied in order to collect data to prevent by-catch risks.
- Participants stated that they did not collect any data from the sea, and this was the duty of research centers.
- None of the participants knows exactly which plastics are recyclable.
- Participants stated that they wanted to receive training on biological expertise on the marine environment for fishermen and how to set a research program?

#### 4.5.3. '2. GENERATE A NEW FIGURE OF FISHERMAN AND FISH FARMER, THAT OF "SENTINEL OF THE SEA"

- All of the participants believe that fishers should be sentinels of the sea.
- Participants stated that marine litter collection is an important issue, but there is no structured marine waste collection and treatment network in Corsica. They did not give any information about how it would affect their daily routines.
- Participants stated that plastic waste is collected on fishing gear when fishing gear is removed during fishing trips.
- Participants stated that scientific data to be collected from the sea is important in regulating fisheries, but the existence of different factors such as pollution, climate change, recreational fishing and poaching should be taken into account. They did not mention how it would affect their daily routine.
- According to the participants, the easiest way to collect data by fishers is to use technological and traditional methods together.

#### 4.5.4. '3. CREATING SECTORAL DECISION-MAKING AND WORKING PRACTICES'

- Participants mentioned a strong scientist-fisherman cooperation in their region.
- Responses from participants do not identify any skill gaps.

According to participants dialogue is essential to anticipate, foresee and not to have to act in a hurry. Exchanges should take place more upstream with fishermen,





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scientists and territorial decision-makers: workshops for knowledge exchange and shared diagnosis.

#### 4.5.5. 'FINAL QUESTIONS'

- All of the participants stated that they were happy to contribute to such a study.
- In addition, all of the participants want to receive training but outside the fishing season (in winter from November to February/March) and the project team to contact them again.

#### 4.5.6. 'After Keyword Analysis'

- The needs for a number of skills that we identified earlier have been confirmed.
- Particularly, it was emphasized by the participants that they should receive training on biological expertise on the marine environment for fishermen and how to set a research program and recyclable plastic types.

#### 4.6. CROATIA CASE

Focus group interviews were conducted with 1 fisherman and 1 researcher from University of ZADAR.

#### 4.5.1. 'GENERAL QUESTIONS'

- All participants declared that they had worked with a scientist.
- All of the participants declared that they received training on marine ecosystems before.
- The fisherman personally collect garbage from the sea and throw it into garbage bins in the ports for recycling.
- The fisherman, avoids fishing juvenliies for protect fishing resources.
- The participant did not mention his contribution to protected marine species.



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- The participant mentioned that when he encounters different situations in the marine environment, he will report this situation to the nearest institution.

#### 4.5.2. '1. GENERATE AN OVERALL GREATER AWARENESS OF ALL THE ACTORS AROUND THE CONCEPT OF "PRESERVATION OF THE SEA"'

- According to the participants, policies are main drivers for reduction of marine litters.
- The source of marine pollution and especially plastic pollutants are of interest to all participants.
- Participant think that scientific research with the help of the fishers and aquaculture farmers can do something to protect fish stocks, safeguard marine biodiversity and protected marine species.
- Conservation of fish stocks and protected marine species is everyone's concern.
- Participant stated that he collect data from sea and marine species but he did not collect any data especially from protected marine species.
- None of the participants knows exactly which plastics are recyclable.
- Participant stated that he wanted to receive training on marine geology.

#### 4.5.3. '2. GENERATE A NEW FIGURE OF FISHERMAN AND FISH FARMER, THAT OF "SENTINEL OF THE SEA"'

- All of the participants believe that fishers should be sentinels of the sea.
- Participants stated that marine litter collection is an important issue.
- Traditional methods is the easiest way to collect marine litter by fishers.
- Participant argue that the collection of data related to marine species negatively impacts their daily routines.
- According to the participants, the easiest way to collect data by fishers is to use technological and traditional methods together.

#### 4.5.4. '3. CREATING SECTORAL DECISION-MAKING AND WORKING PRACTICES'



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- Time is the main problem between scientific community and fisherman/ marine sector workers or representatives.
- According to the participant digital literacy is a skill gap in the sector.
- According to participant, a process of creating policy indications is useful for the work of representation and in the dialogue with the policymakers.

