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Regional Conference on building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea

7–9 March 2016
Algiers, Algeria

General Fisheries Commission for the Mediterranean
Commission générale des pêches pour la Méditerranée

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Small-scale fisheries in Bosa Marina, Sardinia, Italy
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This document has been prepared by the Secretariat of the General Fisheries Commission for the Mediterranean (GFCM) of the Food and Agriculture Organization of the United Nations (FAO). It stems from the Regional Conference on "Building a future for sustainable small scale fisheries in the Mediterranean and the Black Sea", held in Algiers, Algeria, from 7 to 9 March 2016.

This publication gathers information, outcomes and conclusions of the conference and its thematic panels. It also includes the background documents prepared by several authors and discussed during the panels, which are reproduced as submitted and in their original language. These proceedings aim to provide a useful collection of information on small-scale fisheries, which should contribute to the ongoing reflection on the sector and its sustainable development in the Mediterranean and Black Sea region.

The conference overview and conclusions have been edited by the GFCM Secretariat. All papers, documents and abstracts are reproduced as submitted by the authors. The conference material is available at the following webpage: http://www.fao.org/gfcm/meetings/ssfconference2016/en/.

Abstract

The Regional Conference on "Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea" was held in Algiers, Algeria, from 7 to 9 March 2016. This event was organized by the General Fisheries Commission for the Mediterranean (GFCM) and the Fisheries and Aquaculture Department of the Food and Agriculture Organization of the United Nations (FAO), including its Mediterranean regional projects, in partnership with the International Centre for Advanced Mediterranean Agronomic Studies – Mediterranean Agronomic Institute of Bari (CIHEAM-MAIB), the Network of Marine Protected Areas Managers in the Mediterranean (MedPAN), the World Wide Fund for Nature (WWF), and in collaboration with the Algerian Ministry for Agriculture, Rural Development and Fisheries.

More than 200 participants attended the conference and discussed about the main challenges and opportunities for the sustainable development of the small-scale fisheries sector. Building upon the momentum created by the First Regional Symposium on Sustainable Small-Scale Fisheries in the Mediterranean and Black Sea (Malta, 27–30 November 2013), organized by the same partners, the conference was intended as a practical response to the outcomes of this first event. The conference focused on the main socio-economic and environmental challenges for the sustainable development of small-scale fisheries with the aim to promote political commitment towards tailored strategies for the Mediterranean and the Black Sea region.

Discussions were structured around five interactive panels addressing challenges and priorities for the future of this essential activity in the region. Based on the outcomes of the discussions held, conclusions were put forth to urge action in support of sustainable small-scale fisheries in the Mediterranean and the Black Sea. The conclusions agreed upon by all participants reflect the need for concerted efforts to support the sector, raise awareness, share knowledge and devise future strategies to promote its sustainable development.

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All the speakers, authors and participants who contributed to the success of the regional conference by bringing their knowledge and experience, presenting the papers contained in this volume and providing valuable inputs to the discussions are also gratefully acknowledged.

Heartfelt thanks are due to the International Centre for Advanced Mediterranean Agronomic Studies – Mediterranean Agronomic Institute of Bari (CIHEAM-MAIB), the Network of Marine Protected Areas Managers in the Mediterranean (MedPAN) as well as the World Wide Fund for Nature (WWF) for supporting, as partners, the organization of the conference.

Finally, the support provided by all the staff involved in the organization of the regional conference as well as in the preparation of this publication was greatly appreciated.

Abbreviations and acronyms

AC	Advisory Council
ADR	Association for the Development of Rural Capacities
AMP	aire marine protégée
BOE	Boletín Oficial del Estado (official state bulletin of the Spanish Government)
CBDC	community-based data collection
CDB	Convention on Biological Diversity / Convention sur la diversité biologique
CFP	Common Fisheries Policy
CGPM	Commission générale des pêches pour la Méditerranée
CIHEAM-IAMB	Centre international de hautes études agronomiques méditerranéennes – Institut agronomique méditerranéen de Bari
CIHEAM-MAIB	International Centre for Advanced Mediterranean Agronomic Studies – Mediterranean Agronomic Institute of Bari
CM	co-management
CNRDPA	Centre National de Recherche et de Développement de la Pêche et de l'Aquaculture de l'Algérie
COFI	FAO Committee on Fisheries / Comité des pêches de la FAO
CPR	common pool resource
CPUA	catch per unit area
CPUE	catch per unit effort
CSO	civil society organization
DCRF	Data Collection Reference Framework
Directives PAD	Directives PAD Directives volontaires de la FAO visant à assurer la durabilité de la pêche artisanale dans le contexte de la sécurité alimentaire et de l'éradication de la pauvreté
EAF	Ecosystem approach to fisheries
EBK	experience-based knowledge
EC	European Commission
ECOSAFIMED	Ecosystem conservation and sustainable artisanal fisheries in the Mediterranean basin project
EFF	European Fishery Fund
EFHs	Essential fish habitats
EMFF	European Maritime and Fisheries Fund
EU	European Union
FAD	fish aggregating device
FAO	Food and Agriculture Organization of the United Nations / Organisation des Nations Unies pour l'alimentation et l'agriculture
FEK	fishers' ecological knowledge
FMZ	Fisheries management zone

GDP	Gross domestic product
GFCM	General Fisheries Commission for the Mediterranean
GIS	geographic information system
GSA	geographical subarea
GT	gross tonnage
GVA	Gross value added
HDI	Human development index
IAS	invasive alien species
ICM-CSIC	Marine Science Institute of the Spanish Research Council
ILO	International Labour Organization
IUU	fishing illegal, unreported, and unregulated fishing
LEK	local ecological knowledge
LIFE	Low Impact Fishers of Europe
LOA	length overall
LMP	local management plan
LTMP	long-term management plan
MAGP	Multiannual guidance programme
MCS	monitoring, control and surveillance
MedAC	Mediterranean Advisory Council / Conseil consultatif de la Méditerranée
MedArtNet	Mediterranean Platform of Artisanal Fishers / Plateforme méditerranénne des pêcheurs artisanaux
MedPAN	Network of Marine Protected Areas Managers in the Mediterranean / Réseau des gestionnaires d'aires marines protégées en Méditerranée
MIPAAF	Italian Ministry of Agricultural, Food and Forestry Policies
MLS	minimum landing size
MPA	marine protected area
MSC	Marine Stewardship Council
MSY	maximum sustainable yield
NAMPAN	North American Marine Protected Areas Network
NFZ	no-fishing zone
NGO	non-governmental organization
nm	nautical mile
NTZ	no-take zone
OIT	Organisation internationale du travail
OMS	overall management success
ONG	organisation non gouvernementale
PCP	politique commune de la pêche
PIB	Produit intérieur brut
PNUD	Programme des Nations Unies pour le développement
PNUE-PAM	Plan d'action pour la Méditerranée du Programme des Nations Unies pour l'environnement
RBK	research-based knowledge

RFMO	Regional fisheries management organization
SAFRN	Small-scale and Artisanal Fisheries Research Network
SBK	science-based knowledge
SCI	site of community importance
SEPA	Special environmental protection area
SSCF	small-scale coastal fishing
SSF	small-scale fisheries
SSF Guidelines	FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication
SY	sustainable yield
TBTI	Too Big To Ignore Network
TEK	traditional ecological knowledge
TURF	territorial use rights in fisheries
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
VMS	vessel monitoring system
WWF	World Wide Fund for Nature / Fonds mondial pour la nature

Foreword

The Regional Conference on "Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea" marked an important occasion for addressing relevant issues for a sector which represents tremendous economic, cultural and social importance to this region. Indeed, Mediterranean and Black Sea small-scale fisheries account for more than 80 percent of the region's fishing vessels and 57 percent of all on-vessel employment. We know that these fisheries can be quite adaptable, targeting a wide variety of species and being perceived to have a lower environmental impact than other fleet segments. Small-scale fishers themselves are also an esteemed source of valuable knowledge on the marine environment and marine resources.

As a regional fisheries management organization, the General Fisheries Commission for the Mediterranean (GFCM) has an important role to play to foster coordinated policy strategies for the sustainable development of small-scale fisheries. Since the 1980s, the GFCM has called for dedicated national strategies supporting this sector in fisheries management schemes. Moreover, since the adoption in 2014 of its amended legal framework, the GFCM has recognized the role of small-scale fisheries within its institutional remit. This has led to the establishment of the first regional cooperative programme on sustainable small-scale fisheries in the Mediterranean and the Black Sea to promote, together with interested partners, projects aimed at improving the livelihoods of small scale fishing communities and ensuring the sustainable management of this sector. The programme builds upon the outcomes of the First Regional Symposium held in Malta in 2013, which was a historic point of departure for sustainable small-scale fisheries in the region. Yet further effort and targeted policy interventions are necessary to truly secure sustainability for the future, in order to ensure the long-term provision of coastal livelihoods and safeguard the marine resources upon which such livelihoods depend.

In this context, the Regional Conference held in Algiers in 2016 provided a decisive occasion for identifying concrete priorities for the promotion of this sector, involving representatives from national administrations, international organizations, NGOs, fisher organizations, policy-makers, scientific experts, economic experts and numerous other stakeholders. The conclusions of the conference have been widely circulated throughout the region and are being used as the foundation and rationale for follow-up actions.

In noting such successful outcomes, it is of paramount importance to acknowledge the essential role played by the conference partners and the fruitful cooperation that has been built. This conference would not have been possible without the efforts of the Fisheries and Aquaculture Department of the FAO, including its regional projects, WWF, MedPAN and CIHEAM, as well as the Ministry of Agriculture, Rural Development and Fisheries of Algeria. All partners have carried out extensive technical work and brought together a diverse group of experts to share ideas and put forth solutions. To this end, the essential role of such partnerships in providing leadership for the future implementation of regional and subregional strategies for the sustainable growth of the small-scale fisheries sector must be underlined and further strengthened as we move forward. The important work done has paved the way for a concerted regional plan of action for sustainable small-scale fisheries in the region.

Abdellah Srour
Executive Secretary
General Fisheries Commission for the Mediterranean

Conference overview

BACKGROUND

There is no doubt that small-scale fisheries in the Mediterranean and the Black Sea play a significant social and economic role: they constitute over 80 percent of the fishing fleet, employ at least 60 percent of those workers directly engaged in fishing activities and account for approximately 25 percent of the total landing value from capture fisheries in the region.

At their best, small-scale fisheries exemplify sustainable resource use: exploiting living marine resources in a way that minimizes environmental degradation while maximizing economic and social benefits. Yet concerted effort is needed to ensure that best practices become standard practice.

To this end, the General Fisheries Commission for the Mediterranean (GFCM) and the Fisheries and Aquaculture Department of the Food and Agriculture Organization of the United Nations (FAO), including its Mediterranean regional projects, in partnership with the International Centre for Advanced Mediterranean Agronomic Studies – Mediterranean Agronomic Institute of Bari (CIHEAM-MAIB), the Network of Marine Protected Area Managers in the Mediterranean (MedPAN), the World Wide Fund for Nature (WWF), and in collaboration with the Government of Algeria, organized a Regional Conference on "Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea" from 7–9 March 2016 in Algiers, Algeria.

In 2013, the same partners organized the First Regional Symposium on Sustainable Small-Scale Fisheries in the Mediterranean and Black Sea (Malta, 27–30 November 2013), in collaboration with the Government of Malta. For the first time in this region, representatives of national administrations, international and intergovernmental organizations, non-governmental organizations (NGOs) as well as fisheries scientists, professionals and experts gathered around the same table to discuss common issues with regard to the promotion of sustainable small-scale fisheries. This event demonstrated the potential of the small-scale fisheries sector to alleviate poverty, ensure food security and contribute to Blue Growth strategies. It can be considered as a milestone which raised awareness about the main issues at stake, laying the groundwork for future action in the region.

Building upon the momentum created, the organizing partners agreed that concrete steps should be taken towards securing a sustainable future for this sector. The Regional Conference hence offered a unique opportunity to intensify efforts, in a concerted manner, to secure common strategies for sustainable small-scale fisheries in the region.

RECENT DEVELOPMENTS IN THE MEDITERRANEAN AND THE BLACK SEA

Since 2013, much progress has been made to improve knowledge about small-scale fisheries and to enhance the management and support of this sector in the region. The first Regional Programme on Sustainable Small-Scale Fisheries in the Mediterranean and the Black Sea, established by the GFCM to promote, with interested partners, projects aimed at improving the livelihoods of small-scale fishing communities and ensuring the sustainable management of this sector, is certainly a major achievement.

Another major benchmark was the endorsement in 2014 by the FAO Committee on Fisheries (COFI) of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines), which was no doubt a historic event and a potential turning point for the development of the sector.

In parallel, the GFCM has introduced significant changes in its institutional and legal framework to increase the focus on small-scale fisheries and local communities, and has

launched a comprehensive data collection tool that provides for the annual submission of data on small-scale fisheries. The time had come to capitalize the progress made and move forward with implementing and consolidating the outcomes attained thus far.

OBJECTIVES AND OUTCOMES

Building upon the Blue Growth initiative promoted by FAO and following the ecosystem approach advocated in the Code of Conduct for Responsible Fisheries, the Regional Conference focused on the main socio-economic and environmental challenges for the development of sustainable small-scale fisheries. Based on the concrete results of case studies carried out in different areas throughout the region as well as on available information and data, it was designed as an interactive forum to discuss priorities, possible solutions and practical recommendations for the consideration of decision-makers. The aim of the conference was also to promote political commitment towards tailored strategies for the Mediterranean and the Black Sea region.

Based on the outcomes of the discussions held, conclusions were put forth to urge action in support of sustainable small-scale fisheries in the Mediterranean and the Black Sea.

ORGANIZATION

The Regional Conference was attended by more than 200 participants, including representatives of fisheries departments and administrations from all Mediterranean and Black Sea coastal states, of government agencies dealing with small-scale fisheries, as well as of international, intergovernmental and non-governmental organizations (NGOs), national and regional fisheries cooperatives, small-scale fishers' and fishworkers organizations and communities, partner organizations and civil society.

The Conference was in English, French and Arabic with a simultaneous interpretation service for these three languages.

Five thematic panels addressed the main challenges for small-scale fisheries development. Each panel presented the results of case studies carried out in connection with the panel theme and was coordinated by a partner organization. The aim was to prompt discussions and reflection among participants so that relevant conclusions could be derived for each panel. Side events were organized in connection with the thematic panels. These showcased specific experiences of sustainable small-scale fisheries in the region. For further details, see Conference programme in Appendix 2.

PANEL OVERVIEW

PANEL 1: Supporting the sustainable development of small-scale fisheries in the Mediterranean and the Black Sea under the Blue Growth perspective (GFCM and FAO Mediterranean regional projects)

Presentation of the current status of small-scale fisheries in the Mediterranean and Black Sea, particularly with regard to their socio-economic impact. Discussion on the promotion of small-scale fisheries as a strategy for Blue Growth.

PANEL 2: Strengthening the role of stakeholders in the context of management and co-management schemes (WWF)

Review of existing management and co-management options, with specific focus on the role of small-scale fisher organizations and regional platforms, with a view to identifying ways to strengthen stakeholder roles.

PANEL 3: Improving the efficiency of marine protected areas (MPAs) as fisheries management tools and benefits from involving the small-scale fisheries sector (MedPAN)

Discussion on strategies to promote conservation and sustainability by integrating small-scale fisheries into MPAs.

PANEL 4: Enhancing small-scale fisheries value chains (CIHEAM-MAIB)

Presentation of recent developments and innovations in small-scale fisheries value chains highlighting potential areas for investment and improvement.

PANEL 5: Putting the principles of the SSF Guidelines into practice: the case of the Mediterranean and the Black Sea (FAO Fisheries and Aquaculture Department)

Discussion on challenges and opportunities for using the SSF Guidelines as a tool to promote sustainable small-scale fisheries in the Mediterranean and the Black Sea in order to identify key elements to include in national and regional plans of action.

PARTNERS

Food and Agriculture Organization of the United Nations (FAO)

An intergovernmental organization, FAO has 194 Member Nations, two associate members and one member organization (the European Union). Headquartered in Rome, Italy, FAO is present in more than 130 countries.

In support of FAO objectives, the mission of the FAO Fisheries and Aquaculture Department is to strengthen global governance and the managerial and technical capacities of Members and to lead consensus-building towards improved conservation and utilization of aquatic resources.

General Fisheries Commission for the Mediterranean (GFCM)

Created in 1949 under the provisions of Article XIV of the FAO Constitution, the GFCM came into force in 1952. Consisting of 23 member countries along with the European Union, the GFCM has the objective to promote the development, conservation, rational management and best utilization of marine living resources, as well as the sustainable development of aquaculture in the Mediterranean, Black Sea and connecting waters.

FAO regional projects AdriaMed, CopeMed II, EastMed and MedSudMed

The FAO Mediterranean projects act in support of the Mediterranean countries in achieving sustainable fisheries management in the region through collaboration in each Mediterranean subregion.

International Centre for Advanced Mediterranean Agronomic Studies – Mediterranean Agronomic Institute of Bari (CIHEAM-MAIB)

Founded in 1962, the CIHEAM is an intergovernmental organization including 13 Mediterranean member countries. The Mediterranean Agronomic Institute of Bari (MAIB), which was established by CIHEAM as its Italian operating facility, is a centre for postgraduate training and applied scientific research.

Network of Marine Protected Areas Managers in the Mediterranean (MedPAN)

MedPAN brings together the managers of Mediterranean marine protected areas (MPAs) through a partnership approach, the sustainability and operation of a network of MPAs in the Mediterranean. Currently, MedPAN has more than 50 members, primarily MPA management institutions, throughout the Mediterranean basin.

World Wide Fund for Nature (WWF)

Founded in 1961, WWF is an international non-governmental organization which aims to stop the degradation of the natural environment. It has offices in more than 80 countries around the world and focuses its work on six main areas: forests, oceans, wildlife, food, climate and energy and water.

PANEL 1

Supporting the sustainable development of small-scale fisheries in the Mediterranean and the Black Sea under the Blue Growth perspective

PANEL 1
Supporting the sustainable development of small-scale fisheries in the Mediterranean and the Black Sea under the Blue Growth perspective

Stephen Cunningham

EXECUTIVE SUMMARY

This paper provides a background to a discussion on the role of small-scale fishing in a Blue Growth strategy. Blue Growth is a recent concept focusing on the creation of sustainable economic growth in the marine and maritime economy.

To date, marine capture fisheries have not been seen as important within a macroeconomic vision of Blue Growth, as they seem to offer little in terms of additional Gross Domestic Product (GDP) or employment. The economic analysis of fish resources as natural capital shows, however, that through the generation of resource rents, they are capable of making a perennial contribution to the investable surplus which is at the heart of economic growth and development for all economies.

Mediterranean and Black Sea fisheries are dominated by small-scale fishing activities. If therefore the exploitation of fish resources in these seas is to contribute to Blue Growth, these activities will have to play their part. It is clear both from the case studies and from more general considerations that small-scale fishing is not conceptually different from other types of fishing. The factors that determine the contribution of fishing to economic growth will therefore be the same for small-scale fishing as for other kinds.

Bringing small-scale fishing within a Blue Growth strategy raises some policy issues. A first problem concerns the definition of small-scale fishing. The case studies agree that there is no unique definition, although it is typically understood in terms of a physical description of the fishing activity (usually fishing vessel length). Resource rents, however, depend on the fish resource, so there is a need to link the activity to the resource. Small-scale fishing alone is not a sufficient policy entry point if the objective is Blue Growth.

There is a need to link activity to the resource for another important reason. The case studies note that small-scale fishing is a highly dynamic activity which is able to adjust fishing techniques (i.e. changing gear and/or fishing areas) according to the natural fluctuations of the resources. Although an advantage for the small-scale sector, this versatility means that as one species is overexploited, fishers can simply move on to another one. Defining small-scale fishing in such a way as to give the fishers a clear link to and interest in the conservation of particular fish stocks seem to be an important step towards a Blue Growth contribution.

The appropriate link will depend on the resource. In some cases, particularly when sedentary species are involved, it may be possible to define a genuine small-scale fishery – for instance, in the case of some shellfish fisheries in which only small-scale

fishers may be involved. These fisheries may offer the best opportunity to test Blue Growth policies in the case of small-scale fishing.

More generally, small-scale fishers will be only one group exploiting a resource, or an assemblage of resources, so there is a need to include these fishers within a broader management plan for the resource in question.

In each case, the crucial element will be to give the fishers an incentive to fish in such a way that a resource rent emerges. The generation of such an incentive will necessarily involve the implementation of some sort of use rights, although there is a very wide choice in the design of such rights systems. An important issue will be to decide who holds the use rights, as this will influence both the size of the investable surplus that can be created and who makes the decisions concerning investments.

The case studies make clear that the typical situation, at present, is an absence of any formal rights. Some informal rights may exist related to location and customary rules, based on traditional use, but these informal rights are generally weak.

The inclusion of small-scale fishing within a Blue Growth strategy will also require re-thinking the appropriate success indicators. At present, most emphasis tends to be placed on indicators within the fishery, such as the quantity and value of fish production and the number of fishing and fishing-related jobs. There will be a need for additional indicators to measure the contribution of the sector to economic growth and the impact that this has on incomes and jobs outside of the fishery sector.

A Blue Growth strategy would represent a break with the currently dominant strategic approach. Although there may be some variation, broadly speaking, countries have tended to view the inherent wealth of the fish resources to create fishing employment and livelihoods as a kind of social safety net. Economically, the result is that earnings tend towards the minimum wage (adjusted for the risky nature of fishing) and there is nothing left over for investment in other productive areas of the economy – i.e. no investable surplus is produced. The eastern Mediterranean case study shows the generally low level of earnings across a range of countries, suggesting that this is the typical result of current strategies.

This result demonstrates one important conclusion that often seems to be overlooked, namely that it is not the very hard work undertaken by fishers that generates the wealth, but rather, the inherent value of the fish resource being exploited generates the wealth. In fact, the challenge is to get fishers, as a group, to work less hard so that fish resources can recover and generate the totality of their wealth potential. It seems important to stress this conclusion in the context of a conference focusing on small-scale fishing. Such fishing is one kind of exploitation of the resources, but the value generated by that fishing depends on the underlying value in the resource just as much as it does for any other kind of fishing.

In discussing small-scale fishing within a Blue Growth strategy, the implications for existing strategies must be considered. The best strategic choice may vary by location. But it is clear that small-scale fishing activities in the Mediterranean and Black seas have an important role to play within a Blue Growth framework. Realising this role will require a change in the vision of such activities linking them firmly to the resources that they exploit. Gradual reform will then be needed in the way in which the fishing activities are managed, including through the implementation of use-right systems capable of generating resource rents.

PANEL 1
Soutenir le développement durable de la pêche artisanale en Méditerranée et en mer Noire dans l'optique de la croissance bleue

Stephen Cunningham

RÉSUMÉ

Le présent document apporte des éléments de contexte à une discussion sur le rôle de la pêche artisanale dans le cadre de la stratégie en faveur de la croissance bleue. La croissance bleue est un concept récent dont le principal objectif est de créer une croissance économique durable dans le secteur de l'économie marine et maritime.

Compte tenu de leur apparemment faible contribution au produit intérieur brut (PIB) ou à l'emploi, l'importance des pêches de capture marines n'a jusqu'à présent pas été prise en compte au sein d'une vision macroéconomique de la croissance bleue. L'analyse économique assimilant les ressources halieutiques à un capital naturel montre cependant que, grâce à la génération des rentes liées à l'exploitation des ressources, les pêches de capture marines peuvent apporter une contribution pérenne à l'excédent susceptible d'être investi, qui est au cœur de la croissance et du développement de toutes les économies.

La pêche artisanale est un secteur dominant en Méditerranée et en mer Noire. Par conséquent, elle aura nécessairement un rôle à jouer si l'exploitation des ressources halieutiques dans cette région doit s'inscrire dans le cadre de la stratégie en faveur de la croissance bleue. Des études de cas, mais aussi des considérations d'ordre plus général, montrent clairement que la pêche artisanale n'est pas différente des autres types de pêche d'un point de vue conceptuel. Les facteurs qui déterminent la contribution que la pêche artisanale peut apporter à la croissance économique seront donc identiques à ceux des autres types de pêche.

L'intégration de la pêche artisanale dans la stratégie en faveur de la croissance bleue soulève des questions d'ordre stratégique. La première difficulté concerne la définition de la pêche artisanale. Les études de cas conviennent qu'il n'existe pas de définition unique, bien que l'interprétation de ce concept soit généralement liée à la description physique de l'activité de pêche (habituellement la longueur du navire de pêche). Néanmoins, étant donné que les rentes dépendent des ressources halieutiques, il y a lieu de lier l'activité à la ressource. La pêche artisanale à elle seule ne représente pas un point d'accès politique suffisant si la croissance bleue est l'objectif à atteindre.

L'activité doit être liée à la ressource pour une autre raison importante. Les études de cas soulignent en effet que la pêche artisanale est une activité extrêmement dynamique et capable d'adapter les techniques de pêche utilisées (engins et/ou zones de pêche évolutifs) en fonction des fluctuations naturelles des ressources. Cependant, si cette flexibilité représente un avantage pour le secteur de la pêche artisanale, elle peut aussi signifier que, lorsqu'une espèce est en surexploitation, les pêcheurs peuvent tout simplement en viser une autre. Définir la pêche artisanale de manière à souligner clairement le lien unissant l'intérêt des pêcheurs et la conservation de certains stocks de poissons apparaît dès lors comme une étape importante en vue d'assurer la contribution du secteur à la croissance bleue.

Le lien qu'il convient d'établir dépendra de la ressource. Dans certains cas, en particulier pour les espèces sédentaires, il peut être possible de définir une véritable pêche artisanale, comme pour certaines pêcheries de mollusques, dans lesquelles seuls les artisans pêcheurs peuvent être impliqués. Ces pêcheries offrent probablement la meilleure opportunité pour tester les stratégies en faveur de la croissance bleue dans le secteur de la pêche artisanale.

Plus généralement, les artisans pêcheurs représenteront uniquement un groupe exploitant une ressource, ou un assemblage de ressources; il est donc nécessaire d'inclure ces pêcheurs au sein d'un plan de gestion plus vaste portant sur les ressources en question.

Dans chaque cas, il sera crucial d'inciter les pêcheurs à mener leur activité de façon à produire une rente liée à l'exploitation des ressources. L'application d'une certaine forme de droits d'utilisation sera nécessaire pour atteindre cet objectif, bien qu'il existe une grande variété de systèmes de droits. Il importera par ailleurs de déterminer qui détient les droits d'utilisation, car cela aura une influence à la fois sur la taille de l'excédent susceptible d'être investi et sur la personne prenant les décisions en matière d'investissements.

Les études de cas montrent clairement qu'aujourd'hui, la situation habituelle est celle d'une absence totale de droits formels. Certains droits informels existent parfois en fonction du lieu et des règles coutumières, basées sur l'usage traditionnel, mais ils sont généralement faibles.

Pour intégrer la pêche artisanale dans la stratégie en faveur de la croissance bleue, il sera également nécessaire de repenser les indicateurs de réussite utilisés. Actuellement, l'accent tend plutôt à être mis sur les indicateurs inhérents au secteur de la pêche, tels que la quantité et la valeur de la production halieutique et le nombre d'emplois directement ou indirectement liés à l'activité de pêche. Il s'agira donc de développer des indicateurs supplémentaires pour mesurer la contribution du secteur à la croissance économique ainsi que son impact sur les revenus et les emplois en dehors du secteur de la pêche.

Une stratégie en faveur de la croissance bleue constituerait une rupture avec l'approche stratégique qui domine aujourd'hui. À quelques variations près, les pays ont généralement tendance à considérer la richesse inhérente aux ressources halieutiques comme génératrice d'emplois et de moyens de subsistance liés à la pêche, et donc comme une forme de dispositif de protection sociale. D'un point de vue économique, le résultat est que les revenus tendent vers le salaire minimum (adapté au caractère risqué de la pêche) et qu'il ne reste rien à investir dans d'autres domaines productifs de l'économie; autrement dit, aucun excédent susceptible d'être investi n'est produit. L'étude de cas sur la Méditerranée orientale montre le niveau généralement faible des revenus dans une série de pays, ce qui laisse penser qu'il s'agit du résultat type des stratégies actuelles.

Ce résultat donne lieu à une conclusion importante, qui semble souvent négligée: ce n'est pas le travail extrêmement difficile des pêcheurs qui génère de la richesse mais plutôt la valeur inhérente aux ressources halieutiques exploitées. Le défi consiste dès lors à inciter les pêcheurs, en tant que groupe, à travailler moins pour permettre aux ressources halieutiques de récupérer et de générer la totalité de leur potentiel de richesse. Il est important d'insister sur cette conclusion dans le contexte d'une conférence essentiellement consacrée à la pêche artisanale. Ce type de pêche est une forme d'exploitation des ressources, mais la valeur générée par ce type de pêche dépend de la valeur sous-jacente de la ressource, comme c'est le cas pour tout autre type de pêche.

Pour examiner la pêche artisanale dans le cadre d'une stratégie en faveur de la croissance bleue, les conséquences pour les stratégies existantes doivent également être prises en considération. Le choix de la meilleure stratégie à adopter peut varier en fonction du lieu, mais il est indéniable que les activités de pêche artisanale ont un rôle important à jouer dans le contexte de la croissance bleue. Afin de réaliser pleinement ce rôle, il sera nécessaire de faire évoluer la vision de ces activités et de les relier clairement aux ressources qu'elles exploitent. Une réforme progressive du mode de gestion de ces activités sera ensuite nécessaire, notamment grâce à la mise en œuvre de systèmes de droits d'utilisation permettant de générer des rentes liées à l'exploitation des ressources.

Background paper

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1. INTRODUCTION

This paper provides a background to a discussion on the role of small-scale fishing in a Blue Growth strategy in the Mediterranean and the Black Sea. It draws on insights from case studies produced by authors in a number of countries. The main purpose of the paper is to stimulate discussion of this important issue for the development of fisheries policy.

It is beyond the scope of this paper to produce a general analysis of the situation in Mediterranean and Black Sea fisheries. One difficulty is that Mediterranean fisheries are well-known for their diversity, which is reflected in the diverse approaches that different countries and regions take to their fisheries sectors. But the main problem is that the necessary data are not available, largely because the question of linking small-scale fishing to economic growth has hardly ever been posed.

One key requirement, therefore, to further the debate about Blue Growth and fishing will be to undertake a comprehensive and region-wide socio-economic survey to develop complete baseline data on the value and economic impact of small-scale fishing, with a view to ultimately informing policy interventions.

In Section 2, the paper presents an analysis of Blue Growth and discusses why marine fishing does not currently feature significantly in Blue Growth strategies. It is suggested that this is mainly because marine fishing requires a different kind of analysis to most other sectors of the economy in order to appreciate its potential growth contribution.

Section 3 presents the case studies that provide information on the economic outcomes of current policy towards the small-scale fishing sector. Section 4 discusses, in general terms, the relationship between fish resources and economic growth. Section 5 draws lessons from the case studies to position small-scale fishing within a Blue Growth strategy.

It should be noted that this is a discussion document that was designed to stimulate debate at the conference. It is not the intention of the paper to press for any particular strategy. Such strategic choices will of course remain the prerogative of policy-makers.

2. BLUE GROWTH

In the context of this conference, it is worth recalling that in the Preamble to the Agreement for the Establishment of the General Fisheries Commission for the Mediterranean, the contracting parties were:

> *"convinced that the conservation and sustainable use of the living marine resources in the area of application and the protection of the marine ecosystems in which those resources occur plays a major role in the context of blue growth and sustainable development" (emphasis added).*

The issue here is to discuss the precise nature of this role and in particular the part to be played by small-scale fishing.

Blue Growth is a concept that has emerged recently. There is no agreed definition and this has led different commentators and organizations to stress different aspects. The common element seems to be a focus on creating sustainable economic growth in the marine and maritime economy.

The Economist[1] offers the following working definition of the Blue Economy:

> *A sustainable ocean economy emerges when economic activity is in balance with the long-term capacity of ocean ecosystems to support this activity and remain resilient and healthy.*

Adopting this definition would imply that Blue Growth is then economic growth that is sustainable in the long term. The main issue therefore will be to balance issues of growth versus conservation.

This issue of a trade-off between growth and conservation often looms large. At the Global Oceans Action Summit for Food Security and Blue Growth, for instance, the agenda was addressed through six Working Groups, the first of which was on the theme of "Balancing Growth and Conservation". This Working Group's suggestion as to how capture fisheries would add to Blue Growth was primarily by increasing fish production which was to come through:

- restoring overexploited and depleted stocks and protecting/restoring critical habitats;
- reducing fishing capacity and creating alternative job opportunities;
- eliminating the enormous losses and waste which currently exist along the value chain;
- adding value to fishery products to generate jobs and economic growth.

The group recognised however that, "as wild fish production is at its limit, aquaculture is the only solution to significantly increase production". While this statement is true, it sells marine fisheries short. The adoption of a production-oriented approach is the reason why marine fisheries are not being given a more important role in Blue Growth strategies (and also explains the dire straits in which many of the world's fish resources find themselves).

Some organizations, including the Food and Agriculture Organization of the United Nations (FAO), go beyond this basic definition to include distributional aspects such as poverty alleviation into the Blue Growth agenda. However, the way in which these other aspects are to be achieved does not seem to be very different. For instance, the expected medium and long-term results of the FAO Blue Growth initiative[2] are "improved fisheries management; reduced fishing capacity and proportion of overfished stocks; reduced discards and improved bycatch management; improved status of aquatic ecosystems and habitats; increased fish production and income from fisheries and aquaculture; and improved socio-economic status of fisheries and aquaculture communities, including through reductions in illegal, unreported and unregulated (IUU) fishing, up-take of best practices, expansion of responsible aquaculture and the empowerment of small-scale fishing and aquaculture communities". So here also it seems the main focus is on ensuring that growth is sustainable.

In any event, the most important challenge is to generate economic growth rather than discussing how to distribute it. For instance, the Shanghai meeting in February 2016 of G20 Finance Ministers and Central Bankers noted that the global recovery falls short of ambitions for strong, sustainable and balanced growth and that fiscal policy would be used flexibly to strengthen growth, job creation and confidence, recognising that monetary policy alone could not lead to balanced growth.

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1 **The Economist Intelligence Unit.** 2015. *The blue economy: Growth, opportunity and a sustainable ocean economy* [online]. Briefing paper for the World Ocean Summit, Cascais, Portugal, 4-5 June 2015. [Cited 29 April 2016]. http://www.economistinsights.com/sites/default/files/Blue%20Economy_briefing%20paper_WOS2015.pdf

2 **FAO**. *The FAO Initiative on Blue Growth in Support of Food Security, Poverty Alleviation and Sustainable Management of Aquatic Resources*, 6p.

The European Union's (EU) Blue Growth Strategy[3] sees growth in the blue economy as playing a significant role within the central EU policy of promoting jobs and growth. In analysing different sectors of the economy, the Strategy uses as its key indicators employment and gross value added within the sector. Both of these indicators are problematic in the case of fisheries.

The fisheries sector does not do too badly in the rankings, coming eighth out of 18 sectors considered in the document. The problem, however, is that marine fishing offers very little scope for within-sector growth, given that most fish stocks are fully or over-exploited (as noted above and FAO SOFIA).

As a result, the "analysis of the job-creation potential, as well as the potential for research and development to deliver technology improvements and innovation and the need for action at EU level, has suggested that the following five value chains could deliver sustainable growth and jobs in the blue economy" (COM 2012, 494, p6):

1. blue energy – particularly offshore wind power and other offshore renewable energy sources, such as tidal, wave and ocean thermal energies;
2. aquaculture;
3. maritime, coastal and cruise tourism;
4. marine mineral resources; and
5. blue biotechnology.

It will be noted that marine fishing is not on the list. Note also that this list is not simply the current top five in the employment/Gross value added (GVA) ranking; in fact of the top five in these rankings, only tourism, the current number one, is more highly ranked than fisheries. The issue is to do with the perceived potential that marine fisheries can offer to a Blue Growth strategy.

The broad Blue Growth strategy above has been refined in different regions to reflect the specificities of different sea basins, including the Mediterranean, Adriatic and Ionian and Black Sea[4]. As with the Blue Growth strategy itself, the analysis continues to be conducted in terms of economic sectors or value chains. As a result, marine fishing is conspicuous once again mostly by its absence.

When considering what needs to be done to ensure Blue Growth, the focus tends to be on technological innovation with support to research to achieve this goal.

In a general sense this focus is logical, especially when considering the sources of economic growth. Despite criticism, the core definition of economic growth remains growth in the long-run productive capacity of the economy, typically measured by real growth in GDP[5]. Although what determines economic growth in any country is a complicated topic, it is generally acknowledged that long-term growth is driven primarily by productivity. ("Productivity isn't everything, but in the long run it is almost everything." Paul Krugman, quoted in DFID 2011).

The principal innovation in Blue Growth is the focus on the Blue part of the economy rather than on some new type of economic growth. The factors that will lead to Blue Growth will be the same as, or very similar to, the factors that lead to economic growth in other parts of the economy, in particular innovation leading to increased labour productivity.

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[3] **European Commission**. 2012. *Blue Growth opportunities for marine and maritime sustainable growth* [online]. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – COM/2012/0494 FINAL. http://eur-lex.europa.eu/legal-content/EN/NOT/?uri=CELEX:52012DC0494.

[4] **EUNETMAR**. 2014. *Studies to support the development of sea basin cooperation in the Mediterranean, Adriatic and Ionian, and Black Sea: REPORT 1 - Analysis of Blue Growth needs and potential per country*. MARE/2012/07 – REF. No 2. http://www.alieia.gr/wp-content/uploads/2014/12/Report_1_full_final.pdf

[5] **DFID UK**. 2011. *Sources of Economic Growth Trade and Investment Analytical Papers n° 6*. London, UK (also available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32468/11-723-sources-of-economic-growth.pdf).

However, within this general framework, finite but renewable natural resources, such as fish, requires special consideration. The challenge is to ensure that increases in labour productivity do not come at the expense of, or lead to, declines in the fish stocks; the challenge is to achieve a sustainable contribution to economic growth.

To date, the main question in Blue Growth has been: what sectors of the Blue Economy have the biggest growth potential and how can this potential be realized? It is anticipated that success in the strategy to achieve Blue Growth will impact the growth rate of the economy as a whole.

For marine fisheries, however, this is the wrong question. Or at least if this is the correct question, it is no surprise that the marine fishing sector is not considered to have an important role to play.

From a marine fisheries sector perspective, the key question is: how can fish resources be exploited so as to maximise their contribution to growth of the economy as a whole rather than to maximise growth of the sector itself?

If the Blue Growth question is posed in this way, then marine fishing does indeed have an unrealized potential to contribute to economic growth.

This paper discusses this case. In brief, the starting point is the fish resource itself which is considered to be natural capital. The finite but renewable nature of the resource means that it is capable of producing a perennial return in the form of a resource rent (discussed more fully below). If exploitation arrangements can be designed to generate this rent, then the fish resource can create an investable surplus that can invested elsewhere in the economy thus contributing to economic growth. This problem is common to all types of fishing but, given the regional conference's focus on small-scale fisheries, the paper pays particular attention to the small-scale sector.

A Blue Growth perspective therefore requires a vision of fish resources and their exploitation which is different from the vision underpinning other sectors of the Blue Economy and which is also different from the dominant strategic vision for fisheries policy (even if many of the policy tools may remain relevant).

As a consequence, marine fishing also requires a different kind of research support. Where other sectors mostly need support to encourage technical innovation, marine fishing requires first and foremost research to support institutional innovation, especially concerning the integration of small-scale fishing into exploitation arrangements.

3. PRESENTATION OF THE CASE STUDIES

A number of case studies were undertaken to provide background information on the economic condition of small-scale fishing in a variety of settings to inform the debate on the potential role of such fishing in a Blue Growth strategy.

A template was developed for the national case studies. This is outlined in Section 3.1.

The national case studies are presented in Section 3.2. Some additional cases were used, even if they did not necessarily follow the template.

Finally, FAO regional projects provided some input from their projects, presented in Section 3.3.

3.1 The approach

The template was developed in two parts.

The first part set small-scale fishing into the national context. The main issues raised were:

- How is the term "small-scale fisheries" defined and how does this relate to the case study?
- Given the macroeconomic nature of Blue Growth, has the fisheries sector already been assigned a role of this kind? What macroeconomic role, in general, is expected to be played?

- Does the fisheries policy provide different objectives for small-scale fisheries (SSF) compared with other kinds of fishing? If so, why?
- What are considered to be the main benefits, in general, from fish resource exploitation? How are these benefits perceived at the national level in the case of SSF?
- What particular measures (management, support or other) apply in the case of small-scale fishing?

Information was also sought on the key parameters in terms of:

- the number of people engaged in small-scale fishing;
- the means of production;
- fish landings in volume and value by species or species group of small-scale fishing; and
- the marketed output in volume and value.

The second part of the template was concerned with the case study itself. The main issues raised were:

- Volume and value of landings by species
  - Details for species representing over 5 percent by value of landings
  - Any changes in leading species over the past ten years
  - Identification of stocks exploited only by small-scale fishers
  - For important stocks exploited by both small-scale fishers and other segments, what is the output share from small-scale fishers? What management arrangements are in place for each stock as a whole and for the SSF part in particular? Where management plans exist, are SSF included?
- Fishing activity
  - Most important segments and gears
  - Annual revenue by fleet segment
  - Vessel ownership
  - Share system
  - Fishing costs by fleet segment
  - Profitability of the activity
  - Return on capital
  - Typical wage earned by crew (compared with earnings for comparable activities elsewhere in the economy)
- Fish harvesting rights
  - Do SSF hold harvesting rights, either individually or on a communal basis?

  If so, what is the:
  - Nature of the rights
  - Scope of the rights
  - Use of the rights
  - Results of the rights
  - Changes and threats to the rights
  - Overall evaluation of rights: successes and failures (on people, resources and the environment)
  - If not, what is the government's view concerning such rights? Have they been implemented elsewhere in other SSF or for larger-scale fishing but not (or not yet) in the case study example?
  - If there are no rights, what determines the number of small-scale fishers in activity?
- Post-harvest activities
  - For the top species in terms of gross landed value, final destination?
  - What is the final price (and hence the mark-up from first landing price)?
  - What value addition activities are carried out – locally, elsewhere in the value chain?

  - What is the nature of employment in the post-harvest activities?
  - What is known of the profitability of the post-harvest activities?
- What are the main threats and opportunities facing small-scale fishing?

3.2 National case studies

Case studies were prepared for a number of countries, although it was not always possible to strictly follow the template or include all requested information. The overriding message that comes through is the general lack of economic data which makes it difficult to evaluate the potential impact of a Blue Growth policy.

Some of the case studies are very detailed and it is not the intention of this section to summarise them but rather to extract some key elements that elucidate the discussion concerning the development of small-scale fishing in a Blue Growth vision. Interested readers are encouraged to read the original case study reports.

3.2.1 Algeria

The case study presents "The national strategy for fishing and aquaculture development: which approach for the sustainable development of artisanal fishing in Algeria?". The full case study report can be found in Appendix 1.

Small-scale fishing is a traditional activity in Algeria which faces several challenges: falling catch rates, pollution and inadequate implementation of current regulations. Given its importance, small-scale fishing occupies an important place in the fishing and aquaculture development plan, entitled "Plan Aquapêche Algérie 2020", the main aims of which are to contribute to a productive economy, ensure food security, create jobs and improve the socio-economic situation of seafarers.

There is no formal definition of artisanal fishing. The case study conceptualizes of this concept in terms of small-scale fishing activities, which include some 61 percent of fishing vessels that are generally less than 9 m long.

Given the relative importance of the activity, the Algerian government is seeking to develop it on a sustainable basis. A first step has been to create a number of secure and protected landing points to regroup small-scale fishing activities. The intention is then to implement a set of 14 management plans on a co-management basis with the landing sites being managed by the fishers themselves.

An important element of the Aquapêche plan is to provide training to improve the organization of small-scale fishers and facilitate their integration into the local economy. The process will be supported by more general economic development at the local level, including agro-fishing, fish-tourism, aquaculture associated with agriculture, tourism and recreational fishing. The aim is to begin a dynamic local development process improving the well-being of local actors and encouraging their sedentarisation.

At present, despite the best efforts of the government, small-scale fishers tend not to belong to collectives. Even in the important Chambers of Fishing and Aquaculture, only 42 percent of small-scale fishers are members.

The benefits of small-scale fishing are perceived and measured in terms of the food produced and the activity itself. It is estimated that fish is the main source of animal protein for the majority of the coastal population. The activity itself produces a gross turnover of around €8.5 million, thereby providing an estimated 20 000 direct jobs and 60 000 indirect jobs, hence acting as the source of 80 000 direct livelihoods and 240 000 indirect livelihoods (and in 92 percent of cases this activity is the sole livelihood source).

The jobs created are not especially well remunerated however. On average, small-scale fishers earn around 1.92 times the minimum wage with those having vessels over 4.80 m long doing somewhat better at 2.81 times compared with 1.68 times for those with smaller vessels. The case study concludes that the activity is relatively profitable but adjusting the returns for risk they do not seem to be particularly high, a result which is typical of small-scale fishing generally, given its accessible nature.

That said, the fact that the number of small-scale vessels is tending to increase suggests that the actors themselves continue to see the activity favourably from an economic viewpoint.

Like other case studies, in Algeria small-scale fishing is perceived to be relatively environmentally friendly due to the passive and selective nature of the fishing gear used. Although there is an element of truth in this assessment, it remains the case that even passive and selective gear can and does overexploit fish resources if enough of it is used. This issue is of particular pertinence given that, as noted by the case study, small-scale fishing remains difficult to control because numerous "invisible" small vessels fish without being considered as active, especially vessels less than 5m long with outboard motors. Recreational fishing adds another layer to this problem. In addition to potential resource problems, these activities also lead to an underestimation of the economic importance of small-scale fishing activities.

3.2.2 Egypt

The case study presents "Small-scale fisheries along the coastal area off Alexandria from Montazah to Al-Anfoushy". A case study summary can be found in Appendix 2.

Some 263 small-scale vessels land about 10 000 tonnes of fish annually in this area. In principle, a limited number of licences are issued and an annual one-month closed season is in effect, but these measures not effectively applied. The main gears used are hook and line, trammel nets and gillnets. Fish may be marketed directly to the consumer or to retailers but most sales are through fish markets or auctions.

The Egyptian case is somewhat unusual compared with the others because small-scale fishing incomes remain high compared with the national average wage. The main reason for this seems to be the fuel subsidy.

The sector has a number of opportunities. The market demand is strong for higher value "luxury" species and, notwithstanding the previous remark, wages earned by the crew are moderate compared with other fleet segments. The establishment of a small-scale fishers association should lead to better resource management.

The main threats facing the sector come from other economic activities in the coastal area. The principal threats are found in competition with tourism (including recreational fishing), particularly in the summer months and the construction of marinas along the coastal area, all of which is increasing pollution with destructive results for the fish habitat and fishing grounds.

3.2.3 Italy: Adriatic coast

The case study presents "Adriatic Sea Snail Fishery Project".

Fishing for the sea snail (*Nassarius mutabilis*) has long been an important small-scale fishing activity in the Adriatic Sea, especially in the central and northern regions (Emilia Romagna, Marche and Abruzzo, in particular). Precise data are difficult to obtain because the species has usually been grouped either with molluscs or gastropods in official statistics.

The fishery is of great interest, however, especially as a potential pilot in a new Blue Growth vision, because the species is exploited only by small-scale fishers who are relatively few in number. Moreover the project has shown that the stock can be forced relatively easily.

The fishery opens on 1 November and runs through to the end of May. As is typical with fisheries managed in this way, catches tend to be relatively great at the beginning of the season and then gradually decline with the activity continuing over the whole period, even in the face of declining catch rates.

A survey was undertaken as part of the case study of fishing activity in Ortona. During 2014–2015 it is estimated that around 24 tonnes of sea snails were landed with a gross landed value of approximately €133 000.

There is no management plan for the fishery and no use right system. Furthermore, there is no limit to the number of fishers, although only small-scale fishers are licensed to undertake the activity. Trawling for sea snails was prohibited in 1996 by an ordinance that also established a minimum legal size of capture (20 mm shell height).

The case study reports on a project that seeks to apply effective techniques in order to restock the sea snail in coastal area of the Abruzzo region where this resource has been greatly diminished, if not completely disappeared, in recent years. The results are very encouraging. The techniques developed have shown their capacity to increase stocks in depleted areas by using collector structures in areas with high sea snail concentrations to collect a large amount of eggs that can be moved to the depleted areas. The project shared its work with the small-scale fishers operating from Ortona, which has increased their awareness of the need to manage the resource. The project also helped educate the fishers about the growth rates of the snails, encouraging them to avoid landing juveniles. One interesting result of the project is that the fishing baskets themselves provide physical support for the sea snails to lay eggs; it would therefore be appropriate to consider including in a Small-Scale Fishery management plan the obligation to leave the fishing devices in the sea at least until the hatching of the gastropods eggs was complete. The collectors used can also help the deposition of other species, such as shellfish and fish, thus also contributing to the reproductive success of other important resources.

Technically the project has been very successful in demonstrating that simple structures can be effectively used to restock sea snails, while requiring minimum effort from the fishers and resulting in no negative impact on either the habitat or other species.

The difficulty, and the big challenge, is to develop appropriate institutional structures to ensure that the technical gains can be turned into sustainable economic benefits. At present there is no management plan for resources related to small-scale fishing and there seems to be a lack of institutional interest in the issue. This is a missed opportunity because even if the value of the fishery is not large, it provides an ideal case to test co-management approaches to small-scale fishing.

This case study demonstrates that, within a Blue Growth context, the main challenge is not in promoting technical innovation, but rather in promoting institutional innovation.

3.2.4 Italy: Sicily

The case study presents the "Gulf of Castellammare, NW Sicily, Mediterranean Sea". The full case study report can be found in Appendix 3.

Prior to 1990, small-scale fishers were restricted to rough seabed areas where trawlers could not operate. In 1990, a law was enacted banning trawling in the inner part of the Gulf of Castellammare, an area of 200 km^2 covering almost the entire continental shelf down to 500 m depth. This created substantial additional space for small-scale fishers to exploit. However, since 2005 enforcement of the ban has become progressively less effective and illegal lightweight trawling has now become a well-established activity that is carried out in plain sight.

This raises an interesting general question concerning the enforcement of any rights granted to small-scale fishers. Because of the widespread nature of small-scale fishing, it is clear that the state will not have sufficient resources to ensure protection of the rights. Therefore, some system of self-enforcement must be devised and implemented. Depending on legal systems, it is possible that a self-enforcement system could be entirely autonomous and enforced privately through the courts. However, such an approach is unlikely to be applicable in many places so some recourse to state services would have to be built into the selfenforcement system. It will be important therefore for representatives of small-scale user rights to work with the state services to develop a *modus operandi.* For instance, such a *modus operandi* could include defining what constitutes admissible

evidence of infractions, what actions the users are authorised to take to defend their rights (e.g. impounding illegal gear), when and under what conditions the state services will intervene and who meets their costs. Such systems will not be easy to design and will come up against cultural norms. In the Gulf of Castellammare, even though trawling is explicitly prohibited by law, fishers are reluctant to inform the authorities charged with enforcement. Such an attitude is probably a result of both traditional reluctance to denounce members of the same community and distrust towards the authorities charged with enforcement of the trawl-ban.

At present, formal harvesting rights do not exit and, legally, the fishing grounds are a common resource. However, artisanal fishers tend to fish in areas close to their own port for reasons of cost, safety and knowledge, together with customary rules like traditional use of those fishing grounds by some fisher families.

Fishing is managed by licence, but vessels can obtain a licence to fish provided they simply meet the administrative requirements. In principle, under EU Multiannual guidance programme (MAGP) objectives, additional licences should entail an equivalent capacity being removed, but this rule does not apply to vessels less than 2.5 gross tonnage (GT), which covers virtually all small-scale fishing units in the Gulf of Castellammare. Experience elsewhere in the world shows that this kind of gap would be the Achilles heel of any management plan.

Landings were estimated using a sample of 15 out of 99 active small-scale vessels.

Although landings included 37 species (or groups), for an average value of €38 000 per vessel per annum, four species represented more than 57 percent of the total value of landings. These were the European hake (18.41 percent of the catch, 22.29 percent of the value), common cuttlefish (9.87 percent, 12.85 percent), swordfish (8.22 percent, 11.62 percent) and red and stripped mullet (8.24 percent, 10.43 percent). This picture has hardly changed over the past ten years.

Among the target species, dolphin fish is almost exclusively exploited by SSF. In fact some small vessels are fully dedicated to catch this species in late summer, taking advantage of fish aggregating devices (FADs) that are sometimes located well beyond the continental shelf.

The Gulf of Castellammare small-scale fishers perceive risks to their activities from sport or recreational fishers who remain essentially unregulated and unmonitored, as well as from illegal "light" trawling that has progressively developed in recent years with the failure to enforce the trawl ban. The magnitude, extent and extractive capacity of recreational fishing is not known but the activity is growing without control and such fishers use very sophisticated electronic aids and fishing gear and in some cases, at least reportedly, sell their catch.

Professional fishing activities in the Gulf of Castellammare are subjected to different management plans for each segment of the fleet. However, these management plans suffer from serious drawbacks, particularly because they are based on fleet segment and geographical area rather than on the fish resource. Trawlers less than 18 m long are regulated through a single Sicilian management plan, whereas trawlers over 18 m are subject to different management plans for each geographical subarea (GSA). The management plan of GSA 10 (central and southern Tyrrhenian Sea) applies in the Gulf of Castellammare beyond 3 nm from the coastline and between 50 and 1 000 m depth. Although the plan contains provisions against trawl fishing in marine protected areas (MPAs), including in essential fish habitats such as nursery grounds, zones devoted to special protection status (essential fish habitats [EFHs])) and sites of community importance (SCIs), the trawl-ban area in the Gulf of Castellammare does not cite the coordinates of the above types of areas where trawl fishing is prohibited.

The maritime territory from the shoreline to 3 nm is regulated by local management plans (LMPs) which are intended to regulate fishing as well as other activities based on more participatory management of the territory, with a more integrative vision and

scope. Unfortunately, the implementation of LMPs was based on the administrative boundaries of the provinces. As a result, the management of the Gulf of Castellammare is split in two different LMPs, each one being under a different LMP and management body. To date, only the western half of the gulf, which belongs to the administrative province of Trapani, has a LMP in place.

Economic data are not readily available and surveys have to be used. The case study again demonstrates the notorious difficulty of obtaining reliable economic data. When official data are used, average net revenue per vessel is estimated to be around €12 000 per annum whereas a smaller more reliable sample reveals an estimate of €32 000 per annum.

Whichever is the correct figure, it seems that small-scale fishing is not an attractive employment proposition. The case study reports that the mean age of small-scale fishers is progressively growing, despite the fact that few requirements have to be met to take up the activity. The case study authors argue that the number of such fishers seems to be determined by the balance between small-scale fishing profitability and the availability of alternative ways of living. And almost all fishers say that it is hard for small-scale fishing to be economically sustainable and perceive it to be even more difficult in the future. In practice, young small-scale fishers typically come from those families where such activity has been traditionally carried out, possibly because the entry barriers are lower (part of the initial investment has already been made) and the cultural aspects of the activity can be adequately transmitted to the newcomer.

This discussion of what determines incomes in small-scale fishing is very important within a Blue Growth strategy. In designing policy, it is crucial to distinguish between income that is earned by those providing labour and wealth that is generated by the fish resource and going to those holding use rights. Policies which seek to "improve livelihoods" generally have the income aspect in mind but such improvements can be hard to achieve because of the inter-linkage with the rest of the economy.

In the Gulf of Castellammare case, it is argued that fishery management has tended to disregard small-scale fishing because of its opacity. It is further argued that small-scale fishing represents, in many ways, the best chance to achieve sustainable fisheries, to provide employment to a larger number of people and to maintain a cultural heritage which risks disappearing.

3.2.5 Spain

This case study presents "Artisanal Fisheries in the Minorca Channel".

In Spain there is no formal definition of artisanal fishing. Instead, the fishing fleet is organised into segments by gear type: bottom trawl fleet, purse seine fleet, bottom longline fleet, surface longline fleet and specific gillnet fleet. The artisanal fleet then comprises those versatile vessels that use a great variety of gears according to the season and the target species: trammel nets, gillnets, combined nets, pots, longlines, handlines, bottom troll lines, stationary pound nets, boat seines, lampara nets and so on.) As a result, although over 70 percent of the artisanal fleet is less than 12 m long, 21 percent of vessels are between 12 m and 24 m and 8.7 percent are over 24 m long, which is perhaps not an intuitive understanding of small-scale fishing.

The national legislation specifies minimum characteristics for a vessel to be considered as artisanal: it must be motorised, over 5 m long and be at least 1.5 GT.

Spain has adopted a Blue Growth strategy with some clear focal points. Artisanal fishing comes under Coastal and Maritime Tourism, therefore integrating fishing activities and tourist spending, specifically in fish restaurants or on travel to small villages in coastal areas to visit the harbour area, into one sector. Indeed, one of the main benefits of artisanal fishing in Spain is considered to be the local selling of fish products to be consumed in restaurants that are visited by tourists.

These benefits depend mainly on ensuring the sustainability of fishing in terms of fish production. Incorporating artisanal fishing into a broader Blue Growth strategy

focusing on the economic growth potential of the sector would not conflict with the current strategy and would almost certainly make it more secure.

The value of artisanal fishing landings from the Minorca Channel is estimated to have been around €3 million in 2014. Almost one third of this value comes from a single species, the spiny lobster (*Palinurus elephas*). This is followed by dolphin fish (*Coryphaena hippurus* – 18 percent of total value), transparent goby (*Aphia minuta* – 11 percent of total value), red scorpion-fish (*Scorpaena scrofa* – 9 percent of total value) and common seabream (*Pagrus pagrus* – 7 percent of total value). So taken together the top five species represent almost 78 percent of the value generated by the fishery. It would seem that management plans focusing on these species would secure a large part of the value of the fishing activities in this area. This would be of particular interest to small-scale fishers because the case study reports that most of the species are exploited only by this fleet. For instance, spiny lobster, dolphin fish, transparent goby and cuttlefish are all exclusively captured by artisanal fishers.

Some management arrangements exist under specific legislation for certain *métiers* focusing on particular species, including spiny lobster. This legislation is largely based on technical management measures for each *métier* including closed seasons, minimum legal sizes, soak times, minimum and maximum depths, technical characteristics of the gears and quotas. At the moment it seems, however, that the only existing management plan is for the transparent goby.

There is no information on the revenues and costs associated with small-scale fishing.

Formal use right systems do not exist. The number of active small-scale fishers is determined by the number of fishing licences issued by the government in line with the Common Fisheries Policy. However, each fisher community or association has a delimited area where their fleet can fish. Most of these fishing areas were delimited long time ago. In a Blue Growth context, it would seem of interest to explore the possibilities for species-based use rights building on the delimited areas.

3.2.6 Tunisia

This case study presents "Characterization of artisanal fisheries targeting European spiny lobster (*Palinurus elephas*) in La Galite archipelago and Esquerquis Benches (north of Tunisia – GSA 12): *Métier* identification and potential impact on benthic communities". The full case study report can be found in Appendix 4.

In Tunisia, the term artisanal fishing does not appear in the national legislation. The artisanal fleet fishing in the Galite and Esquerquis areas is based in either the Bizerte or the Nabeul regions.

Approximately 112 boats, involving 565 fishers, fish from the Bizerte region. The average artisanal vessel is 13.48 m long with a standard deviation of 2.53 m, suggesting that some vessels are substantially longer, perhaps over 20 m. The number of crew per vessel is also large compared with small-scale fishing activities in many other places.

The situation is similar for the artisanal fleet exploiting Galite and Esquerquis areas and based in the Nabeul region. There are 102 boats involving 526 fishers. The average vessel is 12.14 m long with a standard deviation of 1.73, suggesting that the longest vessels may be well over 15 m long.

The case study uses the concept of "métier" as a useful way to provide a link between fishing gear and target species. It identifies 14 different *métiers* in the Bizerte region and ten in the Nabeul region. From a fisheries management viewpoint, *métier* would seem to provide a far better entry point than small-scale fishing. The case study discusses the *métier* of trammel nets targeting spiny lobster in spring and summer in both the Bizerte and Nabeul regions.

Use rights will also be important to help address the ecological impact of small-scale fishing. The Tunisian case study, for example, reports a conclusion that seems to be

common in the case studies that compare fishing practices (trawling, dredging, etc.), that is, that artisanal fisheries do not seriously impact the benthic communities. As a result, this kind of fishing seems to be the best way to exploit the marine resources in a sustainable manner, in terms of the conservation of the benthic communities.

However, the study also reports the declining catch and overexploitation in the spiny lobster fishery. A change in fishing strategy (from traps to trammel nets) in the 1980s was followed by a great increase in spiny lobster landings and in boat numbers (especially during 1990s). The increase in fishing effort has had a negative impact on the biomass, catches and the average size of spiny lobster in Tunisian waters.

Therefore, even if there is agreement on the value of this type of fishing, the issue of the extent of fishing must still be addressed. Although this activity may have the least impact on benthic communities, excessive exploitation can still reduce biomass and catch, as experienced in the Tunisian spiny lobster fishery.

3.2.7 Turkey

This case study presents "A socio-economic analysis of the small-scale fishery in Antalya coast, Turkey".

Fishing activities along the Antalya coast are predominantly small-scale with low levels of capital. There are 723 registered and licensed fishing vessels, of which only six are longer than 12 m. Vessels are mostly owneroperated and very rarely do they have additional crew members.

The average annual salary is TRY 16 556 (approximately US$5 600) per fisher. According to Eurostat, the national minimum wage in Turkey was €425 per month in July 2015, which is €5 100 per annum. At current exchange rates, this would be just over US$5 700.

One reason for the low salary figure may be that the fishers were not full-time. However for the dominant 612 m group, vessels spent on average 160 days per annum at sea, which is close to a full-time occupation, even if the maximum was 270 days.

However, it would appear that, on average, the fishers do not even earn national minimum wage and this is before taking into account the skill and danger involved in fishing. To make matters worse, the fishers do not have adequate levels of social security.

There are no specific management plans for small-scale fisheries and no use right systems. Fishing and boat licences are used but there is no link to the fish resources being exploited.

There is a discernible decrease in the number of fish species from year to year. As a result, white seabream (*Diplodus sargus*), annular seabream (*Diplodus annularis*), common two banded sea bream (*Diplodus vulgaris*), saddled seabream (*Oblada melanura*) and dentex (*Dentex dentex*) are species which are no longer economically viable. The case study blames coastal development leading to increased seawater pollution for this situation but the economically-valuable nature of the species that are affected makes it difficult to avoid the conclusion that overfishing may be at least partly responsible.

3.3 Regional case studies

Case studies were prepared by the FAO regional projects. As with the national studies, it is not the intention here to summarise them but rather to extract some key elements that elucidate the discussion concerning the development of small-scale fishing in a Blue Growth vision. Interested readers are encouraged to read the original case study reports.

3.3.1 CopeMed

The CopeMed case study concerns Morocco and Tunisia and focuses on the "Involvement of fishers in standardized data collection in SSF and development of complementary activities to improve community livelihoods". The full case study report can be found in Appendix 5.

CopeMed phase II is an FAO-executed project providing: "Coordination to Support Fisheries Management in the Western and Central Mediterranean". Within CopeMed, a project focusing specifically on small-scale fisheries called ArtFiMed, "Sustainable development of artisanal fisheries in the Mediterranean Morocco and Tunisia ", was implemented from 2009 to 2011.

The case study reports on the activities of the ArtFiMed project in three small-scale fisheries communities, one in Morocco and two in Tunisia, related to fisheries data collection and diversification of economic activities by the fishers' communities.

The project involved one community of artisanal fishers in Morocco (Dikky) in the Gibraltar Strait area and two in the Gulf of Gabès in Tunisia (Ghannouch and El Akarit). The first phase of the project involved undertaking diagnostics of the fishing activity, poverty profiles and vulnerability of the target communities.

In Dikky there were 50 small vessels (less than 7 m long) employing some 250 fishers. Due to the rocky seabed, fishers use only hooks (long and handlines) to target high-valued species including bluefin tuna, breams and bass.

In Ghannouch, there were around 200 very small vessels (average length 4.2 m) with under half motorized. Each vessel employs two people and targets a range of species. The most common gear is trammel nets but other nets including beach seines are also used.

In El Akarit the focus of the project was the clam (*Ruditapes decussatus*) fishery. The clams are collected on foot from November to May, mostly by women.

ArtFiMed developed and tested a self-monitoring system whereby local fishers or other members of the community would be responsible for keeping track of local fishing activities. The system provides data on fishing effort (in number of daily trips) and information on the fishing techniques, catch, fishing areas and landing prices of the target species.

The precise implementation depended on the landing site. Dikky is concentrated in a small area that is easy to cover. The system was implemented through one local fisher who collected data daily using an agreed protocol at landing: name of the boat; duration of the fishing trip; fishing gears used; species caught; number of pieces/species; weight by species and boat (kg); commercial categories; price and destination (marketing, consumption, others). If the number of active boats did not exceed six boats, then the data collector conducted extensive surveys of all the skippers; if the number of active boats in a day exceeded six, then the data collector proceeded to sample at least 30 percent of the active boats.

The Ghannouch landing zone is very large (about 20 km) so the system was implemented through two wholesalers who provided information for 50 boats landing in two different points, giving a sample of approximately 25 percent of the boats operating in the area. The project built on information already recorded by the wholesalers for their own use, adding other information as needed. These traders provided each day the following information of the boats of which they buy the products: name and register of the boat; engine power; fishing gears used; fishing effort (number of trips); capture by species and boat; buying price; the financial situation of the fishers; notes regarding the loss or purchase of nets and notes on the species sold. This system generates data on active boats, but not on unsold catch.

In Akarit, one woman from the community was trained to carry out daily data collection and transcription into an ad hoc notebook on the following items: fishing effort (number of people practicing the collection); IUU fishing (number of persons practicing the collection during the prohibition period); production in value (only when the seasonal collection is allowed); quantity collected with legal and illegal size; sale price (only when the seasonal collection is allowed); number of traders.

Overall, the system provided information on important parameters such as the numbers of different fishing gears, fishing effort by gear and target species, production by gear (in kg), value (national currency) and catch per unit effort (CPUE).

The principal conclusions of the study were:

- using trained members of the fishing communities provides baseline information on small-scale fishing in the relevant community;
- accurate information and indicators can be generated on all aspects of small-scale fishing activity;
- the results are reliable, comparable between sites and countries and adapted to the calculation of indicators;
- the implementation of this system is very efficient in terms of human and financial costs compared with conventional monitoring systems;
- the participation of fishing communities contributes to strengthening the capacities of fishers and professional organizations and their involvement in the fisheries management process, as a first step towards co-management;
- data and information from the system could be used in subregional working groups for the assessment of shared stocks (e.g. blackspot seabream of the Gibraltar Strait area); and
- replicating the system in other artisanal fishing sites would help to fill the current gaps in the monitoring of the small-scale fishing activity in the Mediterranean and Black Sea.

In addition to the monitoring system, the case study also reports on the issue of improving community livelihoods, which was one of the main objectives of ArtFiMed. The project undertook a series of initiatives seeking to develop new community activities that would generate additional incomes in the selected sites in Morocco and Tunisia.

These initiatives included:

- developing the capacity of small-scale fisherwomen in El Akarit on traditional weaving and hand embroidery;
- developing the capacity of women of the small-scale fishing communities in Ghannouch and Akarit in traditional tapestry;
- developing the capacity of women in Ghannouch to repair fishing gear;
- developing capacity of women in Ghannouch to process surplus fish products;
- supporting the creation of a small-scale fisher organization in Ghannouch resulting in a local organization that is recognized and very active at the national and international level;
- supporting the creation of a small-scale fisher organization in Dikky for the equipping, managing and monitoring of winches;
- supporting the organization of the women in the small-scale fisher community in Dikky; and
- supporting the creation of a beekeeping organization for fishers in Dikky – this organization ran into difficulties with the ending of the ArtFiMed support, coupled with low production and bee mortality.

All of these initiatives are laudable but they raise some questions. First, why is the small-scale fishing community felt to be especially deserving of this kind of support compared with other non-fishing members of the same community? Second, in the context of Blue Growth, the main question is how to generate an economic surplus from the exploitation of the fish resource that can provide a sustainable investment fund for other economic activities within the community.

3.3.2 EastMed

The EastMed study concerns "A subregional analysis of the socioeconomic situation in the eastern Mediterranean fisheries". The study area covers Cyprus, Egypt, Greece, Gaza Strip and West Bank, Italy (GSA 19), Lebanon and Turkey.

The total fisheries production in the region in 2012 was estimated at 581 thousand tonnes of seafood worth US$1.6 billion. The fishing fleet directly employed 80 017 people on a full-time basis, working on board 40 436 vessels. The production of the small-scale fishing fleet represented around 42 percent of the total fisheries production value and was worth US$680 million, despite accounting for only 21 percent of the

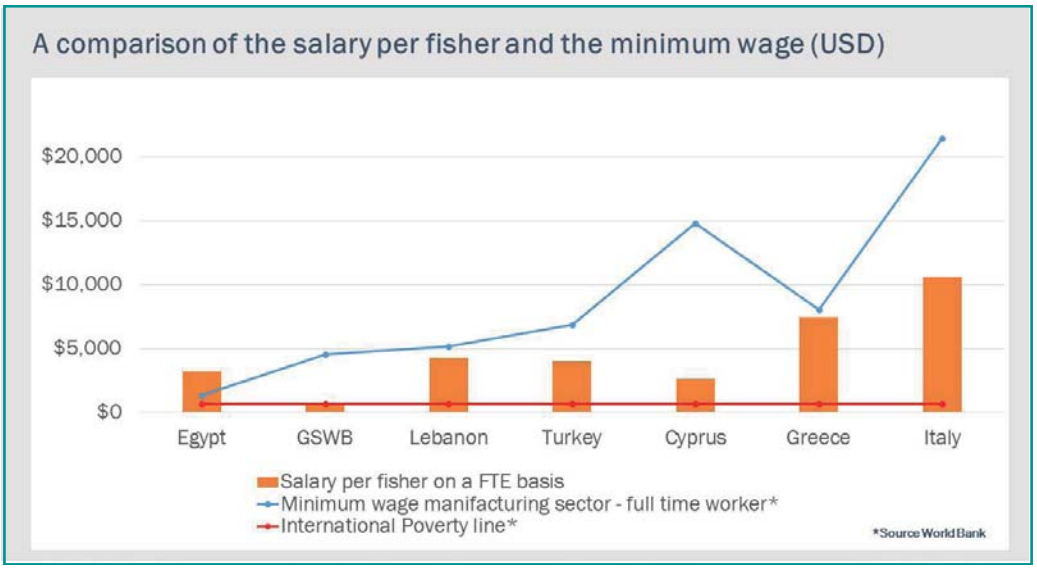
total landed weight (120 000 tonnes). This fleet directly employed 38 828 people on a full-time basis (48.4 percent) working on board 34 457 vessels (85.2 percent).

According to the data presented in this report, the value added generated from fisheries made up about 0.05 percent of the total GDP generated in the region, with the highest value registered in Greece (0.08 percent) and the lowest in Italy (0.03 percent). The value added is calculated discounting from the output (value of production) all the intermediate inputs (all the costs of the activity excluding the labour and capital). Hence, the harvesting considered from a merely economic point of view, provided a limited contribution to the GDP of the countries, although data from Egypt includes only the Mediterranean production while data from Italy and Turkey are at the national level. The data, however, ignores the economic contribution of industries operating in association with the fisheries without being a part of it, including, maintenance of vessels, processing plants and equipment, construction including shipbuilding, manufacture of fishing gear and fish processing.

These factors suggest that the macro-economic impact of the fishery sector as a whole might be higher than what is reported in the official statistics.

The standard approach to calculating GDP also belittles the contribution that depends on healthy fish stocks. From a policy perspective, rather than asking what GDP is gained, it would seem more relevant to ask what GDP what would be lost in their absence.

The fishery sector employs less than 1 percent of the labour force, although the fishery sector is an important source of income and employment in coastal communities. Generally speaking, however, the jobs created in the small-scale sector are relatively poorly paid, as is illustrated by the following graph showing salary per fisher in small-scale fishing compared with the national minimum wage.



3.3.3 AdriaMed

The AdriaMed study is entitled "Seasonality of set gears and eco-ethology of the target species: a comparative approach in the Adriatic Sea".

A previous study carried out by the FAO AdriaMed Working Group on Small-Scale Fisheries identified the major knowledge gaps and priorities for this sector in the Adriatic Sea[6]. The lack of appropriate and complete statistics was one of the main constraints for most of the Adriatic coastal countries (few countries have routine monitoring programs in place). The main aim of the present study is to increase knowledge of the seasonal dynamics of the set gears used by the Adriatic Working Group on Small-Scale Fisheries through the collection of data on target species, landings, fishing effort, composition of catches, length-frequency distributions of target species and economic value of landings.

The Adriatic Sea is semi-enclosed and divided into two GSAs: the northern (GSA 17), which is the shallowest, and the southern (GSA 18), which is the deepest. The western coast of GSA 17 is flat and mostly sandy, whereas the eastern coast and the western coast of GSA 18 is generally steep and rocky, including sensitive marine habitats such as seagrass meadows and coralligenous. The central and northern Adriatic Sea has an extended continental shelf and eutrophic shallow waters, whereas the southern Adriatic is characterised by a narrow continental shelf and a marked, steep continental slope.

The Adriatic Sea acts as a dilution basin, collecting a third of the freshwater flowing into the Mediterranean. The coastal areas of the Adriatic play an important role for the stocks, including priority habitats for commercially important species as nursery and spawning grounds. Due to the pronounced seasonal fluctuations in environmental forcing, coastal waters show a high seasonal variation in bottom temperature, ranging from 7 °C (winter) to 27 °C (summer). The thermal variability of deeper areas is very much reduced with values ranging between 10 °C (winter) and 18 °C (summer) at a depth of 50 m[7].

These characteristics of the Adriatic Sea strongly influence the activities of the small-scale fishery, in terms of target species, fishing gear and seasonality. Therefore, the Adriatic SSF is a highly dynamic sector able to adjust the fishing techniques (i.e. changing gears and/or fishing areas) according to the natural fluctuations in the target species. This is due to the fact that fishers are likely to change the gears over the year following the seasonal occurrence and eco-ethology of the different target species. Indeed, in the Adriatic Sea many different types of set gears (i.e. including different varieties of gillnets, trammel nets and traps) are currently used by SSFs to catch a pool of target species inside the coastal areas over the year. The fishing activity of Italian SSFs using set gears is mainly carried out inside the 3 nm limit because of spatial conflicts with trawling, while on the eastern side of the basin it is mainly carried out amid the islands.

The overlapping of the spatial distribution of spawning and nursery areas with the fishing grounds is evident when analysing the size frequency distribution of set gear catches. Croatian small-scale fishers mainly target spawners of hake, sole and cuttlefish using gillnets, trammel nets and traps, respectively. Conversely, Italian fishers include

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[6] **Cobani, M., Bojanić Varezić, D., Dragičević, B., Dulčić, J., Gambino, M., Giovanardi, O., Grati, F., Grgičević, R., Ikica, Z., Joksimovic, A., Kolitari, J., Kraljević, M., Marčeta, B., Matić-Skoko, S., Pallaoro, A., Sabatella, E., Stagličić, N., Švab, J., Tutman, P., Vrgoć, N., Arneri, E., Ceriola, L., & Milone, N.** 2013. Small-scale fisheries in the Adriatic Sea: information gaps at biological, socio-economic and environmental level. In A. Srour, N. Ferri, D. Bourdenet, D. Fezzardi & A. Nastasi, eds. First Regional symposium on sustainable small-scale fisheries in the Mediterranean and Black Sea, Malta 27-30 November 2013, pp. 71-82. Rome, FAO. 519 pp. (also available at http://www.fao.org/3/a-i4861e.pdf).

[7] **Russo, A., Carniel, S., Sclavo, M. & Krzelj, M.** 2012. *Climatology of the Northern–Central Adriatic Sea*. Modern Climatology. Book 8. . http://digitalcommons.usu.edu/modern_climatology/8

a large portion of juvenile common sole and cuttlefish in the catches of gillnets and trammel nets, respectively. In addition, data analysis revealed that in each country the SSFs concentrate the fishing effort during the spawning or recruitment phases of the target species and therefore even the landings show the highest values in these periods. Analysis of catch composition confirmed the great species selectivity of the set gears, even though kept bycatch often made up a discrete portion in biomass, according with the fact that the Mediterranean fisheries, also when targeting only a few species, commonly include a fraction of bycatch, which can contribute to the total income.

This type of ecological knowledge is becoming increasingly important to help achieve the sustainable exploitation of commercially important marine populations through the protection of critical habitats, which play a key role for population processes such as spawning and recruitment. In the Mediterranean Sea, a semienclosed highly biodiverse basin where more than 90 percent of the harvested stocks are overexploited mostly due to an un-selective exploitation pattern and opportunistic fishery behaviour, the protection of the main nurseries of commercial species is increasingly viewed as a major step toward the achievement of more sustainable exploitation patterns. The study believes that the implementation of spatial management measures to protect areas where juveniles congregate during their first year of life has the potential to substantially improve current fisheries exploitation patterns.

In conclusion, the study points out that even if set gears have low-medium impact on the environment (i.e. less destructive than towed gears) and on the resources (i.e. higher selectivity compared with towed gears), they are commonly used in coastal fishing grounds including ecologically-important habitats for marine fish as spawning areas, nursery grounds, as well as feeding grounds and migratory pathways. On this basis, fishers play a central role in sustainable fishing and should act not only as resource users, but also stakeholders interested in contributing to the protection and safeguarding of natural resources.

3.3.4 MedSudMed

This study presents a comparative analysis of small-scale fisheries in the Straits of Sicily. The study area concerns:

- Kerkennah Islands which are located off the Gulf of Gabès, Tunisia and are a managed fisheries area;
- Malta Islands, which are located in the eastern part of the Strait of Sicily and are a managed fisheries area; and
- Egadi Islands, which are part of the largest MPA in European seas. They comprise the islands of Favignana, Levanzo, Marettimo and islets of Formica and Maraone.

The management systems appear to be rather top-down but the project concludes that: “The decisionmaking process in all the investigated areas is characterised by a system that can transparently address tradeoffs among the management objectives of the different groups of stakeholders and/or local communities”.

A great variety of management measures are used in the different islands including licensing, minimum landing sizes, restricted areas, closed seasons and so on.

In the Egadi, Kerkennah, Maltese islands both managers and fishers acknowledged that a participatory approach is the only possible approach to ensure healthy seas and the socio-economic well-being of coastal communities.

The Egadi, Kerkennah, Maltese islands areas can be considered advanced laboratories, in which the co-existence of many institutional entities and legislative rules, together with proper knowledge of the marine ecosystem and fishing activity represent the baseline for the implementation of management plans under the Blue Growth perspective.

4. FISH RESOURCES AND ECONOMIC GROWTH

Small-scale fishing raises many complicated policy issues, so attempts to simplify and identify the key policy choices are fraught with danger. However, in short, policy-makers face two broad choices in how to address their small-scale fishing sectors in a Blue Growth context: either they can continue with current policies and essentially wait for growth in other sectors of the economy to resolve the economic problems of small-scale fishing or they can see the exploitation of fish resources by small-scale fishers as part of the solution. The fact that the question is posed as an either/or does not mean that the same policy has to be adopted everywhere at the same time. If policy-makers find it of interest to include small-scale fishing into the Blue Growth agenda, then most likely it will be appropriate to develop the situation gradually.

In order to make informed policy choices, it is necessary to develop an understanding of how fish resources relate to economic growth. As was discussed in Section 2, there has been a tendency in work on fisheries policy to re-define economic growth away from the standard definition of GDP. The problem with this approach is that it then becomes difficult to dialogue with the macroeconomic institutions and at least partly as a result fisheries, especially marine capture fisheries, tend not to be seen as a potential source of economic growth.

This is a regrettable conclusion to reach because when exploited in an appropriate fashion, fish resources do indeed have the potential to make a sustained contribution to GDP, far in excess of their current performance. The analysis of this contribution is not straightforward due to the renewable, but finite, nature of fish resources. Moreover, these resources are naturally variable, sometimes highly so. These resource characteristics have important implications for fisheries policy in a Blue Growth vision – for instance it is difficult to predict the precise contribution from one year to the next and, as a result, setting targets is a dangerous exercise, especially because the contribution may rise or fall as a result of resource variability rather than anything to do with policy.

These issues would have to be discussed in detail in each policy situation. This section highlights the key issues and implications of moving towards a growth-oriented fisheries strategy.

Such a strategy has to begin with the fish resources because it is this natural capital that will determine the contribution that the fishing sector can make to economic growth. The key element is the resource rent. The main contribution to sustainable economic growth will come from the investment of rents in productive activities in the economy as a whole. For this reason, these rents may be called the "investable surplus".

This section discusses how fish resource exploitation can generate this surplus. It then considers the implications for small-scale fishing.

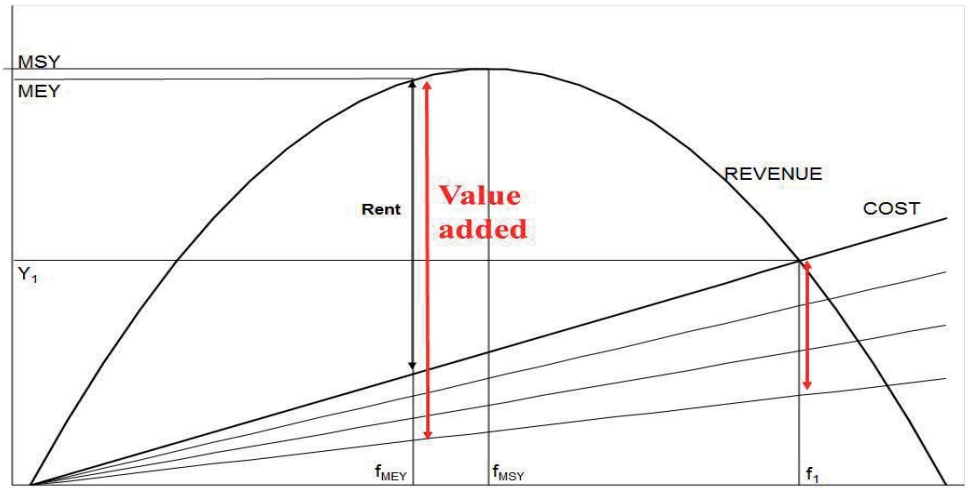
4.1 The investable surplus from fish resource exploitation

The standard bioeconomic model is presented in Diagram 1. The curve labelled "Revenue" comprises the sustainable yield (SY) curve for the fishery, multiplied by the price of fish. Assuming that the price of fish does not change with the quantity landed, the shape of the revenue curve is determined by the SY curve, as is the case here. (Note: the SY curve presented here emerges from a so-called Schaefer model. However, the general shape of the SY curve is very similar regardless of the kind of model used, especially on the left hand side, i.e. effort levels less than maximum sustainable yield (MSY), which is the one most of interest for policy.)

The cost curve shows the cost of producing fishing effort on the assumption that each (standardised) unit of fishing effort costs the same so that cost increases linearly with the amount of effort.

If the fishery is exploited under conditions of free and open access, then fishing effort will increase to f_1. This gives one benchmark against which to compare the performance of fisheries policy.

DIAGRAM 1



Exploiting the fishery at the point of Maximum Economic Efficiency (or maximum economic yield – MEY) will maximise the sustainable wealth generated by the fish resource. This gives a second benchmark against which to assess the performance of policy measures.

4.1.1 The free and open access benchmark

Under free and open access conditions, the fish catching sector is essentially left to its own devices in terms of the level and composition (labour versus capital) of fishing effort deployed.

The result will be that fishing effort will expand to the point f_1 shown on Diagram 1. At this point, revenue equals cost for the fishery so that the fish resource is producing zero net wealth. However, some returns will still be earned by the factors of production involved so that the fishery will still produce some value added.

To explain this more fully, Diagram 2 breaks down fishing costs so that a GDP analysis can be carried out from a value-added perspective. (There are a number of theoretically-equivalent ways of calculating GDP. One method is to deduct the costs of intermediate goods consumed in the production process and then sum the value added. Diagram 2 below uses that approach.)

Assuming for simplicity that all fishing costs are proportional, then as fishing effort increases so does the amount that enterprises use in terms of intermediate inputs as does the amount that they pay out in taxes, salaries and profits. The latter element is often a source of confusion but the idea is simple. If a fishing enterprise (or any enterprise for that matter) does not earn a "normal" level of profit then it will not be able to continue functioning in the long term so the payment of this amount represents a cost.

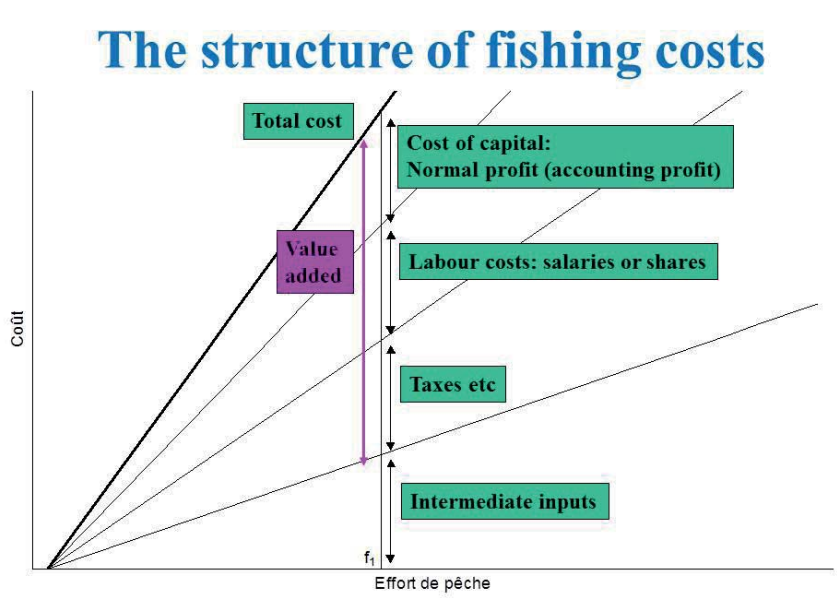
Each of these elements is a component of value added.

Referring back to the Diagram 1 above, at the open access level, the fishery will produce a small amount of value added. And enterprises will just earn normal profits.

A certain amount of employment in fish catching will be created as a result of the fish resource exploitation. But it is important to note that fishing enterprises do not set out to maximise employment; they seek to maximise profit and they will do this by using the least-cost combination of labour and capital in order to achieve a given revenue.

Those employed will also achieve a certain level of livelihood as a result. The level of such livelihoods will depend partly on results in the fishery but in the long run will be determined mainly by the alternatives available elsewhere in the economy. For a

DIAGRAM 2



comparable set of skills and risks, workers will not wish to work in fishing for less than they can obtain elsewhere and enterprises will not wish to pay them more.

What then is the problem with free and open access? Problems can be identified on 2 levels. First, in the case shown above, fishing effort is well above the level necessary for the maximum sustainable yield. This will mean that the size of the fish resource has been reduced to a relatively low level, increasing the risk of stock collapse. An open access fishery does not have to be in this condition, it depends on prices and costs, but experience around the world suggests that a large and increasing proportion of the world's fisheries are well described by Diagram 1.

The second problem is economic. At an effort level of f_1, the fish resource is failing to deliver its economic potential. This brings us on to the second benchmark.

4.1.2 The economic efficiency benchmark

If the fishery is exploited at an effort level corresponding to f_{MEY}, then Diagram 1 shows that a substantial resource rent can be generated.

The notion of resource rent is difficult to grasp. One difficulty is that in practice the resource rent potential of a fishery is not a fixed amount but something that can be increased through time. This raises the question of incentives for the private sector to make the investments necessary to achieve such increases.

For the moment, note from Diagram 1 that as effort is reduced from f_1 towards f_{MEY} a vertical gap opens between revenue and cost. This gap measures the sustainable resource rent that the fishery is capable of generating at each effort level. (In passing, the fact that there are sustainable outcomes associated with all effort levels, at least over a substantial range of effort, rather calls into question the notion of "sustainability" as a guide to fisheries policy.)

This rent arises because the fish resource is valuable and renewable natural capital that is capable of earning a return on a sustainable basis. The difficult challenge for fisheries policy is to identify instruments that will allow this return to be generated sustainably. From the diagram, it is clear that implementing such instruments will substantially increase the gross value added (i.e. the gross contribution to GDP) from fish harvesting.

In order to generate sustainable rents, suitable management instruments must be sought at the level of each fishery management unit – there is no one-size-fits-all solution.

Note that the f_{MEY} level of exploitation should also ensure that ecological objectives concerning the exploited fish stock itself are met as an outcome although other ecological goals (e.g. protecting non-commercial species or habitat) may require specific measures.

The way in which the fish resource rent will materialise itself depends on the management instruments used. In general however it will either appear as increased fishing enterprise profits (capitalised into the price of fishing rights if these are transferable) or as royalties. As mentioned the split between these two requires careful consideration because of the dynamic nature of resource rents. This question is a key part of policy analysis.

The resource rent share of value added is crucial for the contribution made by fish resource exploitation to economic growth because it represents the **investable surplus** that can be used to finance opportunities in other sectors of the economy. A crucial part of fisheries policy analysis is to work not only with the Fisheries Ministry but also with other Ministries, especially Finance, Economics and Planning, to build understanding of the particular nature of the GDP contribution that the exploitation of fish resources can make. Often, too much focus is placed on the size of the contribution and too little on the financing element related to this sustainable (i.e. renewable) investable surplus.

4.1.3 The key role played by fish resource rents

The discussion of the two benchmarks and of Diagram 1 draws attention to the crucial role played by rents. Because the fish resource is natural capital, it is capable of producing wealth in the form of rents on a sustainable basis. But the impact of this wealth will depend on the institutional arrangements in place.

If the fishery is exploited under free and open access conditions (or management arrangements which are similar), then the fish resource wealth will systematically undermine policy measures. For instance, measures taken to improve the technical efficiency of the fleet will reduce fishing costs, which will increase profits in the short term. These increased profits will then attract increased effort driving the fishery back to the revenue=cost equilibrium at a higher effort level and with increased overexploitation of the fish stock (assuming it was overexploited to begin with).

Policy measures which make sense when judged on their own terms will have perverse impacts.

The most important point is that even if, for some reason, policy-makers are not interested in generating the potential wealth of the fish resource, they cannot ignore its impacts. The key to successful fisheries policy is to design measures in such a way that they are not undermined by wealth effects. This is easier said than done however.

In the context of Blue Growth, rather than being a challenge for fisheries policy, fish resource wealth is the principal opportunity. The issue is to design policy measures and instruments that will maximise this opportunity. The economic efficiency benchmark will give some idea of the potential although as mentioned fish resource rents are dynamic. It can be very difficult to predict how fishers will react if institutional arrangements are reformed to give them incentives to maximise wealth. However, experience from around the world suggests that they usually find ways to do better, often much better, than predicted by the economic efficiency benchmark. This benchmark might best be interpreted then as a minimum standard, given current exploitation arrangements.

4.2 Small-scale fishing

It will be noted that the analysis in Section 4.1 is developed in terms of the fish resource. How, then, do these issues relate to small-scale fishing?

Two broad cases suggest themselves: the case where a resource is exploited solely by small-scale fishers and the case where small-scale fishers are only part of the broad exploitation system, along with other fishers.

The first case is the easiest to deal with at least in principle. The main requirement is to devise appropriate use right systems that will give fishers as a group the incentive to exploit the resource(s) under their control in an optimal manner. The best examples tend to come from shellfish fisheries due to the sedentary nature of the resource.

In the Mediterranean, the case study of the Adriatic sea-snail suggests one fishery that could be piloted on this basis.

An example from outside of the Mediterranean concerns the Isle of Man scallop fishery. In Ramsey Bay, the fishery has been leased to the fisher producer organization leading to a revolutionary change in their behaviour. They tendered the fishing activity among themselves with only a few vessels being paid to fish on behalf of the group which then shares the profits through the form of a dividend paid to each member of the organization.

In the second case, the main issue is to devise use right systems that can allow small-scale fishers to function successfully along with larger-scale users of the same resource (and vice versa).

5. DISCUSSION OF THE CASE STUDIES

It is clear both from the case studies and from more general considerations that small-scale fishing is not conceptually different from other types of fishing. The factors that determine the contribution that fishing might make to economic growth will therefore be the same for small-scale fishing as for other kinds.

Therefore, if small-scale fishing activities are to contribute to Blue Growth, the issue is how to ensure that they contribute to the generation of fish resource rents and hence to the investable surplus.

Addressing this problem raises many policy issues. A first problem concerns the definition of small-scale fishing. The case studies agree that there is no unique definition but the understanding is always in terms of the physical activity of fishing. The Italian case study uses a definition of vessels less than 10 m in length, whereas the Turkish one concerns vessels between 4 m and 12 m. In Spain, there is no formal definition but the understanding of artisanal fishing relates more to the versatile nature of the fishing undertaken. As a result, although over 70 percent of the artisanal fleet is less than 12 m long, 21 percent of the artisanal fleet is between 12 m and 24 m, while 8.7 percent is over 24 m long, resulting in an understanding of small-scale fishing which is perhaps not intuitive. In Tunisia, the term artisanal fishing does not appear in the national legislation. In the Tunisian case study, the average artisanal vessel is 13.48 m long with a standard deviation of 2.53 m suggesting that some vessels are substantially longer, perhaps over 20 m.

However, resource rents depend on the fish resource so there is a need to link the activity to the resource. Small-scale fishing alone is not a sufficient policy entry point if the objective is Blue Growth.

There is a need to link activity to the resource for another important reason. The case studies note that small-scale fishing is a highly dynamic activity able to adjust the fishing techniques (i.e. changing gears and/or fishing areas) according to the natural fluctuations of the resources. However, this versatility is a double-edged sword. It is certainly a potential advantage of the small-scale sector but it can also be a risk factor. The problem is that if the fishers have no particular relationship with a defined set of species, their versatility means that as one species is overexploited, they can simply move on to another one.

The Turkish case study for instance reports a discernible decrease in the number of fish species from year to year. As a result, white seabream (*Diplodus sargus*), annular sea bream (*Diplodus annularis*), common two banded sea bream (*Diplodus vulgaris*), saddled seabream (*Oblada melanura*) and dentex (*Dentex dentex*) are species which are no longer economically viable. The case study blames coastal development leading to increased seawater pollution for this situation but the economically-valuable nature of

the species that are affected makes it difficult to avoid the conclusion that overfishing may be at least partly responsible.

Defining small-scale fishing in such a way as to give the fishers a clear link to and interest in the conservation of particular fish stocks seems an important step towards a Blue Growth contribution.

The concept of "métier" may be useful here because it provides the link between fishing gear and target species. The Tunisian case identifies 14 different *métiers* in the Bizerte region and ten in the Nabeul region. From a fisheries management viewpoint, *métier* would seem to provide a far better entry point than small-scale fishing. The case study discusses the *métier* of trammel nets targeting spiny lobster (*Palinurus elephas*) in spring and summer in both the Bizerte and Nabeul regions.

The link that it is appropriate to make will depend on the resource. In some cases, particularly when sedentary species are involved, it may be possible to define a genuine small-scale fishery – for instance, in the case of some shellfish fisheries only small-scale fishers may be involved. These fisheries may offer the best opportunity to test Blue Growth policies in the case of small-scale fishing.

More generally, small-scale fishers will be only one group exploiting a resource, or an assemblage of resources, so the need will be to bring these fishers within a broader management plan for the resource in question.

In each case, the crucial element will be to give the fishers an incentive to fish in such a way that the resource rent emerges. The generation of such an incentive will necessarily involve the implementation of use rights of some kind, although there is a very wide choice in the design of rights systems. An important issue will be to decide who holds the use rights because this will influence both the size of the investable surplus that can be created and who makes the decisions concerning investments.

The case studies make clear that the typical situation at present is an absence of any formal rights. Some informal rights may exist related to location and customary rules based on traditional use but these are generally weak.

Even in the case of sea snails, the case study on the Adriatic reports that no use right system exists. The smallscale segment is the only one that can exploit the sea snail resource but there are no limits on the number of fishers that can access the resource. Management is limited to a minimum legal size of capture and a prohibition of fishing with trawls. Local maritime authorities sometimes add specific fishing periods and catch quantities.

Experience in fisheries based on sedentary species elsewhere has shown that the introduction of use rights can radically alter the way in which the resources are exploited and increase the economic benefits.

Once effective use rights systems are in place, other investments may be made throughout the value chain to increase the fish resource rents. Undertaking these elements of policy in the correct order is essential; an investment in the value chain without effective use rights is highly likely to lead to further overfishing as fishers respond to increased prices and profitability.

Use rights will also be important to help address the ecological impact of small-scale fishing. The Tunisian case study, for example, reports a conclusion that seems to be common through the case studies, that is, compared with other fishing practices (trawling, dredging, etc.), the artisanal fisheries do not seriously impact the benthic communities. As a result, this kind of fishing seems to be the best way to exploit the marine resources in a sustainable manner, in terms of the conservation of the benthic communities.

However, the study also reports the declining catch and overexploitation in the spiny lobster fishery. A change in fishing strategy (from traps to trammel nets) in the 1980s was followed by a great increase in spiny lobster landings and in boat numbers (especially during 1990s). The increase in fishing effort has had a negative impact on the biomass, catches and the average size of spiny lobster in Tunisian waters.

So even if there is agreement on the value of this type of fishing, the issue remains as to its extent. Although it may have the least impact on benthic communities, excessive exploitation can reduce biomass and catch as experienced in the Tunisian spiny lobster fishery

The inclusion of small-scale fishing within a Blue Growth strategy will also require a re-think of the appropriate success indicators. At present, most emphasis tends to be placed on within-fishery indicators, such as the quantity and value of fish production and the number of fishing and fishing-related jobs. There will be a need for additional indicators to measure the contribution of the sector to economic growth and the impact that this has on incomes and jobs outside of the fishery sector.

A Blue Growth strategy would represent a break with the currently dominant strategic approach. Although there may be some variation, broadly-speaking countries have tended to view the inherent wealth of the fish resources as a means to create fishing employment and livelihoods as a kind of social safety net. Economically, the result is that earnings tend towards the minimum wage (adjusted for the risky nature of fishing) and there will be nothing left over for investment in other productive areas of the economy – i.e. no investable surplus is produced.

The case studies demonstrate that there is a general absence of reliable economic data. The Italian case-study for instance reports that official data suggest average net revenue per vessel of around €12 000 per annum whereas a smaller more reliable sample reveals an estimate of €32 000 per annum.

In Algeria, it was estimated that the crew share is about 1.6 times the minimum wage for smaller vessels (less than 4.8 m) and 2.8 times for vessels over 4.8 m long.

The Turkish case reports an average annual salary per fisher of TRY 16 556 (about US$5 600). According to Eurostat, national minimum wage in Turkey was €425 per month in July 2016, which is €5 100 per annum. At current exchange rates, this would be just over US$5 700.

One reason for the low figure may be that the fishers were not full time. However for the dominant 6-12 m group, vessels spent on average 160 days per annum at sea which is close to a full-time occupation, even if the maximum was 270 days.

However, it would appear that, on average, the fishers do not even earn national minimum wage and this is before taking into account the skill and danger involved in fishing. To make matters worse, the fishers do not have an adequate level of social security.

The EastMed case study shows the generally low level of earnings across a range of countries suggesting that it is the typical result.

As a group the case studies highlight the key areas where reform of fisheries policy would be needed in order to move towards a Blue Growth strategy which includes small-scale fishing.

6. CONCLUSIONS

The recent emergence of the concept of Blue Growth has focused attention on the link between fish resource exploitation and economic growth. To date, marine capture fisheries have not been seen as important within a macroeconomic vision of Blue Growth, as they seem to offer little in terms of additional GDP or employment. In fact, however, the economic analysis of fish resources as natural capital shows that they are capable of making a perennial contribution to the investable surplus which is at the heart of economic growth and development for all economies.

It is important to estimate the size of this potential surplus because it will condition the policy approach that it is worth taking. In some cases, fish resources may be so valuable as to be of national significance but generally-speaking in the Mediterranean and Black Sea fisheries, the scale of the resources makes them of more interest at the coastal, local and individual levels.

One important conclusion that often seems to be overlooked is that the surplus which can be generated depends on the fish resource. Nobody doubts the very hard work undertaken by fishers, but it is not the hard nature of this work that generates the wealth. In fact, the challenge is to get fishers as a group to work less hard so that fish resources can recover and generate the totality of their wealth potential.

It seems important to stress this conclusion in the context of a conference focusing on small-scale fishing. Such fishing is one kind of exploitation of the resources but the value generated by that fishing depends on the underlying value in the resource just as much as it does for any other kind of fishing. There is no conceptual difference between different kinds of fishing which is why, as shown by the case studies, it is so hard (or arbitrary) to define small-scale fishing.

One big challenge for fisheries policy therefore is to develop a much stronger linkage between small-scale fishing and the resources that it exploits. The case studies often see as an advantage the fact that small-scale fishers are versatile, shifting from resource to resource as conditions change. However, unless it can be organized within an appropriate framework, this versatility will undermine attempts to manage fish resource exploitation in a Blue Growth vision. Such a framework requires the development of innovative use rights systems.

In discussing small-scale fishers within a Blue Growth strategy, the implications for existing strategies must be considered. The best strategic choice may vary by location. But it is clear that small-scale fishing activities in the Mediterranean and Black Seas have an important potential role to play within a Blue Growth framework. Realising this role will require a change in the vision of such activities linking them firmly to the resources that they exploit. Gradual reform will then be needed in the way in which the fishing activities are managed with the implementation of use right systems capable of generating resource rents.

APPENDIX 1. La Stratégie nationale de développement de la pêche et de l'aquaculture: quelle démarche pour un développement durable de la pêche artisanale en Algérie?[8]

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Mots clés: Pêche artisanale, développement durable, stratégie, démarche, Méditerranée, Algérie.

RÉSUMÉ

Le présent article se veut de contribuer au développement durable de la pêche artisanale et sa promotion, en mettant d'abord en exergue la stratégie adoptée par l'Algérie en faveur d'une croissance bleue, en montrant ensuite le degré de concordance des démarches entreprises avec les directives volontaires de la FAO visant à assurer la durabilité de la pêche artisanale dans un contexte de la sécurité alimentaire et de l'éradication de la pauvreté.

A travers la présentation et l'analyse de l'expérience algérienne, nous voudrions mettre en exergues aussi bien la pertinence des démarches entreprises que les difficultés rencontrées quant à l'implémentation en matière de stratégie. Une analyse qui permettrait d'identifier l'activité pêche artisanale en Algérie, ses caractéristiques techniques, économiques et sociales en mettant en évidence ses atouts et ses faiblesses. Une identification qui pourrait servir de base pour développer et organiser le métier, valoriser ses produits, réduire les conflits d'usage par la concertation et améliorer la situation socioéconomique des pêcheurs «artisans».

En définitif, il est attendu de cette recherche la valorisation et la vulgarisation, à l'échelon local et méditerranéen, de la démarche consultative, participative et de concertation arrêtées dans la mise en place de la stratégie nationale de la pêche et de l'aquaculture en Algérie.

[8] Cette étude a été réalisée à partir de la valorisation des différents travaux et études de terrains et rapports d'experts, du MPRH, de la FAO et du PNUD. Notamment la valorisation des résultats de l'étude socioéconomique « Projet d'appui à la formulation de la stratégie nationale de développement de la pêche et de l'aquaculture 2015/2020 », PNUD/FAO.

[9] Centre National de Recherche et de Développement de la Pêche et de l'Aquaculture.

1. INTRODUCTION

Depuis plusieurs années, la pêche dans le monde est confrontée à une crise sans précédent due à la surexploitation progressive des stocks de poissons et à la dégradation de l'environnement. La productivité commerciale des océans et des mers se trouve à son plus bas niveau; 75 pour cent des plus importantes zones de pêche du monde sont surexploitées, y compris dans les pays méditerranéens. Partout dans le monde, autant les écosystèmes marins que les populations souffrent des conséquences de la pêche non durable (FAO, 2014; AGTER, 2012).

En Algérie, la pêche artisanale est une activité ancestrale; elle représente un legs d'un patrimoine historique et culturel. Avec plus de 1280 km de côtes, l'Algérie est en effet l'un des pays méditerranéens où la pêche constitue une activité incontournable. Toutefois, depuis quelques années, cette activité est confrontée à plusieurs défis: baisse des rendements, pollution et insuffisances en matière d'application de la réglementation en vigueur (contrôle et suivi). C'est pourquoi l'Algérie s'attelle aujourd'hui, à l'instar de nombreux pays, à protéger son environnement marin par des actions visant à améliorer le système d'exploitation et de gestion des ressources halieutiques, tout en se basant sur les principes internationaux de croissance bleue.

Pour ce faire, le Ministère de l'Agriculture, du Développement Rural et de la Pêche a mis en place, dans le cadre d'une approche participative, un plan de développement de la pêche et de l'aquaculture, le «Plan Aquapêche Algérie 2020», en accordant un intérêt particulier à la pêche artisanale.

Découlant d'une démarche sectorielle prospective à l'horizon 2030, ce plan Aquapêche a été accompagné et appuyé par les services techniques du Programme des Nations Unies pour le développement (PNUD) et de la FAO.

Les objectifs prioritaires du plan Aquapêche 2020 est de contribuer à une économie productive, créer de l'emploi, améliorer la situation socioéconomique des gens de la mer et contribuer à la sécurité alimentaire.

Le but recherché à travers la présente étude de cas est de présenter l'expérience algérienne en mettant en exergue aussi bien la pertinence des démarches entreprises que les difficultés rencontrées quant à l'implémentation en matière de stratégie. Cette étude s'inscrit également dans le cadre des échanges et de la valorisation des expériences méditerranéennes. Elle permet surtout à identifier l'activité pêche artisanale en Algérie en mettant en évidence ses caractéristiques techniques économiques et sociales, ses atouts ainsi que ses faiblesses. Cette identification est d'autant plus nécessaire qu'elle pourrait servir de base pour développer et organiser le métier, valoriser ses produits et réduire les conflits d'usage par la concertation et l'amélioration de la situation socioéconomique des pêcheurs «artisans»[10].

La présente étude s'inscrit donc dans le cadre du soutien au développement durable de la pêche artisanale et de sa promotion. Elle met d'abord en exergue la stratégie adoptée en Algérie en faveur d'une croissance bleue[11] et montre, ensuite, le degré de concordance des démarches entreprises avec les directives volontaires de la FAO visant à assurer la durabilité de la pêche artisanale dans un contexte de sécurité alimentaire et d'éradication de la pauvreté (Directives PAD). Ceci renvoie à l'examen de la situation actuelle de la pêche artisanale en Algérie et sa dimension socioéconomique et à l'identification des éléments clés des Directives PAD[12] intégrés et à intégrer dans le plan d'action national.

[10] Dans le cadre des travaux préparatifs de la conférence régionale «Construire un futur pour une pêche artisanale durable en Méditerranée et en mer Noire» (Algérie, mars 2016), il est prévu d'élaborer un document de référence sur «la situation actuelle de la pêche artisanale en Méditerranée et en mer Noire: stratégies et méthodologies pour une analyse efficace du secteur».