#### 4.5.5. 'FINAL QUESTIONS'

- All of the participants stated that they were happy to contribute to such a study.
- In addition, participant don't want to receive training but the project team can contact him again.

#### 4.5.6. 'After Keyword Analysis'

- The needs for a number of skills that we identified earlier have been confirmed.
- Particularly, it was emphasized by the participants that they should receive training on Marine geology, Digital literacy and recyclable plastic types.

TURKEY	GREECE	ITALY	FRANCE	CROATIA
Communication skills	Management of marine pollution	Basics of biology	Biological expertise on the marine environment for fishermen.	Marine geology
To have knowledge of protected marine species	To have knowledge of Fish bio-ecology	Basic research methodology	How to set a research program	Digital literacy
To have knowledge of recyclable plastic types				
	How to record data on marine environment	Using technology		



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**Table 2. Topics for new skills to be identified**

## 5. COMPETENCY SKILL FRAMEWORK

The goal is to define the set of knowledge and skills that are required to sea workers and also to associations in order to be more active and innovative subjects in the relationship with the scientific world, in the collection of plastics, in the creation of circular economy interventions, in the efficient use of resources, in energy saving.

**Definition:** Skills are learned abilities we need to complete certain tasks. Our competencies are the set of skills, knowledge and abilities that make us successful in a job. While the Skills Framework provides key information about what should be done on personal responsibilities.

Both good practice examples and academic articles have been meticulously examined, and the following qualifications have been suggested in order for the experiences to be successful.

**Skills and abilities are classified into two groups.**

### 1. Basic competencies and collaboration skills

The work environment of this project, like most work environments, requires collaboration, so these basic skills are essential for Green to Blue project target groups. Successful cooperation requires a collaborative spirit and mutual respect.

#### Basic competencies and collaboration skills

##### a) Communicative competency

- Reading, writing, hearing, and speaking
- Understanding and expression



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**b) Personal and Interpersonal competency**

- Motivation
- Management
- Cooperation and negotiation skills
- Leadership and conflict management

**c) Problem solving competency**

- Creative and logical thinking
- Problem recognition
- Alternative assessment

**2. Marine and Maritime sector based competencies and work skills**

The competencies and skills that need to be acquired for our project are examined under this heading. It will be finalized with new competencies and skills to be added after the focus groups to be held.

**Marine and Maritime sector based competencies and work skills**

**a) Information capacity**

- Ability to collect maritime information and data
- The nature of the water mass
- Tides & Currents
- Computer literacy

**b) Work on marine environment**

- Marine technology skills
- Using tools and devices
- Ability of the sampling techniques
- Maritime safety skills

**c) Marine consciousness ecological aspect**

- Recognition of marine important
- Ecological (Climate Change and Pollution) awareness
- Respect for marine life
- Affinity for to be 'Sentinel of the sea'
- Importance of marine resources
- Prevention of pollution



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- Waste collection
- d) Understanding blue economy**
- Analyzing plastic markets and trade.
  - Seize recycling opportunities
  - Green boat design (Clean energy and waste reduction)

### 5.1. GREEN TO BLUE SKILLS FRAMEWORK FOR TRAINING

The framework outline, in which knowledge and skills are defined by considering each qualification separately, is as follows.