[11] En accordant un intérêt particulier aux chaines de valeur et à la valorisation des produits de la pêche artisanale pour améliorer la situation économique et sociale des communautés des pêcheurs d'abord.

[12] Adaptation des directives volontaires de la FAO sur la pêche artisanale au contexte régional de la Méditerranée et de la mer Noire.

2. LA PÊCHE ARTISANALE DANS LE CONTEXTE NATIONAL

La pêche artisanale est considérée comme le type de pêche dominant en Méditerranée (Farrugio, 1993 et 1996). Cette activité suscite un intérêt particulier dans certains pays méditerranéens, compte tenu du rôle qu'elle pourrait jouer dans le développement des zones côtières dans un contexte de valorisation des ressources locales. La pêche artisanale induit des effets économiques et sociaux importants sur le développement local, la sécurité alimentaire et l'éradication de la pauvreté, notamment dans les zones littorales enclavées à faibles activités économiques.

2.1 Définitions

> «Pêche artisanale» est une expression assez répandue dans le monde. Mais malgré l'importance de l'activité à laquelle elle renvoie, cette expression n'est guère explicitée et aucune définition commune n'en a été donnée (Debeauvais, 1985; Diallo, 1995; Mrabet *et al.* 2011).

A l'instar de la CGPM, la pêche artisanale en Algérie n'est pas définie. Néanmoins, une classification par zone définit l'activité comme tout exercice d'une pêche pratiquée à l'intérieur des 6 milles marins à partir des alignements de référence. De plus, il est à signaler que la nouvelle loi sur la pêche et l'aquaculture promulguée le 08 avril 2015 stipule, dans son article 7, que la pêche côtière est celle pratiquée dans les eaux à proximité des côtes. Mais si cette première définition s'applique également à la pêche artisanale, il n'en reste pas moins que les conditions et les modalités de la pêche côtière ainsi que la délimitation de ces zones sont en cours de clarification.

Une classification par zone définit la pêche côtière comme tout exercice de la pêche pratiqué dans les eaux intérieures[13]. Ce type de pêche est réservé aux navires algériens répondant aux normes de sécurité et de navigation et respectant la réglementation. Les navires exerçant quant à eux une pêche scientifique sont également autorisés à le faire.

Si on se réfère au glossaire FAO du département des pêches, la pêche artisanale est une «*pêche traditionnelle pratiquée par des ménages de pêcheurs – par opposition à des sociétés commerciales – qui utilisent des quantités relativement faibles de capital et d'énergie, des navires de pêche relativement de petites tailles, effectuent de courtes sorties de pêche, à proximité du rivage, et travaillent principalement pour la consommation locale*».

Cette définition reste relative et peu précise puisque, dans certains pays développés, certains senneurs et chalutiers sont considérés comme artisans alors que dans des pays en voie de développement, la pêche artisanale est souvent considérée comme une activité dont la consommation est locale à régionale, voire une véritable activité de subsistance[14].

De ce fait, il est malaisé de cerner avec exactitude la notion de pêche artisanale. Toutefois, dans les pays de Méditerranée sud – notamment en Algérie –, il est largement admis par la communauté des pêcheurs et les principaux acteurs du secteur que la pêche artisanale est une activité qui utilise des embarcations de petites tailles. Il s'agit donc d'une activité économique à intensité capitalistique faible à moyenne et dont les engins

[13] Selon le droit de la pêche au niveau international, et selon la convention sur le droit de la mer (1982) entrée en vigueur le 16 novembre 1994, les eaux situées en deçà de la ligne de base de la mer territoriale, font partie des eaux intérieures de l'État (Art.8. LOSC). En outre, tout État a le droit de fixer la largeur de sa mer territoriale. Cette largeur ne dépasse pas les 12 miles marins mesurés à partir de lignes de base établie conformément à la convention (Art. 3. LOSC). Il faut noter que, avant même la convention sur le droit de la mer, la limite des eaux territoriales en Algérie était de 12 miles marins (cf. Décret n° 63- 403 du 12 octobre 1963. JORA.).

[14] Selon la FAO, 2015, «*Il n'existe pas de définition conventionnelle unique de ce sous-secteur (pêche artisanale) ; c'est pourquoi aucune définition normalisée de la pêche artisanale n'est prescrite dans les directives, qui ne donnent pas non plus d'indications quant à leur application dans un contexte national.*» (FAO, Directives volontaires visant à assurer la durabilité de la pêche artisanale, Rome, 2015.)

utilisés sont principalement ceux de pêche passive et sélective. En Algérie, la pêche artisanale est principalement une activité exercée par les petits métiers. Pour toutes ces raisons, on entendra, dans notre cas d'étude (Algérie), par pêche artisanale l'activité de pêche exercée au moyen des petits métiers[15].

2.2 Principaux indicateurs

2.2.1 Place de la pêche algérienne en Méditerranée[16]

L'Algérie qui a réalisé 14 pour cent de la production méditerranéenne totale en 2008, est considérée ainsi comme le deuxième plus grand producteur de poisson (pêche maritime) en Méditerranée après l'Italie En assurant plus de 20 pour cent des captures en espèces pélagiques, ce pays devance l'Italie et occupe le premier rang à l'échelle méditerranéenne. Mieux encore, à l'échelle maghrébine[17], l'Algérie assure près de 43 pour cent de la production totale halieutique (côté méditerranéen) et plus de la moitié (51 pour cent) de la production du petit pélagique (Chakour, 2014a).

La pêche algérienne occupe donc une place de choix dans l'économie des pêches méditerranéenne et contribue fortement au développement économique et social et à la sécurité alimentaire dans le bassin méditerranéen notamment dans sa rive sud.

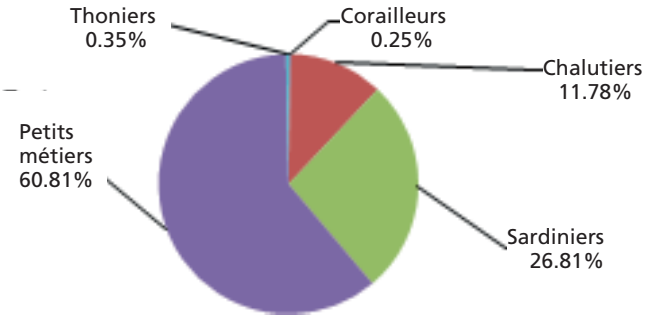
2.2.2 La pêche artisanale dans la pêche nationale

2.2.2.1 Une flottille dominée en nombre par les petits métiers

La flottille nationale de pêche (Période 2011-2014) est composée principalement de petits métiers, avec en moyenne près de 61 pour cent de la flottille. Ce type de métiers domine la flottille de pêche en Algérie.

Graphiques A1.1 et A1.2 montrent respectivement la structure de la flottille et son évolution.

GRAPHIQUE A1.1
Place des petits métiers dans la flottile nationale (immatriculée 2007-2014)



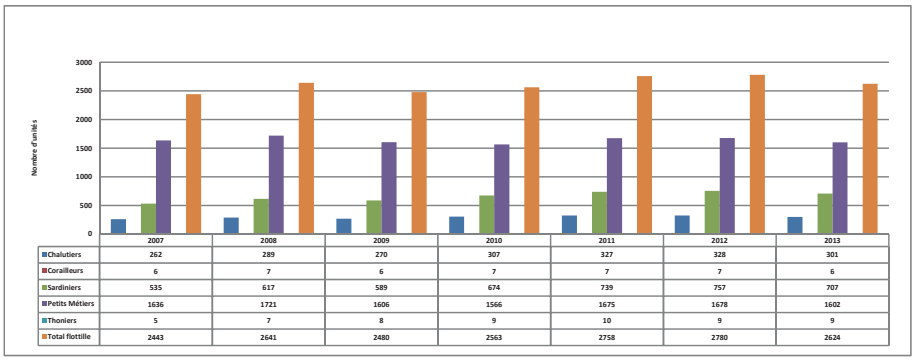
Source: Calculé et estimé par nos soins sur la base des données MPRH, 2014.

[15] Selon le CNRDPA, la pêche artisanale en Algérie fait référence à la pêche aux petits métiers. Les engins qui y sont utilisés sont généralement des petites embarcations dont la longueur est inférieure à 12 m avec une puissance motrice faible, et équipées d'une variété de moyens de pêche (filets maillants, palangres et autres). Ce genre d'activité cible plusieurs espèces à valeur marchande intéressante. Le nombre moyen de pêcheur par embarcation est de 3. Cependant, la CGPM, dans le glossaire, considère la pêche artisanale comme étant une pêche à petite échelle, à faible coût, où la capture est généralement consommée localement»

[16] Nous sommes confrontés à un problème de disponibilité de données récentes et homogènes des différents pays en Méditerranée, ce qui rend les études comparatives difficiles.

[17] La Tunisie, la Libye et le Maroc qui occupent respectivement les 4èmes, 9ème et 10ème rangs à l'échelle méditerranéenne.

GRAPHIQUE A1.2
Évolution de la flottile active par type de métier: 2007-2014



	2007	2008	2009	2010	2011	2012	2013
Chalutiers	262	289	270	307	327	328	301
Corailleurs	6	7	6	7	7	7	6
Sardiniers	535	617	589	674	739	757	707
Petits Métiers	1636	1721	1606	1566	1675	1678	1602
Thoniers	5	7	8	9	10	9	9
Total flottille	2443	2641	2480	2563	2758	2780	2624

Source: Calculé et estimé par nos soins sur la base des données MPRH, 2014.

En effet, la flottille active «petits métiers», qui constitue la majorité de la flottille a connu une stagnation relative de 2007 à 2014, soit en oscillant entre 1 566 et 1 721 petits métiers avec en moyenne 1600 unités pour la période en question. Par ailleurs, la pêche au corail est gelée depuis 2001.

2.2.2.2 L'effort de pêche[18]

TABLEAU A1.1
Estimation de l'effort de pêche moyen par an des petits métiers actifs (moyenne 2007/2013)

Indicateurs	Valeur
Effort de pêche petits métiers	187 032
Total effort de pêche (tous les métiers confondus)	298 145,857
% Effort de pêche petits métiers	62,8140787

Source: Calculé et estimé par nos soins sur la base des données MPRH, 2014

Graphique A1.3 montre l'importance de la part de l'effort de pêche exercée par les petits métiers.

GRAPHIQUE A1.3
Estimation de l'effort de pêche moyen par an des petits métiers (moyenn 2007/2013) (flottile active)

Source: Calculé et estimé par nos soins sur la base des données MPRH, 2014.

[18] Faute de disponibilités des données, l'effort de pêche ne sera appréhendé que par les sorties en mer.

Au même titre que la flottille, l'effort de pêche des petits métiers est tributaire de la flottille et du nombre moyen de sorties par an. Ainsi pour la période allant de 2007 à 2013, le nombre de sorties moyen par an est de l'ordre de 187 032 représentant environ 63 pour cent de l'effort de pêche total exercé par la pêche (tous métiers confondus). Ceci confirme encore une fois les enjeux de la pêche artisanale et sa place de choix dans l'activité des pêches en Algérie.

2.2.2.3 La ressource humaine

Il convient de noter qu'en 2008 le secteur de la pêche en Algérie était le deuxième plus grand pourvoyeur d'emplois en Méditerranée après la Tunisie, représentant 16 pour cent des inscrits maritimes (contre environ 20 pour cent pour la Tunisie) (Chakour, 2014a).

De 2000 à 2013, la structure du collectif marin est restée quasiment la même (stable). Le collectif marin est constitué essentiellement de marins pêcheurs. En moyenne, les marins pêcheurs représentent 83 pour cent du collectif marin. Les patrons pêcheurs représentent environ 12 pour cent du collectif marin contre seulement 5 pour cent pour les mécaniciens.

L'effectif du collectif marin est passé de 25 066 inscrits en 2000 à environ 44 000 inscrits maritimes en 2014. Cette augmentation trouve son explication dans les nombreuses actions engagées par le Ministère de la Pêche et des Ressources Halieutiques (MPRH) pour développer le secteur de la pêche. Cette tendance suit logiquement celle de la flottille totale. Ce constat révèle, dans un premier temps, les effets positifs des actions engagées par la tutelle sur le développement socio-économique local, voire national.

Une estimation du collectif marin exerçant dans les petits métiers permet de donner, à raison de trois marins par embarcation, un chiffre qui avoisinerait les 5 000 pêcheurs artisans.

2.2.3 Performances économiques de la pêche artisanale

Notre analyse reposera essentiellement, dans le cadre de cette étude, sur le calcul d'indicateurs et de ratios relatifs au rendement et à la productivité des facteurs de production durant ces dernières années. Elle sera focalisée sur la période 2007-2013 avec toutefois une recherche poussée de la période 2010-2013 et ce, afin de mettre en exergue les retombées des premières actions du MPRH en matière de stratégie de développement du secteur de la pêche.

2.2.3.1 Productivité du capital fixe: le rendement par unité de pêche active

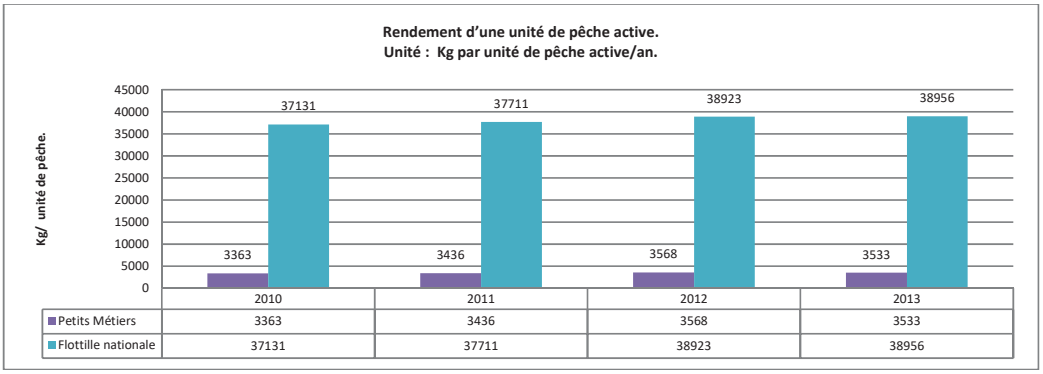
De 2000 à 2013, le rendement par unité de pêche active est passé de 75 690 Kg/unité à 38 956 Kg/unité enregistrant ainsi une perte de l'ordre de 48,53 pour cent.

L'analyse de l'évolution des rendements par unité de pêche sur une période assez longue, est donc à prendre avec prudence, compte tenu de l'insuffisance des informations et de la fiabilité des données qui constituent un réel handicap pour la prise de décision. Toutefois l'analyse des données récentes (2007-2013) permettrait de gérer ce risque et de déboucher sur des résultats plus réalistes.

Le rendement moyen (tous métiers confondus) des unités de pêche actives est passé de 60 926 kg/unité en 2007 à 38 956 kg/unité de pêche en 2013 enregistrant ainsi une régression de l'ordre 36,06 pour cent. Une moyenne qui cache des disparités entre types de métiers.

Le rendement moyen des petits métiers avoisine les 3 400 kg par an et par embarcation, soit dix fois moins que la moyenne annuelle de la flottille nationale (tous métiers confondus). En effet, en moyenne, la productivité des petits métiers reste la moins importante, comparée aux autres métiers. Néanmoins, il convient de noter l'évolution relative des rendements au cours de la période 2010-2013 où on assiste à des accroissements annuels assez significatifs et qui auraient pour origine la mise en place de dispositifs nouveaux pour accompagner et développer la pêche. Ainsi entre 2010 et 2013, le rendement moyen des petits métiers a

GRAPHIQUE A1.4
Évolution du rendement d'une unité de pêche petit métier (2007-2013)

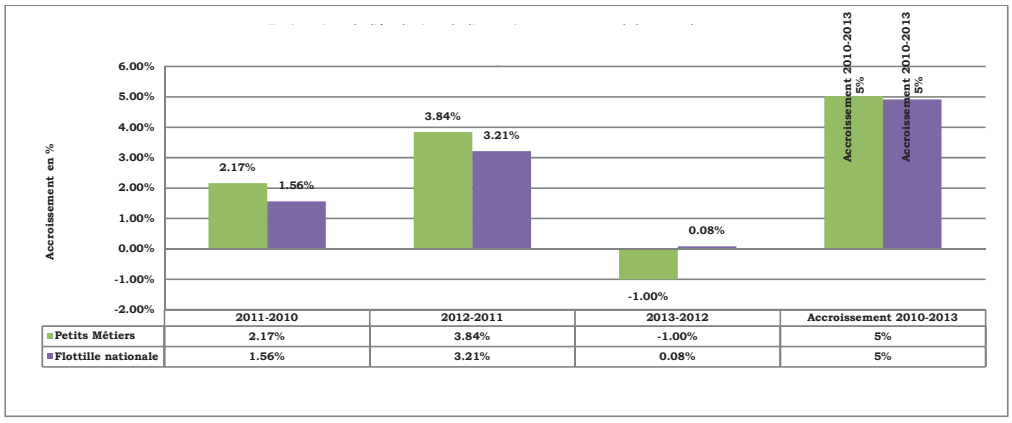


Source: calculé et estimé par nos soins sur la base des données MPRH, 2014. *Total flottille: calculé *Rendements par type de métier: calculés après estimation.

connu un accroissement de l'ordre de 5 pour cent. Cette performance aura sans doute des effets positifs sur le bien-être des pêcheurs artisans, mais elle est à prendre avec prudence surtout lorsque l'on mesure les éventuelles pressions sur la ressource halieutique en l'absence d'une gestion durable de l'activité de pêche.

L'examen du graphique ci-dessus, montre qu'après des années de «décroissance relative» de la productivité, les rendements moyens de la flottille active ont connu un regain de croissance de l'ordre de 5 pour cent entre 2010 et 2013. À ce titre, la phase 2010-2013 semble marquer une nouvelle ère qui coïncide avec les grands chantiers d'aménagement et de développement lancés par le MPRH.

GRAPHIQUE A1.5
Estimation de l'évolution (estimée) de l'accroissement annuel des rendements d'une unité de pêche active



Source: Construite par nos soins sur la base de l'analyse du « Plan Aquapêche 2020 », MPRH, 2014.

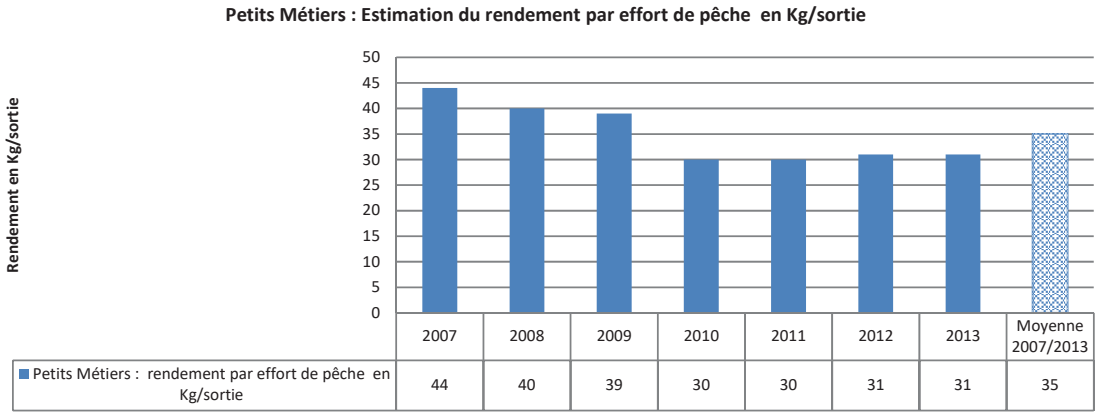
2.2.3.2 Productivité du travail

2.2.3.2.1 Rendement par effort de pêche et par type de métier

L'analyse ci-après est basée sur le calcul estimatif mais fondé[19] du rendement par effort de pêche et par type de métier.

[19] L'estimation du rendement de l'effort de pêche est calculée sur la base du rendement d'une unité de pêche et du nombre moyen de sorties estimées par unité de pêche. Nous avons appliqué le nombre moyen de sorties par unité de pêche pour la période 2009-2010 (seules données disponibles) soit 215, 112 et 114 sorties par an respectivement pour les chalutiers, les sardiniers et les petits métiers.

GRAPHIQUE A1.6
Montre l'évolution du rendement par effort de pêche



	2007	2008	2009	2010	2011	2012	2013	Moyenne 2007/2013
Petits Métiers : rendement par effort de pêche en Kg/sortie	44	40	39	30	30	31	31	35

Source: Calculés et estimés par nos soins sur la base des données MPRH, 2014.

À partir de 2010, les rendements par sortie se sont progressivement améliorés. Ainsi, nous avons noté, entre 2010 et 2013, un accroissement d'1 kg dans le rendement des petits métiers. Cette amélioration des rendements serait le fruit des efforts consentis et des moyens déployés par le MPRH et ses partenaires pour enclencher dans le secteur une dynamique de développement durable.

3. LES DÉMARCHES ENTREPRISES ET À ENTREPRENDRE POUR UN DÉVELOPPEMENT DURABLE DE LA PÊCHE ARTISANALE EN ALGÉRIE EN FAVEUR D'UNE CROISSANCE BLEUE

L'objectif est de présenter, à travers la SNDPA, les démarches entreprises et leur adéquation avec la réalité du terrain et les objectifs escomptés.

3.1 La pêche artisanale en Algérie: un élément fondamental dans la stratégie adoptée en faveur de la croissance bleue

Connue pour son respect de l'environnement et pour son caractère durable, la pêche artisanale est en mesure de jouer un rôle fondamental dans la croissance bleue. À cet effet, l'Algérie accorde, depuis quelques années, une attention particulière au développement durable de la pêche artisanale en l'intégrant dans sa Stratégie de Développement du secteur de la Pêche et de l'Aquaculture[20] SNDPA, faisant d'elle à la fois une cible et un outil de la croissance bleue.

3.1.1 Le développement de la pêche artisanale en Algérie: démarches et repères[21]

Consciente de l'importance socioéconomique de la pêche artisanale l'Algérie a engagé, dans les années 90, des actions de soutien et d'aide à l'emploi des jeunes pour développer la pêche artisanale, appuyées en cela par des projets de coopération à l'échelle régionale, projet FIDA, projet CEE, projet CCI et le projet CopeMed. En 1995 le Fonds National d'Aide pour la Pêche et l'Aquaculture (FNAPA) est venu appuyer et soutenir les acquisitions de petits métiers[22]. Des dispositifs de financement et de soutien, à travers un financement triangulaire sont aussitôt développés.

Vu l'importance de cette activité, à partir de 2012, un intérêt particulier est accordé à cette activité dans la stratégie nationale de développement de la pêche

[20] Aquapêche 2020.

[21] Cette partie est le résultat de la valorisation des résultats de l'étude socioéconomique relative au projet d'appui à la formulation de la stratégie nationale de développement de la pêche et de l'aquaculture 2015/2020 (S.C. Chakour, PNUD/FAO, 2014)

[22] Cf. décret exécutif n°95-173 du 24/06/1995.

et de l'aquaculture, en visant la valorisation des actions pilotes déjà entreprises, et le renforcement de sa politique nationale allant dans le sens des directives des organisations régionales en matière de développement durable de la pêche artisanale. A ce titre, la relance de l'activité en question s'inscrit également dans le cadre du nouveau système d'accompagnement des investissements dans la pêche et l'aquaculture (SAIPA) impliquant les différents dispositifs d'aide à l'emploi de jeunes et appuyés par une expertise nationale et internationale.

Mais malgré l'importance de cette activité, rares sont les études internationales[23] qui ont traité de la pêche artisanale en Algérie. La dernière en date remonte à 2003. Initiée dans le cadre du projet CopeMed (CNDPA/CopeMed, 2003), cette étude indique que la pêche artisanale est pratiquée par des bateaux dont la longueur s'échelonne de 3 à 9 mètres et une puissance oscillant entre 5 et 40 chevaux. Elle est caractérisée par des sorties en mer relativement courtes (quelques heures) puisque les engins de pêche sont généralement callés et les zones de pêches sont très côtières au niveau du plateau continental. Embarquant 2 à 8 hommes, selon la longueur et le type d'engins, la pêche artisanale en Algérie utilise les filets[24], les engins à hameçon et à un degré moindre les pièges. Les principales espèces capturées sont dans leur majorité à forte valeur marchande il s'agit notamment des scombridés, des sparidés, des carangidés et des serranidés.

Par ailleurs, dans le cadre de la formulation de la stratégie nationale de développement de la pêche et de l'aquaculture, une enquête socioéconomique nationale a été réalisée en 2014. Les résultats issus de cette enquête constitueront l'objet de notre cas d'étude qui vous sera présenté dans la deuxième partie de la présente étude.

3.1.2 Principales réalisations en matière de développement et de promotion de la pêche artisanale

Compte tenu de sa place de choix dans l'économie en Algérie, la pêche artisanale a bénéficié d'un un programme ambitieux de réalisation d'infrastructures de pêche dans les zones enclavée connues pour leur activité intense dans ce domaine. L'objectif est de maîtriser l'activité «pêche artisanale» en identifiant les embarcations tout en les regroupant dans des sites protégés et sécurisés et en leur réunissant les conditions favorables à l'exercice et au développement de la pêche artisanale. Ces actions permettraient également de renforcer le dispositif de contrôle des débarquements déjà existant et renforcer les mesures de gestion des ressources halieutiques. Dans ce cadre, de nombreuses actions ont été menées notamment:

- plusieurs (3) plages d'échouage réalisées dont une à El Tarf et deux à Jijel ;
- trois (3) plages d'échouages sont en cours de réalisation dans les wilayas de Tizi-Ouzou et de Boumerdès et Tipaza.

Afin de bien gérer ces plages d'échouages, la nouvelle Loi sur la pêche et l'aquaculture prévoie dans son article 5, un encrage pour la création, la gestion et les modalités d'utilisation des sites d'échouage, dont les textes d'application sont en cours d'élaboration.

Enfin, dans le cadre du développement de la pêche artisanale et de la mise en œuvre des projets intégrés de la pêche artisanale «SAIDHIRAFI», des études socioéconomiques pour la réalisation de sites de débarquements à Fouka Marine (Tipasa), à El Guelta (Chlef) et à Souk El Thenine (Bejaïa).

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[23] Alors que de nombreux pays méditerranéens ont bénéficié et continuent de bénéficier, de projets de coopération avec la contribution des organisations internationales. Il est à noter que de tels projets combien importants pour le développement de la pêche artisanale font défaut en Algérie.

[24] Le recours à la senne tournantes concerne particulièrement les navires de 6.8 mètres et plus.

3.1.3 Les principales actions prévues par le «Plan Aquapêche 2020» en matière de développement et de promotion de la pêche artisanale dans un contexte de croissance bleue[25]

Dans le cadre de la promotion de la pêche responsable, un intérêt particulier est accordé à la pêche artisanale en ciblant sa réhabilitation et sa distinction. À ce titre, le Ministère de l'agriculture, du développement rural et de la pêche, à travers le «Plan Aquapêche 2020» a mis en place des dispositifs cohérents et faisables. L'objectif est de développer, pour le prochain quinquennal, la pêche à petite échelle tout en l'intégrant dans la stratégie globale du secteur, afin de contribuer à la réorganisation de cette activité longtemps marginalisée, et d'améliorer les conditions socioéconomique des professionnels.

3.1.3.1 En matière d'accompagnement technique

La FAO et le PNUD[26] ont réalisé un projet d'appui à la formulation de la stratégie de développement de la pêche et de l'aquaculture, avec une attention particulière pour la pêche artisanale et dont les résultats seront valorisés dans la présente étude.

3.1.3.2 En matière d'aménagements et de gestion des zones de pêche

Il sera question de:

- La mise en en place des quatorze (14) plans d'aménagement et de gestion des pêcheries algériennes (PAGPA), au niveau des wilayas littorales;
- Le renforcement du dispositif réglementaire relatif aux mesures de gestion et de conservation des ressources halieutiques, en tenant compte de l'expérience des pêcheurs et des résultats des différents PAGPA;
- L'affinage de la connaissance des ressources halieutiques ainsi que les potentialités existantes.

3.1.3.3 Mettre en place, avec le consentement des différents partenaires, des régimes de cogestion des pêches

Actuellement, le Ministère de la pêche et des ressources halieutiques, dans le cadre de la révision de la loi N°01-11 du 3 juillet 2001 relative à la pêche et à l'aquaculture par la nouvelle loi 08-15, a intégré un ancrage sur le développement de la pêche artisanale et la création d'espaces propices au développement de cette activité (sites de débarquement). Une disposition qui, convient-il de le préciser, n'existait pas auparavant.

À cet effet, un projet de texte réglementaire a été élaboré, confiant la gestion de ces espaces aux professionnels eux même, à travers les chambres des pêches et de l'aquaculture des wilayas (département). En outre, des projets-pilotes d'aires marines protégées sont en cours d'évaluation, lesquels projets pourraient constituer un outil nécessaire pour la gestion durable de la pêche artisanale.[27].

3.1.3.4 Réhabilitation et distinction de la pêche artisanale

Compte tenu de son rôle socioéconomique et de sa contribution à la sécurité alimentaire, la pêche artisanale requiert réhabilitation et distinction.

Le plan Aquapêche viendra appuyer les actions lancées en visant la réhabilitation et la distinction de la pêche artisanale à travers un projet noyau intitulé «projets intégrés

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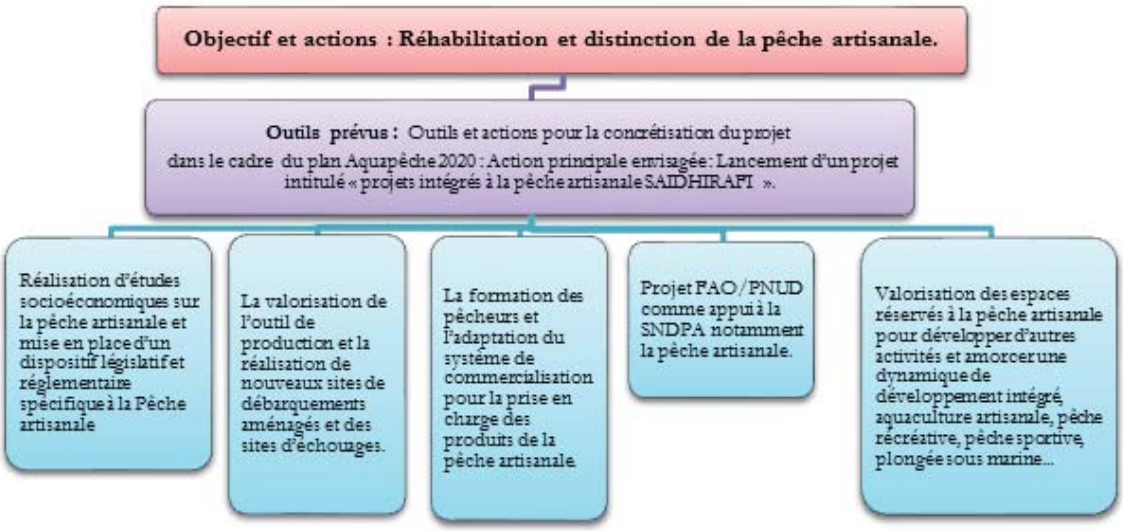
[25] Pour plus d'informations, se référer à: MPRH, 2014; Secteur de la pêche et de l'aquaculture; Bilan (2012-2014), prospective 2030 et projet «Plan Aquapêche».

[26] Ce projet a été initié par le PNUD avec le concours de la FAO pour les aspects techniques.

[27] En Algérie, des aires marines protégées ont été créées, à l'image des aires marines protégées des Iles Habibas (Wilaya d'Oran, 400 km à l'ouest d'Alger), d'El Kala (Wilaya d'El Tarf, à l'extrême est de l'Algérie, de Gouraya (à 200 km à l'est d'Alger), ainsi que l'aire marine protégée de Taza (Projet en cours) (Wilayas de Jijel, à 300 km à l'est d'Alger). Un texte de loi a été adopté en 2011 pour l'organisation et la gestion de ces espaces.

FIGURE A1.1
Démarche entreprise pour la réhabilitation et la distinction de la pêche artisanale en Algérie



à la pêche artisanale SAIDHIRAFI». Le diagnostic et l'analyse développés plus haut justifient les objectifs fixés par la SNDPA en l'occurrence la réhabilitation et la distinction de cette activité. En effet, ses caractéristiques et sa dimension sociale, économique et environnementale confortent la thèse de développement intégré de la pêche artisanale.

À ce titre, les actions prévues dans le cadre du plan Aquapêche 2020 semblent tenir compte de la quasi-totalité des contraintes qui risqueraient d'entraver le développement de cette activité. D'abord par la maîtrise et l'amélioration des connaissances en matière de cette activité, en lançant des travaux et des études socioéconomiques pour une meilleure identification des acteurs, une meilleure compréhension des logiques développées par ces derniers, et une meilleure estimation de la contribution de la pêche artisanale au développement en général et au développement local en particulier[28]. Une maîtrise qui faciliterait la valorisation et la gestion de l'outil de production, l'aménagement et la création d'autres sites résultant d'études pluridisciplinaires et ce, en s'appuyant sur le savoir-faire des professionnels (approche participative) et sur l'expertise nationale et internationale.

Pour pallier le problème de désorganisation de la profession et réhabiliter la place des pêcheurs artisans dans les économies locales, le plan Aqua-pêche prévoit des dispositifs de formation et de mise à niveau permettant une intégration de l'activité et des pêcheurs artisans dans un processus de développement productif et intégré. Ces démarches seront appuyées par des dispositifs de valorisation des espaces réservées à la pêche artisanale. À ce titre, une dynamique de développement locale viendrait améliorer les conditions socioéconomiques de certaines zones notamment dans les régions enclavées à travers le développement de l'agri-pêche, le pescatourisme, l'aquaculture associée à l'agriculture et au tourisme, le sport et pêche, la pêche récréative, etc.

Ces actions permettraient non seulement le désenclavement économique de certaines zones économiquement vulnérables et l'amélioration du bien-être des acteurs locaux, mais surtout d'assurer aussi une sédentarisation tant recherchée grâce aux projets de développement intégrés. En outre, compte tenu des travaux rarissimes sur l'activité de la pêche artisanale et dans le cadre de la coopération internationale, le MPH a fait appel

[28] À ce titre une démarche visant la constitution d'une base de données en impliquant les parties prenantes à sa collecte a été adoptée et a permis la réalisation de nombreuses enquêtes et études notamment l'étude socioéconomique nationale, réalisée en 2014. Une enquête nationale sur la pêche artisanale vient d'être achevée et reste en cours de valorisation.

aux services et à l'appui du PNUD et de la FAO pour contribuer à la formulation de la SNDPA avec une attention particulière à la pêche artisanale.

L'organisation de la profession, cheval de bataille de l'administration des pêches, a permis au bout de quelques années à la communauté des pêcheurs de réaliser beaucoup de progrès en développant notamment certains principes: la vulgarisation et la sensibilisation, la concertation, la participation, la consultation et la transparence, l'équité.

L'application de ces principes, dans sa politique de développement du secteur en général, et de la pêche artisanale en particulier, a permis à l'administration de:

- Gagner la confiance de la communauté pêcheur et de la convaincre de la nécessité de faire des approches du développement de l'activité dans un contexte intégré et écosystémique.
- De responsabiliser les gens de la mer quant à la nécessité de concilier objectifs économiques et sociaux et objectifs environnementaux.
- D'améliorer leur situation socioéconomique et leur protection sociale (de nombreux acquis: retraite, sécurité sociale, carte Chiffa, etc.).
- De défendre, à travers les structures élues (chambres, associations, etc.), l'intérêt des pêcheurs artisans.

ENCADRÉ A1.1

Au terme de cette première partie, il ressort que la Stratégie Nationale de Développement de la Pêche et de l'Aquaculture a adopté une démarche, dynamique, participative, adaptative et itérative. Une démarche non seulement faisable pour un développement durable de la pêche artisanale en Algérie mais surtout qui concorde avec les objectifs et les principes fondamentaux des directives volontaires de la FAO pour une pêche artisanale durable dans un contexte de sécurité alimentaire et d'éradication de la pauvreté.

Par ailleurs, et afin de consolider les résultats de l'analyse globale dans le contexte algérien, Nous nous proposons, dans la deuxième partie de cette étude, d'analyser les résultats d'une approche empirique découlant des résultats de l'enquête nationale sur la pêche artisanale, que nous avons intitulée au demeurant «Analyse des aspects socioéconomiques et techniques de la pêche artisanale en Algérie: valorisation de quelques résultats de l'enquête nationale sur la pêche artisanale».

4. ÉTUDE DE CAS: ANALYSE DES ASPECTS SOCIOÉCONOMIQUES ET TECHNIQUES DE LA PÊCHE ARTISANALE EN ALGÉRIE – VALORISATION DE QUELQUES RÉSULTATS DE L'ENQUÊTE NATIONALE SUR LA PÊCHE ARTISANALE

4.1 Contexte et objectif de l'étude de cas

La pêche artisanale en Algérie revêt une dimension aussi bien économique que culturelle. C'est une activité ancestrale qui représente un patrimoine cher aux communautés des pêcheurs. Développer cette activité nécessite d'abord la maîtrise de ses dimensions et de ses caractéristiques socioéconomiques, techniques et culturelles. Comprendre les logiques développées par les pêcheurs, leurs problèmes et leurs aspirations serait une condition nécessaire mais pas suffisante, pour proposer des actions en faveur de son développement durable. C'est dans ce contexte que s'inscrit la deuxième partie de cette étude et qui tend à mettre notamment en exergue des principaux paramètres qui caractérisent cette activité.

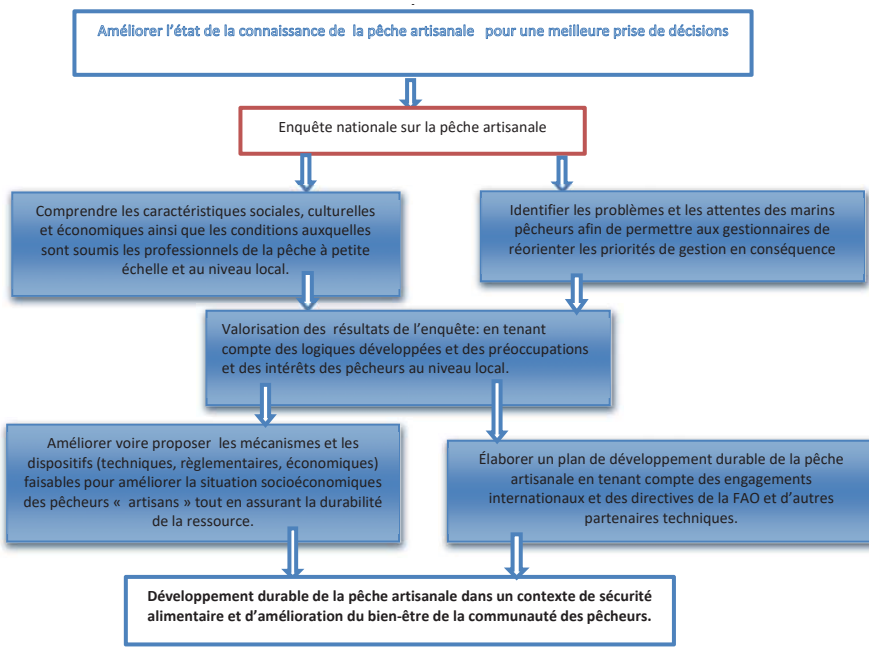
Les paramètres présentés dans cette étude de cas émanent d'une partie des résultats d'une enquête nationale sur la pêche artisanale. Elle est également enrichie et consolidée par d'autres investigations et exploitations de données et de documents émanant de diverses institutions ressources notamment les DPRH et l'ex MPRH. Elle s'inscrit dans le cadre d'une série d'études prévues dans le cadre de la feuille de route 2012-2014 et la

préparation de la mise en implémentation du plan Aquapêche 2020. Elle vise à améliorer les connaissances sur une activité ancestrale, en l'occurrence la pêche artisanale. A travers la maîtrise des aspects aussi bien socioéconomique que techniques de cette activité, une meilleure compréhension de la stratégie des acteurs, de leur comportement et de leurs aspirations serait possible. Laquelle compréhension pourrait servir à l'orientation de la prise de décision en matière de stratégie de développement durable de la pêche artisanale en Algérie, en tenant compte des caractéristiques nationales, voire locales, sans toutefois omettre les principales directives internationales notamment celles de la FAO.

La zone d'étude: l'enquête a couvert tous les sites de la côte algérienne, tels que les ports de pêche, les abris de pêche et les plages d'échouage. Les embarcations ciblées sont celles dont la taille est inférieure à 8 mètres[29]. Concernant les objectifs globaux et les objectifs opérationnels de l'étude empirique, ils sont résumés dans la figure ci-après.

En effet, à travers cette étude qui vise l'amélioration des connaissances quant à l'activité de la pêche artisanale, les objectifs opérationnels sont multiples. Il s'agit de proposer des mécanismes et de dispositifs pratiques et réalisables, dans un contexte participatif et de concertation avec les parties prenantes, pour élaborer des plans de développement durable de la pêche artisanale. Lequel développement devait contribuer aussi bien à la sécurité alimentaire qu'à l'amélioration des conditions de vie des populations locales.

FIGURE A1.2
Objectifs globaux et objectifs opérationnels de l'étude empirique



Source: Réalisation personnelle

[29] La méthode utilisée est basée sur l'échantillonnage aléatoire stratifié avec un intervalle de confiance de 95% et risque d'erreur de 5 pour cent. Pour de plus amples information se référer à A. Badani, MPRH, 2014: Enquête Nationale Sur La Pêche Artisanale En Algérie. 31 pages.

4.2 Paramètres principaux de l'étude de cas

4.2.1 Caractéristiques techniques de la flottille pêche artisanale

TABLEAU A1.2
Objectifs globaux et objectifs opérationnels de l'étude empirique

Caractéristiques techniques de la flottille pêche artisanale. Principaux paramètres		
La flottille	Nombre estimé par la tutelle.	Une flottille estimée à plus de 10 00 embarcations entre des petits métiers immatriculés et non immatriculés et des plaisanciers.
	Taille moyenne de l'équipage.	Le nombre de marins embarqué oscille entre 1 et 8. (8 pour les sardinelles). Effectif moyen par embarcation est de 3.
	Longueur	Longueur moyenne 5,21 m. Elle oscille entre 3 et 9 m, dont environ 70% ont une longueur inférieure à 4.80 m.
	Motorisation:	98,16% sont motorisés.
	Moteur Hors-bord	78,88% ont des moteurs hors-bord. Moteurs hors bord (9 à 30 CV), moteurs Inbord (50 CV et plus)*
	Puissance motrice.	Avec une puissance motrice de l'ordre de 30,23 CV; 51% des embarcations ont une puissance motrice inférieure ou égale à 25 CV.
	Jauge brute	Avec une jauge brute moyenne de 1.53 TJB; 91% des embarcations ont une jauge brute inférieure ou égale à 10 TJB.
	Age et vétusté de la flottille.	L'âge moyen de la flottille pêche artisanale soumise à l'enquête est de l'ordre de 13 ans, dont 64% ont un âge inferieur ou égal à 15 ans.
	Nature de la coque	Environ 75% des embarcations sont en polyester, 10% en bois et 11% en fibres de verre.
	Pays de construction	95% des embarcations sont construites en Algérie.

* Cette information est le résultat de croisement d'informations émanant de plusieurs personnes ressources et des résultats de l'enquête nationale.

Source: construit par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014.

La pêche artisanale est pratiquée par une flotille qui représente plus de 60 pour cent de la flotille nationale.

Construite dans sa majorité (95 pour cent) en Algérie et en polyster (75 pour cent), la flotille pêche artisanale dont l'âge moyen est de 13 ans – donc loin d'être vétuste –, embarque 1 à 8 marins, avec deux marins pêcheurs dont le patron pour la majorité des embarcations.

Avec une taille moyenne de 5.2 mètres, la longueur des bateaux exerçant la pêche artisanale oscille entre 3 et 9 mètres. Cette activité est donc caractérisée par la modeste taille de ses embarcations dont environ 70 pour cent ont une longueur inférieure à 4.80 mètres.

Avec une puissance motrice de l'ordre de 30.23 CV, 51 pour cent des embarcations ont une puissance motrice inférieure ou égale à 25 CV. Alors que 91 pour cent des embarcations ont une jauge brute inférieure ou égale à 10 TJB. Ceci confirme encore une fois qu'il s'agit donc de petites embarcations ne pouvant exercer que des petits métiers.

Construite dans sa majorité (95 pour cent) en Algérie et en polyster (75 pour cent), la pêche artisanale joue un rôle économique en amont par ses effets d'entrainement.

La majorité des embarcations soit 59 pour cent de la flottille est composée de deux pêcheurs dont le patron. 86 pour cent des embarcations ont un effectif inférieur ou égal à trois dont le patron pêcheur. L'effectif moyen par embarcation avoisine donc les 3 pêcheurs. Si l'on tient compte du nombre des effectifs pour comparer l'activité de pêche artisanale à d'autres activités économiques, l'activité de pêche artisanale serait au même rang que la microentreprise et les entreprises de type familial et artisanal.

4.2.2 Pratique et exercice de la pêche artisanale.

Dans ce qui suit, nous présenterons des indicateurs sur l'effort de pêche et nous présenterons les lieux de débarquement, les engins de pêche utilisés et les principales espèces ciblées par la pêche artisanale.

PHOTO A1.1
Pêche artisanale, embarcations petits métiers longueur 4 m et 4,8 m

PHOTO A1.2
Petits métiers de 7 à 9 m, palangrier et sardinelles

Source: Chakour, 2014b (photo); Enquête pêche artisanale. Sept. 2014

TABLEAU A1.3
Détails sur la taille de l'équipage

Effectif équipage (y compris le patron)	Nombre des marins %	% Cumulé
1	4,2	4
2	58,8	63
3	22,8	86
4	4,0	90
5	1,1	91
6	0,5	91
7	0,3	92
8	0,3	92
ND	8,4	100
Total	100,00	

Source: construit par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014.

TABLEAU A1.4
Effort de pêche et lieux de débarquement de la pêche artisanale

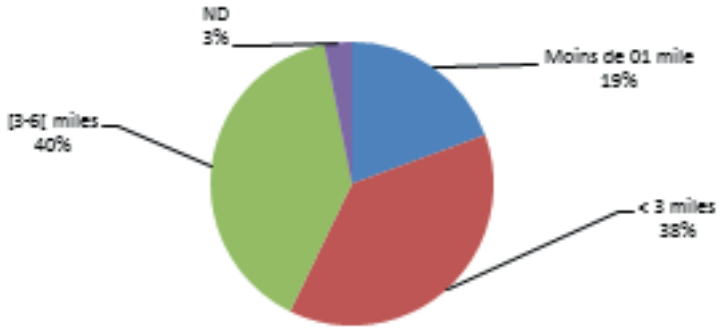
Effort de pêche	L'effort de pêche moyen pour la période a été estimé selon l'enquête à 120 sorties par navire et par an. Cette moyenne cache des disparités dues essentiellement à la taille du navire.
Durée moyenne par sortie	4 à 7 heures (selon la saison et le type de pêche) 3 à 7 jours par semaine (selon la saison et le type de pêche) 1 à 2 sorties par jour (selon la saison et le type de pêche)
Lieux de débarquement	Plages d'échouage et abris de pêche pour certaines embarcations de moins de 5 mètres. Ports de pêche.

Source: Construit par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014.

En moyenne, une unité de pêche artisanale exerce un effort équivalent à 120 sorties par an à raison de 4 à 7 heures par sortie. L'effort de pêche reste un facteur limitant et tributaire des conditions météorologiques. La taille de l'embarcation et les équipements à bord rendent la navigation limitée à des périodes où la mer est calme. Contrairement à d'autres pêches (industrielles ou semi-industrielles), ce genre de pêche se limite, pour des raisons de sécurité, à des zones situées non loin des lieux de débarquement notamment les ports, les plages d'échouage et les abris de pêche. L'activité et l'effort se limitent ainsi à quelques heures de navigation.

GRAPHIQUE A1.7

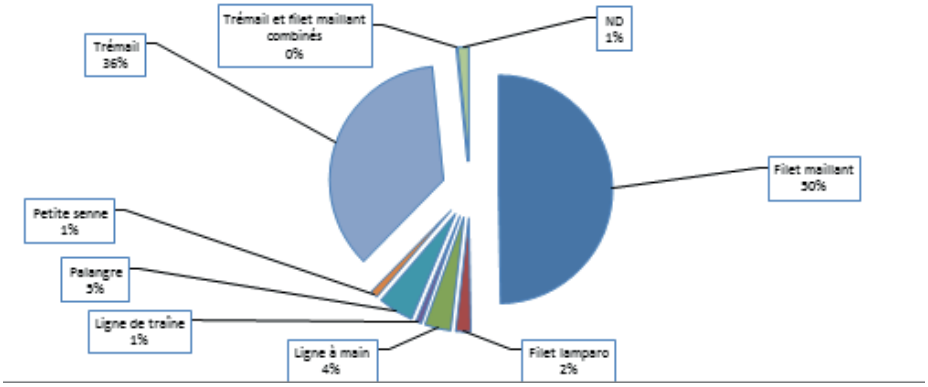
Principales zones de pêche convoitées par la pêche artisanale en Algérie



Source: Construit par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014.

GRAPHIQUE A1.8

Principaux engins de pêche utilisés par la pêche artisanale en Algérie



Source: construit par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014.

Plus d'un tiers de la pêche artisanale est exercé dans la zone des 3 miles et plus, alors que seulement 1/5 des pêcheurs convoitent la zones moins d'un mile. Cette situation reste tributaire de la taille et de la puissance de chaque embarcation. On peut donc conclure que la pêche artisanale en Algérie n'est en fait qu'une une pêche côtière.

La pêche artisanale fait recours à des engins, généralement, sélectifs.

Le graphique ci-dessus présente les principaux engins utilisés par la pêche artisanale en Algérie.

Les filets maillants et les trémails restent les principaux engins utilisés par les pêcheurs avec respectivement 50 et 36 pour cent. La quasi-totalité de ces engins ciblent des espèces à forte valeur marchande dont les principales sont présentées dans le tableau ci-après.

TABLEAU A1.5
Principales espèces ciblées par la pêche artisanale en Algérie

Principales espèces ciblées	Bogue – Bonite – Chien de mer – Cochon de mer – Denté – Dorade – Espadon – Limon – Mafroun – Melva – Merlan – Mérou – Moustelle – Pageot – Pagre – Raie – Rascasse – Rouget – Sar – Saupetchelba – Saurel – Sépia –Tchoukla – Tchoukla – Thon.

Source: Analyse et synthèse des résultats de notre investigation (valorisation des travaux existants, et enquête pêche artisanale 2014.)

ENCADRÉ A1.2

Il ressort donc que la pêche artisanale en Algérie est une pêche côtière.

Elle est pratiquée à proximité des ports et des plages d'échouage (moins de 6 miles) et utilise des embarcations dont la longueur est inférieure à 9 mètres et un équipage qui varie de 02 à 08 membres. Utilisant principalement des engins passifs, la pêche artisanale est une pêche relativement sélective et ciblée.

La pêche artisanale cible aussi bien le pélagique que le démersal. Ce dernier, à forte valeur marchande, constitue la principale cible des «artisans». La contribution économique et sociale de ce genre de pêche à l'amélioration des conditions de vie des professionnels a fait d'elle une activité en pleine expansion. Pour preuve, la taille de la flottille «petit métier» ne cesse de croitre ces dernières années et ce, grâce aux dispositifs de financement et de soutien engagé et mis en œuvre par le MPRH et ses partenaires techniques et socioéconomiques.

4.2.3 Aspects socioéconomiques

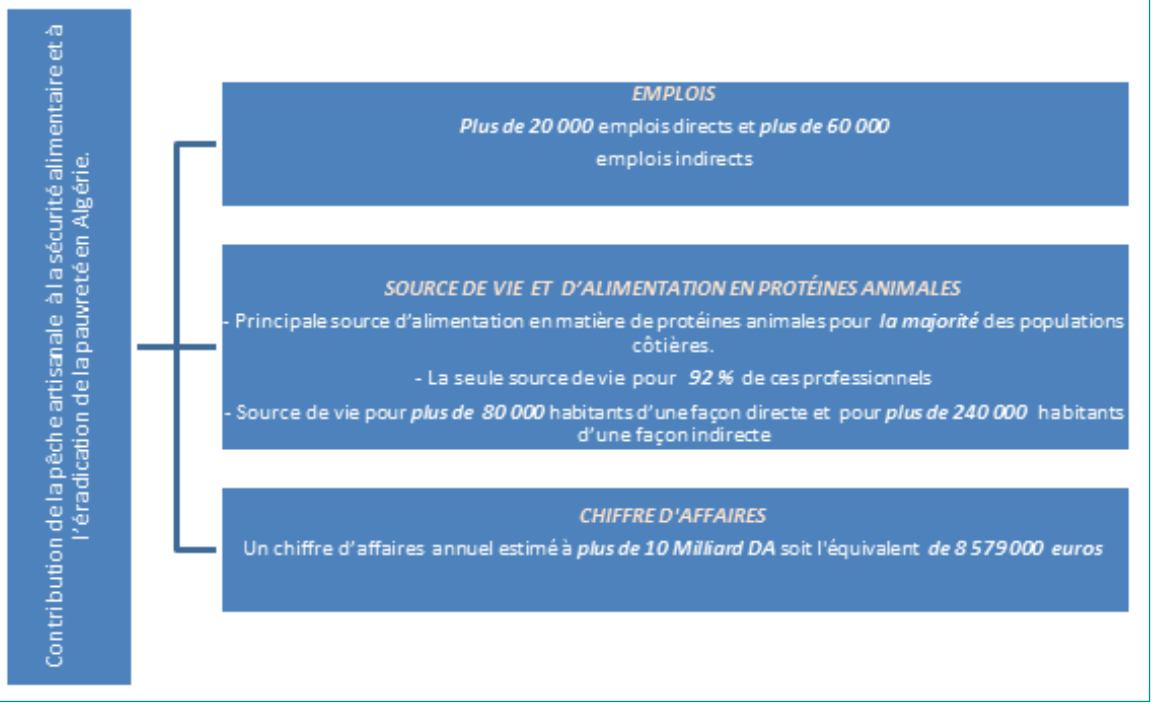
La maîtrise et l'amélioration de la connaissance relative à la dimension économique de la pêche artisanale est l'un des objectifs de la SNDPA visant à beaucoup plus d'efficacité dans l'aménagement et la gestion durable de la pêche.

4.2.3.1 Contribution de la pêche artisanale à la sécurité alimentaire et à l'éradication de la pauvreté en Algérie

La figure ci-dessous met en exergue la contribution de la pêche artisanale à la sécurité alimentaire et à l'amélioration des conditions socio-économiques des pêcheurs voire des populations locales. En effet, l'activité contribue à la création de plus de 80 000 emplois et constitue une source de vie pour plus de 92 pour cent de la communauté des pêcheurs. Elle joue ainsi un rôle socioéconomique considérable.

Cette contribution concorde parfaitement avec les directives de la FAO sur la pêche artisanale dans un contexte de sécurité alimentaire et d'éradication de la pauvreté. Bien qu'elles soient volontaires, ces directives sont prises en compte par l'Algérie car elles restent tributaires de la durabilité et du développement de la pêche artisanale.

FIGURE A1.3
Contribution de la pêche à la sécurité alimentaire et à l'éradication de la pauvreté en Algérie



Source: construit par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014 (*La parité dinar algérien et euro obtenue ici date du 03 Jan 2016 avec 1 DZD = 0.0086 EUR).

4.2.3.1.1 Paramètres socioéconomiques

Avec une moyenne d'âge de 40 ans, une expérience dépassant les 15 ans pour 58 pour cent des enquêtés et un niveau d'instruction de niveau moyen et plus pour 65 pour cent du collectif marin, le personnel marin exerçant dans le domaine de la pêche artisanale en Algérie est assez jeune, instruit et expérimenté. Ce qui constitue un atout en faveur de toute initiative de vulgarisation, de renforcement des capacités, de concertation et de valorisation de son expertise. Il faut noter également qu'en matière de protection sociale environ 2/3 des pêcheurs ont une couverture sociale. Comme il convient également de préciser que la pêche artisanale constitue, pour la majorité des marins pêcheurs (environ 90 pour cent), la principale voire la seule activité, source de vie et de revenus.

TABLEAU A1.6
Principaux paramètres socioéconomiques de la pêche artisanale en Algérie

Paramètres socioéconomiques		
Collectif Marin	Âge	Moyenne d'âge 40 ans
	Expérience	58% des enquêtés ont une expérience supérieure à 15 ans
	Niveau d'instruction	Plus de 65% ont un niveau d'études moyenne et plus
	Statut familial	75% des pêcheurs artisans sont mariés
	Leg du métier	65% sont issus de familles de pêcheurs
	Assurance.	72% de l'équipage est assuré
	Métier principal	90% exerce la pêche artisanale comme unique métier

Source: Construit par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014.

4.2.3.1.2 Production et rendement

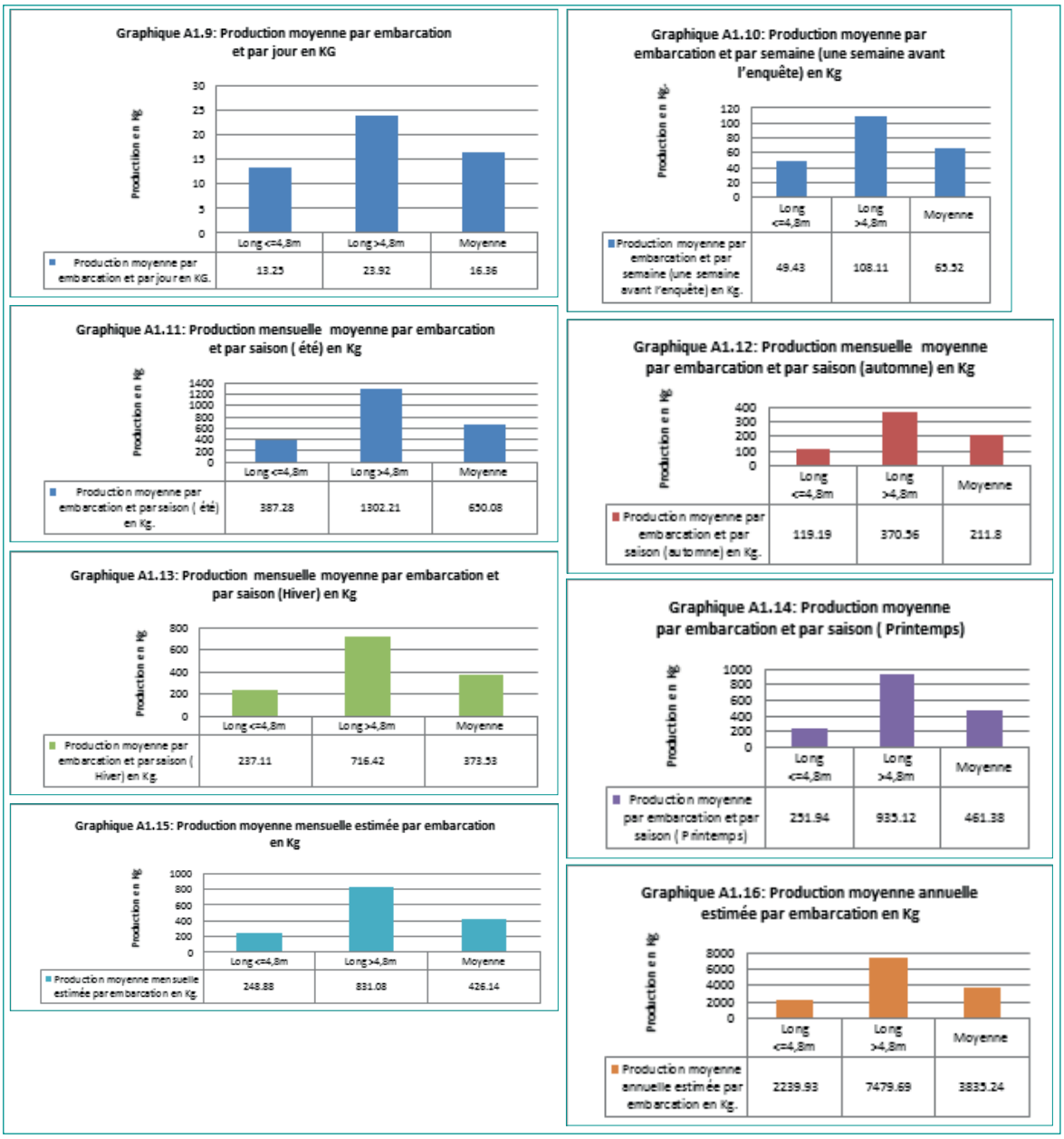
En moyenne, une unité de pêche artisanale produirait 3 835 kg de poissons avec des disparités entre segments. Ainsi les unités de pêches dont la longueur est inférieure ou égale à 4.80 mètres ont une production moyenne par an de l'ordre de 2 240 kg.

L'activité de la pêche artisanale est caractérisée par «la saisonnalité». Ainsi, la saison la plus productive pour les pêcheurs artisans est celle de l'été avec une production mensuelle moyenne de l'ordre de 650 kg par embarcation. Une production qui atteindrait parfois les 1 300 kg notamment pour les unités de pêches dont la longueur est supérieure à 4.80 mètres.

Ceci est dû à plusieurs facteurs favorables à ce type de pêche. Nous en citerons entre autres:

- La diminution de conflits d'usage avec les chalutiers qui n'exercent pas durant la période de repos biologique (suite à la réglementation en vigueur en Algérie), ce qui offre plus d'opportunités avec moins de risques pour les pêcheurs artisans.
- Les conditions météorologiques favorables à l'activité et à l'augmentation de l'effort de pêche.

Graphiques A1.9, A1.10, A1.11, A1.12, A1.13, A1.14, A1.15 et A1.16: Détails sur les rendements de la pêche artisanale en Algérie



Source: Construit et calculés par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014

4.2.3.1.3 Structure du coût de production d'une unité de pêche artisanale en Algérie
La maîtrise des coûts et de leur structure permet de mieux comprendre la formation des prix et ses principales composantes. Une maîtrise qui alimenterait et servirait l'orientation publique en matière de démarches et d'actions à entreprendre pour améliorer les revenus des pêcheurs artisans et assurer des prix à la portée des consommateurs.

TABLEAU A1.7
Structure du coût de production d'une unité de pêche artisanale en Algérie

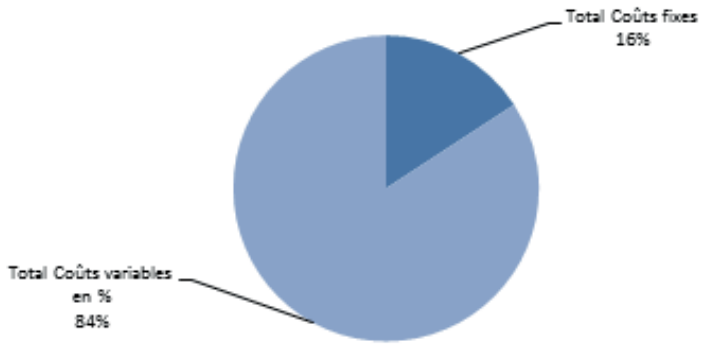
	CHARGES	COÛTS MOYENS PAR SORTIE	NOMBRE MOYEN DE SORTIES PAR AN	COÛT ANNUEL	STRUCTURE DES COÛTS EN %: PAR RAPPORT AUX COÛTS TOTAUX ANNUELS
	Valeur moyenne des taxes et des cotisations annuelles			45 308	7%
	Coût annuel de maintenance			46 700	7%
	charges liées à l'assurance du bateau			12 600	2%
	ST1 Total Coûts fixes			***104 608***	***16%***
	Coût du gasoil par sortie: 36 litres à raison de 13 DA/litre. (DA/sortie)	468	120	56 160	8%
	Dépense moyenne relative aux appâts par sortie (DA/ sortie)	2 704	120	324 480	49%
	Dépense moyenne relative aux lubrifiants par sortie (DA/sortie)	448	120	53 760	8%
	Dépense moyenne relative à la glace par sortie (DA/sortie)	240	120	28 800	4%
	Dépense moyenne relative aux vivres par sortie (DA/sortie)	785	120	94 200	14%
ST2	***Total coûts variables DA/sortie.***	***4 645***	***120***	***557 400***	***84%***
Total = ST1+ ST2	***Total des coûts annuels***			***662 008***	***100%***
	Valeur de la production annuelle moyenne (rente brute) Estimée sur la base d'une production moyenne de 3835 kg / bateau, à raison de 550 DA le Kg.			2 109 250	
	Taux coûts/valeur de la production rente brute) en %			31%	

Source: Construit et calculés par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014.

La pêche artisanale semble, à première vue, intéressante du point de vue rentabilité, puisque les couts totaux ne constituent que 31 pour cent de la rente brute (la valeur de la production). Par ailleurs, les coûts variables constituent l'essentiel des charges puisqu'ils représentent 84 pour cent des coûts totaux. Ceci s'expliquerait par la faiblesse du capital fixe, comparé aux autres activités de pêche non artisanales.

4.2.3.1.4 Estimation des revenus de la pêche artisanale par saison et par type d'embarcation
La contribution socio-économique de la pêche artisanale peut être appréhendée par des indicateurs pertinents, en l'occurrence le chiffre d'affaires (valeur de la production en DA) et les revenus bruts ou nets qu'elle procure. Nous tenterons, dans ce qui suit, de valoriser les résultats de l'enquête nationale sur la pêche artisanale en construisant (après calculs et estimation) des indicateurs susceptibles de nous situer quant à la

GRAPHIQUE A1.17
Répartition des coûts variables et des coûts fixes



Source: Construit et calculés par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014.

place économique de cette activité, après comparaison à des références notamment le Salaire minimum garanti SMIG. Pour ce faire, nous vous présentons les données et les hypothèses qui ont servi aux différents calculs et estimations.

TABLEAU A1.8
Résumé des principales hypothèses et données de calcul

Données et hypothèses de calcul:			**Observation**
Prix unitaire moyen de vente:	550 DA/Kg.		Estimé
Production annuelle moyenne estimée	3 835 Kg/ bateau/an		Estimée
Salaire minimum garanti (SMIG) en Algérie	18000 DA/mois		Donnée
Revenu net = Rente Brute – Part du mandataire - Coûts totaux de production			Donnée
Part du mandataire	10% de la Rente Brute		Estimée
Coûts totaux de production	31% de la Rente Brute		Calculé
	Type d'embarcation		
	Long <=4,8m	Long >4,8m	Moyenne
L'effectif moyen par embarcation dont le patron (estimé)	2	4	3

Source: construit et calculé par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014.

TABLEAU A1.9
Calcul et estimation des revenus de la pêche artisanale par saison et par type d'embarcation

Rente brute en DA	Long <=4,8m	Long >4,8m	Moyenne
Rente brute moyenne par embarcation et par jour en DA	7 288	13 156	8 998
Rente brute moyenne par embarcation et par semaine (une semaine avant l'enquête) en DA	27 187	59 461	36 036
Rente brute moyenne par embarcation et par mois (le mois précédant l'enquête) en DA	85 041	224 246	125 598
Rente brute moyenne par embarcation et par saison (été) en DA	213 004	716 216	357 544
Production moyenne par embarcation et par saison (automne) en Kg	65 555	203 808	116 490
Rente brute moyenne par embarcation et par saison (hiver) en DA	130 411	394 031	205 442
Rente brute moyenne par embarcation et par saison (printemps) en DA	138 567	514 316	253 759
Rente brute moyenne mensuelle estimée par embarcation en DA	136 884	457 094	234 377
Rente brute moyenne annuelle estimée par embarcation en DA	1 231 962	4 113 830	2 109 382

Source: construit et calculé par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014.

TABLEAU A1.10
Comparaison des revenus de la pêche artisanale au SMIG

Revenu brut moyen/SMIG	Long <=4,8m	Long >4,8m	Moyenne
Par embarcation. Unité: nombre de fois le SMIG	5,70	19,05	9,77
Par membre d'équipage. Unité: nombre de fois le SMIG	2,85	4,76	3,26
Revenu net calculé sur la base du système des parts en vigueur			
	Type d'embarcation		
Revenu net sur la base du système des parts.	**Long <=4,8m**	**Long >4,8m**	**Moyenne**
Par embarcation. Unité: nombre de fois le SMIG	3,37	11,24	5,76
Par membre d'équipage. Unité: nombre de fois le SMIG	1,68	2,81	1,92

Source: construit et calculé par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014.

En moyenne la pêche artisanale procurerait un revenu mensuel net de l'ordre de 34 560 DA par mois soit 1,92 fois le SMIG[30]. Toutefois des disparités sont à relever à ce sujet; les marins pêcheurs exerçant à bord de bateaux dont la longueur est supérieure à 4,80 mètres gagneraient en effet un revenu mensuel net qui avoisine les 50 600 DA soit 2,81 le SMIG, contre un revenu net par marin équivalent à 1,68 le SMIG pour les plus petites embarcations[31]. La pêche artisanale est donc une activité relativement rentable. Elle est en mesure de jouer un rôle non négligeable dans la contribution à la sécurité alimentaire et à l'amélioration du bien-être des pêcheurs.

[30] Un salaire équivalant à celui d'un cadre moyen en début de carrière.

[31] Cependant il faut noter que pour les plus petites embarcations, les coûts de production sont relativement plus faibles et la part de 10 pour cent affectée au mandataire est répartie sur les membres d'équipage. À cet effet, le revenu net mensuel est quasiment le revenu brut. Dans notre cas, il représenterait environ 2,5 le SMIG (voir tableau (estimation de la rente brute).

4.2.4 Identification des principales caractéristiques et des indicateurs économiques de la pêche artisanale

TABLEAU A1.11
Principales caractéristiques et principaux indicateurs économiques de la pêche artisanale identifiés en Algérie

Aspects économiques		
Aspects économiques	**Système de rémunération**	• Un système de rémunération à la part. • Part du mandataire 10% du chiffre d'affaires (pour les bateaux accostés au niveau des ports). • Rémunération du travail (part de l'équipage) 50% après déduction de la part du mandataire. • Rémunération du capital fixe (part de l'armateur) 50% après déduction de la part du mandataire.
	La pêche* artisanale, l'investissement et le développement intégré	• Renforce les capacités économiques des artisans. • Représente une activité centrale dans les projets intégrés intersectoriels. • Coût d'investissement faible à moyen (en moyenne 450 000 DA pour les plus petites embarcations à 1 000 000 de DA pour la plus grande). • Taux de capitalisation faible à moyen. • Montage financier (financement) des investissements faisables (existence de dispositifs de financement dans le cadre du SAIPA et d'autres dispositifs de soutien) et unités de pêche relativement solvables (par rapport au coût de l'investissement et à la rentabilité de l'activité pêche). • Faible investissement privé (financement triangulaire, aide de l'État, apport personnel, prêt bancaire bonifié). • Faible réinvestissement dans le secteur.
	Opportunités	• Activité et matériel adaptables aux activités intégrées (pêche récréative, pescatourisme, écotourisme, sentiers sous-marins). • Background et savoir faire des pêcheurs artisans valorisables dans le cadre des projets intégrés (aquaculture marine, Pescatourisme, pêche récréative et sportive)
	Circuits de commercialisation	• Circuits longs pour les navires de plus de 5 mètres • circuits locaux assez courts pour ceux dont la longueur est inférieure à 5 mètres. • Produits généralement à forte valeur marchande. • Mauvaises conditions d'hygiènes et de salubrité pour les produits débarqués hors ports.

* Ces résultats émanent des différentes enquêtes réalisées en 2014 sur la pêche artisanale à Jijel, El kala, Annaba et Ziama Mansouriah. Se conférer à Chakour S.C., 2014a.

Source: Analyse et synthèse des résultats de notre investigation (valorisation des travaux existants, et enquête pêche artisanale sept-oct. 2014).

4.2.4.1 Système de rémunération

Le système de rémunération chez les petits métiers est une rémunération à la part: 10 pour cent du chiffre d'affaires, telle est la part du mandataire, le reste soit 90 pour cent du chiffre d'affaires est partagé entre rémunération du travail (part de l'équipage) 50 pour cent et rémunération du capital fixe (part de l'armateur) 50 pour cent pour chacun[32]. Avec un système des parts accepté par la majorité des membres d'équipage, la pêche artisanale est également une activité rentable.

Pour les embarcations les plus petites (moins de 5 mètres), le mandataire n'intervient pas dans le circuit de commercialisation, le patron pêcheur prend, généralement en charge l'opération. Le caractère artisanal de cette activité ne requiert pas de grands moyens pour écouler la production.

4.2.4.2 Performance économique

Avec un coût d'investissement et un taux de capitalisation moyens, les montages financiers des projets de pêche artisanale sont généralement faisables et possibles grâce

[32] Contrairement aux sardiniers, les charges d'exploitation sont généralement incluses dans la rémunération du capital fixe.

aux dispositifs de financements mis en place par l'État notamment dans le cadre du SAIPA et d'autres dispositifs de soutien à travers des financements triangulaires (aide de l'État, apport personnel, prêt bancaire bonifié).

4.2.4.3 La pêche artisanale, l'investissement et le développement intégré

Il est à constater un faible réinvestissement dans le secteur de la pêche, puisque une partie de la rente halieutique est réinvestie dans le secteur tertiaire notamment dans le commerce. Ce qui expliquerait le faible investissement privé dans la filière pêche artisanale. L'organisation de la profession, la mise en place de dispositifs de suivi et de contrôle et la mise en place d'une charte pour une pêche responsable sont ainsi nécessaires car elles devraient inciter les armateurs à réinvestir dans les différentes filières de la pêche, comme l'aquaculture marine.

L'investissement dans le domaine de la pêche artisanale pourrait constituer l'activité centrale des projets de développement intégrés notamment dans les zones enclavées. Il permettrait un renforcement des capacités économiques des artisans et l'enclenchement d'une dynamique de développement locale dont les retombées et les effets d'entraînement sectoriels ne seraient que considérables.

Avec des équipages qui maîtrisent leur territoire et un savoir-faire local considérable, l'activité «pêche artisanale» dispose de matériels et d'embarcations adaptables et de personnels prêts à toute reconversion en activités intégrées notamment dans les projets de pêche récréative, de pescatourisme, d'écotourisme, et sentiers sous-marins (Guedri et Chakour, 2015).

4.2.4.4 Circuits de commercialisation et chaines de valeurs

Les produits de la pêche artisanale passent par deux types de circuits de commercialisation:

- Un circuit long et à forte traçabilité avec des conditions d'hygiène et de salubrité acceptables pour les navires de 5 mètres et plus.
- Des circuits locaux assez courts et à faible traçabilité caractérisés par de mauvaises conditions d'hygiènes et de salubrité pour les unités de pêche dont la longueur est inférieure à 5 mètres notamment pour les produits débarqués hors ports.

Il faut cependant souligner que le problème de l'organisation, du suivi et du contrôle de la commercialisation des produits de la pêche se pose avec acuité. Il doit faire l'objet d'une analyse fine pour réorganiser l'activité et valoriser les projets structurants (halle à marée, poissonneries, etc.).

4.2.4.5 Démarches et principales réalisations et actions entreprises par l'administration des pêches pour organiser les marchés

En vue d'assurer une meilleure traçabilité des produits de la pêche, un meilleur suivi statistique et une stabilité du marché, plusieurs dispositifs de renforcement ont été mis en place. De nombreuses actions pour organiser les marchés ont été ainsi engagées dont certaines sont en cours d'exécution ou de réalisation. Nous en citerons notamment 21 halles à marées dont 9 inscrites en programme décentralisé à la finalisation des études de l'ensemble des projets en phase de lancement, alors que les 12 restants sont en programme centralisé et répartis comme suit.

TABLEAU A1.12
Détails sur les 12 projets de halles à marées en programme centralisé

Détails sur les 12 projets de halles à marées en programme centralisé		
Action ou opération	***Nombre de projets***	***Lieu***
Equipement	03	• Boumerdès • Jijel • Collo
Réalisation et équipement	02	• Mostaganem • Chlef
Réalisation en cours	02	• Tizi Ouzou • El Kala
Finalisation des études	05 dont deux à Cherchell	• Chechell • Bejaïa • Boumerdès • Skikda
Total projets	12	

Source: Construit sur la base de «Secteur de la pêche et de l'aquaculture: Bilan (2012-2014), prospective 2030 et projet Plan Aqua-pêche 2020». MPRH, avril 2014. Pages 23-24.

Pour appuyer l'organisation des marchés, d'autres actions et réalisations ont été entreprises durant la période 2012-2014 dont les principales sont résumées dans le tableau ci-après:

TABLEAU A1.13
Principales actions et réalisations dans le cadre du renforcement de l'organisation des marchés

Actions et réalisations			
Objectifs	**Réhabilitation de certaines infrastructures existantes**	**Amélioration de la gestion et du fonctionnement des halles à marées**	**Identification des circuits de commercialisation des produits de la pêche et de l'aquaculture pour une meilleure visibilité et traçabilité**
Principales Actions	**Réhabilitation de la halle à marée d'Alger**	• Mise en place d'un référentiel de gestion et de fonctionnement des halles à marée.	Réalisation d'une enquête nationale sur les circuits de commercialisation des produits de la pêche et de l'aquaculture. Enquête réalisée en décembre 2012
		• Décision en cours de signature conjointement par le MPRH, le Ministère des Transports MT, la Société de Gestion des Ports SOGEPORTS et les Entreprises de Gestion des Ports de Pêche EGPP pour fixer les modalités d'organisation et de fonctionnement des halles à marées.	Identification des ports et des sites de débarquement (flottilles, productions, inscrits maritimes, acteurs économiques, superstructure existante…)
		• Une fois la décision signée, la gestion des halles à marrée sera confiée à la EGPP.	Identification des armateurs de pêches (flux de production, prix, rapports commerciaux...)
			Identification des mandataires (fixation des prix, marchés...)
			Identification des principaux intervenants en aval (grossistes, détaillant et concessionnaires pour la pêche continentale)
			Le MPRH prépare un projet de décret, en concertation avec les représentants de la profession et le Ministère du Commerce, fixant les conditions d'exercice de l'activité de mandataire-grossistes en produits de la pêche et de l'aquaculture. Le projet est en cours d'examen au niveau de Secrétariat Général du gouvernement (SGG).

Source: Construit sur la base de «Secteur de la pêche et de l'aquaculture: bilan (2012-2014), prospective 2030 et projet Plan Aqua-pêche 2020. MPRH, avril 2014. Pages 23-24.

4.2.5 Aspects socioprofessionnels

L'organisation de la profession est le principal cheval de batail de la SNDPA La maîtrise des aspects socioprofessionnels de la pêche artisanale passe par la construction d'indicateurs pertinents dont le calcul voire l'estimation est censée éclairer la décision publique. Dans ce qui suit, nous présenterons les principaux critères et caractéristiques socioprofessionnelles de la pêche artisanale.

4.2.5.1 Organisation de la profession et soutien de l'État

En dépit de la création des chambres de pêche et de l'aquaculture au niveau de chaque wilaya (département), l'adhésion du collectif marin exerçant dans le domaine de la pêche artisanale reste timide et appelle une réflexion sur les raisons de cette démission. Quant à l'adhésion à des associations, les quelques pêcheurs adhérents n'en tirent, souvent, pas de profits. Aussi, l'administration des pêches, à travers ses diverses investigations notamment les enquêtes et les études ciblant la pêche artisanale, s'attelle-t-elle à réunir toutes les conditions pour encourager et inciter, en impliquant et en consultant les pêcheurs afin d'arriver à l'organisation de cette profession.

TABLEAU A1.14
Indicateurs relatifs à l'organisation de la profession et au soutien de l'État

Organisation de la profession et soutien de l'État: principaux paramètres		
Collectif Marin	Adhésion à la chambre de la pêche et de l'aquaculture.	Seulement 42% sont adhérents à la chambre.
	Adhésion à des associations Gouvernementales ou Non gouvernementales.	Seulement 19% sont adhérents à des associations.
	Soutien de l'Etat	36% des pêcheurs (patrons) ont bénéficié du soutien de l'Etat. Les principaux soutiens sont par ordre de priorité: – Solidarité 55% – ANGEM 15% – ANSEJ 11%.

Source: Construit et calculé par nos soins sur la base des résultats de l'enquête nationale sur la pêche artisanale, sous-direction des statistiques, MPRH, 2014.

TABLEAU A1.15
Principales caractéristiques socioprofessionnelles et quelques indicateurs sociaux de la pêche artisanale

Aspects socioprofessionnels		
Aspects socioprofessionnels	Dimension sociale	Représente un patrimoine pour les familles pêcheurs. Une activité de type familial souvent léguée de père en fils et qui consolide les relations à l'échelle locale. La seule activité de pêche qui reste polyvalente et qui permet de conserver et de sauvegarder le métier de pêche et son patrimoine (Techniques, pratiques, comportement, traditions et habitudes...). Un attachement particulier au territoire et à l'activité pêche (assurer la pérennité de l'activité et la transmission du savoir-faire local). Un enracinement social non négligeable.
	Organisation de la profession	Métier qui nécessite une meilleure restructuration. Métier peu représenté dans les associations professionnelles et dans les chambres de pêche et d'aquaculture.

Source: Analyse et synthèse des résultats de notre investigation (valorisation des travaux existants, et enquête pêche artisanale sept-Oct- 2014).

Pour les pêcheurs artisans, la pêche artisanale est plus qu'un métier, c'est aussi un patrimoine à valoriser et une activité à pérenniser. En l'absence de distinction et de différenciation en mesure de réglementer et d'organiser l'accès aux territoires maritimes et à la ressource, l'activité demeure mal structurée, mal organisée et faiblement représentée dans les instances et organisations professionnelles notamment dans les associations de pêche et les chambres de pêches et d'aquaculture. Une quasi-absence qui a eu des effets sur le bien-être (conditions socioéconomiques) des pêcheurs artisans d'une part et qui pèse, d'autre part, sur la nature des rapports de force entre chalutage et petit métier (pêche artisanale). Devant l'antagonisme d'intérêts entre les deux types de métiers, la position des artisans s'affaiblit pour défendre leurs intérêts communs voire leurs droits communs.

Cette situation accentuerait les conflits et deviendrait contraignante à toute tentative de gouvernance tant recommandée dans les stratégies de développement.

En adoptant une démarche consultative et participative, les concepteurs de la stratégie de développement du secteur de la pêche visaient l'implication des professionnels, à travers les chambres, dans la prise de décision et l'orientation de l'intervention publique dans le domaine de la pêche et de l'aquaculture. Le renforcement de l'organisation de la profession constitue donc une priorité dans la SNDPA.

L'examen du statut et de l'organigramme de la Chambre algérienne de la pêche et de l'aquaculture et de ceux des Chambres de la pêche et de l'aquaculture de Wilayas, montre que ces institutions, telles qu'elles ont été conçues, sont en mesure de jouer un rôle déterminant dans l'organisation de la profession et le développement du secteur de la pêche et des ressources halieutiques. Malheureusement sur le terrain, la réalité est tout autre; ces institutions quand bien même dotées de prérogatives ne pourraient, faute de moyens, accomplir toutes ses missions. Une amélioration progressive est, cependant, constatée chez les professionnels qui affichent depuis quelque temps une volonté pour s'organiser.

4.2.5.2 Démarches et principales réalisations en matière de renforcement de l'organisation des professionnels et des opérateurs économiques

Le MPRH a depuis octobre 2012 engagé des actions visant le renforcement de l'organisation des professionnels et des opérateurs économiques[33]. Des actions découlant de la mise en œuvre de la feuille de route sectorielle «STRAT-E- SAID» et dont les principales sont:

- La redynamisation de la création d'associations professionnelles par filière, par catégorie professionnelle et par port (64 nouvelles associations).
- La mise en place d'un réseau national des associations activant dans le secteur de la pêche.
- La mise en place dans plusieurs wilayas maritimes de comités intersectoriels locaux pour améliorer les conditions d'exercice des activités et valoriser les réalisations publiques.
- La réalisation de la première enquête socioéconomique sur la population des marins pêcheurs en Algérie. Elle permettrait de mieux comprendre les logiques développées par les gens de mer, leur attentes et leurs contraintes et problèmes.
- L'organisation de forums thématiques de discussion et d'écoute regroupant les différentes catégories professionnelles (armateurs, mandataires, patrons pêcheurs, associations et coopératives ayant un lien avec les activités de la pêche et de l'aquaculture, opérateurs de la transformation des produits de la pêche et les constructeurs de bateaux de pêche).

[33] Cf. Secteur de la pêche et de l'aquaculture: Bilan (2012-2014), prospective 2030 et projet « Plan aqua-Pêche 2020 ». MPRH, Avril 2014. Page 13.

– La signature avec l'UE de la convention de financement du projet DIVECO II d'un montant de 15 millions d'Euros pour une durée de 04 ans dont deux axes sont consacrés aux professionnels et aux opérateurs du secteur, l'axe «promotion et valorisation des filières» et l'axe « renforcement des capacités des organisations professionnelles» .
– L'organisation par le MPRH, en janvier 2014, du premier atelier international sur la socioéconomie des pêches et de l'aquaculture et le développement intégré. Un atelier qui a regroupé professionnels, chercheurs, associations, ONG, experts et administratifs, et qui a donné naissance à un réseau de compétences régionales dans le domaine de la socioéconomie des pêches, de l'aquaculture et du développement intégré.

Il ressort que depuis quelques années, le MPRH, à travers les diverses actions, a affiché une volonté à réorganiser la profession. En témoignent toutes ces réalisations attestant de la détermination du MPRH à renforcer les dispositifs et les outils d'organisation de la profession. Ces actions s'avèrent certes nécessaires mais méritent d'être accompagnées par d'autres dispositifs complémentaires.

4.2.6 Aspects environnementaux de la pêche artisanale et gestion durable de la ressource

Dans le cadre de la promotion de la pêche responsable et durable, la détermination d'indicateurs environnementaux est essentielle pour s'enquérir des effets de la pêche artisanale sur la durabilité de la ressource et sur les écosystèmes marins. À ce titre, notre investigation fait ressortir des éléments d'analyse assez pertinents qui mériteraient valorisation.

TABLEAU A1.16
Identification des principales caractéristiques environnementales et des indicateurs de développement durable de la pêche artisanale

	Problèmes	Caractéristiques de la pêche artisanale
Aspects environnementaux et gestion durable de la ressource	Respect de l'environnement	• Sélectivité dans les engins en faveur d'une gestion durable de la ressource. • Sélectivité dans les espèces en faveur d'une gestion durable de la ressource. • Principalement des engins de pêche passifs • Faibles à très faibles rejets (pas de gaspillage et faibles effets sur la dégradation des habitats et des stocks). • Faibles impacts environnementaux sur le milieu et l'écosystème marins. • Maîtrise et très bonne connaissance du territoire maritime par les pêcheurs artisans. • Effets sur l'épuisement de la ressource faible • Pêche durable à labéliser dans le cadre de la croissance bleue. • Produits (poisson) issu d'une activité artisanale à valoriser.
	Conflits d'usage et externalités négatives croisées	• Conflit d'usage de la ressource avec les chalutiers. • Subi les effets des externalités négatives émanant de la pêche chalutière illicite.
	Contrôle et suivi du métier pour une gestion durable des ressources	• La pêche artisanale est difficilement contrôlable. • Mieux cerner la pêche artisanale en la définissant et en la délimitant dans l'espace. • Elle nécessite, cependant, une étude exhaustive pour déterminer: qui sont ces artisans pêcheurs, combien, quels sites fréquentent-ils ? quelles espèces ciblent-ils, combien produisent-ils et comment écoulent-ils leur production ?

Source: Analyse et synthèse des résultats de notre investigation (valorisation des travaux existants, et enquête pêche artisanale sept-oc. 2014).

Eu égard à ses caractéristiques et à sa dimension environnementale, la pêche artisanale est une activité à laquelle nous pouvons conférer le statut de pêche durable et respectueuse de l'environnement. En effet, étant donné ses engins passifs et à sa sélectivité dans les engins et les espèces, la pêche artisanale conforte la gestion durable des ressources halieutiques.

4.2.6.1 La pêche artisanale principale victime des problèmes de conflits d'usage, d'externalités négatives et de dégradation de l'environnement

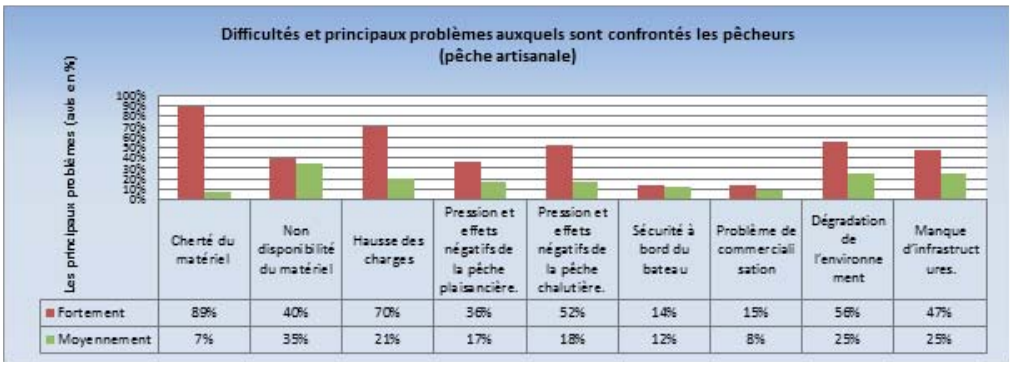
Maîtrisant leur environnement naturel et socioéconomique, les pêcheurs, grâce à leur expérience et leur niveau d'instruction, sont conscients des enjeux de leur métier. Ils sont à même d'appréhender les principales menaces qui entraveraient le développement durable de la pêche artisanale et sa pérennité. Ainsi, en plus de la cherté du matériel et les charges élevées qui suscitent leurs principales inquiétudes problèmes, les pêcheurs font part des conflits d'usage et de ses effets sur la ressource, notamment avec les autres activités, telles que la pêche chalutière et la pêche exercés par les plaisanciers. La dégradation de l'environnement est également un problème fortement posé par 56 pour cent du collectif des marins pêcheurs artisans. Si la majorité des préoccupations a été prise en charge par l'administration des pêches, il n'en reste pas moins que les réflexions, les consultations et les concertations sont toujours engagées pour prendre en charge partiellement ou totalement certaines préoccupations jugées urgentes.

En outre, l'existence de conflits d'usage entre le petit métier et le chalutage occasionne des dommages non négligeables aux artisans pêcheurs. En effet, les espaces réservés aux petits métiers sont fréquemment convoités par les chalutiers, provoquant non seulement une dégradation du bien-être des pêcheurs artisans (pêche artisanale) mais aussi de considérables pertes financières suite à la destruction et à la perte des différents engins des petits métiers notamment les engins calés[34]. Ce conflit exige de lancer un appel à l'ordre pour respecter la réglementation et protéger la pêche artisanale.

La pêche artisanale reste difficilement contrôlable. Une grande partie des petites embarcations « invisibles » exerce la pêche sans qu'elle soit comptabilisée comme active. Il s'agit principalement des embarcations à moteurs hors-bord de moins de 5 mètres dont les débarquements se font au niveau des plages d'échouage et au niveau des différents abris de pêche. Il faut noter que la pêche artisanale est également concurrencée, d'une manière informelle et déloyale par les plaisanciers[35]. Ces activités

GRAPHIQUE A1.18

Difficultés et principaux problèmes auxquels sont confrontés les pêcheurs exerçant la pêche artisanale



Source: Construit par nos soins sur la base des résultats de l'enquête nationale sur la pêche Artisanale, sous-direction des statistiques, MPRH, 2014.

[34] Tous les pêcheurs artisans rencontrés ou enquêtés affirment avoir perdu des engins de pêches suite à la fréquentation illicite par les des chalutiers de certains sites.

[35] Selon certaines sources non officielles, le nombre de plaisanciers en Algérie varierait entre 4 000 et 6 000. Un simple calcul économique avec une hypothèse de 30 kg/an/plaisancier, donnerait une production oscillant entre 120 000 kg (120 tonnes) et 180 000 kg (180 tonnes) par an.

échappent au suivi et au contrôle de l'État, ce qui constitue une réelle contrainte à la gestion durable des ressources halieutiques.

L'estimation et l'évaluation de la contribution économique et sociale de la pêche artisanale au développement local deviennent difficiles à cerner surtout qu'une partie non négligeable de la production nationale et des stocks exploités ne sont pas pris en compte dans les bilans bioéconomiques et le calcul des indicateurs socioéconomiques combien nécessaires pour l'aménagement des pêches. Aussi la SNDPA accorde-t-elle un intérêt particulier à ces questions et compte, à travers le plan Aqua-pêche, lancer des actions en mesure de pallier cette contrainte.

PHOTO A1.3

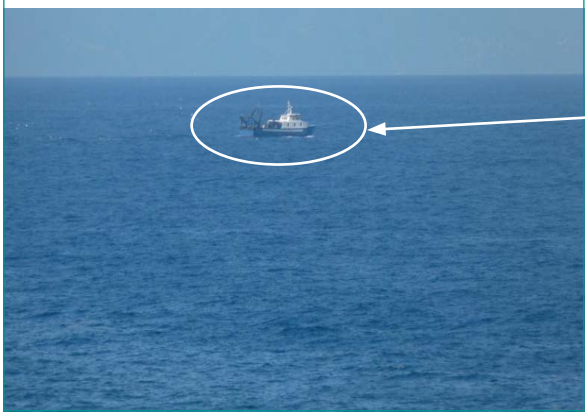
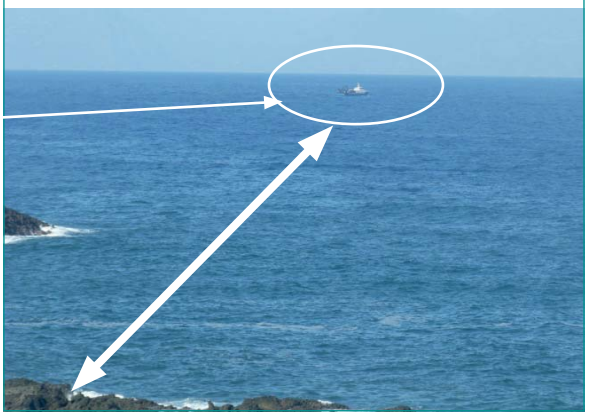


PHOTO A1.4



Chalutier pêchant à quelques dizaines de mètres de la côte (non-respect de la réglementation, zone réservée aux petits métiers).
Source: Chakour, 2014b (photos); enquête pêche artisanale. Sept. 2014.

PHOTO A1.5
Plaisanciers qui pratiquent la pêche artisanale. (Embarcation de 4,80, moteur hors-bord 15 CV)

PHOTO A1.6
Plages d'échouages. Petits métiers et plaisanciers qui pratiquent la pêche artisanale (embarcations de 4,80 et 5 mètres, moteur hors-bord 9.9 CV à 25 CV)

Source: Chakour, 2014b (photos); enquête pêche artisanale. Sept. 2014.

5. LA STRATÉGIE NATIONALE DE DÉVELOPPEMENT DE LA PÊCHE ARTISANALE ET LES DIRECTIVES VOLONTAIRES POUR UNE PÊCHE ARTISANALE DURABLE

L'Algérie, dans sa stratégie de développement du secteur de la pêche en général et la pêche artisanale en particulier, a mis en place des dispositifs et des outils économiques et règlementaires pour la promotion et le développement de la pêche artisanale en tablant sur une démarche participative et en hiérarchisant les priorités d'action et d'intervention. Ainsi, une priorité est donnée à l'homme en ciblant d'abord l'amélioration des conditions socioéconomiques de la communauté des pêcheurs notamment ses catégories les plus vulnérables (la pêche artisanale) à travers l'organisation de la profession d'abord. A cet effet, un arsenal juridique et règlementaire, résultat de la stratégie nationale, a été institué pour la mise en œuvre et la réussite de la stratégie. Arsenal qui tient compte des nombreuses directives nationales, régionales et internationales notamment les Directives PAD.

Dans le présent travail, nous tenterons d'évoquer les principales démarches entreprises et à entreprendre pour une meilleure mise en œuvre des Directives PAD en Algérie. Pour ce faire, nous essayerons de répondre à un certain nombre de questions à travers la présentation:

- de certains exemples de cadres politiques (stratégie nationale) et juridiques qui prennent en compte spécifiquement la pêche artisanale. Tout en mettant en exergue les effets positifs ou négatifs sur la mise en œuvre des Directives PAD (appuyer ou entraver la mise en œuvre);
- des principaux groupes de parties prenantes impliqués dans le développement de la pêche artisanale et la mise en œuvre des directives et de la stratégie, ainsi que les structures institutionnelles qui contribuent à la mise en œuvre de la stratégie;
- des principaux points d'accès pour la mise en œuvre des Directives PAD dans la région, et de la portée des interactions et de la collaboration avec d'autres initiatives.

5.1 Cadres politique et juridique

En Algérie, «*La politique sectorielle a été conçue et mise en œuvre selon une démarche volontairement ouverte et inclusive, à travers la participation des professionnels, la concertation avec les autres administrations concernées et la mobilisation de l'expertise scientifique tant nationale qu'internationale*» (Aquapêche 2020).

La stratégie nationale de développement de la pêche artisanale accorde une attention particulière à la pêche artisanale. Cela se traduit sur le terrain par une politique claire adoptée par l'administration publique pour atteindre, à travers une batterie de mesures, tous les objectifs fixés.

Dans ce contexte, si le cadre légal et organisationnel ne souligne pas explicitement le développement durable de la pêche artisanale d'une manière spécifique, il n'en demeure pas moins que tout est conçu pour valoriser cette activité en respectant cette politique environnementale.

En effet, d'une manière claire mais généralement indirecte, la stratégie et les politiques de développement de la pêche en général tiennent compte des Directives PAD en créant les dispositifs nécessaires et les mécanismes susceptibles de faciliter la mise en œuvre de la stratégie. Ainsi, un cadre légal et règlementaire visant l'aménagement de la règlementation est adopté pour procéder, d'une part, à l'aménagement les zones de pêche et organiser d'autre part la profession et l'activité pêche, particulièrement la pêche artisanale.

Ce cadre législatif et règlementaire est censé assurer la mise en œuvre de cette stratégie de développement qui doit respecter les principes d'une pêche responsable dans un contexte de gestion durable des ressources halieutiques. Ainsi, l'Algérie déploie, depuis quelques années, de grands efforts pour s'adapter aux nouvelles orientations et directives régionales et internationales, notamment après l'émergence

de nouveaux dispositifs comme le code de conduite pour une pêche responsable et les directives volontaires relatives à cette activité artisanale[36].

5.1.1 Rôle du Ministère de l'Agriculture, du Développement Rural et de la Pêche (MADRP) dans la gestion durable de la pêche artisanale

Présenté comme la seule autorité habilitée à mettre en vigueur la législation sur les pêches au niveau national, le MADRP (ex Ministère de la Pêche et de Ressources Halieutiques, MPRH) partage toutefois la responsabilité juridique de l'aménagement des pêches de capture marines avec d'autres organes ou autorités aussi-bien au niveau national que local. Précisons ici que la législation relative à l'activité de pêche et de l'aquaculture vise la mise en place d'un cadre fixant une série de mesures et de dispositifs organisationnels et de mise en œuvre qui favorisent la réhabilitation et le développement durable de la pêche artisanale à travers:

- La définition des politiques en matière de gestion et d'exploitation des ressources halieutiques et aquacoles,
- La réglementation de l'accès à l'exploitation des ressources halieutiques, corallifères et aquacoles,
- La détermination des conditions d'accès à la zone de pêche réservée et la fixation des quotas à prélever,
- L'élaboration et la mise en place d'un dispositif de prospection, d'évaluation et d'exploitations,
- Et enfin la proposition des mesures de soutien économique et financier de l'État aux activités du secteur.

Les mesures prises dans le cadre d'aménagement des pêches protègent d'une manière implicite l'activité de pêche artisanale, puisqu'elles visent entre autres à empêcher la surexploitation de la ressource halieutique, à protéger les diversités biologiques des espaces marins et aqueux, à fixer la période de fermeture de pêche au chalut, ainsi qu'à réglementer la pêche dans certaines zones; comme les zones protégées et les zones servant de frayères aux ressources.

5.1.2 La loi 08-15, un instrument de la politique et cadre légal pour la mise en œuvre de la stratégie de développement d'une pêche artisanale durable et responsable en Algérie[37]

5.1.2.1 La loi 15-08 et la gouvernance des ressources halieutiques et des pêcheries

Contrairement aux biens publics ou privés, l'allocation et la gestion des biens communs est une tâche complexe (Ostrom, 2010)[38]. Les ressources halieutiques sont des biens communs, leur gestion durable ainsi que l'aménagement des pêcheries doivent donc faire appel à une gouvernance plutôt qu'à une gestion. (Chakour et Boncoeur, 2005; Chakour, 2008a).

En effet, la Loi n° 15-08 est venue modifier et compléter la loi n° 01 relative à la pêche et à l'aquaculture de 2001. Une loi[39], résultat d'un grand chantier de réflexion, de consultation et de concertation entre les diverses parties prenantes du secteur de la pêche.

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[36] L'Algérie a ratifié la quasi-totalité des conventions régionales et internationales relatives au développement durable et aux droits de l'homme.

[37] Cette loi est en mesure de constituer un instrument adaptatif et itératif, entre autres un ancrage élargi pour le nouveau cadre réglementaire pour la pêche artisanale.

[38] Les biens communs sont souvent sujets de conflits d'usage. À ce titre, Elinor Ostrom (Prix Nobel d'Économie 2009) aborde cette question dans son ouvrage intitulé « Governing the commons » publié en 1990 et traduit en 2010, Gouvernance des biens communs, (Traduction française), édition De Boeck Université, Bruxelles.

[39] Loi n° 15-08 du 12 Joumada Ethania 1436 correspondant au 2 avril 2015 modifiant et complétant la loi n° 01-11 du 11 Rabie Ethani 1422 correspondant au 3 juillet 2001 relative à la pêche et à l'aquaculture.

Bien qu'elle ne soit pas spécifique à la pêche artisanale, ladite loi permet, grâce à l'introduction de nouveaux outils et instruments, techniques, économiques et règlementaires, de faciliter la mise en œuvre de la stratégie de développement de la pêche, notamment la pêche artisanale en tenant compte des directives volontaires concernant cette activité.

Dans le but d'assurer une gestion durable de la ressource par l'implication de toutes les parties prenantes, le législateur, dans l'article 3 bis de la loi 08-15 assure l'exploitation, la conservation et la préservation des ressources biologiques marines des eaux sous juridiction nationale, à travers:

- une pêche responsable des ressources biologiques afin d'assurer leur conservation et gestion durables;
- l'institution de pêcheries aménagées pour promouvoir la diversité et la disponibilité des ressources biologiques, en garantissant un effort de pêche proportionnel à la capacité de production et leur utilisation durable[40];
- la recherche et la collecte de données, pour améliorer les connaissances scientifiques et techniques sur les pêcheries[41];
- le contrôle, en coordination avec les autorités concernées[42], pour veiller à ce que les activités de pêche ne portent pas atteinte aux ressources biologiques et à leurs milieux.

5.1.2.2 La loi 15-08, les conflits d'usage et les externalités négatives: protéger la pêche artisanale des pratiques illicites

La gestion des conflits constitue également un autre volet dans la législation halieutique en Algérie. En effet, afin de mieux organiser les différentes activités de pêche et protéger les petits métiers, des mesures spécifiques sont prises pour réduire les conflits d'usage et le règlement des différends au sein du secteur. Dans ce contexte, la limitation de l'utilisation de chaluts de fond dans le temps et dans l'espace[43] constitue l'une des mesures dans le processus d'aménagement des pêches de captures marines donc artisanales. De plus, le zonage des différents territoires marins pour différents usagers, la répartition des ressources entre les différents participants à la pêche ainsi que la limitation d'accès à certaines zones pour certains types de pêcheurs, sont également arrêtés par la législation sur l'aménagement des pêches. Reste toutefois que l'observation de l'état des stocks, et la répartition équitable des ressources de pêches marines, échappent souvent cette législation. La planification et la régulation de l'effort de pêche, ainsi que la gestion des zones de pêche obéissent à la préservation des ressources biologiques et à leur exploitation durable. (Art. 16. Bis. Loi 08-15.)

5.1.2.3 La loi 15-08 et la protection des habitats: protéger les sites coralligènes c'est protéger la pêche artisanale

Une autre activité qui n'a pas été omise par le législateur algérien. Il s'agit de la pêche au corail qui doit s'effectuer ainsi d'une manière rationnelle à l'aide des équipements

[40] Les instruments proposés à ce titre sont les Plans d'Aménagement et de Gestion de Pêcheries (PAGPA). Les PAGPA doivent également tenir compte de la concurrence et des conflits d'usages entre métiers.

[41] La mise en place d'un système informationnel avec des instruments et des dispositifs de collecte et de traitement de données pour l'aide à la décision notamment la gestion durable de la pêche artisanale en impliquant les acteurs de la pêche, est une priorité de cette stratégie. Reste que ce volet nécessite un renforcement des capacités et un appui technique des partenaires régionaux et internationaux.

[42] Ce qui permettrait d'identifier les acteurs du braconnage et de la pêche illicite et de réduire les conflits. Un durcissement des sanctions liées à la pêche illicite et le renforcement des moyens de lutte (protéger la pêche artisanale contre le braconnage et les activités illicites concurrentes).

[43] Le chalutage illicite et l'exercice de la pêche illicite par les plaisanciers constituent les principales pratiques qui affectent négativement la pêche artisanale et le bien-être des pêcheurs artisans (selon les résultats des études de cas).

et systèmes de plongée appropriés et dans des zones de pêche identifiées «Art. 36. Loi 08-15». L'objectif est de mettre en place un plan de gestion et d'exploitation alterné du corail sur l'ensemble du Littoral et ce, pour assurer sa valorisation durant son processus de transformation et de commercialisation. Des instruments de contrôle permettraient également une meilleure gestion de l'activité à travers le renforcement du dispositif de surveillance et de suivi à distance des activités des corailleurs. À ce titre, des mesures coercitives avec un durcissement des sanctions en fonction de la gravité des infractions liées à sa pêche ou à sa commercialisation, sont prévues par loi[44].

ENCADRÉ A1.3

Le renforcement du cadre juridique et réglementaire a été consacré par l'élaboration et la promulgation de la loi n°01-11 du 03 juillet 2001, relative à la pêche et à l'aquaculture, modifiée et complétée par la Loi n° 15-08[*], et qui définit l'aménagement des pêches comme étant «*l'ensemble des règles générales de gestion et de développement de la pêche et de l'aquaculture, en conformité avec les engagements internationaux en matière d'exploitation, de conservation et de préservation des ressources biologiques*».

[*] Loi n° 15-08 du 12 Joumada Ethania 1436 correspondant au 2 avril 2015 modifiant et complétant la loi n° 01-11 du 11 Rabie Ethani 1422 correspondant au 3 juillet 2001 relative à la pêche et à l'aquaculture.