## GREEN TO BLUE SKILLS FRAMEWORK TABLE

<b>GtB_Target Group</b>	<b>Workers, operators and representatives in fishery and aquaculture sector</b>	
<b>GtB_SF</b>	<b>Cooperation and negotiation skills</b>	
<b>GtB_SF Description</b>	Collaborative, collaborative or interest-based negotiation involves the efforts of the parties to meet each other's needs jointly and to satisfy their interests.	
<b>GtB_Proficiency Description</b>	<b>Level 1 - Foundational</b> <b>*FOR LOW-SKILLED AND WEAK-SKILLED WORKERS</b>	<b>Level 2 - Intermediate and Advanced</b>
	<b># GtB_001_1</b>	<b># GtB_001_2</b>
<b>Knowledge</b>	Knows that negotiation and cooperation is a "give and take" process that results in a compromise where both parties make a compromise for the benefit of everyone involved.	Knows the five essential elements of principled negotiation as listed by Fisher, Ury, and Patton (Folberg et al., 2020).
<b>Abilities</b>	Basics of for a healthy work environment. <ul style="list-style-type: none"> <li>• <b>Employee to Employee Negotiations and Cooperation</b></li> <li>• Employee to Employer Negotiations and Cooperation</li> <li>• Employee-to-Third-Party Negotiations and Cooperation</li> </ul>	<b>In addition to the Level 1;</b> <ol style="list-style-type: none"> <li>1. Separate the people from the problem.</li> <li>2. Focus on interests, not positions.</li> <li>3. Invent options for mutual gain.</li> <li>4. Insist on objective criteria</li> <li>5. Know your Best Alternative to a Negotiated Agreement</li> </ol>



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<b>GtB_Target Group</b>	<b>Workers, operators and representatives in fishery and aquaculture sector</b>	
<b>GtB_SF</b>	<b>Ecological (Climate Change and Pollution) Awareness</b>	
<b>GtB_SF Description</b>	It is essential for individual employees of the sector to have a strong awareness of environmental preservation in terms of climate change and marine pollution-based factors.	
<b>GtB_Proficiency Description</b>	<b>Level 1 - Foundational</b> <b>*FOR LOW-SKILLED AND WEAK-SKILLED WORKERS</b>	<b>Level 2 - Intermediate and Advanced</b>
	<b># GtB_003_1</b>	<b># GtB_003_2</b>
<b>Knowledge</b>	Knows the impact of our actions and professional activities, individually or collectively, on the marine environment, the marine ecosystem and the final product on the global and local scale.	It prioritizes environmental concerns in human activities, professional activities and decision-making processes, regardless of benefit balance.
<b>Abilities</b>	<ul style="list-style-type: none"> <li>• Knows pollution with all its aspects such as sources and effects</li> <li>• Pays attention on Conserving Energy and Water</li> <li>• Knows Climate change and its effects on income source</li> <li>• Reduces carbon footprint</li> </ul>	<b>In addition to the Level 1;</b> Contribute to the global goal of mitigating climate change specifically looking at issues around climate change and its impact on marine ecosystems.





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<b>GtB_Target Group</b>	<b>Workers, operators and representatives in fishery and aquaculture sector</b>	
<b>GtB_SF</b>	<b>Respect for marine life &amp; Affinity for to be 'Sentinel of the sea'</b>	
<b>GtB_SF Description</b>	Our seas, which are entrusted to our future, and the life there have a fragile balance. Working in marine environments comes with the responsibility of knowing how to respect marine life.	
<b>GtB_Proficiency Description</b>	<b>Level 1 - Foundational</b> <b>*FOR LOW-SKILLED AND WEAK-SKILLED WORKERS</b>	<b>Level 2 - Intermediate and Advanced</b>
	<b># GtB_004_1</b>	<b># GtB_004_2</b>
<b>Knowledge</b>	Knows the species that are endemic or should be protected in the marine environment, their life cycles and sensitivities, and considers the ecological and economic values of the species.	Knows that the oceans are not just fisheries and aquaculture resources, they produce most of the oxygen we breathe, help combat the climate crisis, have a vast biodiversity and benefit all humanity.
<b>Abilities</b>	<ul style="list-style-type: none"> <li>Abides by appropriate fishing rules</li> <li>Knows species and their lifecycle</li> <li>Won't leave fishing gear and ghost nets in marine</li> <li>Releases non-targeted (by-catch) species</li> <li>Not feed marine creatures with snacks</li> <li>Takes care of oil, fuel and dirty water leaks from the boat.</li> </ul>	<b>In addition to the Level 1;</b> <ul style="list-style-type: none"> <li>Adopts innovative approaches such as ecosystem-based fishing and fishing tourism.</li> <li>Acts for the beached, sick, or injured animal</li> <li>Supports conservation efforts</li> </ul>