5.2 L'approche participative, les parties prenantes impliquées dans le développement de la pêche artisanale et la mise en œuvre des directives et de la stratégie

L'approche participative dans la gestion durable de la pêche est fortement recommandée (Chakour, 2008b). Faut-il rappeler que l'approche participative et la contribution des acteurs à la prise de décision en encourageant la valorisation de la pêche artisanale et en reconnaissant ses dimensions socio-économiques à travers sa contribution à la sécurité alimentaire, à l'éradication de la pauvreté et au développement local, est une directive, voire un principe fondamental du PAD. Cette nouvelle approche recommande le renforcement des capacités et l'organisation des pêcheurs. Comme elle veille à revoir les cadres réglementaires nationaux pour assurer la participation des organisations à la gestion durable de la pêche artisanale.

5.2.1 Les professionnels et les acteurs socioéconomiques: les chambres de la pêche et de l'aquaculture, le conseil consultatif et les différents intervenants en amont et en aval de la filière pêche artisanale

L'article 3 bis de la loi 08-15 fait de la participation des professionnels du secteur au processus de formulation des politiques liées à la pêche notamment artisanale, une démarche indéniable. Leur participation à la prise de décision par la proposition d'instruments d'application est aussi recommandée[45].

Les principaux partenaires socioéconomiques jouent un rôle déterminant dans le développement et la promotion de la pêche artisanale dans la mesure où ils contribuent à mettre en place des dispositifs de montage de projets et à protéger cette activité en assurant une couverture sociale aux pêcheurs. Ces partenaires sont principalement:

[44] Loi 08-15 « titre xiii » des sanctions; chapitre 1er des sanctions applicables à la pêche et à l'aquaculture ; et le « chapitre 2 des sanctions applicables à la pêche au corail ».

[45] À ce titre, la stratégie Nationale de développement de la pêche et de l'aquaculture, en Algérie est partie de la base pour arriver au niveau central (une approche endogène ascendante, du local au national) en impliquant toutes les parties prenantes dans la formulation de la stratégie nationale. Des rencontres locales, régionales puis nationales sont alors organisées. L'objectif étant la consultation, la participation et la concertation pour une meilleure valorisation des connaissances locales et des expertises des pêcheurs.

- le Ministère de la Solidarité Nationale, de la Famille et de la Condition de la Femme (MSNFCF) à travers l'Agence Nationale de Gestion du Microcrédit (ANGEM),
- la Banque de l'Agriculture et du Développement Rural (BADR),
- la Chambre Algérienne de la Pêche et de l'Aquaculture (CAPA),
- l'Agence de Développement Social (ADS), et
- le Ministère du Travail, de l'Emploi et de la Sécurité Sociale (MTESS) à travers la Caisse Nationale d'Assurance Chômage (CNAC) et l'Agence Nationale de Soutien à l'Emploi des Jeunes (ANSEJ).

5.2.2 Les actions entreprises pour une mise en œuvre de la stratégie et des Directives PAD

Afin d'atteindre les objectifs escomptés, la stratégie du secteur prévoie pour sa mise en œuvre des actions concrètes:

- Le renforcement des dispositifs de concertation intersectorielle au niveau local et national à travers:
  - la dynamisation du Conseil National Consultatif de la pêche et de l'aquaculture;
  - la reconduction de la convention de concertation (Ministère de la Défense Nationale / Ministère en charge de la pêche [MND/MADRP]) pour une gestion durable des ressources biologiques marines;
  - l'application de la convention État/entreprises notamment en matière d'investissement et développement des ports de pêche;
  - la consolidation à l'échelle locale (wilaya) des travaux des comités intersectoriels[46] chargés des activités de la pêche et de l'aquaculture.

5.2.3 Des partenaires et des institutions nécessaires pour respecter la réglementation et la mise en application

En effet, en plus d'un cadre législatif national, les textes algériens sur les pêches offrent également un cadre administratif pour l'aménagement des pêches de captures marines sur trois niveaux: national, régional et local. Par ailleurs, le MADRP Mest l'organisme chef de file en charge de l'aménagement des pêches de capture en Algérie. Cette institution est représentée au niveau local par des Directions de la Pêche et des Ressources Halieutiques de Wilaya (DPRHW).

Par ailleurs, la mise en application et le respect des mesures requises par la législation des pêches de capture, nécessite l'intervention de multiples organismes de contrôle à différents niveaux. En Algérie, cette mission est confiée aux autorités suivantes:

- la marine (les agents du service national des gardes côtes), chargée des patrouilles en mer, de la surveillance des pêches notamment la vérification des débarquements et des journaux de bord ainsi que des tâches coercitives dans les eaux **côtières** (0–3 miles nautiques) du pays;
- la gendarmerie maritime;
- D'autres équipes de patrouilleurs et de surveillance dans les eaux territoriales (0–12 miles nautiques), à savoir les officiers de police judiciaire et les commandants des bâtiments des forces navales qui sont chargé des patrouilles en mer, de la surveillance et des tâches coercitives pour plus de 12 miles nautiques.

En plus de ces organismes, des agents de la direction de la pêche et des ressources halieutiques de wilaya sont chargés aussi de la surveillance et d'inspection des journaux de bord. La mise en application de l'aménagement des pêches et le respect de ses dispositions requièrent plusieurs mesures de surveillance, à savoir des

[46] Des comités intersectoriels sont créés au niveau local (Wilaya). Ils représentent un cadre de concertation pour contribuer activement au développement intégré de la pêche artisanale notamment avec les secteurs de l'agriculture, du tourisme, de l'artisanat, du commerce…

systèmes de suivi des navires (vessel monitoring system [VMS]),[47] des inspections d'accostage randomisées dans le cas des navires affrétés, le signalement des captures en mer en temps réel, des inspections sur navire ou bien au moment de débarquement, etc.

5.2.3.1 Les acteurs partenaires en matière de formation et de recherches

Confiées administrativement à la direction de la formation, de la recherche et de la vulgarisation du ministère, la formation et la recherche dans ce secteur sont assurées par des organes distincts présents sur les trois niveaux:

Au niveau national:

- le Centre National de Recherches et de Développement de la Pêche et de l'Aquaculture (CNRDPA)
- l'Institut National Supérieur de la Pêche et de l'Aquaculture (INSPA), Alger.

Au niveau régional:

- **Région centre du pays:**
  - École de formation technique de pêche et d'aquaculture, Cherchell
- **Région Est du pays:**
  - École de formation technique de pêche et d'aquaculture, El-Kala
  - Institut de technologie des pêches et d'aquaculture, Collo
  - École de formation technique de pêche et d'aquaculture, Annaba
- **Région Ouest du pays:**
  - Institut de technologie des pêches et d'aquaculture, Oran
  - École de formation technique de pêche et d'aquaculture, Beni-Saf
  - École de formation technique de pêche et d'aquaculture, Ghazaouet

Au niveau local: wilaya (départements)

- Les formations sont assurées par des équipes mobiles de pêcheurs aux niveaux des Centres de Formation Professionnelle (CFP), ainsi que dans des départements rattachés aux différentes universités.

- Des laboratoires et des départements de diverses universités à travers le pays contribuent, grâce à une coopération intersectorielle, par leur output à la formation de cadres ainsi qu'à la recherche scientifique dans différents domaines[48].

[47] Certaines technologies et outils de surveillance sont coûteuses et n'intéressent pas les artisans pêcheurs. Comme ils constituent pour l'administration publique un coût de surveillance relativement important notamment dans les pays du Sud de la Méditerranée. Il est recommandé, à cet effet, d'innover et de mettre à la portée de cette catégorie de pêcheurs et de ces pays des outils efficaces à moindre coût. Dans ce cadre, les états et les organisations régionales et internationales en charge de la pêche sont interpelés pour trouver des solutions.

[48] ICnq domaines de recherches avec plusieurs axes de recherches ont été retenus après concertation et consultation avec les professionnels, l'administration des pêches et les établissements de recherche et appuyés par les réseaux de compétences créés par l'administration des pêches. Ces domaines sont: i) ressources halieutiques: biologie, évaluation et gestion, ii) ressources aquacoles: installation, surveillance et optimisation, iii) écosystèmes côtiers: surveillance, usage et mise en valeur, iv) Qualité et transformation des produits aquatiques, v) économie, sociologie et réglementation.

5.3.3.2 La mobilisation et la mise en synergie de compétences scientifiques nationales
Grâce au Comité Sectoriel Permanent de la Recherche Scientifique et du Développement Technologique CSPRSDT[49], de nombreux réseaux par domaines et thématiques prioritaires ont été mis en place notamment:

- Environnement et écosystèmes marins
- Socioéconomie et aires marines protégées
- Gestion des pêcheries algériennes
- Aquaculture marine et aquaculture continentale

Ces réseaux visent:

– le renforcement du partenariat avec les organisations internationales et régionales dans le domaine de la pêche et de l'aquaculture, et
– la réalisation de projets structurants pour prendre en charge les thématiques identifiées dans le cadre des réseaux avec des équipes de recherche pluridisciplinaires et intersectorielles impliquant les professionnels.

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APPENDIX 2. Small-scale fisheries along the coastal area off Alexandria from Montazah to Al-Anfoushy (Egypt)

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1. INTRODUCTION

The coastal area of Alexandria has traditionally been one of the most important fishing areas in Mediterranean Sea, Egypt. According to the official statics data, the number of small-scale fishing boats (<12m length overall [LOA]) along all the Egyptian coast at the Mediterranean are 645 boats, about 40 percent of them in Alexandria. 263 boats are operating in the coastal area off Alexandria with average annual catch as 10 thousand tonnes or about 20 percent of the all Mediterranean catches of Egypt during the past ten years. In fact, this percentage did not include all the catch of the small-scale fisheries operating along the shallow coastal region of Alexandria. Most of small-scale fisheries catch being marketed and consumed locally. Fishing activities are traditional and cultured in the area and recreational fishing is observed along the coast. During the last decade, traditional fishing activities in the coastal zone have been partially replaced by new activities, fishing-tourism and tourist pleasure boating along the coast particularly in summer. In last four years, the construction of marina area in Montazah and Sanstephano was accelerating these changes. Avoiding issue new fishing license and closed season for one month is the only measures used for the management of all fishing fleet along the Mediterranean coast. Unfortunately these measures are not firmly applied, particularly last four years.

2. KEY PARAMETERS OF THE CASE STUDY

There are no enough information or research activities conducted regarding the small-scale fisheries in the shallow coastal area off Alexandria (from Anfoushy to Montazah) since 2005. Recently (during 2015) a socioeconomic survey was conducted on this area supporting by FAO project EastMed, the unpublished results revealed that the estimated number of fishers involved in fishing activities was varied from 1 000 to 1 200 persons; some of them got help from their wife in repairing nets. Considering the social pattern of the fishery and its very artisanal nature, where normally more members of the same family are directly involved in the onboard activity, the vessels tend to operate more as a single economic unit. The salary per crew and the profit are therefore a figurative value that will likely be additive (FAO EastMed, 2014).

According the recent survey, some of the landing is marketing directly to the consumer or fish-shop while the majority sales through fish market or auction particularly when the catch is high. In some cases they catch with no commercial purposes, but for the fisher's own consumption.

These fisheries make important not only create wealth and contribute to economic development, but also provide food security and social safety nets for the poor. It is a sector that has a low level of investment.

In 2012, GAFRD conducted an economic survey through a fisher questionnaire along the entire Egyptian Mediterranean coast which revealed that; the small-scale

fisheries segment (<12m LOA) was composed by 645 vessels employing about 3 272 fishers and operating at the coastal area along the Egyptian Mediterranean coast, mainly using hooks and line & trammel and gill nets. The main target species were grey mullet, shrimp, meagre and seabream. The majority of fishing grounds are close to the coast. The segment showed very good economic performances with a GCF per vessel worth $13.9 thousand and a salary per fisher worth $3.3 thousand, which is higher than the other segments such as trawlers and with a lower number of working hours. Labour costs take a large proportion of the revenue due to the nature of the work in this category that depends on manpower, while the energy costs accounted for 20 percent.

3. VOLUME AND VALUE OF LANDINGS BY SPECIES:

- The main fishing gears and methods that used in the proposed area are hooks and line and trammel and gill nets.
- The average annual Landing from SSF in the proposed study area off Alexandria coastal area was estimated as 600 tonnes in 2015. The landing consisted from *Sparidae*, *Siganidae*, *Pomatomidae*, *Carangidae* and *Mugilidae*, *Scombridae* and Crustaceans.
- The value of that area landing in 2015 might reach two million US dollars. The fish price is little higher than the normal market price due to its high degree of freshness.
- There is no document or data mentioned the disappearing or flourishing of a certain species in the area during the last ten year. However as present in all the area, fluctuation may occur in some landing species from year to year.
- There were no management measures applied particularly for the small-scale fisheries.

4. FISHING ACTIVITY

- The common boat types used are P-01, P-02, P-05, P-06, L-01 and L-02. The fishing gears used are FCN, SB, GEN, GN, LHP, LTL, GNS, LX, GTR and FIX according to a sample fisher interview during 2015.
- After exclusion the fishing cost, the crew share the owner the same percentage of profit.
- Fishing costs estimated as from 50 to 60 percent of the fishing revenue.
- Wage earned by crew is considered as moderate.
- About 30 percent are part time (increased during summer) and 70 percent of fishers are full time employee. Women have a little role (construction and fixing the fishing nets).

5. FISH HARVESTING RIGHTS

- There are no special rights for SSF except the normal civil rights; they have a right to access the sea from sun rise to sun set with a licence as a fisher. They belong to the fisher's association for motorized boats but no particularly association for them. In some landing sites, fishers selected a head for their group but unofficially.

6. POST-HARVEST ACTIVITIES

- Most of the small-scale catch are consumed locally as fresh fish, there is no considerable post-harvest activities can be taken. Market supply and demand factors control prices, the higher value of "luxury" species transfer from fisher to fishmonger directly.

7. THREATS AND OPPORTUNITIES

During the last decade, traditional fishing activities in the coastal zone have been replaced by other activities such as recreational fishing, tourism pleasure particularly in summer months. In the last few years, the construction of some marina along the coastal area was accelerated these changes. Such random changes may increase the pollution and destroy the fish habitat and fishing ground in the area. Furthermore, weak information about SSF (fishing gear and catch composition) has a negative impact on the management plans where the fishing activity affects the fisheries sustainability. Loss of this important resource may lead to decrease the employee opportunities and income in the community around.

The opportunity looks in establishing an association for SSF which may support a management plan for this resource.

APPENDIX 3. Socio-economic characterization of the small-scale fishery in and around the trawl-exclusion area of the Gulf of Castellammare

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1. INTRODUCTION

The Gulf of Castellammare is located in NW Sicily, in the Central Mediterranean Sea. It lies between Capo San Vito and Punta Raisi, which are positioned between 012' 48" and 013' 01" E, and between 38' 02" and 38' 08" N respectively. The gulf embraces a total surface of 397 km^2, encompassing a variety of habitat types from the shoreline down to the continental slope.

The inner part of the gulf was legally closed to trawl-fishing in 1990, thereby creating a fishery exclusion area accounting for 200 km^2 and covering almost the entire continental shelf down to 500 m depth (Figure A3.1). Although the measure had an important historical precedent (Badalamenti *et al.*, 2012), the management initiative was completely empirical since it was not based upon sound scientific information. As soon as enforcement was in place in 1991, the effective exclusion of trawling left additional space to be exploited by SSF, which were previously restricted to rough bottoms where trawlers did not operated. However, enforcement progressively dwindle from about 2005. As a consequence, the decreased probability of penalties made illegal trawling more and more convenient (Stefanoni *et al.*, 2008). By those dates both informal communication from SSF fishers and side scan sonar echo-surveys denounced incursions by trawlers from the seaward ban line towards the coast (Pipitone *et al.*, 2014). By the time of the present study, illegal lightweight trawling has become a well stablished activity barely hidden.

The Gulf of Castellammare encompasses 7 municipalities divided in 2 provinces, summing up 118 442 inhabitants by 2010 (ISTAT, 2011). Fisheries display an important exception to the Sicilian declining context, with a 7.7 percent increase in job positions after the establishment of the trawl-ban, mainly through a highly diversified artisanal fishery. In contrast, the implementation of the fishery reserve influenced negatively the fishery based at the neighbouring port of Terrasini, due to fleet displacement from the fishery reserve towards fishing grounds already exploited by local vessels.

SSF is hereafter defined as that performed by vessels of less than 12 m Length Over Board (LOB), equipped with engines of moderate power, and with few technological aids. A total of 95 vessels satisfied the SSF definition above, operating out of five coastal towns: Terrasini (where 18 out of 35 vessels are devoted to SSF), Trappeto (16/16), Balestrate (9/9), Castellammare del Golfo (27/28) and San Vito Lo Capo (25/28).

Fish is sold fresh soon after being catch mostly in the port quay and sometimes directly to local restaurants; some fishers sell fish on the streets of their own towns. There is not further processing throughout the value-chain. In exceptional cases, like exceptionally large catches of seasonal targets (cuttlefish, amberjack, dolphinfish) or where fishers incur illegal catches (red tuna), the landing is sold to fish brokers or large retailers. In the case of illegal catches of tuna fish, fishers are paid well below the market price.

Formal harvesting rights do not exist and, on legal basis, fishery grounds are a common resource. However, artisanal fishers tend to fish in areas beside their own port. Such behaviour is based on considerations about fuel and travel expenses, safety at work, knowledge of the territory and customary rules like traditional use of those fishing grounds by some fisher families.

Sometimes fishers based at different ports share the same area. When this is the case, these are either areas relatively far from both ports or from the shoreline. Whereas activity of different fishers coincide in the same place, priority is given to the first who arrived that day. Exceptionally, fishers are seen fishing in areas beside a port different from their own. This is seem as wrongdoing but it is largely tolerated in the case of temporally abundant fisheries which are inherently ephemeral and spatially patchy. This is particularly the case of sardine fry fishery. Here, it is well accepted that all vessels fish close together in a few spots within the gulf, although enforced regulations establish in this case that vessels can operate beyond their own maritime department by two adjacent departments as most (national management plan for boat seines).

The aim of the present study is to illustrate the socio-economic characteristics of the SSF operating in the Gulf of Castellammare, which include a fishery reserve where trawl fishing has been permanently excluded for 25 years. The gulf comprises fishing ports in and out the trawl-ban area, bringing the opportunity to assess the status of artisanal fishers in both contexts. Although the presented socio-economic characterization is recent, major changes in the history of the area are discussed to illustrate their impact on the current state of affairs.

This study brings SSF socio-economic evidence in relation to a long-termed, effective trawl fishery exclusion. At present, this type of information is scanty and much needed to inform management, particularly in the Mediterranean region.

2. LEGAL AND ADMINISTRATIVE FRAMEWORK

Sicily is one of the five out of twenty Italian regions which deserve special status which empower the Sicilian government to manage local fisheries. In doing so, the management of Sicilian fisheries should tackle local idiosyncrasy and site-specific contexts, while remaining aligned with national legislation and complaining EU directives (art. 1(2) LR26/1987). In practice, the Sicilian legislation regarding fisheries mostly contains provisions for the implementation of national and European policies.

The Italian coastal territory is divided into ten maritime zones, which in turn are further divided into forty-eight naval districts. Each district holds a single Harbour Master's Office (L 381/1988) which is charged with the registration of professional fishing enterprises, patrolling, fish trading and prosecution of violation to the regulations regarding those activities. The registration of fishing enterprises encompasses both vessels and fishers in one of the following categories:

- Vessels that are suitable and equipped with appropriate gear and refrigeration and processing equipment for fishing outside the Mediterranean.
- Vessels that are suitable and equipped with appropriate gear and refrigeration and processing equipment for fishing in the Mediterranean.
- Vessels that are suitable and equipped with suitable gear for inshore (coastal) fishing, up to 20 miles from the coast.
- Vessels that are suitable and equipped with gears for local (coastal) coastal fishing, up to 6 miles from the coast.
- Vessels used in support of fixed fishing systems (arts. 8 and 9, DPR 1639/1968).

The SSF as here defined is made of vessels suitable for fishing up to 6 miles from the coast. Registries are compiled at the headquarters of each administrative province. In particular, the Harbour Master's Office in Palermo holds the registry where fishing enterprises from Terrasini, Trappeto and Balestrate are recorded, while those of

Castellammare del Golfo and San Vito are in Trapani. All fishers employed in any one enterprise must be registered (art. 9 L 963/1965) and this seems to be the case currently. However, since registration implies some costs, some crews were unregistered in past years. Apart from the crew, fishing enterprises should also make explicit the details of the company, owners, location, category and characteristics of the vessel or vessels, type and characteristics of the fishing activity (arts. 63 and 66, DPR 1639/1968, amended by art. 4 D219).

Being all these requirements satisfied, the vessel could obtain a license to fish. In order to get such license, it is necessary that an equal fishing capacity become removed from the fishery, in order to meet European Multi-Annual Guidance Program (MAGP) objectives. However, this rule does not apply to vessels smaller than 2.5 GT, which are virtually all SSF units in the Gulf of Castellammare. Licenses are valid for eight years and the owner must declare the vessel active to the Harbour Master every year during that period. The license specify the type of gear carried in the vessel, can be transferred under restrictive conditions and suspended by the competent Ministry whereas any conflict with policies in place is raised. Fishers usually apply for multiple fishing gears, but licenses can accommodate up to five and usually authorize an average of three gears.

The mesh of fixed fishing gears must be 20 mm long across the diagonals for those species larger than 7 cm of adult length (art. 86 and 87, DPR 1639/1968), except for sardine and anchovy for which there are not restrictions in mesh size. The maximum length of the gear is limited between 4 000 to 6 000 m for a single fisher or three fishers, respectively (DPR 1639/1968, EC 1967/2006) but in the Gulf of Castellammare, the LMPs define a reduction of nets' length as effort reduction measure, and it uses to be between 2000 and 3000 m. There are not catch quotas except for tuna, neither restrictions on landings.

The fishery of fish fry is firmly rooted in the local tradition and constitutes the most valuable, yet ephemeral source of income during a short period. Although this fishery is formally banned by EU and Italian legislation, the fry fishery has been carried out intermittently until 2013 on the basis of special derogates emanated by the Sicilian government. Articles 126 and 127 of DPR 1639/1968 stated that the fry fishery can be carried out on the fry of sardine and picarel, for a maximum of 60 days each year between 1st December and 30th April, without any other catch limitation. No derogates have been emitted up to date.

Many incentives are available for SSF fishers, usually in the form of grants and low interest loans. The criterion for qualification is to be a resident of the region for at least three years prior to the application. Fishers are eligible for financial assistance of up to 60 percent upgrading vessels in order to increase target selectivity and safety of working conditions. Demolition of vessels was financed in the past in order to contribute to the overall reduction of fishing effort seek by the CFP, but this measure was discarded in the recent strategies. Funds are also available for the conversion of existing vessels to touristic fishing cruises, mainly in terms of adequate safety equipment for this purpose.

A monetary compensation for a Voluntary Fishing Rest is expected by the LMPs, but not all fishers in the study area follow the rest, although they are generally eligible for the compensation. In this case this measure is defined by the plan as a measure to protect some target species such as cephalopods or lobster.

The complex bureaucracy and the small amounts of money being requested greatly reduce the efficiency of these incentives in attaining the management objectives of reduced fishing pressure and higher target selectivity.

In summary, the legal and regulatory framework influences the SSF in the Gulf of Castellammare by influencing the activities of fishers (tourism fishing), reducing fishing effort in terms of the number of days at sea (fishing rest), and prompting target selectivity (vessel and gear upgrade). However, the overall reduction in the number of

fishing vessels (dismiss *versus* new registrations) has been largely ineffective. Indeed, Pipitone *et al.* (2000) recorded a total of 96 vessels dedicated to SSF in 1999, which is almost identical to the current figure of 95 units nowadays.

3. VOLUME AND VALUE OF LANDINGS BY SPECIES

Landings were analysed on a representative sample of 15 vessels out of 95 holding the operative definition of SSF utilized in this study. The landings encompassed 37 species (or groups of them) that yielded an average of 4 686.73 kg per vessel and year, for an average value of 38 700.56 euro per vessel and year. Based on these figures, the whole fishery in the Gulf of Castellammare was estimated to land a total of 445 239.67 kg per year, for an estimated total value of 3 644 060.33 euro per year. Four species represented more than 5 percent of the value of the landings. Together, they accounted for about 64 percent of the landings and about 57 percent of the total value. In particular they were the European hake (18.41 percent of the catch, 22.29 percent of the value), common cuttlefish (9.87 percent, 12.85 percent), swordfish (8.22 percent, 11.62 percent), as well as red and stripped mullet (8.24 percent, 10.43 percent). A complete list of the target species, as well as their relative contribution to the total catch in terms of biomass and monetary value, is given in Table A3.1. This picture changed few, if any, with respect to that of ten years ago. However, independent monitoring of demersal resources in the Gulf of Castellammare showed a dramatic increase of target species immediately after the exclusion of the trawl fishery in the inner part of the gulf. The yields between the shoreline and the 50m depth isobaths, where SSF was concentrated then, displays substantial increases for most target species (European hake 226 percent, red mullet 418 percent, pandora 116 percent, European squid 223 percent). Only a few species (stripped mullet and common octopus) registered decreasing trends at the time (Pipitone *et al.*, 2000). Moreover, after the trawl ban the SSF expanded to fishing grounds down to 200m depth (utilizing gill-nets, trammel nets, and bottom long-lines) or even further (using FADs). This was previously unfeasible due to the risk of gear damage or loss by trawlers.

Among the target species, dolphinfish is almost exclusively exploited by the SSF. In fact some small vessels are fully dedicated to catch this species in late summer, taking advantage of FADs that are sometimes located well beyond the continental self.

In the special case of the Gulf of Castellammare, the SSF target stocks within the trawl exclusion area, so that there was not competition for the resources with trawlers. However, interviewed fishers unanimously identified two types of unfair competitors for the valuable resources. First, sport or leisure fishers, whose activity is largely unregulated and almost never monitored, neither controlled by enforcement authorities. Second, illegal "light" trawling that progressively developed in recent years, after professional fishers perceived that cheating was becoming profitable as a result of decreasing enforcement of the trawl ban. Both activities are perceived as unfair and highly detrimental for the stocks.

Professional fishers blame leisure fishers because of several reasons briefly illustrated below. Sport fishers are numerous and their number continues to grow without any attempt to limit it. Often, leisure fishers are not based at any port, making them virtually free to exploit any fishing ground without the constraints of traditional uses - a real case of common resource use. In addition, many of them built a noticeable harvesting capacity through acquisition and renewal of continuously updated technological innovations like enhanced (colour, 3D) echo-sonar, (differential) GPS, motorized vertical jigs, on-board refrigerators, etc. In many cases sport boats display engine power, speed, and sailing capacity well above those of the professional vessels. Some sport fishers use professional gear like gill-nets and long-lines, which are prohibited to them. Lastly, some sport fishers illegally sell the catch to restaurants and some of them manage to cover the cost of investing in the fishing equipment, and

even get positive revenues. Anecdotal but independent information confirms all the above points. However, the magnitude, extent, and extractive capacity of leisure fishing remains unknown.

Some professional fishers also denounce the existence, within the past few years, of *paranzedde*: a dialectal diminutive of the traditional name of trawl vessels (*paranze*). *Paranzedde*, hereafter denominated illegal light trawlers, are small vessels that pull a small trawling net that remains opened by light (18 to 30 kg) otters. They are regularly used to trawl over shallow habitats, including *Posidonia oceanica* seagrass beds, within the trawl-ban area and based at every port within the Gulf of Castellammare. Despite such practices are explicitly prohibited by law, fishers are reluctant to inform the authorities charged with enforcement. Such attitude is probably a result of both traditional reluctance to denounce members of the same community, and distrust towards the authorities charged with enforcement of the trawl-ban.

Professional fishing activities in the Gulf of Castellammare are subjected to different management plans for each segment of the fleet. Trawlers less than 18 m Length Over Boat (LOB) are regulated through a Sicilian management plan which apply everywhere in the island. Of course, those trawlers can only operate out of the trawl-ban area of the gulf and are restricted to fishing grounds far from the coast, which can be roughly identified at the continental slope. For this reason most trawlers in the area are larger than 18 m LOB and hence subjected to a different management plan. In contrast with the former one, different plans apply to every FAO Geographical Sub-Area (GSA) for the "large trawlers" category. The management plan of GSA 10 (Central and southern Tyrrhenian Sea) applies in the Gulf of Castellammare beyond 3 nm from the coastline and between 50 and 1000 m depth. Although the plan contains provisions against trawl fishing in MPAs, essential fish habitats including nursery grounds and zones devoted to special protection status (EFHs), and SCIs, the trawl-ban area in the Gulf of Castellammare is not cited, neither the coordinates of the above types of areas where trawl fishing is prohibited. Finally, LMPs should regulate fishing as well as other activities in the maritime territory from the shoreline to 3nm. LMPs bring the novelty of bottom-up approaches to a more participatory management of the territory, with a more integrative vision and scope. Unfortunately, the implementation of LMPs was based on the administrative boundaries of the provinces. As a result, the management of the Gulf of Castellammare is split in two different LMPs, each one being charged to a different management body. A national management plan for boat seines for sardine fry and Mediterranean sand eel also apply in the area. However, in many aspects this is in fact a policy document containing high-level goals - that is to say a road-map of overarching goals - rather than an operative management plan. Indeed operative objectives, reference values, monitoring of the performance, revision of the plan, as well as management and advisory bodies remain to be defined yet.

4. FISHING ACTIVITY

Fishing activity was completely surveyed by accessing the database held by the Coast Guard, which is the competent authority to enforce fishery regulations. Officially, the fishery within the Gulf of Castellammare is virtually made of polyvalent vessels. This is to say, all vessels asked and obtained authorization to use several registered fishing gears, despite the fact that, in practice, one or few gears could be used most of the time. Most of the units are small-scale vessels with engine using passive gears and between 6 and 12 m LOB (code P-06: 56.03 percent), followed by those of less than 6 m (P-05: 25.86 percent), between 12 and 24 m (P-07: 16.38 percent), and more than 24 m (P-08: 1.72 percent). As noticed above, this last group is still registered as polyvalent units. However, these vessels (and more specifically those over 18 m LOB) perform either trawl or long line fishing exclusively in practice.

Since the whole fishery appears to belong to the single polyvalent segment, the annual revenue for this segment is based in the sample already used in the previous section, which equals 15 vessels. Based on that sample, the value of the landings was estimated as 3 644 060.33 euro per year for the whole polyvalent segment (95 units), which in turn faced estimated cost amounting for 2 299 218.50 euro per year.

Giving these values, the total revenue of the segment would be 1 344 841.83 euro per year, and the average revenue per vessel would equal 14 156.23 euro per year, ranging from -20 845.00 to 70 910.00 euro. However, these values must be handled with great care, as it is well acknowledged that fishers are reluctant to declare their actual incomes. If the above values are sub-sampled on those 7 vessels for which interviewers have high confidence to obtain accurate scores, the previous estimates become as follows: A total income from landings of 6 299 836.79 euro per year for the entire segment, against a total cost of 2 324 907.86 euro per year, yielding a total revenue of 3 974 928.93 euro per year. On average, each vessel get a revenue of 41 841.36 euro per year. This figures indicate that a correction factor of roughly 3 should be applied to the landings declared by the rest of interviewed. After correcting for the remaining 6 vessels, the estimates from the whole sample from the entire segment become a total value of landings of 5 339 329.33 euro per year, with an associated cost of 2 299 218.50 euro per year, and a revenue of 3 040 110.83 euro per year. Regarding individual vessels, the average revenue results to be 32 001.17 euro per year, ranging from -1 082.00 to 77 796.00 euro per year.

The reasons of the different degree of confidence in the sampled scores was due to the fact that in the sub-sampled vessels, both interviewers and interviewed were born and grew up in the same small town and hence shared a long-termed personal cognisance. In must be noted that, in order overcome the forecasted difficulties in obtaining sound information for the rest of the sampled vessels, the interviewers accessed data-books held by the local fisher unions. Notwithstanding data-books constitute official information, the data obtained in this way appeared to be biased.

Please note that sampling was representative of those vessels holding the operative definition of SSF utilized in the present socio-economic assessment: a total of 95 units. The remaining 21 registered vessels were not represented in the figures provided above.

Fishing assets are chiefly the vessel, the engine, the gear and the hydraulic hauling gear that most vessels mount, excepting the smallest ones. All this equipment is bought and belongs to the vessel owner, who in most cases is also the commander and can eventually contract additional crew. The only exception were the vessels from San Vito (4 out of 15 interviewed) were the ship ownership is split in two different entities, following shipping standards: the vessel owner and the equipment owner. Young fishers can be contracted for assistance once they are registered as professional fishers, at the age of 14 as soonest, until they start their own enterprise.

Despite the arrival of fiberglass vessels, most vessels have wooden skulls and are made by one single boat builder based at the port of Castellammare del Golfo. Possible reasons for the predominance of wooden skulls are durability, stability, ease of repair and availability of the repair and maintenance service. Vessels are held in use for an average of about 20 years, but there are some vessels that display up to 50 years of service. Such extended periods of service are achieved for units located in Castellammare del Golfo, where the repair and maintenance facilities by the boat builder are located. Fishers give appraisal for wooden skulls also because they are heavier than fiberglass ones, making vessels easier to maintain the route under windy or rough sea conditions.

Engines are invariably internal and diesel. The reasons adduced are higher reliability over petrol fuelled outboard engines, which are the choice for the vast majority of leisure boats; as well as security against firing. Preferred engines are those Italian or otherwise locally distributed because the ease to find spare pieces for repairing the engine in short time, and Japanese ones because light weight and compactness. Engines are substituted every 10 or 15 years on average, but can be much older in some cases.

The hydraulic hauling gear is coupled to the engine and allows to save substantial time an effort during fishing operations. Even more important, it allows some fishers to exploit deep fishing grounds in order to target large individuals of highly priced species found in the outer continental shelf (180 to 200 m depth) and its margin (down to 500 m). Such fishery would be impossible without the aid provided by hydraulic means and the exclusion of the trawl fishery in those areas.

Fishing gear mainly comprise gillnets, trammel nets, long lines, miniature purse seine for fish fry called *tartarone*, encircling seine to fish around FADs named *raustina*, and jigs for squid. Other used fishing gears encompass line and hook, pots, *ferrettara* (a traditional drifting net that specifically targets bonito), and harpoon. Fishing gear requires constant repair, which consumes a substantial amount of time and money.

The earnings are always divided through a share system, which can differ slightly among vessels. In most cases the owner of the vessel is also the only person on board, and the earnings are divided as 50 percent for the owner, plus 30 percent for the vessel maintenance and 20 percent for gear maintenance. In those cases were the owner contracts an assistant, the distribution is roughly 50 percent for the owner, plus 20 percent to the vessel maintenance, 10 percent for the gear and 20 percent for the assistant. In contrast, whereas there is an equipment owner included in the enterprise, he takes 30 percent of the earnings, while the ship owner and the assistant take 35 percent of the earnings each. It is worth noting that, by virtue of the share system, the personnel cost depends primarily on vessel performance but also on the price at which the landings are marketed.

In contrast, a number of operating costs can be considered as nearly fixed because, apart from variations in prices induced by market forces, they depend on the intensity of the fishing activity itself. Interviewed fishers split operational cost as follows: vehicles (nearly null since fishers use their own vehicle to transport the landings), ice (on average 567.86 euro per year and vessel), packaging (340.71), selling costs (121.00), man labour (13 853.33), taxes (1 216.07), fuel (3 256.00), oil (317.23), painting (355.33), regular maintenance (173.33), carpenter (84.62), towing (159.33), electric network repair (81.54), engine repair (139.29), pump repair (107.69), repair of navigation aids (3.85), repair of nets (1 753.33), fridge repair (23.08), cables and ropes (546.43), customs (69.23), crew remunerations (1 500.00), replacement of hooks (175.00), clothing (153.57), bait (671.43), telephone (66.43), and other (93.33) for a total of 24 202.30 euro per year and vessel.

Profitability underestimation is almost legendary in SSF. Although trusted fishers can provide accurate information about their regular incomes, it is a matter of fact that additional earnings coming from exceptional catches or illegal fishing are almost surely veiled. The reported estimation of revenues for 36 000 to 70 000 euro per year by vessel should be considered as an accurate picture of regular incomes. The possibility to sell catches without declaring them at the fish market, both legally (at the port) or illegally (at fish brokers and retailers) allow fishers to hide part of their incomes. The fact that the range of revenues, as declared to the own cooperative, largely encompasses negative values support this point. At least two reasons can explain this phenomenon. A first reason is that, while illegal fishing is subjected to heavy fines, the probability to be denounced to the competent authority is pretty low. As a result, poaching can become economically convenient since total revenues exceed total fines (Stefanoni *et al.*, 2008). Among the factors which allow such a paradox, it can be identified the low and inconsistent level of patrolling, as well as the lack of legitimacy of the regulations and the administrative bodies implementing them (Pardo & Prato, 2010). A second reason is that almost every fisher considers exceptional catches a secret that can possibly lead, through the identification of new fishing places or enhanced techniques, to a competitive advantage over the rest of the fishers. Once an exceptional catch is regarded a purely stochastic event - therefore lacking any strategic interest – the fisher speaks about it as of ancient memory.

Half of the vessels (6 out of 14) are run by the single owners (excepting one single vessel with two owners). On the other half, the crew is generally composed by a single assistant (in all cases except one out of 15). It appears from the interviews that the gain obtained by the crew vary widely from 10 to 50 percent of the value of the catches. Translating such a figure in monetary terms, it shows a mean net gain of 12 954.69 ± 16 186.28 (one unit of standard deviation) euro per year, ranging from 49 005.00 to 1 480.00 euro per year. The average value is in line with those of comparable activities, but the associated variability is huge. Indeed some fishers based in the industrial port of Castellammare del Golfo are temporally employed as dockworkers when needed, provided that weather conditions and fishing seasonality make the choice advantageous. Comparable is, however, a hardly applicable term since no other purely extractive harvesting activity exits. On one hand, most fishers consider that touristic fishing excursions represent a highly convenient alternative to fishing, but such perception is again based on the intrinsic seasonality of SSF. Indeed tourism flourishes at mid-summer, when fishing yields are low and conflict with leisure fishing and sailing is high. On the other hand aquaculture, which is argued to be an appropriate alternative to extractive fishing, has repeatedly failed to become a sustainable activity in the study area, to the point that relict facilities represent obstacles to shipping and fishing.

Regarding the nature of employment, SSF is a full-time activity without participation of women.

5. FISH HARVESTING RIGHTS

SSF regulations do not recognize harvesting rights to fishers. Up to date, only the regulations of some marine protected areas located beyond the study area (e.g. Egadi MPA) contain provisions to lock some fishing grounds to local fishers. Such provisions are generally based on zoning schemes which give local fishers exclusive access to certain areas, provided that fishing effort is moderate, gear selectivity is high, and environmental impact is low.

In the rest of the maritime territory, the prohibition of fishing beyond two maritime departments from the own one somehow localizes fishing activities around the local communities to which fishers belong. However this is not a recognition of a right, but rather the indirect result of freedom limitation probably prompted by the need to control the movement of goods and persons in the open maritime territory.

Nevertheless each fisher tends to fish in some areas rather than elsewhere, and recognize the need for fishing grounds to the rest of fishers. It is said that traditional rules were stronger in the past, when specific fishing grounds were recognized to be used by certain families and the ruling power of one person in the community was recognized by all. An example of shared use of fishing area in the Gulf of Castellammare is the so-called shade fishing to catch mainly dolphinfish and amberjack aggregated under FADs made of floating objects such as refuse or vegetal materials, called *cannizzi*.

The government and the administrative bodies charged with the regulation of SSF failed to recognize traditional, locally-based rules to manage SSF. The reason could be the harmonization of regulations across the territory, or the promotion of fair competition among fishers. Whatever the rationale and recognizing that is unclear what the result would be otherwise, today fisheries (including SSF) are just another example of the tragedy of the commons (Hardin, 1968).

Recently, the implementation of LMPs brought the opportunity to convey locally-based proposals into integrated management of the maritime territory. In Sicily, LMPs started in 2013 and they are the first implementation in Italy of a bottom-up process to manage fishing resources.

The success of LMPs is yet to be seen, but the imposition of the province administrative boundaries to define the extent of the plans undermine its effectiveness.

Indeed, the Gulf of Castellammare holds two independent LMPs: one in the province of Palermo and the other in the province of Trapani. The result is a gulf split in two pieces of roughly equal size, with two redundant, overlapping management bodies nested in different administrations. Although such set-up does not preclude transversal collaboration, it possibly promotes intensive exploitation of common mobile resources.

LMPs in the Gulf of Castellammare include measures aiming at reducing the catch effort both in terms of number of vessels and of length and size of fishing gears. Moreover, voluntary fishing rests are possible during some periods of the year to protect spawners of target species such as lobsters and cephalopods. The success of these initiatives are also linked to the economic incentives for fishers adhering to the measures.

It is generally acknowledged that fish stocks generally declined following the increase of fishing capacity of the industrial fishing fleet around the 1950s and 1960s. As a result, the general trend in fisheries management is towards reducing fishing effort and to eliminate fishing subsidies. In doing so, little attention seems to have been paid to the specific characteristics of SSF. The opacity of SSF economic activity has probably contributed to the disregard of SSF in the political agenda (there is not a National management plan for SSFs), as well as the larger incomes generated by industrial fisheries. Restrictions have been applied to SSF activities without sound information about its peculiarities and effects, like the prohibition of traditional gears like the *ferrattara* (Scovazzi 1998) or the ban of catching sardine-fry. However, SSF represents in many aspects the best attempt to achieve a sustainable fishery, provide employment to a larger number of people, and hold a cultural heritage which is being progressively perceived at risk of disappearance. In fact the mean age of SSF fishers is growing in Italy (Guidetti, pers. com.). Although in principle everybody holding few basic requisites can be included in the small-scale fisher registry, their number seems to be determined by the balance between SSF profitability and the availability of alternative ways of living. Almost all fishers say that it is hard for SSF to be economically sustainable, and perceive the future even harder. In practice, young SSF fishers appear in those families where such activity has been traditionally carried out, possibly because part of the investment is already made and the cultural aspects of the activity can be adequately transmitted to the newcomer.

A first legislative tool to support SSF in the Gulf of Castellammare was the institution of the Consortium for Rebuilding of Fish Stocks under the provisions of LR31/1974 which included all the coastal towns of the gulf. Starting 1986, the Consortium has created artificial reef areas to increase the quantitative and qualitative level of fish production and preventing fishing using bottom scrapping gears. SSF fishers were authorized by Consortium to fish inside and adjacent the artificial reefs area.

6. POST-HARVEST ACTIVITIES

Post-harvest trading of SSF landings is virtually absent. All SSF landing are consumed in the local market and do not reach other commercial means. Catches are generally sold directly to public at the arrival into the port. Whereas highly sought specimens like big groupers or large lobster are landed, fishers sell them directly to local restaurants. In some instances, whereas there is not people enough awaiting for landings in the port, fishers make a tour within their own town to sell the catches door to door. In contrast, fish retailers buy their products directly from wholesalers at fish markets located in main fishing ports out of the study area (e.g. Palermo and Mazara del Vallo). They behave this way because the products, which come from trawling and aquaculture, are cheaper. Another advantage is the consistency in the availability of the fish products. Finally, they have access to products different from those in SSF landings. This picture is apparently promoted by tourism. Indeed tourist represent the bulk of consumers during the warm season and seek for a handful of species that are well served by

trawling landings (e.g. pink shrimp, giant red shrimp, and octopus) and aquaculture production (sea bass and gilthead seabream).

Two exceptions apply to the picture above: exceptional catches of a single species and illegal fishing. In some instances fishers collect a large quantity of a temporally abundant species (e.g. dolphinfish, cuttlefish). If the landing is just too large to be absorbed by the local market, fishers sell the fish in a fish market (at Terrasini, Palermo, or Mazara del Vallo). In other occasions fishers participate in illegal fishing, typically of blue-fin tuna for which catch quotas are imposed, but also swordfish under the minimum legal size. In the case of blue-fin tuna, fishers take advantage of the current impossibility to track individual tuna fish to buy a single quota that is then used repeatedly in several catches. The repeated catches are sold with the very same document to consentient wholesalers, thereby illegally inflating catches and revenues for the benefit of both the infringing fishers and the wholesalers, while the whole tuna fishery bears the cost.

Apart from reared lobsters that escapes the vagaries of seasonality in the market prices, and illegal blue-fin tuna that are sold well under the market value, the final price of landed species is on average that declared by interviewed fishers. By virtue of direct trade of SSF landings to local consumers, products are sold at first landing price without any further mark-up. Albacore (sold at an average price of 6.00 ± 0.00 [mean ± 1 standard deviation] euro per kg), European hake (10.00 ± 1.00 euro/kg), common cuttlefish (10.75 ± 1.55), swordfish (8.00 ± 0.00) and mullets (11.33 ± 1.15) are the most important species both in terms of landed biomass and monetary value (Table A3.1). Unsurprisingly both criteria coincide since those species represent the main SSF targets, and the fishing gear is highly selective.

The maintenance of lobsters alive in a single land-based facilities represents a value addition activity. Such facility resemble an aquaculture system but the scope is just keep lobsters alive. The facility allow to buy lobsters at low price when they are abundant and sell them later on as fresh product when the market price rises. One single facility exits in San Vito and possibly takes advantage of the reproductive aggregations and migrations of lobsters off this locality, which are well known by local fishers. It should be noted that lobster rearing is not carried out as an aim in itself, but is rather an additional activity performed in facilities devoted to the salting of fish (which in turn come from fleets well beyond the study area) and therefore it does not represent any additional employment opportunity for the local population. Authors had not access to information about the benefits of this activity.

Selling very large individuals of highly sought species (e.g. lobsters, amberjacks, and groupers) to restaurants greatly increases the final price to the consumer. However realistic estimates of the price mark-up are not available. In addition, fishers consistently blame the unfair competition represented by leisure fishers who illegally sell their catches to restaurants, thereby making prices to drop.

7. THREATS AND OPPORTUNITIES

All the interviewed fishers, as well as those meet elsewhere during the last years unanimously blame leisure and illegal fishing, as well as environmental degradation as the main threats for SSF sustainability.

Leisure fishing is itself an activity directly competing with professional fishing for some of the target species. Sport fishing varies from spear gun fishing to line fishing, but some (or many, on depending of the perception of the interviewed) regularly use professional gear like seines, longlines and nets. Fishers denounce several facts related to sport fishing.

First, leisure fishing is loosely regulated and enforcement is almost absent in practice. Possible reasons are that sport fishing vessels frequently shuffle among different ports, are difficult to identify (they do not show an identification number as professional vessels do), and are very numerous.

Second, some leisure vessels are equipped with high-end engines, navigation aids, fish detection capabilities and fishing gear well above the possibilities of any SSF fisher. This allow some sport fishers to display high harvesting capacity. Even more important, high-end sport fishers target very large, "relictic" individuals that remained inaccessible up to date by virtue of remoteness (e.g. off-shore banks) or impossibility to manoeuvre conventional gears (e.g. overhanging cliffs and shipwrecks). Spear gun fishing and motorized vertical jigging appear to be particularly effective in depleting such large specimens. The ecological consequences for SSF sustainability can be potentially large, since larger individuals are often those females contributing most to the reproductive potential of the (meta) population. Unfortunately, there is a paucity of sound information about leisure fishing effort, its biological impact and the associated socio-economic consequences in the study area.

Third, some sport fishers illegally sell their catches to restaurants, thereby reducing the demand of fish products to professional fishers and lowering the price at which professional fishers can sell their catches.

Fourth, some sport fishers interfere or impede professional fishing operations by e.g. deliberately or accidentally cutting the ropes of pots, long-lines, nets and FADs.

An additional concern is represented by illegal trawling. As noted above, SSF greatly benefits from the trawl ban in the study area. This is due to both the biological effects of the exclusion of trawling (Pipitone *et al.*, 2000b) and the expansion of SSF to fishing grounds previously exploited by trawlers. Indeed the number of vessels devoted to SSF has remained fairly constant since the exclusion of trawling in the study area 25 years ago, in sharp contrast with the trend elsewhere in western Mediterranean (Pipitone *et al.*, 2000a).

Illegal trawling developed in recent years as a result of the decrease in patrolling activities in the Gulf of Castellammare as well as elsewhere. During informal meetings, coast guard officials said that enforcement was reduced due to the shortage of resources and the appearance of priority actions like maritime rescue of illegal immigrants. The reduction in patrolling effort made poaching economically convenient, since the probability of fees was reduced, while the catches were expected to be large after many years of trawling exclusion (Stefanoni *et al.*, 2008). An additional factor could be a certain tolerance towards this practice, possibly due to the diffuse perception among fishers that the physical perturbation of the sea bottom enhances fish productivity. It should be noted that, while such perception accurately reflects the effects of slight perturbations of nearly pristine ecological communities, the pressure exerted by bottom trawling is much heavier and have a depressing effect on the abundance and biomass of target species (Pipitone *et al.*, 2000b). Admittedly, catches are expected to be large in a first instance, while the poacher is exploiting the fish biomass built over many years of protection from trawling, thereby supporting the belief in a non-negative effect of illegal trawling.

Illegal trawling is carried out in two different ways. On one hand, some regular trawlers enter the exclusion area from their regular fishing grounds to perform a first haul at the beginning of the journey. Their activity is clearly recorded as otter marks on the bottom, as revealed by imagery from side scan sonar. An additional illegal fishing is performed close to the shoreline with trawlers much smaller than the norm (*paranzedde*), pulling otters of about 30 kg and small nets. Such vessels allow poachers to operate less manifestly, in shallow waters, and onto seagrass beds. Although the entity of the phenomenon is unknown, interviewed fishers said that *paranzedde* are found in every port in the Gulf of Castellammare.

Environmental degradation has been regularly blamed by professional fishers as a factor determining the progressive decrease in catches everywhere. However, in the Gulf of Castellammare small-scale fishers have identified the release of olive oil sub-products as the cause of drastic reductions in catches around the points were such

substances plausibly reach the sea. Oil sub-products result from pressing olives to obtain olive oil during autumn. The machines used to press the olives must be cleaned and the resulting waters, containing both oil fractions and detergents, are regularly discharged. The key point seems to be that most, if not any water treatment facilities in the area are not fully operative. Indeed water treatment is legally-binding and many municipalities constructed treatment facilities, sometimes with EU structural funds. Later on, resources became insufficient to run and maintain the facilities so that discharged waters reach the sea with little or no treatment at all. This picture is still unchanged in Sicily (e.g. Pipitone, 2015), but authors did not verify the effectiveness of sewage treatment in the municipalities of the Gulf of Castellammare. Therefore the present description is exclusively based on the perceptions of interviewed fishers.

In general, threats and the related uncertainties are simply not managed by SSF managers, neither fishers, in the Gulf of Castellammare and neighbouring areas (D'Anna *et al.*, in press). There are several factors contributing to this picture, with the lack of effective communication and stakeholder engagement being prime ones. Therefore the business-as-usual approach prevails, hindering active adaptive management despite adequate tools are available to deal with uncertainty (Parma, 1998; Stelzenmüller *et al.*, 2015).

Interviewed fishers did not perceive any upcoming opportunity. Yet, the trawl exclusion area in the Gulf of Castellammare provided SSF the opportunity to expand and sustain. In fact some fishers would be prone to abandon SSF whereas the trawl ban would be revoked (Whitmarsh *et al.*, 2003). It is remarkable that the trawl ban has been well accepted from the beginning, possibly due to links with traditional values still latent in the local population (Pardo & Prato, 2011). Indeed, it has been found that trawl ban can be tracked back at least to 1896 in the Gulf of Castellammare. Notably, the trawl ban was then introduced following the request made to the king by local fishers (Badalamenti *et al.*, 2012). After the introduction of the current trawl ban in 1990, incentives and enforcing prompted compliance until the local economic context deteriorated (Stefanoni *et al.*, 2008). At that point, the unresolved issue of trawl fishery displacement emerged in the form of illegal trawl fishing. This evidence highlight the need for mechanisms to share management responsibility with stakeholders, and ensure equity in the distribution of cost and benefits derived from management decisions. In this sense, new opportunities will be brought by the implementation of LMPs. Despite being subjected to some obvious difficulties in this initial phase, LMPs represent the first attempt of a bottom-up approach to the integrate management of the maritime territory in the study area. The importance of the balance between top-down and bottom-up initiatives in the governance of an area is illustrated by the recent experience in the neighbouring MPA of Egadi Islands. There, the inclusion of a bottom-up way to convey the voice of trawl fishers and aspirations resulted in a re-zonation of the MPA. As a result, the perceived legitimacy of the management body increased dramatically among trawl fishers, thereby increasing compliance with MPA regulations (D'Anna *et al.*, in press). In the Gulf of Castellammare, LMPs could serve to bring the needs of SSF and trawl fishers, as well as other stakeholders, into a shared scheme of use which put the basis for a more integrated, spatially explicit management. For example, conflict exits between SSF and trawl fishing regarding the deployment of FADs, since these are static and remain in position for the duration of the whole fishing season of some species highly targeted by SSF (dolphinfish, amberjack, etc.). FADs are often placed far from the shoreline, thereby representing a physical obstruction to trawling. Reciprocally, FADs go lost whereas trawlers cut the anchoring rope during their fishing activity. Nowadays, deployment of FADs is regulated by LMPs, which define the fishing season and the distance from the coast at which FADs should be placed.

LMPs become of prime importance for the implementation of Marine Spatial Planning (MSP) (Katsanevakis *et al.*, 2011; Stelzenmüller *et al.*, 2013). MSP is particularly timely

in the face of the European Integrated Maritime Policy (COM 2010/771/EC; DIR 2014/89/EU). It is indeed remarkable that the European Commission (EC) recognized the need of stakeholder participation and transparency as key factors for the successful management of the maritime territory (COM/2008/791/EC). In addition to the previous ones, the EC also recommend the implementation of agreed rules as another factor for a better maritime governance in the Mediterranean region (COM/2009/466/EC). Finally, the EC established a fund aimed at improving sustainability of SSF (COM 2012/491/EC). It is clear that SSF appears far more sustainable than industrial fishing with respect to their social importance, contribution to the local economy, and pressure on the environment. These has been widely recognized as the three pillars of sustainability (Adams, 2006), and the SSF in the Gulf of Castellammare appears to meet all of them while taking advantage of the trawl exclusion zone.

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TABLE A3.1

Target species of the SSF in the Gulf of Castellammare, their average landings per vessel in kg per year (and standard deviation in the same unit) and their total monetary value in euro per year (standard deviation in the same unit). Please note that the mean landings were calculated across all the surveyed vessels (N), while their value was computed for the solely vessels targeting such species (n).

Common name	Scientific name	Kg/year	N	Euro/kg	n	Euro/year
European hake	*Merlucius merluccius*	826.67 ± 998.54	15	10.00 ± 1.00	9	8 626.67
Common cuttlefish	*Sepia officinalis*	462.67 ± 620.50	15	10.75 ± 1.54	12	4 973.67
Red and stripped mullet	*Mullus* spp.	386.33 ± 701.59	15	10.44 ± 0.88	9	4 035.04
Swordfish	*Xiphias glaudius*	385.33 ± 1,291.07	15	11.67 ± 3.51	3	4 495.56
Dolphinfish	*Coryphaena hippurus*	366.67 ±1,076.81	15	4.50 ± 0.71	2	1 650.00
Mackerels	*Trachurus* spp.	268.00 ± 351.23	15	3.63 ± 0.92	8	971.5
Albacore	*Thunnus alalunga*	253.33 ± 787.28	15	6.00 ± 0.00	2	1 520.00
Silver scabbard fish	*Lepidopus caudatus*	193.33 ± 540.46	15	5.33 ± 1.53	3	1 031.11
Bogue	*Boops boops*	174.67 ± 234.03	15	4.14 ± 1.07	7	723.62
Gunards	*Chelidonichthys* spp.	140.00 ± 307.18	15	10.20 ± 1.10	5	1 428.00
Pandoras	*Pagellus* spp.	138.67 ± 307.48	15	10.00± 0.00	4	1 386.67
Seabreams	*Diplodus* spp.	125.33 ± 161.99	15	10.89 ± 1.05	9	1 364.74
Atlantic bonito	*Sarda sarda*	93.33 ± 162.42	15	4.20 ± 1.10	5	392
Common octopus	*Octopus vulgaris*	92.00 ± 159.79	15	9.00 ± 1.10	6	828
Sand steenbras	*Lithognathus mormyrus*	79.33 ± 152.10	15	11.50 ± 1.00	4	912.33
Blackspot seabream	*Pagellus bogaraveo*	77.33 ± 174.01	15	5.00 ± 3.56	4	386.67
Forkbeard	*Phycis phycis*	72.67 ± 156.96	15	5.50 ± 2.47	6	399.67
Greater amberjack	*Seriola dumerili*	72.67 ± 93.84	15	11.63 ± 2.33	8	844.75
Atlantic bluefin tuna	*Thunnus thynnus*	66.67 ± 258.20	15	3.50 ± 0.00	0	233.33
Saddle bream	*Oblada melanura*	63.33 ± 219.14	15	5.50 ± 0.71	2	348.33
Salema porgy	*Sarpa salpa*	50.00 ± 154.69	15	3.00 ± 0.00	3	150
Other small fishes	*Other small fishes*	46.67 ± 180.74	15	5.00 ± 0.00	1	233.33
Bullet mackerel	*Auxis rochei rochei*	43.33 ± 117.82	15	3.00 ± 0.00	2	130
Scorpionfishes	*Scorpaenidae* spp.	32.40 ± 58.58	15	9.20 ± 1.10	5	298.08
Annular seabream	*Diplodus annularis*	20.00 ± 77.46	15	5.00 ± 0.00	1	100
Soles	*Solea* spp.	20.00 ± 77.46	15	20.00 ± 0.00	1	400
European flying squid	*Todarodes sagittatus*	20.00 ± 77.46	15	8.00 ± 0.00	1	160
Pilot fish	*Naucrates ductor*	16.67 ± 64.55	15	5.00 ± 0.00	1	83.33
Stargazer fish	*Uranoscopus* spp.	15.33 ± 29.73	15	8.75 ± 2.50	4	134.17
Atlantic pomfret	*Brama brama*	10.00 ± 38.73	15	6.00 ± 0.00	1	60
Flathead grey mullet	*Mugil cephalus*	10.00 ± 38.73	15	5.00 ± 0.00	1	50
Sea basses	Serranidae	8.00 ± 30.98	15	3.00 ± 0.00	1	24
Groupers	Epinephelidae	7.33 ± 25.76	15	15.00 ± 7.07	2	110
Mediterranean lobster	*Palinurus elephas*	4.67 ± 12.46	15	35.00 ± 0.00	2	163.33
Corb	*Umbrina cirrosa*	4.00 ± 11.21	15	7.50 ± 2.12	2	30
European barracuda	*Sphyraena sphyraena*	2.67 ± 10.33	15	6.00 ± 0.00	1	16
Wrasses	*Labrus* spp.	1.33 ± 5.16	15	5.00 ± 0.00	1	6.67
	Total	4 686.73		8.18		38 700.56

ANNEX 1

List of the main elements of the legal framework and the related inspiring policies regarding fisheries and conservation in the Gulf of Castellammare.

International

- United Nations Agenda 21
- United Nations Convention on Biological Diversity
- United Nations Convention on the Law Of the Sea (UNCLOS)
- International Convention for the Prevention of Pollution From Ships (MARPOL)
- Convention on the prevention of Marine Pollution by Dumping of wastes
- International Convention for the prevention of pollution and wastes
- International Convention for the Control and Management of Ship's Ballast Water and Sediment
- Barcelona Protocol for the Protection of the Mediterranean Sea against pollution resulting from exploration and exploitation of the continental shelf and seabed and its subsoil
- Regulation 19 of Solas Chapter V: AIS
- ICES Convention
- FAO Code of Conduct for Responsible Fisheries
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)

Mediterranean region

- Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean (MAP Phase II)
- MAP policy (in particular SPA/DB Protocol)
- Fisheries Mediterranean Regulation

European Union

- Strategic Environmental Assessment Directive (SEAD)
- Directive 2000/60/EC (Water Framework Directive - WFD)
- Marine Strategy Framework Directive (MSFD)
- Common Fisheries Policy (CFP)
- Council regulation (EC) 2371/2002, art. 37 (m): conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy
- Habitats Directive 92/43/EEC
- Directive 2009/147/EC (Birds Directive)
- Biodiversity Strategy 2020
- EC Communication. Roadmap for Maritime Spatial Planning: Achieving Common Principles in the EU
- European Convention on the Protection of the Archaeological Heritage
- SPA & Biodiversity Protocol
- EC/1224/2009 Regulation about VMS
- European Integrated Maritime Policy COM/2007/0575 final

National

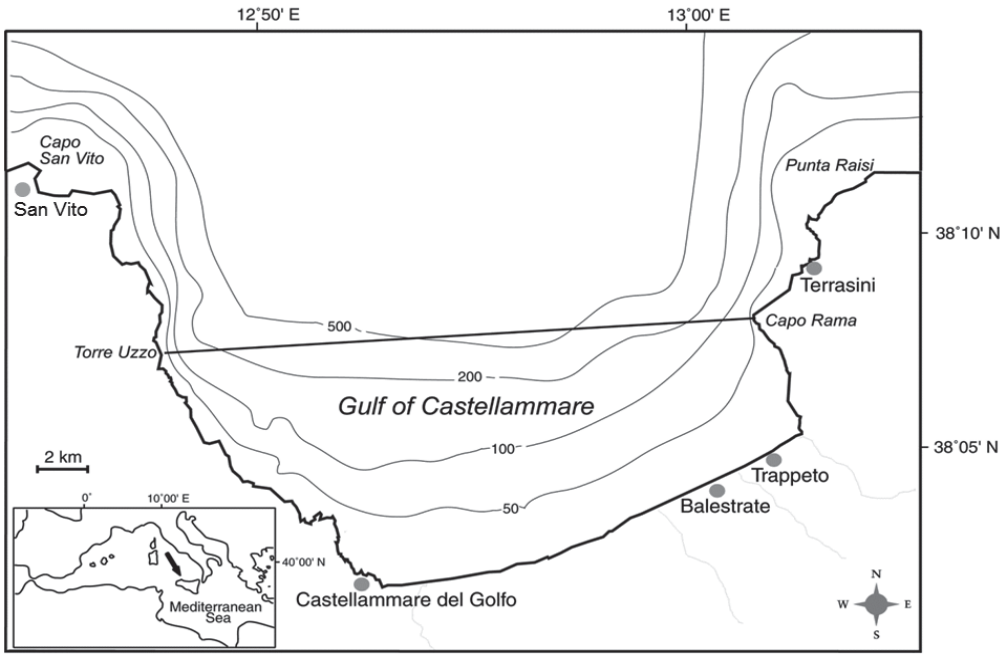
- L. no. 347/1978
- Italian operative plan of fishing 2007-2013 approved with EC decision No. 6792/2007
- Italian Ministerial Decrees - Adoption Ways to permanently stop the activities of fishing units

- Italian Ministerial Decrees related to (EC) No 1198/2006 (EFF) to realize the CFP objectives
- Italian Ministerial Decree 6 April 2010 – Adoption of the Italian fishing effort adjustment plans. Art. 21,(EC) regulation No 1198/2006
- Italian Ministerial Decree 44, 17 June 2010 – Adoption of National Management Plans of trawling fleet
- Italian Ministerial Decree 0010988 06/12/2010
- Act no. 979/1982 on the defence of sea.
- Act no. 34/1991 on marine protected areas.
- Decree 30 March 2009, list of Italian SCIs and Special Protection Areas (SPAs).

Sicilian

- Regional [Sicilian] Law no. 40/1983.
- Regional [Sicilian] Law no. 95/1984.
- Regional [Sicilian] Law no. 26/1987.
- Regional [Sicilian] Law no. 25/1990.
- Regional [Sicilian] Law no. 26/1998.
- Sicilian Regional Department of Fisheries, 2010 - Local management plans.
- Sicilian Regional Department of the Environment, Decree n. 221 of 31 Dec 2010, list of marine SICs.

FIGURE A3.1
Study area



APPENDIX 4. Characterization of artisanal fisheries targeting European spiny lobster (*Palinurus elephas*) in La Galite archipelago and Esquerquis Benches (North of Tunisia: GFCM GSA 12): *Métier* identification and potential impact on benthic communities

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Key words: Spiny lobster fishery, *métiers* identification, fishing pressure, benthic communities.

ABSTRACT

In Tunisian water, Spiny lobster fishing is practiced exclusively in the north region of Tunisia and in particular in the Esquerquis Bank and La Galite Archipelago by an important artisanal fleet notably from the regions of Bizerte and Nabeul. The fishing activity occurs between 01 March and 15 September of each year. The artisanal fleet of the region of Bizerte fishing in the study areas is composed by 112 boats involving 565 fishermen; about 67 percent of this fleet has Bizerte as homeport. A total of 14 different associations' species/gear or *métiers* were identified. The main fishing gear used is trammel nets followed by longlines and gillnets. Trammel nets are mainly used to target spiny lobsters (*Palinurus elephas*) and red scorpionfish (*Scorpaena scrofa*). The second *métier* is longlines targeting the red porgy (*Pagrus pagrus*), the common dentex (*Dentex dentex*) and the red scorpionfish (*Scorpaena scrofa*). For the region of Nabeul, the artisanal fleet, exploiting La Galite and Esquerquis areas, is composed by 102 boats involving 526 fishermen. Kelibia and Sidi Daoued harbors are the homeports of respectively 55 percent and 32 percent of the artisanal fleet working in our study area. Ten fishing *métiers* were identified. The most important *métier* is the gillnet targeting Bonito (*Sarda sarda*) followed by the *métier* of longlines targeting swordfish (*Xiphias gladius*) and by the boat seine net for dolphinfish (*Coryphaena hippurus*).

The evaluation of the possible pressures of artisanal fishing gears especially spiny lobster trammel nets on benthic communities in the study selected areas had been made by onboard surveys carried out in La Galite and Esquerquis Benches. Scientific observers were onboard of artisanal vessels to estimate catch composition with special attention to structural benthic species. Results have shown that the Lobster trammel nets could have at long run an impact on maerl beds, bryozoans and algae in the La Galite area and on Echinoderms, algae and maerl species in the Esquerquis benches. As well, the fish trammel nets have

shown a possible impact on algae and molluscs in the La Galite region and on maerl beds and algae in the Esquerquis area. However, it is very important to point out that the majority of discarded species of the two types of trammel nets have been released alive. For the longlines, the possible impact on benthic communities is smaller than that of the trammel nets.

1. INTRODUCTION

The European spiny lobster (*Palinurus elephas*) is widely distributed in the NE Atlantic and Mediterranean waters where it lives on rocky, coralligenous and maerl substrates from close inshore to depths of 200 m where micro-caves, crevices and natural holes are available (Ceccaldi & Latrouite, 2000). It is exploited throughout its range and in the western Mediterranean Sea primarily at 50-100 m depth. In the Mediterranean Sea, *P. elephas* is now generally most abundant around islands that have suitable rocky substrates because their relative isolation has provided refuge to exploited populations.

It is traditionally targeted by artisanal fisheries, but between the 1960s and the 1970s has severely impacted lobster populations (Hunter, 1999; Goñi and Latrouite, 2005). Consequently, lobster catches have declined in most of the distribution range during recent decades (Goñi *et al*., 2003a; Goñi and Latrouite, 2005).

In Tunisian water, Spiny lobster fishing is practiced exclusively in the north region of Tunisia and in particular in the Esquerquis Bank and La Galite Archipelago. The fishing activity occurs between 01 March and 15 September of each year. The change in fishing strategy (from traps to trammel nets) that took place during 1980s was followed by a great increase in spiny lobster landing and in boat number (especially during 1990s). The increase in fishing effort have had a negative impact on the Biomass, catches and the average size of spiny lobster in Tunisian water (Gaamour *et al*., 2005).

In addition, trammel nets could have a great impact over the benthic communities because they mainly operate on the bottom or in its proximity. However, until now there are no scientific studies that are designed to assess this impact. Thus the ECOSAFIMED project (an ENPI CBCMED project financed by the EU), was realized to study the impact of artisanal fisheries and specially the spiny lobster fishery on shelf areas with low trawling pressure in the two Tunisian study areas: Esquerquis Bank and La Galite archipelago.

In this case study, we will focus on the presentation of the activity of small-scale coastal fishing in terms of characterization of fishing ports, fishing units, fishing gears and target species. The basic data were collected from 80 interviews carried out in the two governorates of Bizerte and Nabeul and from the official fishing statistics yearbook of the Tunisian Ministry of Agriculture. In addition, we will present the results of the onboard surveys that had been conducted in the two study areas in April–June 2015 with an assessment of the impact of the Lobster trammel nets on the benthic communities.

2. PRESENTATION OF THE STUDY AREA

The Esquerquis benches (Figure A4.1) and the La Galite archipelago (Figure A4.2) are located far away from Tunisian coasts; about 51 nautical miles respectively on the north-east and north-west of Bizerte. The majority of artisanal boats fishing in Galite and Esquerquis are those of the governorates of Bizerte and Nabeul. Therefore, in this part we will describe fishing ports, artisanal fleet and gears of Nabeul and Bizerte regions.

2.1 Overview of the Bizerte region

The region of Bizerte is located in the extreme north of the country, it is a very important opening on the Mediterranean Sea and the maritime lanes of the Strait of Sicily which gives it a strategic position.

The Bizerte region enjoys a unique ecological setting combining the sea (200 km coastline), the mountain and the forest. It is distinguished by the natural park of Ichkeul listed as World Cultural and Natural Heritage of UNESCO.

FIGURE A4.1
Esquerquis Benches

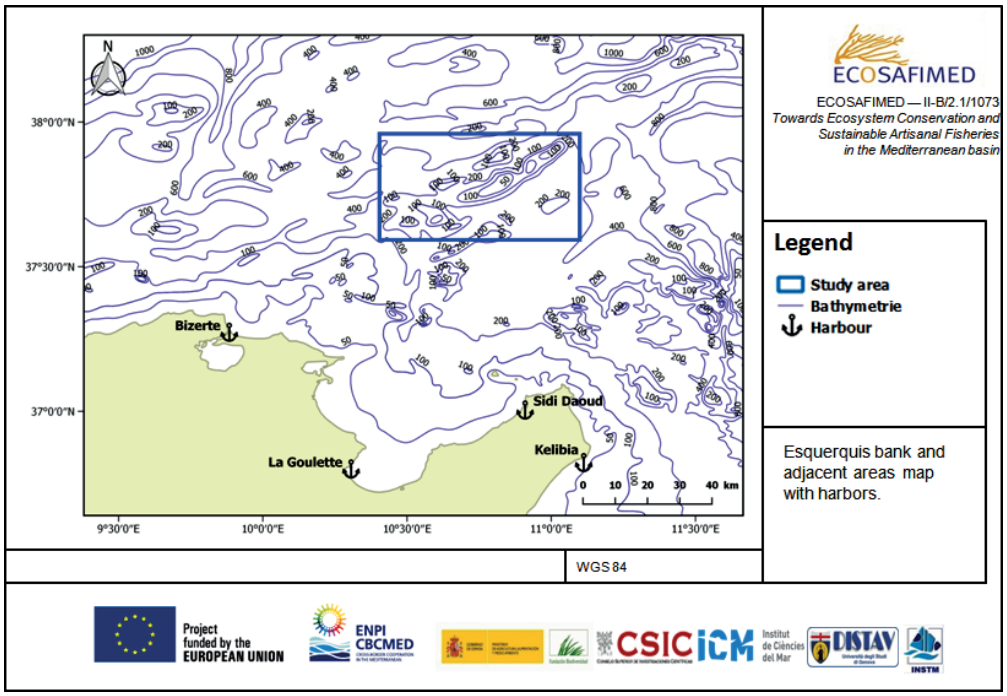
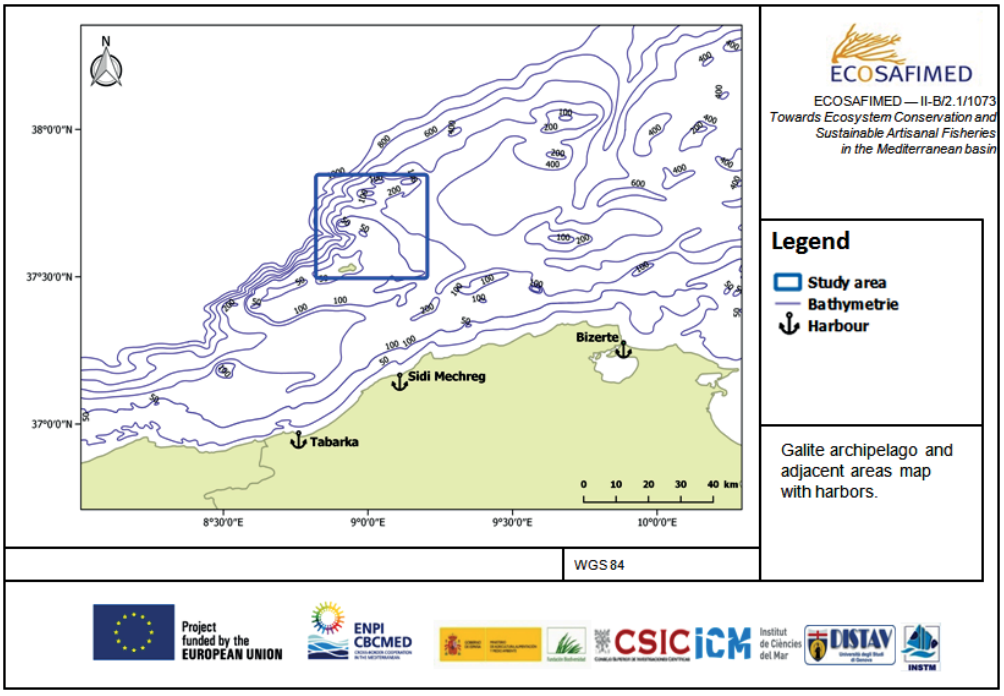


FIGURE A4.2
La Galite Archipelago



The fisheries of Bizerte region are exploited by different operating modes namely artisanal fishing, benthic trawling, purse seine and lagoon fishing. This part of Tunisia is also distinguished in some fishing practices targeting especially spiny lobster and red coral.

It is also at the port of Bizerte that the first experience of north-south partnership was created as part of joint ventures in trawl fishing, purse seine fishing and long line fishing (1999).

2.1.1 Port infrastructure

The Bizerte region has a complete port infrastructure which include one (1) deep-sea port and four (4) coastal ports (Table A4.1). These ports are:

- The deep-sea port of Bizerte is located near the city of "Zarzouna" in proximity of the east jetty of the commercial por. The construction of the fishing port of Bizerte was completed in 1985. It is a deep-sea fishing port which has important links with processing units of marine products and exporters mainly in partnership with Europe.
- The coastal port of Sidi Mechreg is located in a small cove about 1.5 km to the east of the locality of Sidi Mechreg between Cap Negro and Cap Serrat. This cove is open to the North West, and thereby greatly exposed to dangerous swells. The port of Sidi Mechreg has been realized in 1997 with the aim to fix the maritime population on the site, improve the conditions for the exercise of their activity, increase their income and develop the artisanal fishing activity.
- The coastal port of Menzel Abderrahmane is located inside the Bizerte lagoon. It has been constructed in 1995 with the aim to fix the maritime population of the lagoon of Bizerte in their cities.
- The coastal port of Cape Zebib occupies the bottom of a small cove near the cape at its eastern side. It has been accomplished in 1997.
- The coastal port of Ghar Melh is located in the north-west of the Gulf of Tunis. It was built in 1975 along the shoreline resulting from the contributions of the greatest Tunisian river "Oued Medjerda". It has recently undergone rehabilitation and extension works.

2.1.2 Importance of artisanal fishing in the Bizerte region

The Bizerte region hosts a fleet of 1535 fishing vessels whose 1 472 artisanal vessels, 20 trawlers and 43 seiners (Table A4.1). The motorization rate of the artisanal fleet is around 43 percent. The active maritime population in artisanal fisheries was around 4 253 individuals in 2011.

In the Bizerte region artisanal fishing activity is present in all the ports with varying importance from one port to another. This importance could be seen through the following points:

- The artisanal units are more concentrated in the port of Bizerte with a percentage of 51 percent of the total fleet followed by the port of Ghar Melh (18 percent) and the port of Menzel Abderahmen (15 percent);
- As consequence of this concentration of artisanal fleet the production of the port of Bizerte is the largest both in weight and value followed by the port of Cape Zebib;
- The artisanal fleet of the port of Menzel Abderahmen holds the highest unit price of products of the artisanal fishing activity (11.6 DT/kg) followed by the port of Bizerte with 10.1 DT/Kg. The lowest values are recorded in the ports of Ghar Melh (4.5 DT/Kg) and Cape Zebib (5.7 DT/Kg) where landings of the artisanal boats is composed mainly by small pelagic species and mendole (*Spicara maena*) with low commercial value;
- For the comparison by port we note that in relative terms, artisanal fishing is exclusively engaged in the ports of Sidi Mechreg Menzel Abderahmen and Cape Zebib. While in the ports of Ghar Melh and Bizerte, artisanal fishing activity

TABLE A4.1
Infrastructures, superstructures artisanal fishing activity in the ports of Bizerte region

Ports		Deep-Sea	Coastal			
		Bizerte	Sidi Mechreg	Menzel abderahmen	Cap Zebib	Ghar Melh
Docks (m)		1035	340	126	263	460
Halls (Number)		1	1			1
Wholesale market (Number)		1	1	1	1	1
Repair Shops (Nb (Surface))		24 (1500m^2)	1 (50 m^2)		1 (80 m^2)	1 (150 m^2)
Dry up equipment (capacity in Tons)		110	15		15	15
Shipyard (Number)		7				2
Local fishermen (Nb (Surface))		89	20 (142 m^2)		10 (112 m^2)	2 (60 m^2)
Social purpose premises (Yes / No)		Yes	Yes		Yes	Yes
Ice plant (Tons / day)		42	2,5		10	20
Ice silos (Tons)		70	15		20	16
Cold chambers (Tons)		70	5		8	47
Freezing chambers (Tons)		250				1,5
Freezing tunnels (Tons / day)		32				
Number of trawlers		20				
Number of purse seiners		16				27
Artisanal fleet (attached to the port)	Motorised	239	26	76	42	129
	Non Motorised	182	48	148	32	134
Artisanal fleet (close Sites)	Motorised	107			18	
	Non-Motorised	230			61	
Production by weight (tons)	Artisanal fishery	603	60	44	322	278
	% (Artisanal/Total)	17%	100%	100%	100%	14%
Production value (Thousand DT)	Artisanal fishery	6116,4	413	509	1838	1260
	% (Artisanal/Total)	28%	100%	100%	100%	18%
Average price (DT/Kg)		10,1	6,9	11,6	5,7	4,5

is not a big part of the total fisheries production due to the existence of highly developed purse seine fishing and trawl fishing respectively in the ports of Bizerte and Ghar Melh.

- Finally, we note that the active artisanal fleet in the study areas of ECOSAFIMED project is attached to the port of Bizerte. The units of the port of Sidi Mechreg and Cap Zebib are small and do not fish away from their home sites. While those of the port of Menzel Abderahmen are only active in the Bizerte lagoon and never go out in the open sea. For artisanal boats from the port of Ghar Melh, they practice mainly lagoon fishing in the lagoon of Ghar Melh and the rest go fishing in the shallows close to the port and rarely fish in the ECOSAFIMED project study areas.

2.1.3 Artisanal fleet and fishing tactics in the region of Bizerte

The artisanal fleet, fishing in Galite and Esquerquis areas, is composed by 112 boats involving 565 fishermen; about 67 percent of this fleet has Bizerte as homeport. Technical characteristics of this fleet are summarized in Table A4.2. The average of the technical features are 13.48 m total length (±2.53 S.D.), 18.2 t GT (±9.22 S.D.) and an engine power of 176 HP (±96.7 S.D.). Additionally, the quasi-totality of artisanal boats is made of wood material. We note that the fleet of Sidi Mechreg harbor has limited characteristics allowing them to work frequently near the coast of Bizerte.

TABLE A4.2
Technical characteristics of the artisanal fleet of Bizerte region

Harbour	Number	Total Length (m) (Mean±SD)	HP (Mean±SD)	GT (tonnes) (Mean±SD)	Total Crew Number
Bizerte	75	13.45±2.77	165.35±102.99	17.77±10.56	365
Cap Zebib	2	16.47±0.767	375.00±106.10	25.88±1.59	12
Ghar el Melh	32	13.76±1.42	201.00±51.10	19.87±3.93	181
Sidi Mechreg	3	9.54±0.059	59.67±14.500	6.60±0.71	7
Total	112	13.48±2.53	176.00±96.70	18.20±9.22	565

A total of 14 different fishing tactics or *métiers* were identified in the region of Bizerte with the corresponding fishing period in the fishing area (Figure A4.3). We note that these *métiers* are practiced in the two study areas of La Galite and Esquerquis benches.

In the region of Bizerte the main fishing gears used by the coastal fishery are trammel nets followed by longlines and by gillnets. Trammel net is mainly used to target spiny lobster (*Palinurus elephas*) in spring and summer, red scorpionfish (*Scorpaena scrofa*) in spring and summer, various fish (*mullus* sp., little sparidae, etc.) also in spring and summer and finally the cuttlefish (*Sepia officinalis*) in spring and early summer. The second *métier* in terms of percentage of fleet practising it in the region of Bizerte is longlines targeting the red porgy (*Pagrus pagrus*), the common dentex (*Dentex dentex*) and the red scorpionfish (*Scorpaena scrofa*) all year round. Another type of *métier* which is specific for the region of Bizerte is longlines targeting *Polyprion americanus* all year round. For the Gillnets there are two types generally employed to catch Mullets (*Mullus* sp.) From January to September and bonito (*Sarda sarda*) in autumn, winter and spring.

With minor importance we find some *métiers* such as longlines targeting little *sparidae* and various species of grouper *(Epeniphelus* sp.) with predominance of speckled grouper *(Epeniphelus marginatus*) all year round and traps targeting the black sea bream (*Spondyliosoma cantharus*) in winter-spring. Among all the northern region of Tunisia; the last *métier* is encountred only in the port of Bizerte.

We note that the new *métier* boat seine net for dolphinfish (*Coryphaena hippurus*) is practiced since 2010 in the region of Bizerte and it is used from September to December.

The technical characteristics of the main gears used in the region of Bizerte are detailed in Table A4.3.

The most striking fact is that some fishermen in the region de Bizerte tend to replace the intermediate net of trammel nets targeting Mullets (*Mullus* sp.), the cuttle fish (*Sepia officinalis*) and little *sparidae* by a polyethylene monofilament nets instead of polyamide multifilament nets.

2.2 Overview of Nabeul region

The Nabeul region is located in the north east of Tunisia and covers 2 822 km² representing 1.8 percent of the total area of the country. It is characterized by an important strategic location with 300 km of coastline representing 20 percent of the total Tunisian coastline in that it forms a peninsula opening the Sicily Channel with Sicily and closes the Gulf of Tunis.

The Nabeul region and in particular the zone of Kelibia has always strong traditions related to fishing activities particularly small pelagic fishing activity using purse seines. The seine or lamparo commonly called “diablo” made its first appearance in the region during the period 1948-1949.

2.2.1 Port infrastructure

The Nabeul region has a complete port infrastructure which includes one (1) deep-sea port and four (4) coastal ports (Table A4. 4). These ports are:

FIGURE A4.3
Chronogram with seasonal fishing activity and percentage of artisanal fleet practicing each *métier* in the region of Bizerte

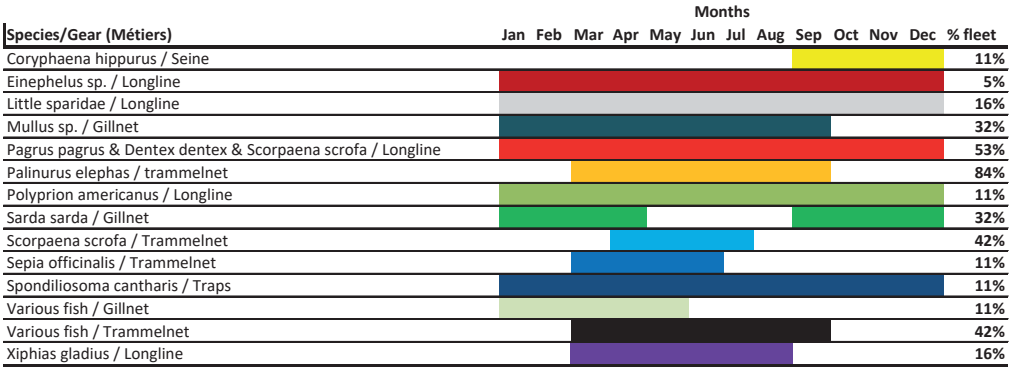


TABLE A4.3
Summary of technical characteristics of main gears used. PA = Polyamide, PET = Polyethylene; MF = monofilament, MMF = Multimonofilament. $^{+}$ Mainly used Material

TECHNICAL CHARACTERISTICS OF GEARS IN THE REGION OF BIZERTE

Gillnets				
Target species	**Mullus sp.**	**Sarda sarda**	**Spicara maena**	**Various fish**
Mean of Inner mesh size	54	82	56	64
Min of Inner mesh size	52	70	56	52
Max of Inner mesh size	60	90	56	70
Mean ± SD of Depth of the net (m)	2,8 ± 0,8	9 ± 4,8	1,5 ± 0	1,2 ± 0,1
Mean ± SD of Set total length (m)	1203 ± 406	3150 ± 1401	1400±	650 ± 87
Mean ± SD of panel number /set	21 ± 7,0	70 ± 32,6	40 ± 0	15 ± 0
Mean ± SD of number set haul/day	3,3 ± 2,1	1,7 ± 0,5	1,0 ± 0	2,7 ± 1,2
Material	PET	PET	PET	PET/PA
Type of filament	MF	MF	MF	MF/MMF

Trammelnets						
Target species	**Dentex dentex**	**Mullus sp.**	**Palinurus Elephas**	**Scorpaena Scrofa**	**Sepia officinalis**	**Various fish**
Mean of Inner mesh size	70	48	138	70	67	64
Min of Inner mesh size	70	48	80	60	60	52
Max of Inner mesh size	70	48	160	80	70	70
Mean ± SD of Depth of the net (m)	1,2 ± 0,05	1,5 ± 0,05	1,7 ± 0,8	1,3 ± 0,9	1,6 ± 0,2	1,7 ± 0,6
Mean ± SD of Set total length (m)	750 ± 0	1250 ± 0	603 ± 138	554 ± 213	850 ± 132	600 ± 122
Mean ± SD of panel number /set	15 ± 0	25 ± 0	13 ± 3,0	14 ± 4,6	16 ± 3,2	14± 1,6
Mean ± SD of number set haul/day	2 ± 0	2 ± 0	7,4 ± 2,1	4 ± 1,7	3,7 ± 2,3	3,6 ± 2,7
Material	PA	PET	PA	PA	PET^{+}/PA	PA^{+}/PET
Type of filament	Twisted/MMF	MF	Twisted/MMF	Twisted/MMF	MF/MMF	MMF/MF

Longlines					
Target species	**Epinephelus sp.**	**Little sparidae**	**Pagrus pagrus & Dentex dentex & Scorpaena scrofa**	**Polyprion americanus**	**Xiphias gladius**
Mean ± SD of Lengh of main line (m)	850 ± 71	767 ± 404	1084 ± 453	1400 ± 566	10875 ± 16126
Mean ± SD of Diameter of main line (mm)	3 ± 0	1,8 ± 0,3	2,4 ± 0,4	7,5 ± 0,7	1,6 ± 0,3
Mean ± SD of Lengh of branch line (m)	1,0 ± 0	1,3 ± 0,7	1,0 ± 0,1	1,1 ± 0,1	5,4 ± 2
Mean ± SD of Diameter of branch line (mm)	1,2 ± 0	0,9 ± 0,3	0,8 ± 0,1	2,2 ± 1,1	1,4 ± 0,4
Mean ± SD of Hook number	225 ± 106	285 ± 0	295 ± 145	185 ± 92	420 ± 333
Hook size	4-5	10-11-12	10-11	3-4	3-4-5
Average Distance between branches or hooks (m)	4,8	2,7	3,8	6,9	25,8

- The deep-sea port of Kelibia, built in 1964, is installed on the Eastern facade of the Cape Bon in a mountainous coastal area that has a steep-terrain north of the city and lowlands where sandy beaches are spread more or less developed sometimes lined with sand dunes and sebkhas. It should be noted that it advances in sea about 400 m in the SW of a rocky point (Cape Mostefa)
- The coastal port of Sidi Daoud is located on the western coast of the peninsula of Cape Bon. It is located to the north of a bay about 2 km wide and 1.3 km deep. Its construction was completed in 1983
- The coastal port of Haouaria is located on the eastern facade of the Cape Bon peninsula, south of Ras Addrag, it is about 4 km from the city with the same name in the right of a popular beach frequented by fishermen and vacationers. Protection work recently completed this year since the port had problems with silting and accumulation of algae.

TABLE A4.4
Infrastructures, superstructures artisanal fishing activity in the ports of Nabeul region

Ports		Deep-Sea port	Coastal ports		
		Kélibia	Sidi Daoud	Haouaria	Bni Khiar
Docks (m)		1 179	587	295	450
Halls (Number)		2	1		
Wholesale market (Number)		1	1	1	1
Repair Shops (Nb (Surface))		10 (2106 m^2)	1 (54 m^2)		1 (60 m^2)
Dry up equipment (capacity in Tons)		250	25	15	17
Shipyard (Number)		2			1
Local fishermen (Nb (Surface))		72 (1 988 m^2)	38 (328 m^2)	9 (63 m^2)	41(1 920 m^2)
Social purpose premises (Yes / No)		Yes	Yes	Yes	Yes
Ice plant (Tons / day)		68	11	2	23
Ice silos (Tons)		220	5	9	80
Cold chambers (Tons)		170	500	2,5	100
Freezing chambers (Tons)		100	50		20
Freezing tunnels (Tons / day)		13	15		
Number of trawlers		19			
Number of purse seiners		45	10		4
Artisanal fleet (attached to the port)	Motorised	73	53	17	85
	Non-Motorised	10	42	11	7
Artisanal fleet (close Sites)	Motorised		12		30
	Non-Motorised		20		8
Production by weight (tons)	Artisanal fishery	530,2	1052	21	490
	% (Artisanal/ Total)	4%	61%	100%	30%
Production value (Thousand DT)	Artisanal fishery	3 830	4 074	112	2607
	% (Artisanal/ Total)	14%	83%	100%	39%
Average price (DT/Kg)		7,2	3,9	5,3	5,3

- The coastal port of Beni Khiar was built since 1984. It has been the object of protection works against silting and agitation in 1998. This port opens on the Gulf of Hammamet and the fleet which is attached to it does not fish in the ECOSAFIMED project study areas.
- The region also contains two little sites hosting non-motorized artisanal boats: Hammamet and Slimen.

2.2.2 Importance of artisanal fishing in the region of Nabeul

The fishing fleet of the Nabeul region accounts for 446 fishing units including 368 artisanal vessels, 19 trawlers and 59 purse seiners (Table A4.4). The motorization rate of the artisanal fleet is relatively higher than that of Bizerte region with 73 percent of artisanal units equipped with engines. The active maritime population in artisanal fisheries was around 1 833 individuals in 2011

In the region of Nabeul artisanal fishing activity is present in all the ports with varying importance from one port to another. This importance could be seen through the following points:

- The artisanal units are more concentrated in the ports of Beni Khiar and Sidi Daoud with respective percentages of 35 percent and 34 percent of the total

number. They are followed by the port of Kelibia (23 percent) and the port of Haouaria (8 percent);

- The production of artisanal fishing activity in the port of Sidi Daoud is the largest compared to other ports both in weight and value. So, it stands out from the Port of Bni Khiar hosting almost the same number of artisanal boats. This indicates a better working efficiency and hence higher yields per boat in the port of Sidi Daoud;
- The port of Kelibia holds the highest unit price of products of artisanal fisheries (7.2 DT/kg) because of its fish marketing pole status in the northern region of Tunisia and that serving the multitude tourist restaurants of the city of Kelibia. The lowest unit price is recorded in the port of Sidi Daoud (3.9 DT/Kg) where artisanal units fish large quantities of small tuna like species that have low commercial value;
- For the comparison by port we note that in relative terms, artisanal fishing is exclusively engaged in the port of Haouaria. Then comes the port of Sidi Daoud where artisanal fishing activity contributes by 60 percent in weight and 80 percent in value of total fisheries production due to the coexistence of purse seine fishing (targeting small pelagics). Finally, we note that in the port of Kelibia, artisanal fishing activity has not an important place in the total fisheries production due to the existence of highly developed purse seine and trawl fishing activities;
- Finally, we note that the active artisanal fleet in the study areas of ECOSAFIMED project is attached to the port of Sidi Daoud and Kelibia. The units of port Haouaria are small and do not fish away from their home site. While those of the port of Beni Khiar are only active in the Gulf of Hammamet and rarely fish in the ECOSAFIMED project study areas.

2.2.3 *Artisanal Fleet and Fishing tactics in the region of Nabeul*

The artisanal fleet, exploiting Galite and Esquerquis areas, is composed by 102 boats involving 526 fishermen. Kelibia and Sidi Daoud harbors are the homeport of respectively 55 percent and 32 percent of the artisanal fleet working in our study area. Technical characteristics of this fleet are summarized in Table A4.5. The average of the technical features are 12.14 m total length (±1.73 S.D.), 14.14 t GT (±5.84 S.D.) and an engine power of 117.12 HP (±55.07 S.D.). As the case of Bizerte fleet the quasi-totality of Nabeul artisanal fleet is made of wood material. We note that the fleet of Haouaria harbor is generally installed at Sidi Daoud and Kélibia harbors.

In the region of Nabeul we had identified 10 associations species/gear or *métiers* which are practiced dominantly in the Banc of Esquerquis (Figure A4.4).

The most important *métier* in this region is the gillnet targeting Bonito (*Sarda sarda*) from March to June and from October to December. This *métier* is declared by all the boats sampled in the region of Nabeul. In second position we find the *métier* of longlines targeting the swordfish (*Xiphias gladius*: 96 percent of the fleet) in winter, spring and summer, this *métier* is followed by the boat seine net for dolphinfish (*Coryphaena hippurus*). In forth position we find two *métiers*: Long lines targeting the red porgy *(Pagrus pagrus*), the Common dentex (*Dentex dentex*) and the red scorpionfish (*Scorpaena scrofa*) all year round and Long lines targeting various species of grouper (*Epeniphelus* sp.) with predominance of speckled grouper (*Epeniphelus marginatus*) in spring, late summer, autumn and early winter.

Unlike to the region of Bizerte, the *métiers* using trammel nets are not very practiced in the region of Nabeul. Among the trammel net *métiers* that one targeting the spiny lobster is the most practiced (30 percent of the boats sampled) from March to September. The boats targeting the spiny lobster are more localized in the port of Sidi Daoud.

The technical characteristics of the main gears used in the region of Nabeul are detailed in Table A4.6.

FIGURE A4.4
Chronogram with seasonal fishing activity and percentage of artisanal fleet practicing each *métier* in the region of Nabeul

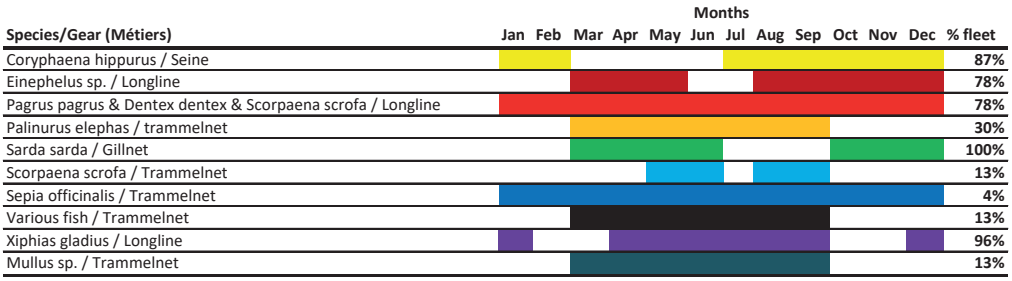


TABLE A4.5
Technical characteristics of the artisanal fleet of the Nabeul region

Harbour	Number	Total Length (m) (Mean±SD)	HP (CV) (Mean±SD)	GT (tonnes) (Mean±SD)	Total Crew Number
SIDI DAOUED	33	12.08 ± 1.40	116.91 ± 50.62	14.12 ± 4.06	160
HAOUARIA	13	11.97 ± 1.51	114.69 ± 58.88	14.26 ± 4.56	60
KELIBIA	56	12.22 ± 1.95	117.83± 57.66	14.12 ± 6.96	306
Total	102	12.14 ± 1.73	117.12 ± 55.07	14.14 ± 5.84	526

TABLE A4.6
Summary of technical characteristics of main gears used. PA = Polyamide, PET = Polyethylene; MF = monofilament, MMF = Multimonofilament. + Mainly used Material

TECHNICAL CHARACTERISTICS OF GEARS IN THE REGION OF NABEUL

Gear	Gillnets	Trammelnets					
Target species	**Sarda sarda**	**Mullus sp.**	**Palinurus Elephas**	**Sarpa salpa**	**Scorpaena Scrofa**	**Sepia officinalis**	**Various fish**
Mean of Inner mesh size	79	50	137	60	52	65	100
Min of Inner mesh size	60	48	100	60	52	60	100
Max of Inner mesh size	90	52	160	60	52	70	100
Mean ± SD of Depth of the net (m)	10 ± 3,5	1,3 ± 0,5	1,6 ± 0,5	1,2 ± 0	2 ± 0	1,5 ± 0,7	1,5 ± 0
Mean ± SD of Set total length (m)	4300 ± 1802	650 ± 173	779 ± 27	700 ± 0	500 ± 0	1450 ± 71	500 ±
Mean ± SD of panel number /set	78 ± 34	10 ± 0	12 ± 2,7	10 ± 0	10 ± 0	27 ± 4,9	10 ± 0
Mean ± SD of number set haul/day	1,6 ± 0,5	2,8 ± 2,1	4,3 ± 2,7	1 ± 0	1 ± 0	2 ± 0	1 ± 0
Material	PET+/PA	PA	PA	PA	PA	PA	PA
Type of filament	MF/MMF	Twisted/MMF	Twisted/MMF	Twisted/MMF	Twisted/MMF	Twisted/MMF	Twisted/MMF

Longlines			
Target species	**Epinephelus sp.**	**Pagrus pagrus & Dentex dentex & Scorpaena scrofa**	**Xiphias gladius**
Mean ± SD of Lengh of main line (m)	1742 ± 271	1506 ± 618	12182 ± 6702
Mean ± SD of Diameter of main line (mm)	2,8 ± 0,8	2,5 ± 0,8	1,8 ± 0,7
Mean ± SD of Lengh of branch line (m)	2,3 ± 1,4	1,6 ± 0,5	5,8 ± 2
Mean ± SD of Diameter of branch line (mm)	1,4 ± 0,4	1,2 ± 0,5	1,3 ± 0,2
Mean ± SD of Hook number	275 ± 31	347 ± 225	698 ± 478
Hook size	4-5	7-8	3-4
Average Distance between branches or hooks (m)	5,8	4,4	22,1

3. RESULTS OF THE ONBOARD FISHING SURVEYS

One of the main aims of the ECOSAFIMED project has been the evaluation of artisanal fishing gears especially spiny lobster trammel nets possible pressures on benthic communities in the study selected areas. To reach this goal, 2 onboard surveys had been carried out in La Galite and Esquerquis Benches during the period April-June 2015 and the scientific observers were onboard of artisanal vessels to estimate catch composition with special attention to structural benthic species (number of benthic organisms or fragments and identification of captured species) in order to evaluate the *métier* interaction with benthic communities.

In this section we will summarize the operation and the results obtained from the onboard observations in the La Galite archipelago and the Esquerquis Benches.

3.1 Results of the onboard fishing survey in La Galite archipelago

A total of 88 hauls were performed in depth range between 30 and 110 meters. These hauls were operated in the high (40 hauls) and the low (48 hauls) artisanal fishery effort areas. We note that all the hauls were carried out in no or low trawling.

Fishing operations were done with three different gears: lobster trammel nets (62 sets), fish trammel nets (16 sets) and bottom long lines (11 sets). The average length of the lobster trammel nets (mesh 80 mm) is 750 m, whereas for the fish trammel nets (mesh 40mm) the average length is 1 100 m.

The soak time was around 24 hours (one night) for the Trammel nets and about 2 to 5 hours for the bottom long lines. In some cases, the soak time of bottom long lines was about 10 hours.

3.1.1 Trammel net lobster (TnL)

A total of 10976 specimens were caught during the surveys. The total catch of the European spiny lobsters (*Palinurus elephas*), considered as the target species of this *métier*, was 132 individual, 9.1 percent of which (12 individuals) was discarded to be dead (rotten 9 individual, damaged 1 individual) or undersized (3 individual). Without considering invertebrate catches, lobster represent 68.6 percent of commercial catches and 41.1 percent of discarded species.

The commercial bycatch is composed by 58 individual (0.53 percent of total), distributed in 22 commercial species. Without considering invertebrate catches, commercial bycatch represent 76.4 percent of total landings. Table A4.7 shows a summary of the abundance and length of commercial species.

TABLE A4.7
Abundance and length of commercial catches in the Galite archipelago

Commercial catches	N	Mean length	Min. length	Maxi. length	S.D
Aspitrigla cuculus	1	26.2	26.2	26.2	-
Dentex dentex	1	57	57	57	-
Eledone moschata	2	10.5	8.5	12.5	2.83
Labrus bimaculatus	1	37	37	37	-
Lophius budegassa	2	52.5	44	61	12.02
Lophius piscatorius	5	60.1	34	86.5	22.54
Maja squinado	1	22	22	22	-
Merluccius merluccius	1	34.3	34.3	34.3	-
Muraena helena	1	90.5	90.5	90.5	-
Mustelus mustelus	2	64.5	64	65	0.71
Pagrus pagrus	7	26.87	24.5	32.5	2.65
Phycis phycis	3	31.47	27.4	39	6.53
Scorpaena scrofa	10	32.95	22	42.3	6.89
Scyliorhinus canicula	2	40.75	39.5	42	1.77
Squalus blainville	1	42	42	42	-
Symphodus tinca	1	32.5	32.5	32.5	-
Synodus saurus	4	30.63	25	36	5.94
Trachurus picturatus	1	27	27	27	-
Trachurus trachurus	4	25.15	24	26.4	1.03
Trygla lyra	1	17.50	17.5	17.5	-
Uranoscopus scaber	1	33	33	33	-
Zeus faber	6	45.1	40.5	54	5.4
TOTAL	58				

The discarded catches amount 34 individuals, divided in 15 species, 3 of which (*Eriphia verrucosa, Macropodia longirostris and Pisa armata)* are no commercial.

Without taking into account invertebrate catches, discarded species represent 23.6 percent of catches. Table A4.8 shows a summary of abundance and length per discarded species.

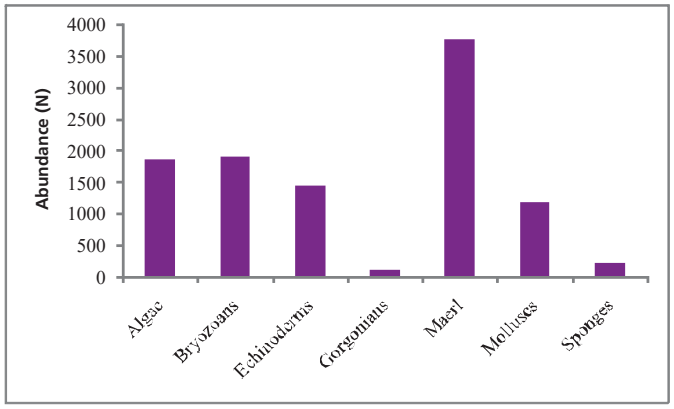
TABLE A4.8
Abundance and length of discarded catches in the Galite archipelago

Discarded catches	N	Mean length	Min length	Max length	S.D
Dasyatis sp	1	28.5	28.5	28.5	-
Epinephelus aeneus	1	56.5	56.5	56.5	-
Eriphia verrucosa	1	5.1	5.1	5.1	-
Lophius sp	3	64.83	52	82.5	15.81
Macropodia longirostris	1	3.1	3.1	3.1	-
Maja squinado	2	2.25	1.8	2.7	0.64
Mustelus mustelus	1	80	80	80	-
Pagrus pagrus	2	28.85	26.2	31.5	3.75
Pisa armata	1	4.5	4.5	4.5	-
Palinurus elephas	12	6.89	4.3	9.7	1.66
Raja montagui	1	17	17	17	-
Scorpaena scrofa	2	39.05	36	42.1	4.31
Spondyliosoma cantharus	2	33.8	26	41.6	11.03
Squalus blainville	1	42	42	42	-
Zeus faber	3	48	38	61	11.79
TOTAL	34				

For the benthic communities, a total of 10 764 individuals (98 percent of total) distributed in 79 species were caught. The majority of species were released alive, except the cidaridae, *Neopycnodonte cochlear,* maerl and bryozoans, where all of them are crushed to clean the nets.

Figure A4.5 shows the distribution of the abundances for the main sessile benthic groups that provides structure to the benthic community (algae, bryozoans echinoderms, gorgonians, molluscs and sponges).

FIGURE A4.5
Abundances of the major benthic habitat forming species by groups in the Galite archipelago



3.1.2 Trammel net fish (TnF)

A total of 1 313 specimens were caught during the surveys. Only 6 spiny lobsters were caught, one individual out of them was discarded to be undersized.

The commercial catch correspond to 14.2 percent of total catch, it is composed by 186 individuals, distributed on 32 species. The most abundant species were *Scorpaena scrofa, Boops boops* and *Serranus cabrilla.*

Without considering invertebrate catches, commercial catches represent 87.4 percent of total landings (commercial and discard). Table A4. 9 shows a summary of commercial species, abundance and length.

The discarded catches amount 68 individual (5.18 percent of total), divided into 21 species, 4 species are no commercial (*Dromia personata, Macropodia rostrata, Galathea strigosa, Pisa armata).*

The discarded species was mainly represented by *Mullus surmuletus* and *Phycis phycis* (42.6 percent of total).