	<ul style="list-style-type: none"> <li>Plastic waste collection and applied blue circular economy approaches: recognizes the role of “ecological operator”</li> </ul>	
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<b>GtB_Target Group</b>	<b>Workers, operators and representatives in fishery and aquaculture sector</b>	
<b>GtB_SF</b>	<b>Importance of marine resources</b>	
<b>GtB_SF Description</b>	Marine resources are very important to human being. Protecting the seas strengthens the fight against poverty by increasing people's incomes and improving their health. With this feature, it is among the sustainable development goals of the United Nations with the title 'Goal 14 Life Below Water: Conserve and sustainably use the oceans, seas and marine resources'.	
<b>GtB_Proficiency Description</b>	<b>Level 1 - Foundational</b> <b>*FOR LOW-SKILLED AND WEAK-SKILLED WORKERS</b>	<b>Level 2 - Intermediate and Advanced</b>
	<b># GtB_005_1</b>	<b># GtB_005_2</b>
<b>Knowledge</b>	Knows that ocean acidification, increase in ocean temperature, tons of plastic entering the ocean and overfishing on stocks threaten marine life and negatively affect the marine ecosystem.	Knows that 90 percent of fishing employment worldwide, which corresponds to nearly half a billion people, is dependent on small-scale fisheries.
<b>Abilities</b>	<ul style="list-style-type: none"> <li>Prevents all kinds of pollution</li> <li>Respects marine life, protected areas and protected species.</li> </ul>	<b>In addition to the Level 1;</b> <ul style="list-style-type: none"> <li>Participates in decision-making processes.</li> </ul>

	<ul style="list-style-type: none"> <li>• Supports the identification and management of marine resources with accurate fishing data.</li> <li>• Becomes a part of responsible aquaculture activities.</li> <li>• Approaches scientific cooperation</li> </ul>	
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<b>GtB_Target Group</b>	<b>Workers and operators in fishery and aquaculture sector</b>	
<b>GtB_SF</b>	<b>Prevention of pollution</b>	
<b>GtB_SF Description</b>	Fishing activity generates many types of waste and the aquaculture sector uses chemicals and produces waste. Prevention of pollution is a set of practices that reduce, eliminate or prevent pollution at its source before it emerges.	
<b>GtB_Proficiency Description</b>	<b>Level 1 - Foundational</b> <b>*FOR LOW-SKILLED AND WEAK-SKILLED WORKERS</b>	<b>Level 2 - Intermediate and Advanced</b>
	<b># GtB_006_1</b>	<b># GtB_006_2</b>
<b>Knowledge</b>	Knows the focus of pollution originating from the fisheries and aquaculture sector and extracts the pollutants in the working environment.	Knows the importance of pollution prevention both in terms of human health and finance. Knows that it provides economic growth while ensuring the protection of natural resources and fisheries resources and aquaculture products.
<b>Abilities</b>	<ul style="list-style-type: none"> <li>• Prevents oil pollution from boat</li> <li>• Prevents garbage pollution from fishing gear or aquaculture environment.</li> <li>• Prevents accidental loss or discharge of fishing gear</li> <li>• Prevents food wastes from boat or crew</li> <li>• Reports to authorities pollution and source</li> </ul>	<b>In addition to the Level 1;</b> <ul style="list-style-type: none"> <li>• Adopts circular economy approach</li> </ul>

	<ul style="list-style-type: none"> <li>Participates In Cleanup activity</li> </ul>	
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<b>GtB_Target Group</b>	<b>Workers and operators in fishery and aquaculture sector</b>	
<b>GtB_SF</b>	<b>Waste collection(solid)</b>	
<b>GtB_SF Description</b>	Marine litter, also known as marine debris, is human-made waste that is intentionally or accidentally released into the ocean includes solids such as plastics. Majority of large plastic in the oceans is discarded and lost nets from the fishing industry.	
<b>GtB_Proficiency Description</b>	<b>Level 1 - Foundational</b> <b>*FOR LOW-SKILLED AND WEAK-SKILLED WORKERS</b>	<b>Level 2 - Intermediate and Advanced</b>
	<b># GtB_007_1</b>	<b># GtB_007_2</b>
<b>Knowledge</b>	Knows that the collection of marine litter is important for the circular economy as well as its ecological benefits and should be a new source of income with fishing.	Knows that must do more than reduce and collect.

<b>Abilities</b>	<ul style="list-style-type: none"> <li>● Fishing for litter.</li> <li>● Knows recyclable plastics and other wastes from work environment.</li> <li>● Collects waste and separates on deck</li> <li>● Knows 3R ( Reduce, Reuse, Recycle) principals</li> </ul>	<b>In addition to the Level 1;</b> <ul style="list-style-type: none"> <li>● Promoting multi-stakeholder approaches for addressing marine litter</li> <li>● Acts for marine litter policies and solutions.</li> </ul>
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<b>GtB_Target Group</b>	<b>Workers, operators and representatives in fishery and aquaculture sector</b>	
<b>GtB_SF</b>	<b>Analyzing plastic markets and trade &amp; Seize recycling opportunities</b>	
<b>GtB_SF Description</b>	Plastic recycling is a mechanical or chemical process for the recovery of plastic waste that is discarded after the use of products by consumers and has a large transaction volume in the circular economy.	
<b>GtB_Proficiency Description</b>	<b>Level 1 - Foundational</b> <b>*FOR LOW-SKILLED AND WEAK-SKILLED WORKERS</b>	<b>Level 2 - Intermediate and Advanced</b>
	<b># GtB_008_1</b>	<b># GtB_008_2</b>
<b>Knowledge</b>	Knows that plastic garbage collected from the sea is recyclable and marketable.	Knows the subsidies or support of governments and various organizations suffering from marine litter in this regard.
<b>Abilities</b>	<ul style="list-style-type: none"> <li>● Knows economic benefits of plastic recycling</li> <li>● Increases data collection.</li> </ul>	<b>In addition to the Level 1;</b> <ul style="list-style-type: none"> <li>● Contributes to the development of policies supporting 'Recycling'.</li> <li>● Explores new markets for the Recycling of marine litter.</li> </ul>



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<b>GtB_Target Group</b>	<b>Workers, operators and representatives in fishery and aquaculture sector</b>	
<b>GtB_SF</b>	<b>Green boat design (Clean energy and waste reduction)</b>	
<b>GtB_SF Description</b>	The production of marine vehicles used for fishing and maritime activities using natural and recycled materials and, moreover, their energy sources from environmentally friendly electric motors, etc. are important in terms of sustainability and will reduce the amount of carbon. The purpose of this skill is to raise awareness about boats designed with an ecosystem-based approach, not only in terms of materials and engines, but also with on-deck equipment, drainage systems and waste management onboard.	
<b>GtB_Proficiency Description</b>	<b>Level 1 - Foundational</b> <b>*FOR LOW-SKILLED AND WEAK-SKILLED WORKERS</b>	<b>Level 2 - Intermediate and Advanced</b>
	<b># GtB_009_1</b>	<b># GtB_009_2</b>
<b>Knowledge</b>	Knows that marine vehicles and deck equipment can be produced from recyclable materials and will provide the energy of motion from environmentally friendly engines. Uses an all-green approach boat.	Strives to ensure that not only its own but also all other marine vehicles in the fleet meet environmental standards.
<b>Abilities</b>	<ul style="list-style-type: none"> <li>• Knows what is composite material</li> <li>• Knows renewable energy sources</li> <li>• Knows environmentally friendly vessels</li> <li>• Knows environmentally friendly engines</li> </ul>	<b>In addition to the Level 1;</b> <ul style="list-style-type: none"> <li>• Encourages the use of recycled materials all around the sector</li> </ul>



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<b>GtB_Target Group</b>	<b>Workers, operators and representatives in fishery and aquaculture sector</b>	
<b>GtB_SF</b>	...	
<b>GtB_SF Description</b>		
<b>GtB_Proficiency Description</b>	<b>Level 1 - Foundational</b> <b>*FOR LOW-SKILLED AND WEAK-SKILLED WORKERS</b>	<b>Level 2 - Intermediate and Advanced</b>
	<b># GtB_010_1</b>	<b># GtB_010_2</b>
<b>Knowledge</b>		
<b>Abilities</b>	•	In addition to the Level 1; •

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