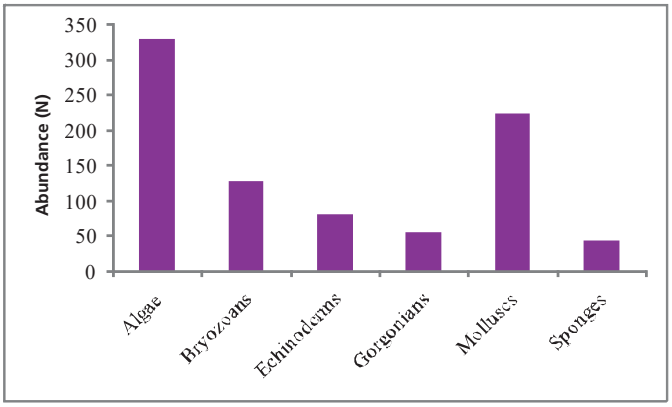
TABLE A4.9
Abundance and length of commercial catches in the Galite archipelago

Commercial catches	N	Mean length	Min. length	Max. length	S.D
Boops boops	29	21.2	13	27	3.56
Diplodus sargus	3	26.7	22	30.5	4.31
Diplodus vulgaris	4	19.9	16.2	26	4.23
Eledone moschata	1	13.0	13	13	-
Merluccius merluccius	1	35.0	35	35	-
Microchirus ocelatus	1	15.0	15	15	-
Mullus surmuletus	10	22.7	20.2	30.5	3.03
Pagellus erythrinus	2	22.0	19	25	4.24
Pagrus pagrus	5	29.8	24.5	34.5	4.49
Palinurus elephas	5	9.8	7.4	12.5	2.09
Phycis phycis	13	27.5	21	36.5	4.80
Scorpaena maderansis	1	22.5	22.5	22.5	-
Scorpaena scrofa	37	22.2	8	43.5	8.06
Scorpaena porcus	2	22.8	22.5	23	0.35
Scyliorhinus canicula	3	40.3	34	44	5.51
Scyllarides latus	1	9.5	9.5	9.5	-
Sepia officinalis	4	15.4	12	18	3.09
Seriola dumerili	2	44.9	44.5	45.3	0.57
Serranus cabrilla	17	21.3	19	29.9	2.44
Serranus scriba	4	17.3	12.5	19.5	3.31
Solea sp	1	18.0	18	18	-
Spicara flexuosa	10	19.4	18.1	20.5	0.94
Spicara maena	5	19.4	17	21.5	1.85
Spondyliosoma cantharus	4	29.5	21.5	34	5.52
Symphodus cinereus	1	12.5	12.5	12.5	-
Symphodus melops	2	20.3	20.1	20.5	0.28
Symphodus rostratus	2	10.1	10	10.1	0.07
Symphodus tinca	8	20.2	17	29.5	4.18
Synodus saurus	1	28.7	28.7	28.7	-
Trachinus draco	4	20.6	18	24	2.69
Trachurus picturatus	1	28.0	28	28	-
Uranoscopus scaber	2	25.8	24	27.5	2.47
TOTAL	186				

For the benthic communities, a total of 1 059 individuals (80.65 percent of total) distributed in 50 species were caught. The majority of species were released alive, except the cidaridae, *Neopycnodonte cochlear* and bryozoans (33.4 percent of total benthic bycatch) which all of them are crushed to clean the nets.

Figure A4.6 shows the distribution of the abundances for the main sessile benthic groups that provides structure to the benthic community (algae, bryozoans, echinoderms, gorgonians, molluscs and sponges).

FIGURE A4.6
Abundances of the major benthic habitat forming species by groups in the Galite archipelago



3.1.3 Bottom long lines

A total of 107 individual were caught, the commercial species amounted to 73 specimens (68.2 percent of total) distributed in 11 species; the most abundant species was *Scyliorhinus canicula* which accounted for 26 percent of the total. *Pagrus pagrus* and *Muraena helena* were also abundant with 22 percent and 19.2 percent of the total commercial species, respectively.

The commercial catches represent almost the whole landings (commercial and discard) with 96 percent of total.

Table A4.10 shows a summary of commercial species, abundance and length.

The benthic species amount 31 individual (29 percent of total) distributed in 7 species. All of them released alive. The most abundant species were *Cystoseira* sp with 19 specimen and 61.3 percent of the total benthic species). Table A4.11 summarizes the abundance of benthic species.

3.2 Results of the onboard fishing survey in Esquerquis Benches

A total of 59 hauls were performed in depth range between 30 to 140 meters. These hauls were operated in the high (30 hauls) and the low (29 hauls) artisanal fishing effort sectors. We note that in the selected study areas the trawling pressure is absent or low.

Sampling was carried out using three different gears: lobster trammel nets (30 sets), fish trammel nets (10 sets) and bottom long lines (9 sets). The average length of the lobster trammel nets (mesh 70 mm) is 700 to 900m, whereas for the fish trammel nets (mesh 35 – 40mm) the average length is 1 000 to 1 100 m.

The soak time was around one night (24 hours) for the trammel nets and between 1 and 5 hours for the bottom long lines.

3.2.1 Trammel net lobster (TnL)

A total of 19344 specimens were caught during the surveys. The total catch of the European spiny lobsters *Palinurus elephas*, target species of this *métier*, were

TABLE A4.10
Abundance and length of long lines commercial catches in the Galite archipelago

Commercial catches	N	Mean length	Min. length	Max. length	S.D
Epinephelus aeneus	2	82	82	82	-
Merluccius merluccius	3	31.17	28	33	2.75
Muraena helena	14	73.07	41	115	18.78
Pagellus erythrinus	1	33.5	33.5	33.5	-
Pagrus pagrus	16	36.98	27	46.7	6.66
Scorpaena porcus	1	28	28	28	-
Scorpaena scrofa	6	27.58	19.00	33.00	5.77
Scyliorhinus canicula	19	41.68	35	48.5	3.06
Sepia officinalis	1	13	13	13	-
Serranus cabrilla	7	22.86	15.5	29	4.53
Serranus scriba	3	19.5	19	20	0.5
TOTAL	73				

TABLE A4.11
Abundance of benthic species captured with long lines in the Galite archipelago

Benthic species	N
Cystoseira sp	19
Eunicella cavolinii	1
Fauchea repens	4
Laminaria sp	1
maerl	3
Peyssonnelia sp	1
Smittina cervicornis	2
TOTAL	31

74 individuals, 11 percent of which (8 individuals) was discarded to be rotten (2 individuals) or undersized (6 individuals).

Without considering invertebrate bycatch, lobster represent 36.8 percent of commercial catches and 27.8 percent of total catches (discard and commercial).

The commercial bycatch amount 112 individuals (0.92 percent of total), distributed in 22 commercial species. The most abundant species were *Scorpaena scrofa* and *Pagrus pagrus* with 31 specimen 27.7 percent of total commercial species. Without considering invertebrate species, commercial bycatch represent 61.5 percent of total landings (commercial and discard). Table A4.12 summarizes the abundances and length of each commercial species.

The discarded catches amount 85 individual, distributed in 22 species, 4 of which (*Calappa granulata, Charonia lampas, Liocarcinus corrugatus* and *Pisa armata*) are no commercial. 57 percent of the total are dead 81.4 percent of them are rotten or bitten.

Without taking into account the invertebrate bycatch, discarded species represent 38.5 percent of catches. Table A4.13 shows a summary of discarded species, abundance and length.

For the benthic communities, a total of 19081 benthic individuals (98.65 percent of total) distributed in 62 species were caught. The majority of species were released alive, except the *cidaridae* and bryozoans which are crushed to clean the nets.

Figure A4.7 represents the distribution of the abundances for the main sessile benthic groups that provides structure to the benthic community (algae, bryozoans, echinoderms, gorgonians, maerl, molluscs and sponges).

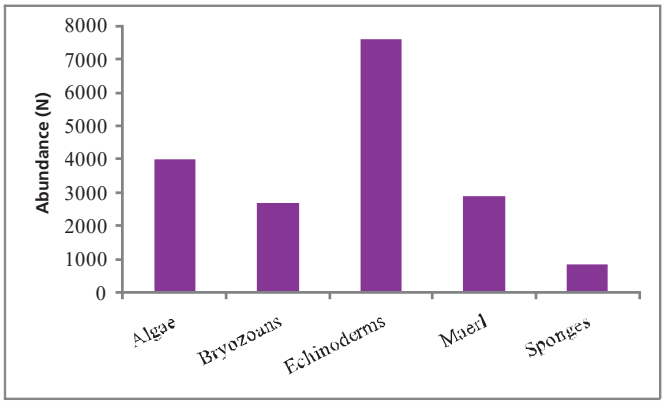
TABLE A4.12
Abundance and length of commercial species caught with lobster trammel net in the Esquerquis benches

Commercial catches	N	Mean length	Min. length	Max. length	S.D
Boops boops	2	22.05	21.5	22.6	0.78
Echiichthys vipera	7	33.21	28.4	41	4.13
Lophius piscatorius	3	74.33	60	102	23.97
Merluccius merluccius	1	37.1	37.1	37.1	-
Mullus barbatus	1	24.5	24.5	24.5	-
Mullus surmuletus	1	26	26	26	-
Octopus vulgaris	1	16	16	16	-
Pagellus acarnee	4	21.5	20.5	24	1.68
Pagellus erythrinus	7	25.73	18	34	5.59
Pagrus pagrus	14	34.51	21	41	5.24
Phycis phycis	6	37.98	26	46.9	8.92
Scorpaena porcus	3	30.7	26.7	32.9	3.47
Scorpaena scrofa	19	34.89	14	44	7.49
Scyliorhinus stellaris	12	41.29	38	46	2.4
Scylliorhinus canicula	8	47.88	41	81	13.47
Sepia officinalis	3	17.37	16.5	17.8	0.75
Squalus blainville	4	72.75	55	85	12.71
Synodus saurus	1	30.2	30.2	30.2	-
Trachurus mediterraneus	1	23	23	23	-
Trigloporus lastoviza	3	38.6	23.1	62	20.62
Uranoscopus scaber	5	25.44	18.6	33.5	5.96
Zeus faber	6	44.55	43.2	45.4	0.81
TOTAL	112				

TABLE A4.13
Abundance and length of discarded catches of lobster trammel net in the Esquerquis benches

Discarded catches	N	Mean length	Min. Length	Max. Length	S.D
Boops boops	1	12.5	12.5	12.5	-
Calappa granulata	9	19.71	7.9	62	22.6
Charonia lampas	4	5.78	5.5	6	0.22
Dasyatis sp	5	31.22	26.1	35	3.53
Echiichthys vipera	8	33.19	17	44	8.93
Licarcinus Corrgatus	1	3.5	3.5	3.5	-
Maja squinado	2	9.25	8.3	10.2	1.34
Merluccius merluccius	1	18	18	18	-
Mullus sp	1	19	19	19	-
Murena helena	1	62	62	62	-
Pagellus erythrinus	1	27.5	27.5	27.5	-
Pagellus sp	7	28.3	17	42	9.02
Pagrus pagrus	2	36.5	36.5	36.5	-
Palinurus elephas	8	7.37	5.3	13.4	2.53
Phycis phycis	5	41.5	38	46	3.42
Pisa Armata	3	2	1.5	2.4	0.46
Raja montagui	13	34.58	22	50	10.5
Scorpaena scrofa	7	34.64	14	42	9.67
Spinolambrus macrochelos	2	12.45	2.5	22.4	14.07
Synodus saurus	1	40	40	40	-
Trigloporus lastovisa	1	58	58	58	-
Uranoscopus scaber	2	28.75	24.5	33	6.01
TOTAL	85				

FIGURE A4.7
Abundances of the major benthic habitat forming species by groups in the Esquerquis benches



3.2.2 Trammel net fish (TnF)

A total of 2008 specimens were caught during the surveys. Only one red spiny lobster was caught and discarded to be undersized.

The commercial catch amount 231 individuals, which represent 11.5 percent of total catch, distributed in 26 species. The most abundant species were *Mullus barbatus*, *Pagellus erythrinus, Scyliorhinus stellaris* and *Serranus cabrilla* with 114 specimen 49.35 percent of total commercial catches.

Without considering invertebrate catches, commercial catches represent 81.73 percent of total landings (commercial and discard). Table A4.14 recaps the abundances and length for each commercial species caught with fish trammel net.

The discarded catches amount 36 individuals (1.8 percent of total), divided in 18 species, 4 of which are no commercial (*Dardanus* sp, *Eurynome aspera, Licarcinus corrgatus, Pisa armata*). Without taking into account invertebrate species which are usually returned alive, the discarded species are often rotten or bitten. Because of its low commercial interest 11 individual of *Torpedo nobiliana* (20.5 percent of total catch) were discarded, the majority of them are alive. The discarded species represent 22 percent of total catches (commercial and discard).

For the benthic communities, a total of 1 741 benthic individual (86.7 percent of total) distributed in 43 species were caught. The majority of species were released alive, except the bryozoans and maerl (56.6 percent of total benthic bycatch); all of them are crushed to clean the nets.

Figure A4.8 shows the distribution of the abundances for the main sessile benthic groups that provides structure to the benthic community (algae, bryozoans, echinoderms, gorgonians, maerl, molluscs, phanerogams and sponges).

3.2.3 Bottom long lines

A total of 358 individual were caught, the commercial species amount 174 species (48.6 percent of total) distributed in 14 species; the most abundant species was *Serranus cabrilla* with 81 individuals followed by *Scyliorhinus stellaris* with 32 specimens. The commercial catches represent almost the whole landings (commercial and discard) with 98.9 percent of total. Table A4.15 shows the abundances and length of commercial species caught with long lines.

Only two individuals; *Raja montagui* and *Scorpaena scrofa*; were discarded because of their small sizes.

For the benthic communities, a total of 182 individuals (50.8 percent of total) were recorded distributed in 24 species. All of them released alive. The most abundant

TABLE A4.14
Abundances and length of commercial species caught with fish trammel net in the Esquerquis Benches

Commercial catches	N	Mean length	Min. length	Max. length	S.D
Boops boops	8	24.6	21.6	27.9	1.99
Bothus podas	1	21	21	21	-
Dactylopterus volitans	2	35.75	33	38.5	3.89
Echiichthys vipera	1	18.6	18.6	18.6	-
Eledone moschata	1	120	12	12	-
Mullus barbatus	31	21.21	16.9	27.5	1.85
Mullus surmuletus	16	23.29	19.4	28.7	2.84
Muraena helena	1	80	80	80	-
Pagellus acarnee	1	26	26	26	-
Pagellus erythrinus	31	18.57	16.2	28	2.59
Pagrus pagrus	3	27.17	26.5	28.5	1.15
Phycis phycis	11	30.85	23.4	36.4	4.69
Sardinella aurita	7	25.84	23.5	32.1	3.05
Scorpaena porcus	3	25.17	22	31	5.06
Scorpaena scrofa	19	17.39	10.5	31.6	7.29
Scyliorhinus stellaris	24	41.87	37	46	2.35
Scylliorhinus canicula	5	40.52	34.5	44.6	3.88
Sepia officinalis	3	28.83	23.5	37	7.18
Serranus cabrilla	28	19.65	16.4	28.9	2.26
Serranus scriba	3	18.3	16.7	20.7	2.12
Symphodus tinca	17	24.02	16.7	37.2	4.74
Synodus saurus	3	31.2	24.2	35.4	6.1
Trachinus draco	2	27.55	17	38.1	14.92
Trachurus mediterraneus	3	22.63	19.4	24.5	2.81
Trigloporus lastoviza	5	23.8	21.5	31.5	4.31
Uranoscopus scaber	2	23.06	15.1	31	11.24
TOTAL	231				

FIGURE A4.8
Abundances of the major benthic habitat forming species by groups in the Esquerquis Benches

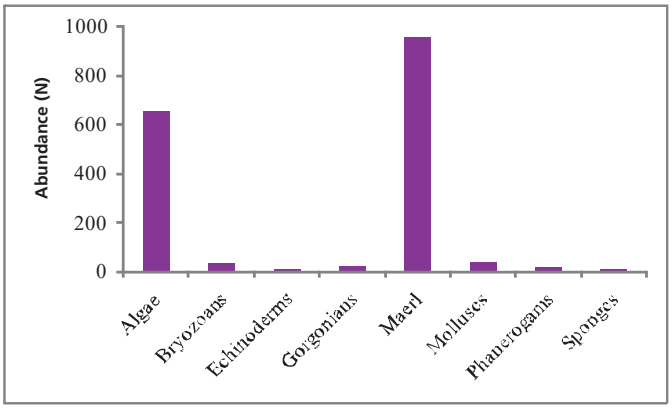
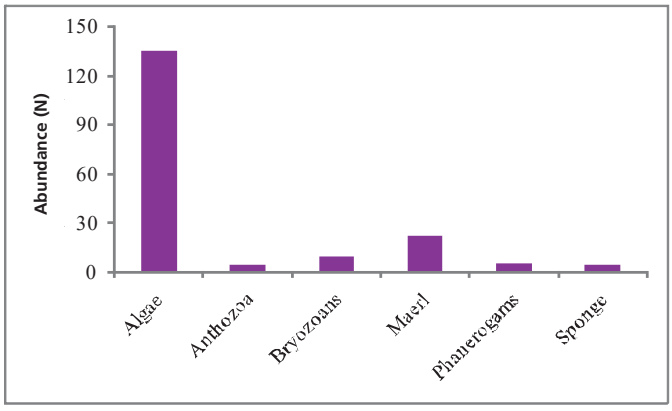


TABLE A4.15
Abundance and length of commercial species caught with long lines in Esquerquis benches

Commercial catches	N	Mean length	Min. length	Max. length	S.D
Conger conger	1	146	146	146	-
Dactylopterus volitans	2	38.5	37.5	39.5	1.41
Echiichthys draco	4	30.13	29	32	1.31
Echiichthys vipera	23	31.23	19.5	39	4.98
Pagellus erythrinus	1	39	39	39	-
Pagrus pagrus	11	36.99	29.5	42.5	4.24
Scorpaena porcus	1	32.6	32.6	32.6	-
Scorpaena scrofa	1	36	36	36	-
Scyliorhinus stellaris	32	41.22	36	46.2	2.24
Serranus cabrilla	81	22.06	15.1	29.5	2.56
Serranus scriba	1	19.4	19.4	19.4	-
Symphodus tinca	1	23.2	23.2	23.2	-
Trachinus draco	13	28.68	22.7	33.2	2.58
Trachurus picturatus	2	20.75	18.5	23	3.18
TOTAL	174				

species were respectively *Laminaria* sp (53 specimens), *Vidalia volubilis* (24 specimens), *Cystoseira* sp (22) and Maerl (21 specimens). Figure A4.9 shows the distribution of the abundances for the main sessile benthic groups (algae, anthozoa, bryozoans, phanerogams and sponges).

FIGURE A4.9
Abundances of the major benthic species groups in the Esquerquis Benches



4. CONCLUSION

The Tunisian ECOSAFIMED study areas: La Galite archipelago and Esquerquis benches; located in the northern part of Tunisia (GFCM/GSA 12) are exploited by an important artisanal fleet notably from the regions of Bizerte and Nabeul.

The artisanal fleet of the region of Bizerte fishing in the study areas is composed by 112 boats involving 565 fishermen; about 67 percent of this fleet has Bizerte as homeport. The averages of the technical characteristics are 13.5 m total length (±2.53 S.D.), 18.2 t GT (±9.22 S.D.) and an engine power of 176 HP (±96.7 S.D.). A total of 14 different associations' species/gear or *métiers* were identified as mainly used. The main fishing gear used by the coastal vessels is trammel nets followed by longlines and gillnets. Trammel

nets are mainly used to target spiny lobsters (*Palinurus elephas*) and red scorpionfish (*Scorpaena scrofa*). The second *métier* is longlines targeting the red porgy (*Pagrus pagrus*), the common dentex (*Dentex dentex*) and the red scorpionfish (*Scorpaena scrofa*). Another type of *métier* specific to the region is longlines targeting the wreckfish (*Polyprion americanus*).

For the region of Nabeul, the artisanal fleet, exploiting La Galite and Esquerquis areas, is composed by 102 boats involving 526 fishermen. Kelibia and Sidi Daoud harbors are the homeports of respectively 55 percent and 32 percent of the artisanal fleet working in our study area. The averages of the technical characteristics are 12.1 m total length (±1.73 S.D.), 14.14 t GT (±5.84 S.D.) and an engine power of 117.12 HP (±55.07 S.D.). Ten fishing *métiers* were identified in this region. The most important *métier* in this region is the gillnet targeting Bonito (*Sarda sarda*) followed by the *métier* of longlines targeting the swordfish (*Xiphias gladius*) and by the boat seine net for dolphinfish (*Coryphaena hippurus*). In forth position we find two *métiers*: Long lines targeting the red porgy *(Pagrus pagrus*), the Commun dentex (*Dentex dentex*) and the red scorpionfish (*Scorpaena scrofa*) all year round and Long lines targeting various species of grouper (*Epeniphelus* sp.)

Unlike to the region of Bizerte, the *métiers* using trammel nets are not very practiced in the region of Nabeul. Among the trammel net *métiers* that one targeting the spiny lobster is the most practiced (30 percent of the boats sampled).

The onboard surveys carried out in the study areas have shown that the Lobster trammel nets could have at long run an impact on maerl beds, bryozoans and algae in the La Galite area and on Echinoderms, algae and maerl species in the Esquerquis benches. As well, the fish trammel nets have shown a possible impact on algae and molluscs in the La Galite region and on maerl beds and algae in the Esquerquis area. However, it is very important to point out that the majority of discarded species of the two types of trammel nets have been released alive. For the longlines, the possible impact on benthic communities is smaller than that of the trammel nets.

Comparatively to other fishing practices (trawling, dredging, etc.), the artisanal fisheries does not seriously impact the benthic communities and we should promote artisanal fisheries in the Mediterranean, since these practices seem to be the best way to exploit the marine resources in a sustainable manner, in line with the conservation of the benthic communities. But, to reach this final goal the ECOSAFIMED project has issued 10 recommendations to minimize the potential impacts of artisanal fisheries on the seabed:

1. Promote the inclusion of fishermen's knowledge in scientific studies and monitoring activities;
2. Return in water the benthic discard in less than 30 minutes and avoid as much as possible crushing;
3. Return the benthic discard in the same location where the gear has been hauled;
4. Avoid fishing in areas where fragile communities have been detected;
5. Pursue the establishment of marine protected areas or fishing restriction zones in the identified valuable ecosystems;
6. Promote the use of more selective gears and more efficient materials;
7. Decrease the fishing impact by reducing the number of sets in the same site in a season;
8. Decrease the fishing effort by reducing the length of the fishing sets;
9. Promote the regular mending of fishing nets;
10. Promote best fishing practices with easy, straight-forward video footage.

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APPENDIX 5. CopeMed II case study: Involvement of fishers on standardized data collection in SSF and development of complementary activities to improve community livelihoods in Morocco and Tunisia

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ABSTRACT

ArtFiMed was a FAO Project implemented by CopeMed in Morocco and Tunisia from 2008 to 2011 aiming to develop capacities in three artisanal fisheries communities, two in Tunisia (El Akarit and Ghannouch) and one in Morocco (Diky) in the area of the Gibraltar Strait. In the three selected communities a monitoring system of fishing activity was put in place and run by members of the fishing community. Trained fishers provided detailed information on all components of artisanal fishing activity: fleet, fishing gear characteristics, catches by gear or period, effort by boat and gear, sizes distribution in the capture and economic production. The results were reliable, comparable between sites and countries and adapted to the calculation of indicators. Data and information from the system were used in sub regional working groups for the assessment of shared stocks (e.g. blackspot seabream of the Gibraltar Strait area). The participation of fishing communities contributed to strengthening the capacities of fishers and professional organizations and their involvement in the fisheries management process, as a first step towards co-management. In addition to the monitoring system the project undertook a series of initiatives seeking to develop new community activities that would generate additional incomes such as: developing the capacity of small-scale fisherwomen on traditional weaving, embroidery, and tapestry, to repair fishing gears, to process surplus fish products and the creation of a beekeeping organization. The project also supported the creation of fishers associations in the three sites.

1. INTRODUCTION

CopeMed phase II, "Coordination to Support Fisheries Management in the Western and Central Mediterranean", is a project executed by FAO and funded by Spain (Fisheries Secretariat) and the European Commission (DG Mare), active since 2008. Building on the achievements of the first phase (CopeMed, 1996-2005), the project aims to strengthen scientific and management collaboration among the eight countries involved in the project: Morocco, Algeria, Tunisia, Libya, Malta, Italy, France and Spain. Its main objective is to maintain the sustainability of marine fisheries, taking into consideration environmental, biological, economic and social issues.

During the first phase of the Project FAO CopeMed, attention was brought to the situation of SSF in the western and central Mediterranean. Following the request from the project Committee, Spain funded a second project targeting SSF, the FAO ArtFiMed project. ArtFiMed, "Sustainable development of artisanal fisheries in the Mediterranean Morocco and Tunisia", was financed by the Spanish Cooperation Agency (AECID) from 2009 to 2011. The project included: (i) priorities of the two countries in the fight against poverty, ii) improvement of socioeconomic conditions of coastal communities and rehabilitation of small-scale fisheries; (ii) regional concerns regarding the exchange of experiences, improved management of shared stocks and species of mutual interest; (iii) international recommendations and targets set under the Millennium Development Goals and the FAO Committee on Fisheries. It was carried out within the framework of CopeMed II and coordinated by the CopeMed II office in Malaga (Spain).

This document summarizes activities of ArtFiMed project in three small-scale fisheries communities, one in Morocco and two in Tunisia, related to fisheries data collection and diversification of economic activities by the fishers' communities during 2009-2011.

2. THE ARTFIMED PROJECT

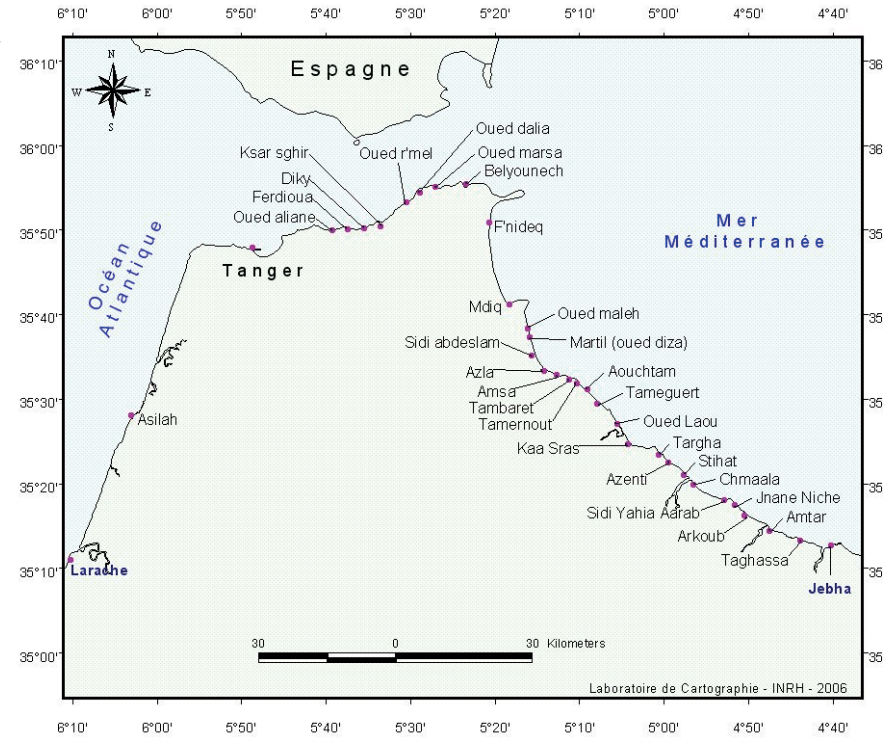
FAO, in collaboration with national administrations, identified a community of artisanal fishers in Morocco (Dikky) in the Gibraltar Strait area and two in the Gulf of Gabès in Tunisia (Ghannouch and El Akarit) as suitable for the development of the project ArtFiMed[50]. Regionally, the project aimed to establish the basis for a methodology to improve the management of national and regional fisheries through the integration of artisanal fisheries in the process. The project was implemented during an execution period of 36 months. Diagnoses reports of the three sites were done during the first phase of the project. The three diagnoses reports form an accurate picture of fishing activity, poverty profiles and vulnerability of the target communities (ArtFiMed 2009; ArtFiMed 2009a; ArtFiMed 2009b; ArtFiMed 2009c).

Dikky is a coastal community with important SSF activity located in the Gibraltar Strait coast of Morocco about 30 km east of Tangier (Figure A5.1) frequented by tourists in summer. Artisanal vessels are anchored at sea or protected on the beach during bad weather conditions. The site does not hold any fishery infrastructure.

Fishing activity began in the early sixties, with just four rowing boats and since then it has experienced an upward trend. The introduction in 1994 of longline fishing for bluefin tuna improved the incomes of fishers and the attraction for building new boats. At the starting of ArtFiMed, around 50 boats were active at the site providing employment to about 250 fishers. The main gears used were surface longline and hand line. The longline include 80 to 500 hooks, baits mainly with sardines, octopus and cuttlefish. Hand lines used between 2 and 10 hooks. The fleet consisted of wooden boats, with a length not exceeding 7 m and a capacity less than two tons, usually equipped with an inboard engine, with a capacity ranging between 15 and 55 horsepower (Hp).

[50] For complementary information, http://www.faoartfimed.org

FIGURE A5.1
Map of the Strait of Gibraltar and the location of the fisheries community of Dikky (Morocco)



Fishers from Dikky use only hook gears, due to the rocky bottom nature of main fishing areas. Still, these gears capture high-value species (Table A5.1). During summer fishing period they use a hook line targeting bluefin tuna. Fishers frequently reported attacks by orcas during the hauling, which cause important losses in terms of captures, incomes and damaged gears (Malouli *et al.*, 2013).

Ghannouch, located in the Gulf of Gabès (Figure A5.2), is characterized by a tidal range that can reach 2 m. The project site includes several consecutive beaches where fishers had their boats concentrated in groups. In Ghannouch there are neither port facilities nor other tools for helping fishers. The services for maritime work (gas oil, ice, repair outlets, etc.) are all in the city of Gabès.

Main target species include Sardinelle (*Sardinella aurita*); Ouzef, a denomination for juveniles of Bigscale sand smelt (*Atherina boyeri*) and Anchovies (*Engraulis encrassicholus*); Flathead grey mullet (*Mullus cephalus*); Pandora (*Pagellus erythrinus*); Marbled Sole(*Lithognathus mormyrus*) (*Solea aegyptica*); Common cuttlefish (*Sepia officinalis*); Octopus(*Octopus vulgaris*); Royal shrimp (*Penaeus kerathurus*) and White shrimp (*Metapenaeus monoceros*).

The number of boats is less than 200 out of which almost a third was in illegal situation at the beginning of ArtFiMed. The average length of boats is 4.2 m ranging between 3 and 6.3 m, with the largest being a beach seiner; rowboats represents 57 percent of all. Introduction of motors is recent (over 60 percent acquired in 2008). Outboard motors boats represent 43 percent of the fleet and average power is 9.9 HP. There are always two persons onboard for different types of fishing. Beach seine requires a larger number of people (14 – 17) on the beach.

Fishing gears used in Ghannouch include trammel nets, gillnets and the beach seines “Hlig” and “Tilla”, which are two traditional nets used for fishing the Ouzef. Trammel nets target cuttlefish and shrimp (22 and 30 cm central mesh size

FIGURE A5.2
Map of the Gulf of Gabès and the location of the fishing community of Ghannouch in Tunisia

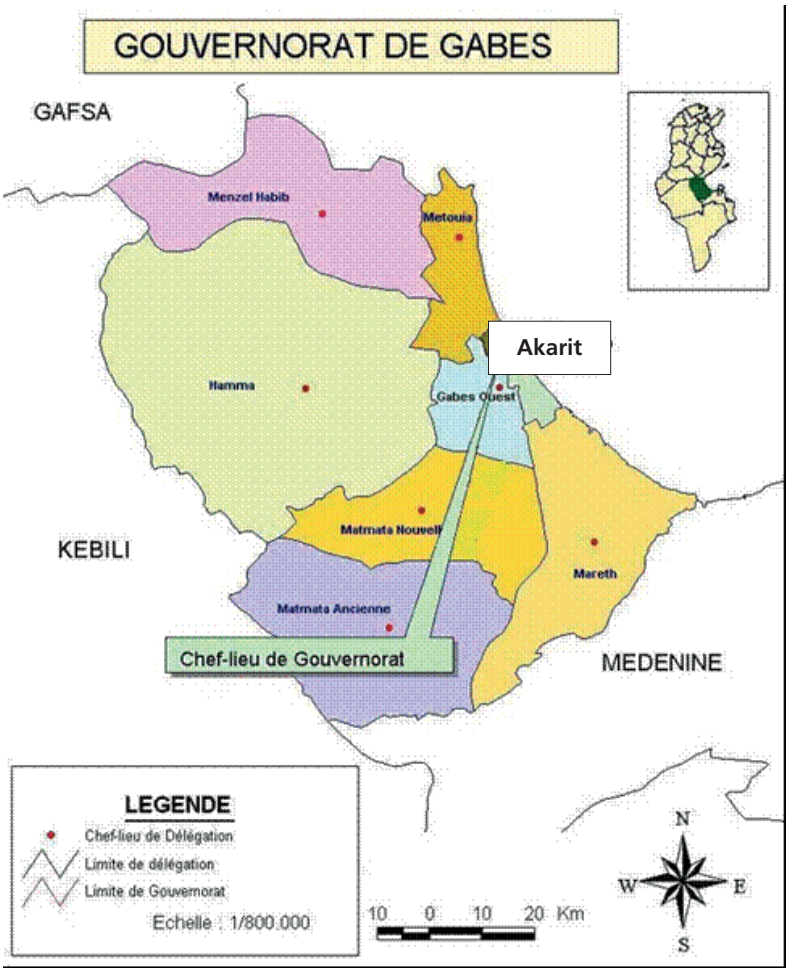


TABLE A5.1
Characteristics of fishing gears and main target species in the Dikky fishery

Gears types	Hooks types N°	Fishing period	Fishing area	Operation duration (hs)	Target species Common name	Target species Scientific name
Longline1	3-4	March-June	Zammij, Dalia; Bekhat	8-16	Blue-spotted seabream	*Pagrus caeruleostictus*
Longline2	11-12	October-April	Close to the site	6-12	Blackspot seabream	*Pagellus bogaraveo*
Longline3	1-0	July-August	Bakhat-Zemmig	5-10	Bluefin tuna	*Thunnus thynnus*
Hand line	7-15	all year round	Close to the site	6-12	Sparidae	*Sparidae*
Train line	10-15	all year round	Close to the site	6-12	Seabass; Grouper; Conger, Seabream	*Dicentrarchus labrax; Epinephelus* spp*; Conger conger; Sparus aurata*

respectively and 120 mm external mesh size). The number of trammel net units used by boat is between 20 and 30 for cuttlefish and between 14 and 20 for shrimp.

Each unit measure is 42 m length. Trammel net for cuttlefish is the most used gear (97 percent of fishers). Gillnets (29 percent of fishers have this gear) are deployed on the bottom (in waters between 5 to 10 m depth) they have a drop of up to 6 m and catch a large number of demersal and pelagic species. The fishers have 10-25 units.

There are two types of beach seines in Ghannouch: simple, called Hlig, and with pockets, called Tilla. Hlig is deployed with a large boat (5–6 meters) to form a semi-circle from the beach. When the Hlig is almost on the beach, and if they observe juvenile of sardines, anchovies or atherinids (Ouzef) a second seine, Tilla, is deployed afoot behind the Hlig, to capture the Ouzef escaping from the first seine. If there is no Ouzef, the Tillais not lowered.

El Akarit. In this community the focus of the project ArtFiMed was the clam fishery. The clam (*Ruditapes decussatus*) fishery is concentrated in the governorates of Sfax, Gabès and Medenine. The collection is done by a large number of collectors (an average of 5 000 individuals) the majority (80 percent) of them is women. This collection is made afoot from November to May using rudimentary equipment (a sickle) and in periods strongly related to daily tidal range, at an average of six hours per day. Clam collectors in El Akarit area are 400 (72 percent of women) coming from towns in an area ranging from 3 km to more than 20 km from El Akarit. The only fishing activity practiced in the area is the collection of clams.

PHOTO A5.1
Sickle and clams collected

The characteristics of the area favour this activity, since at low tide large sandbars with a high density of clams appear. The prices of this shell, the lack of other sources of income and the relative simplicity of this business, have led the villagers to get gradually involved in collecting clams since 1960s. In Akarit, production and effort statistics by fishing area date back from 2004, the year in which professional groups for development and exploitation of clams were created.

The authorized clam size is 3.5 cm. Collectors use a sickle to remove the clam. It is a tool about 20 cm long and 1.5 cm wide (Photo A5.1). The average of sickles used by a collector is four. Average price of a sickle is TND 2 (TND 1 = US$ 0.4949 in 2016). The collected clams are lodged in a container or a bag that doesn't retain water to prevent disease transmission until return to the beach for weighing and sale to traders.

PHOTO A5.2
A group of women collecting clams in Akarit

The maximum number of working days is 20 days a month. Moreover the Minister of Agriculture decree of 16 June 1997, states that clam fishing is prohibited from 15 May to 30 September. However and as a Minister's decision, this ban period can be extended until November 15, and clams can be exceptionally allowed in certain areas during the period from July 1 to August 31.

3. SOCIO-ECONOMIC CHARACTERISTICS AND DESCRIPTION OF THE COMMUNITIES INVOLVED

Dikky

The houses of the fishers are distributed mainly in three small towns located at distances from less than 1 km up to more than 6 km relative to the landing site. Almost 98 percent of the population is native from towns near the site. This is a generally illiterate population. Learning the fishery work is transmitted from fathers to sons. Fishers are also engaged in subsistence agriculture. The fishing community is relatively young, with skippers being the oldest. The large proportion of fishers is in the age group 35-50 years. Experience in fisheries is in average 14 years for fishers and 22 years for skippers. The number of fishers by boat (3-5 people) depends on the gear performed.

The practice of SSF requires an investment of between TND 47 000 (= US$ 23 260) and TND 300 000 (= US$ 150 470) in means of production (boat, motor and fishing gears). These means of production are financed in almost all cases by own savings or loans from relatives.

The targeted species are all high-value and generally sold for exporting. Price is governed by two factors: i) demand from export companies and ii) demand increases in specific periods of the year, as the month of Ramadan or European celebrations. The SSF in Dikky practiced a traditional benefit "sharing system" described in ArtFiMed (2009).

The commercialization of species is done by 4 to 6 traders, who play a role of commissioners from large export companies. These traders ensure the supply of fishing inputs, including equipment, ice and bait to the crews. The rudimentary working conditions of fishers and the distance to markets in Tangier are two factors that force fishers to sell their catch to intermediaries. In this scenario, a verbal commitment of mutual interest between the two parties is established based on the exclusive sale of catches by the fish wholesaler.

Generally, SSF fishers support their families. The average of persons supported by a fisher in Dikky is about five people. Women does not participate in the development of economic activities, they are only limited to carry out the household tasks. In rare occasions women can contribute to the income, by carrying out subsistence farming or petty trading activities. Women live in a difficult situation, with limited freedom to develop any lucrative activity that could guarantee them certain autonomy from the head of family.

TABLE A5.2
Equipment of fishers in Dikky. Maximum, minimum and average number of gears used by each active fisher

Gears	Minimum	Maximum	Average	CV
Longline blackspot seabream	4	25	15	23
Longline common seabream	3	10	5	27
Longline blue spot seabream	3	8	5	18
Handline bluefin tuna	2	6	5	21
TOTAL	12	49	30	23

Ghannouch

This site, covering an area of 19 km^2 is located in the Gulf of Gabès, approximately 15 km north of the city of Gabès and 400 km from Tunis, capital of Tunisia. Out of the 23 000 inhabitants of Ghannouch approximately 1 500 are involved in the fishing activity, working on motorized or sail artisanal fishing boats.

The majority (72 percent) of Ghannouch fishers have had access to primary education, but only 11 percent have completed secondary education. There are 16 percent of the fishers who are illiterate, mainly people over 60 years; more that 78 percent are married. The average number of children per family is 3.6 although can have a maximum of ten. Family has an average of 5.6 persons in charge with a maximum of ten people. The price of different fishing gears used in Ghannouch varies from TND 90 to TND 200 the unit. Indeed, a gear for cuttlefish usually consists of 30 pieces representing a cost of TND 2700 on average, whereas a 17 units gear for shrimp cost around TND 1 530. The typologies of fishing equipment in Ghannouch are summarized in Table A5.3.

Other investments include the price of the boat (from TND 1 570 to TND 4 935), engines (TND 2 500 for a 5 HP motor to TND 6 000 for a 15 HP), reparations cost (between TND 100 and TND 400 per year), cost of fishing authorizations set at TND 0.1/GRT, and maintenance (TND 80 – TND 200/year). The 35 percent of fishers have taken out a loan to purchase a motor. Most of the fishing equipment including trammel nets is financed through informal loans given by traders.

TABLE A5.3
Number of vessel using each combination of gears and cost of each combination. Cost values in TND (TND 1 = US$ 0.4949)

Gears combinations	Motor boat (N°)	Rowing boat (N°)	% of Total	Average equipment cost
cuttlefish trammel net	8	29	47	2 700
cuttlefish trammel net + shrimp trammel net + gillnet	9	4	17	6 100
cuttlefish trammel net + shrimp trammel net	8	4	15	4 230
cuttlefish trammel net + gillnet	7	2	11	4 570
cuttlefish trammel net +beach seine + tilla	2	3	6	5 100
beach seine + tilla	0	2	3	2 400
cuttlefish trammel net + beach seine	0	1	1	4 700
TOTAL	34	45	100	4 258

El Akarit

El Akarit is a village located 30 km from the capital of the governorate Gabès and about 370 km from Tunis and about 3 km from the sea. The population is about 400, including 190 men and 210 women, and there to count hundred families. Average age of clam's collectors is 40.9 years. However, there are also older women, with no other source of income, who are also involved in the clam collection. Average number of children per household is 3.4 with a maximum of ten children.

Schooling became compulsory in Tunisia since the sixties but 49 percent of fishers in El Akarit are illiterate (aged more than 40 years), 47 percent have primary education and 3 percent secondary level. Collectors are members of the Clam's Development and Conservation Grouping.

Fishing effort to collect clams is regulated depending on the health status of the areas. Maximum production occurs in January and February. The average workday production/collector peaks in February (1.3 kg/person). Individual production is weighed by an intermediary that has a commission of TND 0.2/kg. The clam's Group (a sort of cooperative) brings together the production of all women and is responsible for selling it by taking an additional commission of TND 0.1/kg. After the selling, the Group pays the production to each woman. Women estimated at 07.30 hours/day their involvement in collection, time divided into one hour of transport, 05.30 hours collecting clams and 1 hour to select sized clams and return home. The Akarit Regional Office for Agricultural Development of Gabès controls the size of harvested clams and issues the travel vouchers certifying the origin of the product. Daily incomes vary between TND 2 and TND 12.

4. THE ARTFIMED MONITORING SYSTEM

A protocol was prepared by ArtFiMed (ArtFiMed 2010) to test a methodology, monitoring the activities, define indicators and develop analytical results.

The ArtFiMed monitoring system was created to follow up local fishing activities by the fishers themselves/members of the community. This system provides data on fishing effort (in number of daily trips) and information on the fishing techniques, catch, fishing areas and prices of the target species on landing. In general, the procedure followed by ArtFiMed with the communities included: 1. Description of the activities of beneficiaries; 2. Preparation of the baseline information; 3. Process of consultation and identification of beneficiaries; 4. Awareness, information, exchange of experiences; 5. Preparation of the training contents through participation and involvement of beneficiaries; 6. Cooperation with other organizations experienced in capacity development; 7. Organization of training activities; 8. Analysis of problems encountered and solutions proposed; 9. Results and; 10. Lessons learned concerning: i) procedures and duration; ii) involvement of beneficiaries; iii) involvement of local and national stakeholders and administrations; iv) evaluation (the pros and cons), v) if repeated again, what would do differently; and vi) opportunities and sustainability: what must be done to ensure the development and sustainability of the activity?

The phases of implementation included:

- *Capacity building and community involvement*. The procedure for the implementation of the activities was based on mutual respect, transparency, the involvement of the communities, the participation of the administration and the strengthening of cooperation and coordination with other stakeholders, agencies and actors in the countries. Capacity building activities were based on selected requests by the SSF communities, supported by ArtFiMed, with the participation of national agencies responsible for each requested theme and involving experienced experts on the field.
- *Definition and selection of monitoring indicators.* A methodology for the selection of indicators in a local context was defined (Document ArtFiMed TD N°13). Based on surveys conducted during the diagnosis phase, it was possible to define five focus areas (themes) requiring follow-up through indicators: 1. Significant fisheries for the selected site; 2. Socio-economic aspects of fishing communities; 3. Fishery products marketing; 4. Professional organization Systems and; 5. Environmental aspects associated with the fisheries.

The indicators selected for each theme were classified in two priority levels, 1 and 2. The identification and classification of indicators was done taking into account the available means in terms of human and financial resources. Priority 1 indicators are those essential for the supervision of the activities. Priority 2 indicators are also relevant to the objectives but depend on their follow-up and the opportunities that arise during the project.

4.1 Monitoring of artisanal fishing in Dikky, Morocco

The landing site is concentrated in a small area easy to cover. Thus, ArtFiMed implemented a system to monitoring fishing activity in March 2010 with the participation of a local fisher. On a daily basis, he collected data following an agreed sampling schema at landing requesting: name of the boat; duration of the fishing trip; fishing gears used; species caught; number of pieces/specie; weight by species and boat (kg); commercial categories; price and Destination (marketing, consumption, others). If the number of active boats did not exceed six boats, then the field monitor conducted extensive surveys to all the skippers; if the number of active boats in a day exceeded 6, then he proceeded to sample at least 30 percent of the active boats.

4.2 Monitoring of artisanal fishing in Ghannouch, Tunisia

The landing zone is very large (about 20 km). The ArtFiMed monitoring system instead of implemented by fishers as in Morocco it was based on the collaboration of two wholesalers who provided information for 50 boats landing in two different landing points in Ghannouch area. This allowed us to obtain information on a sample of approximately 25 percent of the boats operating in the area. To implement the monitoring system, we're inspired by the own notebook of the wholesalers by asking them to supplement the information obtained with other information of interest to the project. These traders provided each fishing day the following information of the boats of which they buy the products: name and register of the boat; engine power; fishing gears used; fishing effort (number of trips); capture by species and boat; buying price; the financial situation of the fisher; notes regarding the loss or purchase of nets and of the species sold. This system allows recovering the data on active boats, but not on captures which are not sold.

4.3 Monitoring of shellfish clams in Akarit, Tunisia.

Collecting clams during low tide occurs over a relatively large area (about 10 km) and therefore monitoring of this activity necessarily requires significant displacements over the area. A woman of the community involved in the fishery was selected and trained to carry out daily data collection and transcription on an "ad hoc" notebook on the following items: fishing effort (number of people practicing the collection); IUU fishing (number of persons practicing the collection during the prohibition period); production in value (only when the seasonal collection is allowed); quantity collected with legal and illegal size; sale price (only when the seasonal collection is allowed); number of traders on the field.

Complementary to the monitoring systems, a guide was elaborated to harmonize and standardize the data and methods of measurement of the species sampled during landings operations (Annex 3, CopeMed-ArtFiMed TD Nº 13). Other guides and technical documents prepared in support of the professionals and administrations are available in the CopeMed Web page (http://www.faocopemed.org/html/publications.html).

5. MAIN RESULTS FROM THE ANALYSIS OF THE DATA OBTAINED WITH THE ARTFIMED MONITORING SYSTEM INVOLVING THE SSF SECTOR

The Methodology for analysis of data (FAO-ArtFiMed-CopeMed, 2012) used the tools of descriptive statistics. Regarding the available time series, to be free of short-term changes and to facilitate comparison between sets, the general trend series was extracted by smoothing. The method chosen was the local regression smoothing type LOWESS1 (Robust Locally Weighted Regression), based on the adjustment of local polynomials.

Main results obtained includes the following parameters: numbers of different fishing gears, fishing effort by gear and target species, production by gear (in kg), value (national currency) and CPUE. Complete results from the analysis and complementary information are available in CopeMed web page and technical document Nº 28 (CopeMed, 2012). Examples of results in Dikky, Akarit and Ghannouch in format of tables and figures are presented here as examples.

FIGURE A5.3
Fishing effort (nº of fishing days, "marées") by commercial specie in Dikky (Morocco)

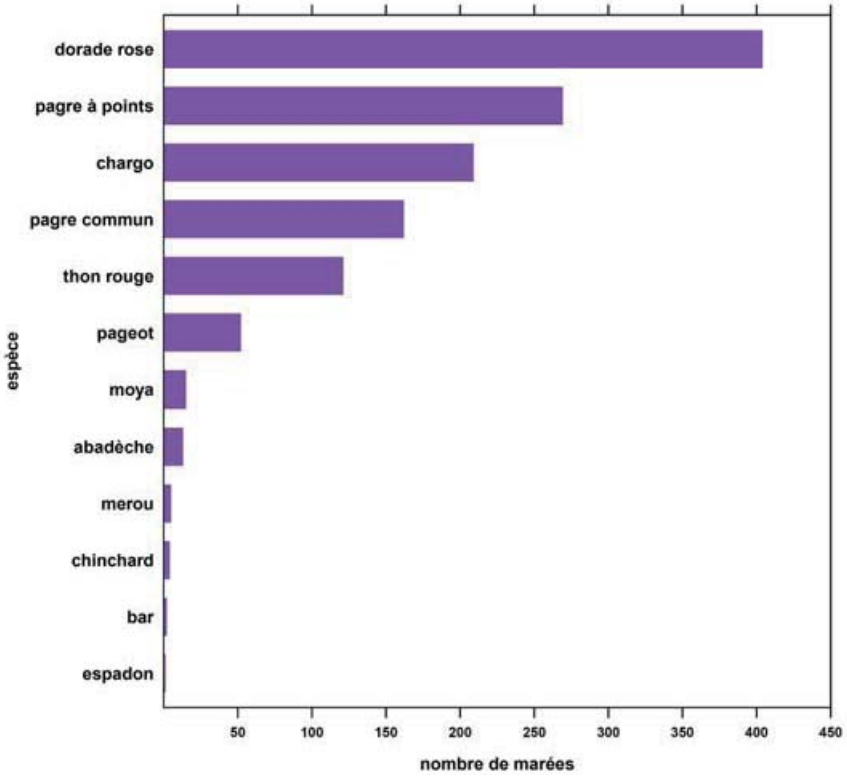


TABLE A5.4
Production (in kg) of main target species landed in Dikky (Morocco)

période	espèce	production (kg)	%
mars 2010- décembre 2010	thon rouge	20234.0	53.27
	dorade rose	5983.0	15.75
	pagre à points	5118.5	13.48
	chargo	3694.0	9.73
	pagre commun	1775.5	4.67
	pageot	614.0	1.62
	termes (moya)	182.0	0.48
	chinchard	148.0	0.39
	abadèche	91.5	0.24
	merou	75.5	0.20
	espadon	53.0	0.14
	bar	13.0	0.03
	total	**37982.00**	**100.00**

FIGURE A5.4
Fishing effort (number of women collectors by month) in two consecutive campaigns in Akarit, Tunisia. In blue authorized and in red unauthorized collectors

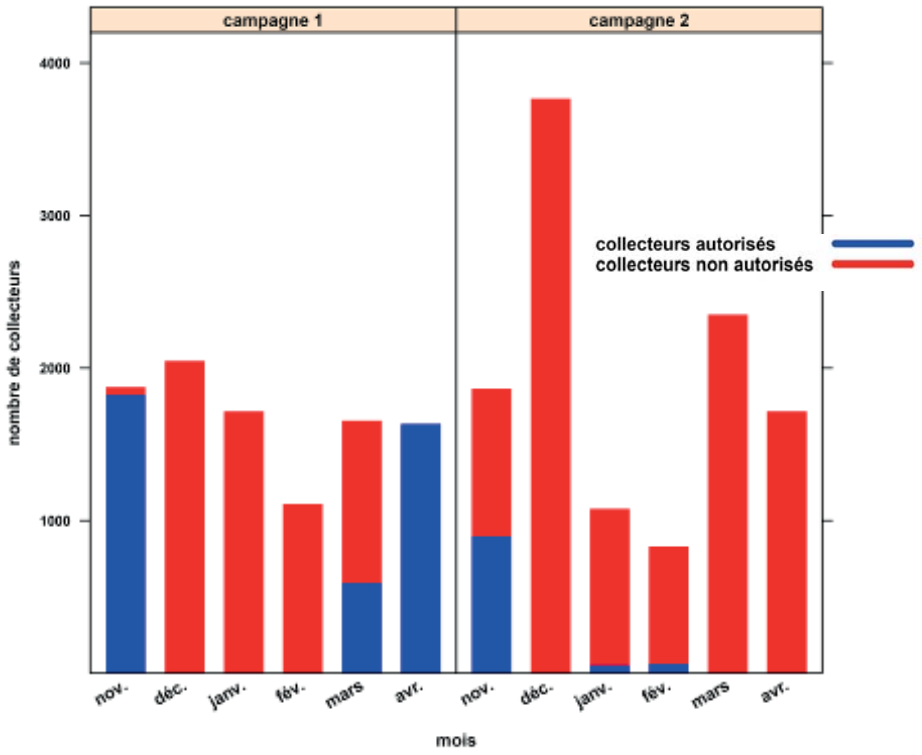


TABLE A5.5
Average CPUE (expressed in kilograms of biomass collected by number of collectors) per campaign (1 and 2) and month during the period 2009-2011 in Akarit (Tunisia) with confidence intervals

campagne	mois	cpue moyenne	sd	CV(%)	n	95%LL	95%UL
1	11	1.86	1.71	0.92	18	1.06	2.65
	12	0.00	0.00	NA	26	0.00	0.00
	1	0.00	0.00	NA	23	0.00	0.00
	2	0.00	0.00	NA	24	0.00	0.00
	3	0.72	1.13	1.57	27	0.29	1.15
	4	2.04	0.86	0.42	19	1.65	2.42
2	11	2.44	6.36	2.60	23	0.00	5.04
	12	0.00	0.00	NA	26	0.00	0.00
	1	0.00	0.00	NA	16	0.00	0.00
	2	0.00	0.00	NA	25	0.00	0.00
	3	0.00	0.00	NA	27	0.00	0.00
	4	0.00	0.00	NA	27	0.00	0.00

TABLE A5.6
Total number of operations (effective fishing days) per month in Ghannouch (Tunisia)

année	mois	engin				
2009		FM	FTC	FTS	SP	**total**
	novembre			1568		**1568**
	décembre			1972		**1972**
2010		FM	FTC	FTS	SP	**total**
	janvier			1512		**1512**
	février	4		2296		**2300**
	mars	36	8	1520		**1564**
	avril	104	364	552		**1020**
	mai	508	432	880	32	**1852**
	juin	284	0	2596	8	**2888**
	juillet		16	2668		**2684**
	août	1536	4	1364		**2904**
	septembre	660		1012		**1672**
	octobre	128		2288		**2416**
	novembre	52		3064		**3116**
	décembre			2920		**2920**
	total	**3312**	**824**	**26212**	**40**	

FIGURE A5.5
Production (Capture total in Kg) by month in Ghannouch (Tunisia)

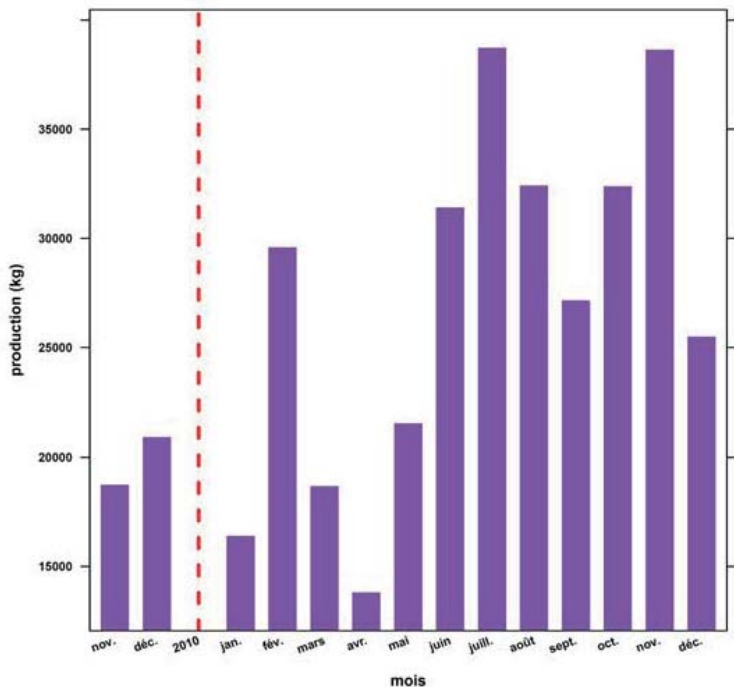


FIGURE A5.6

Richness of species by fishing gear and month in Ghannouch (Tunisia). Richness is expressed as the ratio between the number of species recorded and the total number of possible species sold for the considered stratum.

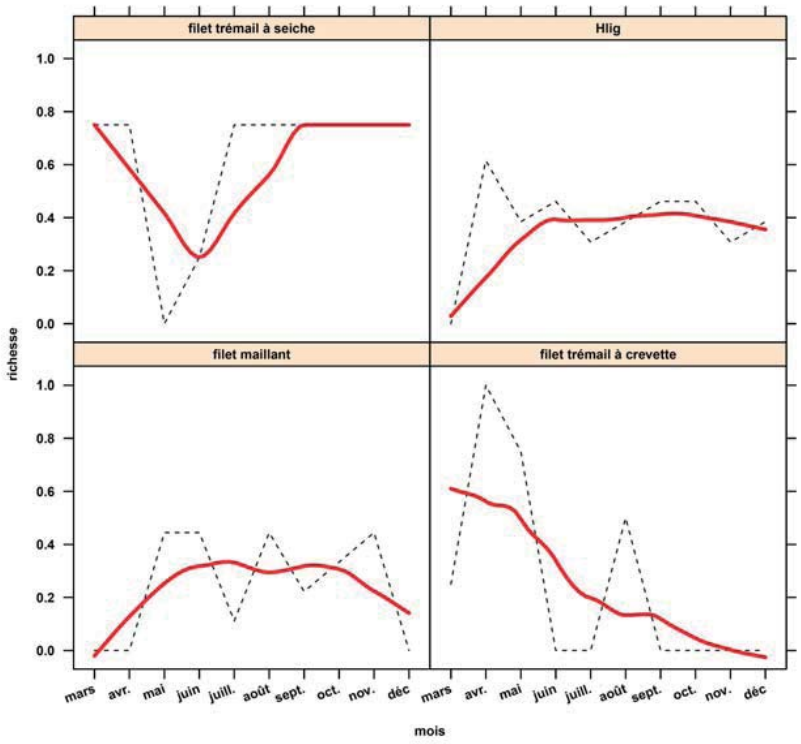


FIGURE A5.7

Fishing area used by the Ghannouch (Tunisia) SSF related to target species

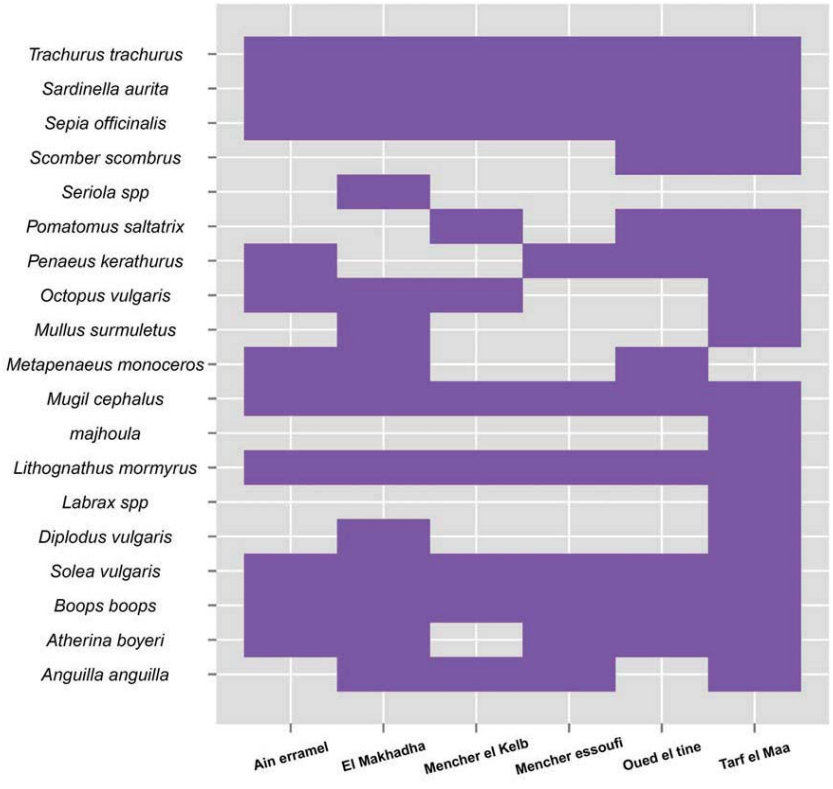
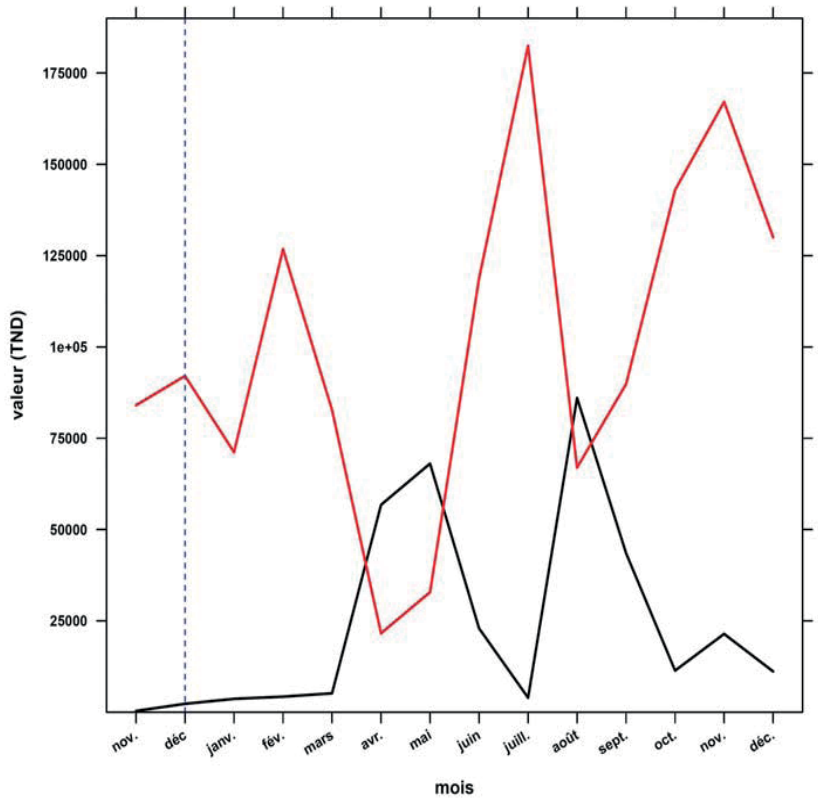


FIGURE A5.8
Production (in national Tunisian currency) by specie and month (Red: cuttlefish; Black: Others)



5.1 Conclusions from the Monitoring System and the Analysis of data

The ArtFiMed monitoring system implemented by members of the fishing communities trained to collect all the necessary information provided baseline information on SSF in the communities studied.

Data obtained with the ArtFiMed monitoring system provided accurate information and indicators on all aspects of SSF activity: fleet, fishing gear characteristics, catches by gear or period, effort by boat and gear, sizes distribution in the capture and economic production. The results were reliable, comparable between sites and countries and adapted to the calculation of indicators.

The implementation of this system is very efficient in terms of human and financial costs compared with conventional monitoring systems, which do not involve fishers.

The participation of fishing communities contributes to strengthening the capacities of fishers and professional organizations and their involvement in the fisheries management process, as a first step towards co-management.

Data and information resulting from this monitoring system was used in some sub regional working groups of CopeMed for the assessment of shared stocks, as for example the black spot sea bream of the Gibraltar Strait area (CopeMed, 2011).

Replicating that system in other artisanal fishing sites would help to fill the current gaps in the monitoring of the SSF activity in the Mediterranean and Black Sea.

6. DIVERSIFICATION OF ACTIVITIES IMPROVING COMMUNITIES LIVELIHOODS

Improving community livelihood was one of the main objectives for ArtFiMed. A series of case studies implemented to develop new community activities generating additional incomes in the selected sites in Morocco and Tunisia are summarized here below. The

implementation of each activity had 4 Phases: 1. Participatory approach; 2. Selection of candidates; 3. Training of beneficiaries; 4. Monitoring and evaluation of results.

6.1 Activities in El Akarit and Ghannouch (Tunisia)

6.1.1 Developing capacity of Small-scale fisherwomen in El Akarit on traditional weaving and hand embroidery

Objective: Training of fisherwomen and fishing community members in producing traditional products.
Beneficiaries: 3 groups of 25 women trained during 10 months.
Results: women trained producing local products and new commercial opportunities.

6.1.2 Developing capacity of women of SSF in Ghannouch and Akarit on traditional tapestry

Objective: Training of the wives and daughters of fishers in producing traditional carpets.
Beneficiaries: 25 women were trained during ten months.
Results: women producing handmade traditional carpets.

6.1.3 Developing capacity of women in Ghannouch on reparation of fishing gears

Objective: Training of the wives and daughters of fishers in repairing and assembly fishing nets.
Beneficiaries: 20 women were trained during ten months.
Results: women repairing gears of her husband or other fishers.

6.1.4 Developing capacity of women in Ghannouch on transforming fishing surplus products

Objective: Training of the wives and daughters of fishers in handling and preserving fish products (sardines) for consumption other than fresh.
Beneficiaries: 15 women trained in a workshop.
Results: sardines increased their value when sold in different cooked ways.

6.1.5 Supporting the creation of a SSF organization in Ghannouch

Objective: Create an SSF organization adapted to the needs of fishers.
Beneficiaries: More than 250 fishers working in the Ghannouch area.
Phases for implementation:

1. Consultation and participatory approach with fishers;
2. Preliminary study phase;
3. Awareness and capacity development of beneficiaries;
4. Contacts with other existent local organizations;
5. Creation of the organization and election of their representatives;
6. Administrative support of the SSF organization;
7. Monitoring and evaluation of the organization.

Results: A local organization of SS fishers is currently recognized and very active at national and international level.

6.2 Activities implemented in Dikky, Morocco

Document ArtFiMed 2009d reports activities implemented by ArtFiMed related with complementary actions to improve the community livelihood in Dikky. Main results are summarized below:

6.2.1 Creation of an Organization of SSF in Dikky

Objective: Create Dikky fisher group for equipping, management and monitoring of winches Dikky.
Beneficiaries: more than 100 fishers.

Phases:

1. Consultation and participatory approach;
2. Preliminary study phase;
3. Awareness and capacity development of beneficiaries;
4. Creation of the organization;
5. Supporting the SSF organization;
6. Monitoring and evaluation of the organization.

Problems: Identification of partners; Cost of winches; administrative procedure.
Results: Originally boat's owners and intermediaries had the power to manage the decision of the group; at the end of the process, fishers are predominantly represented in this grouping (strengthening the role of fishers).

6.2.2 Support an organization of women of artisanal fishers

Objective: Create a group of women for the development and diversification of activities generating new income.
Beneficiaries: more than 25 women.
Results: A group of organized female fishers administratively recognized generating new activities.
Problems: consultation with administrations; cost of renting the office.

6.2.3 Support the creation of a beekeeping organization for fishers in Dikky

Objective: Diversification of activities generating revenues independent of SSF.
Beneficiaries: 25 fishers of the SSF Cooperative of Dikky (Morocco) trained and supported during 20 days.
Results: A group of fisher organized in a new activity.
Problems: Stop ArtFiMed support; low production; bee mortality.

7. LESSONS LEARNED

The implementation of activities by ArtFiMed supporting SSF and organizations in Morocco and Tunisia provided many lessons, including those related to:

7.1 Support to the fishers organization

The creation of a fisher organization in Ghannouch (Tunisia) permitted to legalize the activity of 100 fishers/artisanal boats. Main lessons derive from the participatory process that allowed to give them the right to access fishery resources; eligibility among others for obtaining micro-credit in the framework of the national fisheries development program; gave them access to training (security at sea, management), knowledge and information and facilitated their representation and integration in the national fisheries management system.

7.2 The creation of beekeeping cooperatives

As alternative and complementary activity to diversify the incomes of fishers this experience was relatively innovative. Indeed, in the case of Morocco, it was successful, it gave the opportunity to fishers to develop both activities, this diversification reduced vulnerability and poverty. The lessons we can draw from the participatory process to create a beekeeping cooperative are related to:

- The administrative process. Once engaged in the action, they can demonstrate they are eligible for subsidies and beekeeping material to increase the production
- The professional organization process takes time and requires follow-up over a long period
- Finding a place to meet and to establish the headquarters of the organization is a general and important problem for a new organization.

- The process to create Professional Organization (PO) for SSF may be replicated in other sites in Morocco and Tunisia because the PO provide solutions to major problems faced by SSF communities (representativeness and implication in co management process, added value, trade and commercialization of products, access right to the resources, eligibility to micro credit and sector development programs, diversification and income increase, access to knowledge information education and training).
- The involvement of local authorities and fisheries related institutions are crucial during the whole process, from the identification to the creation of a PO.
- The PO legislation is different in each country. Each country should provide updated training and education materials, support to the PO during the first years (in term of training, basic material, monitoring and assessment and facilitate the hosting of the organization) and facilitate the access to micro credits.
- Develop networking and experience sharing for PO by sector in each country and at international level.

7.3 Support to the creation and follow-up of a SSF community based monitoring system (in Morocco and Tunisia)

Main lessons learned related to this activity include:

- Have a very low human and financial cost of implementation
- It is a reliable and responsive system for the calculation of indicators for monitoring SSF activities
- Contribute to develop capacity of SSF community, fishers and professional organizations
- Strengthens the participation of fishers and SSF communities in the fisheries management process
- Provides comparable data between sites and countries
- Is adapted to the specificities of small-scale fishing in the Mediterranean

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APPENDIX 6. Artisanal fishery communities in the central Mediterranean: three managed case studies in the blue growth perspective

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Key words: Small-scale fisheries, artisanal fishing, fishery economics, fishery management, fishery resources, fishing vessels

ABSTRACT

SSF are considered worldwide as potential options for a sustainable exploitation of fisheries resources. Despite its potential, SSF are still poorly understood and monitored. They are generally difficult to manage because of the lack of common paradigms like a univocal definition. At global level, FAO developed a tool for promoting SSF monitoring and management. In Europe, the European Commission encouraged small-scale data collection. At regional level in the Mediterranean Sea, the FAO General Fisheries Commission for the Mediterranean (GFCM) encouraged institutional and scientific work on SSF. A preliminary overview is provided on the dynamic, management and governance systems of SSF in three selected archipelagos of the Central Mediterranean: Kerkennah (Tunisia), Malta and Egadi (MPA, Italy). Data were gathered in the framework of the FAO MedSudMed project through an inventory table defined by experts from Italy, Malta and Tunisia. The average number of vessels in Kerkennah, Malta and Egadi Islands were 2012 (±42), 660 (±178) and 137 (±9), respectively. The data showed the greatest catch (landing per vessel per year) in the Egadi Islands (3,032 kg ±133), although people involved in the fishing sector at all levels were lowest in the MPA Egadi Islands (576). The estimation of average net profit, maintenance and full cost for vessel showed great differences among the investigated areas. The smallest profit was recorded in Kerkennah (MB = 605€; NMB = 1,492 €), the greatest profit was recorded in the MPA Egadi Islands (8,400 €). The management measures implemented in each area referred mostly on the minimum landing size rules and spatial-temporal restriction to fishing activities related to biological aspects. The three investigated areas can be considered as advanced laboratories, in which several and multidimensional aspects coexist and contribute to the definition and implementation of management plans.

1. INTRODUCTION

SSF are considered worldwide as potential options for a sustainable exploitation of fisheries resources (Matthew, 2003; Pauly, 2006). SSF play a significant role in the provision of high quality food to local communities, and in contributing to poverty reduction and to sustainable development in several areas of the world (FAO, 2005).

In the Mediterranean Sea, the term SSF was used in 1990 by the European Commission (EC) to define non-industrial fisheries (Anonymous 1990). For the same fisheries, other terminology have been used at Mediterranean level like artisanal fisheries or coastal fisheries. Similarly, several definitions of SSF in the Mediterranean have been suggested by Colloca *et al.*,(2004), Tzanatos *et al.*, (2005, 2006), Forcada *et al.*,(2010), Maynou *et al.*,(2011). At the European level, Guyader *et al.*, (2013) proposed an operational definition of SSF based on the length overall (LOA) of vessels: all vessels with LOA ≤ 12 m and not using towed gears should be considered part of SSF. According to FAO, SSF are defined as "traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amounts of capital and energy, relatively small fishing vessels, making short fishing trips, close to shore, mainly for local consumption".

Mediterranean SSF exhibit great differences in terms of social, economic and historical contexts. These differences reflect the great variety of biological and environmental conditions that characterise coastal and shallow water areas where SSF traditionally operate (Farrugio *et al.*, 1993). In the Mediterranean Sea, SSF are generally characterised by substantial differences at regional, national and even local level in terms of fishing gears, method of operation, boat characteristic, number of crew, target species, market behaviour, seasonality, catches, yields, revenues, etc. Moreover, the relatively low economic contribution of SSF to national domestic production, has determined a scattered monitoring activity for this sector. In turn this resulted in poor data collection and unnoticed real impact of SSF in terms of fishing effort and total catch. Recently, at national level, policy makers asked research institutes to devote more effort on SSF studies with the objective to improve information on fishing activities, stocks targeted, management, and to save the cultural heritage of fishing traditions.

At global level, FAO developed a tool for promoting SSF monitoring and management, the "FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries" (FAO, 2015a). In Europe, the European Commission (EC) encouraged small-scale data collection with the goal to improve knowledge on the fishing activities, economic and social aspects related to SSF (EU Data Collection Regulations, EC no. 1543/2000). At Mediterranean level, the FAO General Fisheries Commission for the Mediterranean (GFCM) encouraged institutional and scientific work on SSF and organized two regional conferences on this theme (FAO, 2015b; 2016).

In the Strait of Sicily (central Mediterranean Sea) SSF, like other fishery sectors, are facing serious difficulties because of increased costs, overexploitation and reduction of overall abundance of the fisheries target species (Alverson *et al.*,1994; Pirrodi *et al.*, 2015). Some of the reasons that led to the observed decrease of fisheries resources abundance are, among others, the paramount enhancement of knowledge on fish behaviour and ecology, the increase of fishing technology and power occurred to large scale fisheries since the 1950s. These aspects were coupled by the implementation of fisheries management approaches and measures (Freire and Garcıá-Allut, 2000; Gomez *et al.*, 2006) that were not able to cope with fisheries development. In response to the lower availability of fisheries resources a decrease in catch and profitability of the more selective SSF began in the mid-1980s and continued until now. The reduction in catch and profitability was detrimental for SSF that initiated to decline in terms of number of fishers and fishing units (e.g. Pirrodi *et al.*, 2015).

The recognition at international level of increased need to manage the fishing activities with new strategies, led to the development of a number of tools to approach

fisheries management e.g. the FAO Code of Conduct for Responsible Fisheries, (FAO, 1995); the Ecosystem Approach to Fisheries (Garcia, 2003); the FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (FAO, 2015). Moreover, initiatives to increase the sustainability of marine and coastal activities were put in place at international level: e.g. the EU Marine Strategy Framework Directive (2008), the EU Blue Growth initiative (2012), the UNEP EcAp-MED Initiative (2012), the EU Marine Spatial Planning and Integrated Coastal Zone Management initiative (2013), the EMFF European Maritime and Fisheries Fund (Reg. EU n° 508/2014), the GFCM framework program 2013 – 2018, FAO network of Mediterranean projects (AdriaMed, CopeMed II, EastMed and MedSudMed). The latest reform of the European Common Fisheries Policy (Reg. EU 1380/2013) has also taken steps towards ensuring more sustainable fishing activities by EU fleets, embracing the ecosystem approach and the precautionary principle to fisheries. In this context, the international scientific community is called to contribute, through specific studies, to the twin and inter-related goals: ensure the sustainable exploitation of fisheries resource and, opportunely managed, express the great potential for innovation and growth in the marine and maritime sectors.

Traditional fisheries management was generally based on advice derived from biological studies. On the contrary, modern fishery management requires a huge amount of data including on ecological aspects of the exploited marine resources and on cultural, environmental, political, and especially socio-economic dimensions of fishery. In light of this, the basic characteristics of artisanal fisheries (the fleet structure, fishing gears, target species and some socio-economic aspects) of three case-studies, Kerkennah (Tunisia), Malta Island and the MPA of the Egadi Islands (Italy) were examined. The objective was to obtain a preliminary overview of behaviour and dynamic of the SSF, as well as to investigate the management measures and the governance systems adopted.

1.1 Study area and case studies

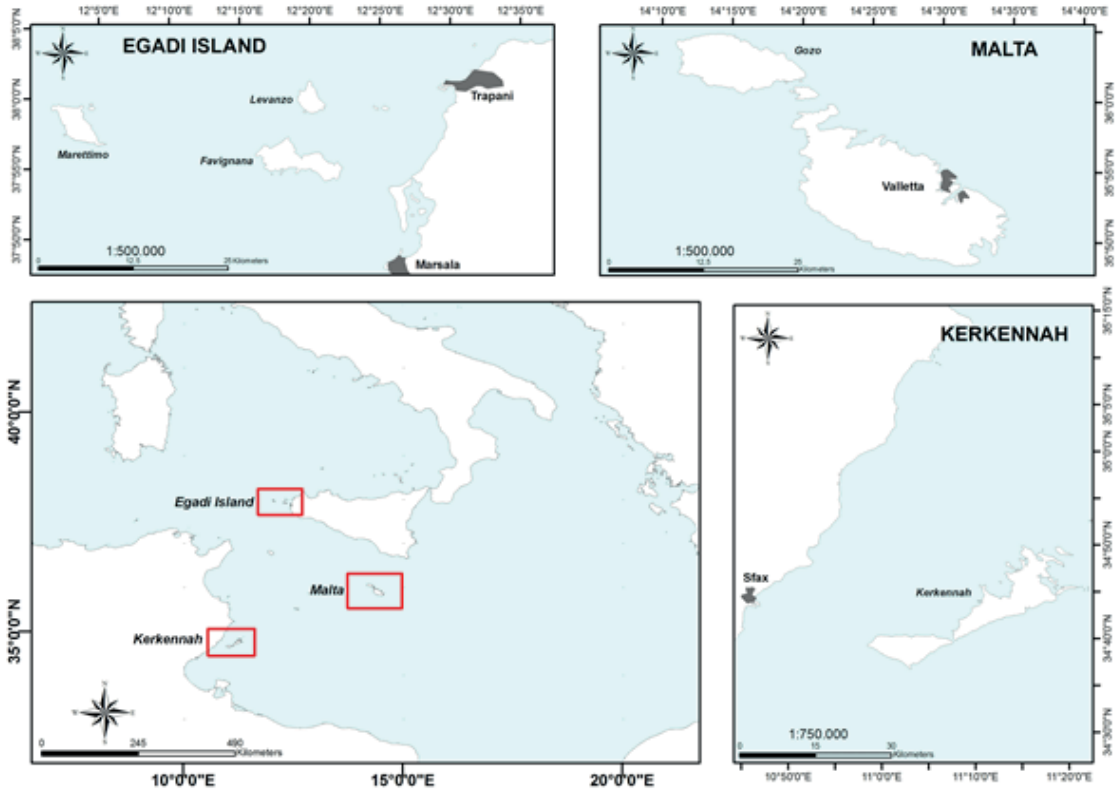
The Mediterranean Sea is a semi enclosed region that for ecological characteristics can be divided into a western and an eastern basins. The two basins are separated by a sill at a depth of about 400 m extending from the south Sicily to the North African (Tunisia and Libya) coasts. The three investigated case-studies fall on this sill, in the central Mediterranean Sea (Figure A6.1a). This area can be considered as the most productive area for fishery in the Mediterranean after the Adriatic Sea (Papaconstantinou and Farrugio, 2000). The continental shelf off Tunisia and the Sicily Channel support an important trawl fishery, predominated mainly by large scale Italian, Maltese, Tunisian and, recently, other fleets from different Mediterranean countries. The main target species exploited by these fleets are the deep water rose shrimp, *Parapenaeus longirostris*, European Hake, *Merluccius merluccius*, Red Mullets, *Mullus* spp., Norway lobster, *Nephrops norvegicus* and Giant Red shrimps, *Aristaeomorpha foliacea* (Gancitano *et al.*, 2016a,b; Vitale *et al.*, 2006a,b).

In the central Mediterranean, SSF operate throughout the year by seasonally adapting the gear used and fishing technique to the biology and ecology of target species like Striped red mullet, *Mullus surmuletus*, Common two-banded seabream, *Diplodus vulgaris,* Common Spiny Lobster, *Palinurus elephas*, Common Cuttlefish, *Sepia officinalis* (Vitale *et al.*, 2011a; Falsone *et al.*, 2016). Regarding the investigated areas, Kerkennah Island (Figure A6.1d) comprise two main islands and about 8 small islands located off the south-east coast of Tunisia in the Gulf of Gabès. In 2014, a population of 15 501 people lived in the archipelago that has an area of 161 km^2, a coastline of 160 Km and a flat topography that does not exceed 5m deep (Ben Mustapha, 2007). The sea surface temperature ranges between 14.5 °C in winter and 24 °C in spring. The salinity of the seawater can peak is about 38 ‰ even if in the coast of the Sbekha peaks is reached occasionally in summer time (surface value) 45 ‰. The submarine morphology is related to the growth of underwater morphologies of marine plants.

Malta Islands (Figure A6.1c) are an archipelago composed of three islands, Malta (the largest), Gozo and Comino. A total of about 409 259 people lives in the three islands characterized of a total area of the archipelago of about 316 km^2, with an overall coastline of 252 km. It lies on the Malta plateau, a shallow shelf formed from the high points of a land bridge between Sicily and North Africa, between the Eurasian and African tectonic plates. The average sea temperature exceeds 20°C with a salinity of about 37.75 ‰.

Egadi Islands, located in front of the north-western coast of Sicily, are part of the largest MPA in European seas (Figure A6.1b). The MPA was established by Ministerial Decree of 27 December 1991 and comprising the islands of Favignana, Levanzo, Marettimo and islets of Formica and Maraone. The MPA was established with the purposes to: i) protect and enhance natural habitats and marine resources; ii) carry out scientific research and environmental education programmes and iii) promote sustainable development and management of coastal areas. A total of about 4 300 people lives in the islands. The MPA has a surface of 539.92 km^2 and largely overlaps with the Egadi Archipelago Specially Protected Area (EU Birds Directive 79/409/EEC) and with the Egadi Archipelago Seabed Site of Community Importance (EU Habitat Directive 92/43/EEC), which are both spatially nested in the area covered by the Trapani local fisheries management plan, adopted according to the Reg (CE) n. 2371/2002 (D'Anna *et al.*, 2016).

FIGURE A6.1
Map of the three investigated case-studies and of the central Mediterranean Sea. a) = south-central Mediterranean Sea; b) Egadi Islands; c) Malta islands; d) Kerkennah



2. MATERIAL AND METHODS

2.1 Data Source

The data used in this study were compiled in the framework of the FAO MedSudMed project (Assessment and Monitoring of the Fisheries Resources and the Ecosystems in the Straits of Sicily). To this extent, a summary table was agreed on by national experts from Italy, Malta and Tunisia, with the goal to compile a single standardised data set from the three selected case-studies. The collected information included environmental aspects, target species, fishing techniques and methods, social information, economic aspect, management measure and governance from each case-study (Table A6.1). The

TABLE A6.1
Information collected and indices computed on SSFs in the framework of the FAO MedSudMed project

Environmental aspects: • Coastline • Different types of coastline (morphological features) • Max depth • Main currents flow (oceanographic features) • Surface temperature ranges • Thermocline depth • Deepness temperature ranges • Salinity **Common species:** • Target • Associated • Discard **Fisheries features:** • Number of vessel • Average gross tonnage • Fishing gears • Fishing gears for season • Target species for fishing gears • Target species for season • Landing/year • Landing/season **Social information:** • Number of fishers and gender (%) • Number of people involved in fishing sector and gender (%) • Number of fishers by main fishing gear • Mean age of fishers by gender • Mean age of fishers by fishing gear **Economic aspect:** • Average market price of landings (overall, by taxa, target species) • Average fuel cost of each vessel • Average maintenance cost of each vessel • Average employment cost of each vessel • Average production of each vessel in terms of market value • Average net profit of each vessel **Management measure:** Report the management measures (if implemented) on: landings, socio-economic aspect; biological aspects, Spatial and temporal exploitation, etc... **Governance:** Existence of an MPA decision-making and management body Body responsible for management The body responsible of the MPA is a Consortium or what? Please, add all the information that you feel useful	**Indices** $1° = \frac{NF}{NV}$ $2° = \frac{NFL}{NVL}$ $3° = \frac{NPI}{NV}$ $4° = \frac{AFCV}{LYV}$ $5° = \frac{AMCV}{LYV}$ $6° = \frac{ANPV}{LYV}$ NF: Number of fishers NV: Number of vessels NFL: Number of fisherman for length overall (LOA) NVL: Number of vessel for LOA NPI: Number of people involved in the fishing sector AFCV: Average fuel cost vessel for year LYV: Landing year vessel AMCV: average maintenance cost vessel ANPV: average year net profit vessel

vessels were grouped by length (length overall, LOA) to highlight the technical structure of the three investigated SSF fleets. Two segments were considered: < 6 m LOA and 6 – 12 m LOA. The collected data refers to the following years: Kerkennah from 2005 to 2014; Malta Islands, from 2012 to 2014; Egadi Islands from 2013 to 2014.
Socio-economic indices are considered useful tools to provide decision-makers with criteria for developing management strategies (Bonzon, 2000). In this context some selected performance indicators were selected following several technical papers and guidelines to describe fisheries behaviour (Table 1; FAO, 1999; Tietze, 2005).

3. RESULTS

Table A6.2 summarizes basic information of the SSF in the three investigated areas. The average number of vessels in Kerkennah was 2012 (± 42). Among them, differently from the other investigated case studies, 74 percent of vessels are not motorized (NMV). In Malta, the average number of vessels was 660 (± 178), while in the Egadi Islands it was 137 (± 9). The greatest part of the fleet belonged in the segment < 6 m, both in Kerkennah and Malta; whereas in the Egadi Islands the greatest number of vessels was found in the segment 6–12 m. The landing per vessel was computed considering all the main gears used by SSF in each investigated area: i) in Kerkennah trammel net, gill net, charfia (with traps) and mini-trawl (Kiss); ii) in Malta, beach and boat seine, combined gillnets-trammel nets, hand and pole lines, hooks and lines, pots and traps, set longlines, trammel net and trolling lines; iii) in the Egadi Islands, trammel nets, combined gillnets-trammel nets, hooks and lines, set longlines, trolling lines. The data showed the greatest catch (landing per vessel per year) in the Egadi Islands (2 432 kg ± 862). Regarding people involved in the fishing sector at all levels, the greatest number was reported in Kerkenaah (5 000) and the lowest in the MPA Egadi Islands (800).

The estimation of average net profit, maintenance and full cost for vessel showed great differences among the investigated areas. The smallest profit was recorded in Kerkennah (motorised vessels, MV = 605€; NMV = 1 492 €) whilst the greatest profit was recorded in the MPA Egadi Islands (8 400 €). It is worth to note that as in Kerkennah the profit for fishers using NMV is greater with respect to fishers using MB. The greatest average maintenance cost for vessel was observed in Egadi Islands (1 961 €) and it was about 4 times greater than what found in the Kerkennah. The greatest average full cost of each vessel was recorded in Kerkennah (2 627 €), the smallest in Malta (1 815 €).

TABLE A6.2
Basic information of the SSF in the three investigated areas

FISHERIES FEATURES	KERKENNAH	MALTA	EGADI ISLAND
Number of total vessels	2012 ± 42 (NMB-74%)	660 ± 178	137 ± 9
LOA (m)	LOA <6: 720 LOA 6-12: 1.292	LOA <6: 579 LOA 6-12: 81	LOA <6: 28 LOA 6-12: 93 LOA >12: 16
Landing/year/vessel (kg)	1.193 ± 728	718 ± 113	2.432 ± 862
Landing/year (kg)	2.384.620 ± 1.427.944	473.922 ± 40.980	333.289 ± 118.106
N. of fishers	4.325 (NMB: 39.5%)	1.090	500
N. of people involved in fishing sector	5.000	1.144	800
Average net profit of each vessel (€)	MB: 605 NMB: 1.492	2.824	8.400
Average maintenance cost of each vessel (€)	MB: 543 NMB: 421	1.074	1.961
Average fuel cost of each vessel (€)	2.627	1.815	1.958

Table A6.3 shows a check-list of the main target and associated species caught and their average market-price (average per year) in the investigated areas. These species contribute mainly to the total fisherman's income. The target species in common among the investigated areas were: *Diplodus vulgaris*, *Mullus surmuletus*, *Pagellus erythrinus*, *Pagrus pagrus* and *Sepia officilnalis*. The highest market prices per species were registered in the Egadi Islands whilst the lowest was recorded in Kerkennah. The control of minimum size at landings and the spatial-temporal restriction of fishing activities are the main management measures adopted in the whole region (Table A6.4).

TABLE A6.3
Check-list of the common species caught and their average market-price in the three investigated areas. Target Species (X) and associated species (O)

COMMON SPECIES	KERKENNAH		MALTA		EGADI ISLAND	
	Catch	*€/Kg*	*Catch*	*€/Kg*	*Catch*	*€/Kg*
Dentex dentex	X		O	13.5	O	16.1±3.4
Diplodus annularis	X	2.2	O	2.2	O	9±1
Diplodusvulgaris	X		X	4.6	X	18.8±2.0
Mullus surmuletus	X	3.6	X	5.8	X	18.9±2.3
Octopus vulgaris	X	2.7	X	7.8	O	10.0±1.7
Pagellus erythrinus	X	2.2	X	7.5	X	15.0±0.0
Pagrus pagrus	X		X	11.9	X	16
Sarpa salpa	X	1.3	O	2.0	O	1.2
Scorpaena porcus	X		O	4.4	X	18.0±2.3
Sepia officinalis	X	2.2	X	4.3	X	14.7±2.8
Serranus scriba	X		O	7.5	O	10.0±2.1
Sparus aurata	X	4.5	O	7.1	O	20

TABLE A6.4
Main management measures in each investigated area

MANAGEMENT MEASURES	KERKENNAH	MALTA	EGADI ISLANDS
Landings rules	– Minimum legal landing weight – Minimum legal size	– Total catch per vessel – Minimum landing size – Limited number of vessels by fisheries	– Total catch per vessel – Minimum landing size – Technical measure for Trammel net – One kind of gear for fishing trip
Biological aspect	– Protection of the spawners and the juveniles	– Protection of juveniles	– Protection of spawners: Spiny lobster, European lobster, Common Cuttlefish and Common octopus
Spatial-temporal exploitation rules		– Temporal closures – Restricted areas	– Temporal reduction of fishing effort – Restricted areas
Fleet management rules	– Vessel licencing	– Satellite monitoring – Vessel licencing	– Vessel licencing

The governance implemented for the three areas is summarised in Table A6.5. Overall, the decision-making process in all the investigated areas is characterized by a systems that can transparently address trade-offs among the management objectives of the different groups of stakeholders and/or local communities.

Each of the computed indicators in Table A6.6 was useful to highlight the main fishing behaviour in each of the investigated case-studies. In particular, the first index showed a greater number of fishers per vessels in Egadi Islands (3.65). The second index, empathized that the number of fishers on board of the smallest vessels is similar in all the areas, whereas differences between areas were found in other segments. The

ratio between the number of people involved in the fishing sector and number of vessel was about three times greater in Egadi Islands (5.84) with respect to Malta Island (1.73). Kerkennah displayed intermediate values.

TABLE A6.5
Governance system implemented for the three area

GOVERNANCE SYSTEM	KERKENNAH	MALTA	EGADI ISLANDS
Body responsible for management	Ministry of Agriculture, hydraulic Resources and fisheries	Department of Fisheries and Aquaculture (DFA)	Ministry of the Environment
Actor/s overall responsible for the management and governance	National Administration: General Direction of Fishery and Aquaculture (DGPA)	Department of Fisheries and Aquaculture	The MPA advisory commission (includes nine delegates), A technical-scientific committee, The Harbour Master's Office of is charged with the enforcement
Decision-making and management body in the area	Inside the Ministry, there is a tripartite committee (administration, stakeholders and scientists) that take care of all the governance of fisheries	The DFA consults and communicates with the fishing sector through representative elected by various fishers' cooperatives; no producer organisations exist in Malta to assist in governance	The MPA President-that is the Mayor of Favignana-assigns the MPA director and links the Municipality to the MPA

TABLE A6.6
Computed indices for each investigated area

INDICIES	KERKENNAH	MALTA	EGADI ISLAND
Number of fishers / number of vessels	2.15	1.65	3.65
Number of fishers LOA / number vessel LOA	LOA <6: 1 LOA 6-12: 2.79	LOA <6: 1.5 LOA 6-12: 2.73	LOA <6: 1.5 LOA 6-12: 3.5
Number of people involved / number of vessels	2.49	1.73	5.84
Average fuel cost vessel / landing year vessel	2.20	2.53	0.81
Average maintenance cost vessel / landing year vessel	0.44	1.5	0.81
Average year net profit vessel / landing year vessel	0.51	3.93	3.45

4. DISCUSSION AND CONCLUSION

The blue growth perspective is a possible future vision for SSF and it could be a desirable strategy to be adopted to bring SSF to the centre of sustainable fisheries management. In this view, it is worth to note that SSF activities are strongly related to the area where they were developed and are part of the culture and traditions of local communities. This aspect should be taken into account to ensure continuity to local traditions and maintain the human cultural diversity at national and local level. It has been demonstrated that SSF generally have lower impact on fish stocks and marine environment with respect to large scale fisheries (Jennings and Kaiser, 1998). The social and cultural role of SSF at local level is generally recognized, as well as their greater fragility in terms of profitability and sustainability with respect to large scale fisheries (Jennings and Kaiser, 1998). These aspects call for specific objectives and measures when fisheries management is concerned. However the management objectives are generally set univocally for small and large scale fisheries in the Mediterranean Sea without taking into account the specificities of each fishing sector (FAO, 2015b). Setting specific objectives and management strategies aimed at preserving SSF and

avoiding the further expansion of large scale fisheries could result in benefit for local communities and for fish stocks and marine ecosystem. Defining proper management could result in a trade-off between maintaining fish stocks and associated ecosystems in healthy conditions and profitable resources exploitation. In this framework, the governance should contribute to avoid the over expansion of fishing fleets generally, thus preventing the biological overfishing and the reduction of income and profit for fishers in long term. Nevertheless, it is worth to recall that, often, management is driven by information, which is surrounded by uncertainties. Consequently, it seems necessary to build a balanced and risk-averse management strategies (Vitale *et al.*, 2011b). The case studies considered, are characterized by a certain level of involvement of the fishing communities in the management objectives setting. This involvement gives the possibility to properly address broad conservation objectives and specific local priorities. As a result, the decision-making process within the three investigated areas is followed by a governance systems that transparently address trade-offs between the management objectives and stakeholder priorities.

Analysing the results, some convergences can be highlighted between the three areas. In terms of SSF classification, the three areas investigated take into account vessel length and gears as classification factors, in line with the definition of SSF also adopted at European level: vessels of up to 12 m and not using towed gears. Moreover, in all areas SSF are characterised by strong seasonality throughout the year, with the alternation of several fishing gears and target species. In addition, the same gears are specifically set according to the local expertise/experience with the aim to optimize the catch efficiency, strictly related with the abiotic and biotic aspects of the investigated area. Similitudes could be also found in terms of management approach. The management measures implemented in each area are based on knowledge on the target species and fishing gear characteristics, aiming at protecting some critical phases of the species biological cycle like the successful reproduction and/or recruitment (i.e. minimum landing size and spatial-temporal restriction to fishing activities). Another common issue is that in each country the body responsible for management system is usually established by specific Ministries: the Ministry of Agriculture, Water Resources and Fishing in Tunisia, Ministry for Sustainable Development, the Environment and Climate Change in Malta and Ministero delle Politiche Agricole Alimentari – Ministrero dell'Ambiente e della Tutela del Territorio e del Mare in Italy.

In terms of governance, the selected case studies underline that managers and fishers shared the same view on the main advantage of a participatory approach: ensure the conservation of healthy marine ecosystem, as well as the best well-being solutions for the coastal communities. In this context, the three investigated areas can be considered as advanced laboratories, in which several and multidimensional aspects coexist and contribute to the definition and implementation of management strategies under the blue growth prospective: institutional entities and legislative framework, advanced ecological and biological knowledge, and a certain level of fishing activity. Overall, from the case studies considered, it is evident that to further improve the state of marine resources and fishing communities, a wide set of management measures incorporating closed areas and a new approach actively involving fishers in the management process should be further put in place taking following the participatory approach already established.

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APPENDIX 7. An important small-scale fishery targeting rapa whelk along the Southern Black Sea Coast (Samsun province, Turkey); the social, economic and ecological effects

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*Presented as a side event to Panel 1
Key words: South-eastern Black Sea, sea snail, small-scale fisheries, social, economic and ecologic effect

ABSTRACT

Rapa whelk is an invasive species which was introduced to the Black Sea ecosystem at the end of the 1940s. After introduction it adapted to the ecosystem in a short period of time and formed a dynamic stock across the Black Sea. Commercial harvesting has been started first time by Turkey in 1983 and then became an alternative fishery for the small-scale fishers along the whole coastal line; especially in the Eastern Black Sea. In a very short time the number of rapa fishers has been increased in the region after the collapse of the Black Sea fisheries due to Comb jelly predation and other impacts. During this period rapa whelk fisheries has compensated the economic losses of the fishers due to dramatic decline of the fish production and increased employment in harvesting, whelk handling and processing, and transportation for export since the last 33 years. rapa fishers, in that period, have earned and saved money and then used this capital for bigger vessels for bottom and midwater trawling for more earnings.

After 2000, the rapa whelk was the most dominant species forming a large biomass in the nearshore coastal habitat causing a high fishing pressure with beam trawls resulting in significant physical disturbance on sea bottom. The maximum landing was obtained in summer months. Actually, fishing with beam trawls is banned in this period in order to protect the nearshore benthic and demersal macrofauna. This is one of the main constraints in the fishery of this region. Rapa whelk stocks and the impacts of harvesting gears and methods should be monitored continuously for the sustainability the Black sea ecosystem and stock assessments should be done regularly. According to the multi-criteria analysis, the protection of natural habitats was found to be the best management alternative and the second best was the enforcement of beam trawl modification to reduce bycatch rate especially in summer time. If the responsible authorities wish to achieve good environmental and socio-economic results in rapa whelk fisheries then investments are needed for improved management including funding for research, for strict control and inspection, and subsidizing non-native species control and habitat friendly harvesting methods.

1. INTRODUCTION

The rapa whelk (Rapana venosa) is an invasive species that was first recorded in the Black Sea during the 1940s (http://www.issg.org/database). They are top predators with a ferocious appetite, and bivalve diversity in the Black Sea declined two-fold since their introduction. Sea snail is associated with a decline in range and density of native mussel settlements, near both the Anatolian, Caucasus coasts and Western-Danube Shelf Region on the Black Sea, originally biologically rich areas (Black Sea TDA, 2008). Thus, the sea snail has caused important changes in the interaction between fishing and habitat in the coastal waters of the south-eastern Black Sea. While being an introduced species that has attained an important role in the demersal ecosystem of the Black Sea, rapa whelk has also became one of the most important commercial species trade since beginning of the 1980s (Black Sea TDA, 2008; BSC, 2008).

The impact on bivalve populations is variable and ranges from rather mild along the Romanian coast possibly due to suboptimal environmental condition, moderate in Bulgarian and Turkish Black Sea, and severe along Russian, Ukrainian and Georgian coasts, where the whelk has been blamed for local exterminations or major declines in the numbers of other bivalves (Black Sea TDA, 2008). After the adaptation in the Black Sea ecosystem, it has being a dynamics stocks along whole Black Sea Coasts since 1969 (Bilecik, 1975). The whelk population has spread gradually onward to the 1970s and also its stock has started increasing in coastal benthic extremely in the 1980s. Rapa whelk has established and pressured on the bivalve communities for predation in the shallow waters in the Black Sea coast of Turkey (Bilecik, 1990).

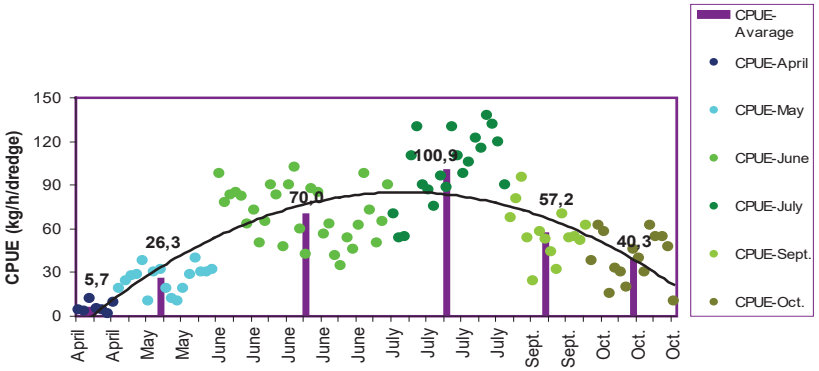
In the Black Sea, *Rapana venosa* occurs on sandy, sandy-muddy and hard-bottom substrates to 45 m depth. The highest abundance occurs in the Kerch Strait at the entrance to the Sea of Azov, near Sevastopol and Yalta (Ukraine), and along the Bulgarian coast (ICES, 2004). *R. venosa* is a prolific, extremely versatile species tolerating low salinities, water pollution and oxygen deficient waters. Veined rapa whelk becomes mature at the age of 2-3 old and has 8-9 years life span. Preferred habitats are shell substrates and shell bottoms with varying degrees of silting, but on the silt beds it occurrence is not high. The species demands to salinity with the lower limit of its development about 12‰ and also to the temperature-at low temperatures the activity of rapa whelk falls and if the temperature falls to 10°C, the species stop to feed. Local migrations of rapa whelk have been associated with seasonal changes of water temperature and have been oriented toward the shore in the period of water heating during spring-summer season, and towards to depths in the autumn-winter cooling (Sağlam *et al*, 2009). Chukhchin (1984) describes the reproductive period of *R. venosa* in the Black Sea as July to September, corresponding to a temperature window of 19°C to 25°C. Şahin (1997) reports a spawning period of May to November in the eastern Black Sea. Females lay eggs in cocoons attached to the substrate. Each egg capsule contains 200-500 eggs. Pelagic larvae of sea snail feed on nanoplankton algae and their adults feed mainly on bivalves of families Cardiidae, Mytilidae, Veneridae, Archidae (GFCM, 2010). Looking for prey rapa whelk is able to move on rather large distances. The speed of movement makes up from 5 till 20 cm/min. In some periods of a year it buries itself into the ground.

2. STATE OF STOCKS

The Turkish investigations concerning biomass distribution of rapa whelk by depth and season indicates that 76.5 percent of the population inhabits the depths of 0-15 m from the shore, 22.5 percent in 15-35 m and the last 1.0 percent is in depths over 35 m. The major factor for seasonal distribution is the sea water temperature. In summer, 62.5 percent of the population distributes in near shore of 0-15 m depths when the temperature reaches its maximum (Zengin, 2006). By the end of the reproduction activity and the decrease in sea water temperature, generally starting from September up to early spring, rapa whelk moves to deeper waters and buried in substratum.

The maximum catch is obtained in summer period in studies carried on with commercial beam trawl along Samsun in 2013 and 2014 (Figure A7.1). The catch per unit of dredges in June and July is estimated as 70 and 100.9 kg/hour/vessel. The CPUE decreases in spring and autumn. It reaches to its minimum in spring; 5.7 and 26.3 kg/h/vessel for April and May, respectively. It is considered to be related to temperature fall and the movement of Rapana to deeper waters. The CPUE increased slightly in autumn and estimated as 57.2 and 40.3 kg/h/vessel for September and October.

FIGURE A7.1
CPUE data obtained from rapa whelk commercial beam trawl in Samsun coasts for 2013 and 2014



The significant increase in rapa whelk abundance has been observed since 1990, which leads to some ecological problems in near shore benthic communities. The feeding of rapa whelk on bivalve species as a major source of food creates a high predation pressure that impacts both itself and other demersal species feeding on the same source. The scarcity of food lowers the growth rate of *Rapana* and prevents to reach harvestable length (Zengin, 2006).

The overexploitation of eastern stocks speeds the decline through the ends of 1990s and a significant difference in mean length appears between western (Samsun and Bulgaria) and eastern (Georgia and Ordu) stocks. The mean length is 4.7 cm (1.1-10.7 cm), 6.4 cm (2.5-11.7 cm) and 6.9 cm (3.5-11.9 cm) for eastern stocks, Samsun (between two big river between Kizilirmak and Yeşilirmak shelf area) and western stocks, respectively. Therefore, eastern *Rapana* fishers move to Samsun area and further west (Figure A7.2) (Zengin *et al.*, 2014a). It is also confirmed by a number of studies that the mean length decreased contrarily to the increase in biomass. The mean length was recorded as 110 mm in 1986 (Ünsal, 1989), 69.2 mm in 1991, 67.2 in 1995 (Düzgüneş *et al.* 1992), 54.3 mm in 1999 (Sağlam, 2003), 51.3 cm in 2003 (Zengin, 2006), 59.1 mm in 2006 (Knudsen and Zengin, 2006), and 55.0 mm in 2014 Zengin *et al.*, 2014a) respectively (Figure A7.3).

The possible reasons of the decrease in mean length may be considered due to: (1) the overexploitation of larger length groups due to high demand for market and export. (2) The reduction of natural food sources as a result of intense rapa predation and consequential poor feeding period. The rapa whelk has no effective natural predator in Black Sea and this may also play an important role in population increase. Its feeding strategy depending dominantly on mussels (Cesari and Mizzan, 1993) and its high rate of predation depleted nearly all mussel stocks (*M. galloprovincialis, C. gallina, A. cornea*) distributed along the coasts from Georgia border to Ünye/Terme. It is recorded that 99 percent of *C.gallina* population is composed of empty shells in the period of 2002/2003 (Dalgıç and Karayücel, 2007). Actually this destructive effect

FIGURE A7.2
Length frequency distributions of rapa whelk landing by commercial beam trawl in fishing season, 2014, along Eastern coasts (Georgia-Ordu), Samsun Shelf Area (SSA) and Western coasts (Sinop-Bulgaria)

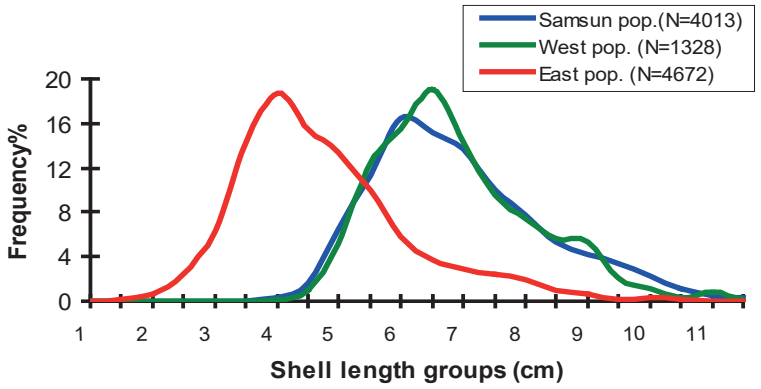
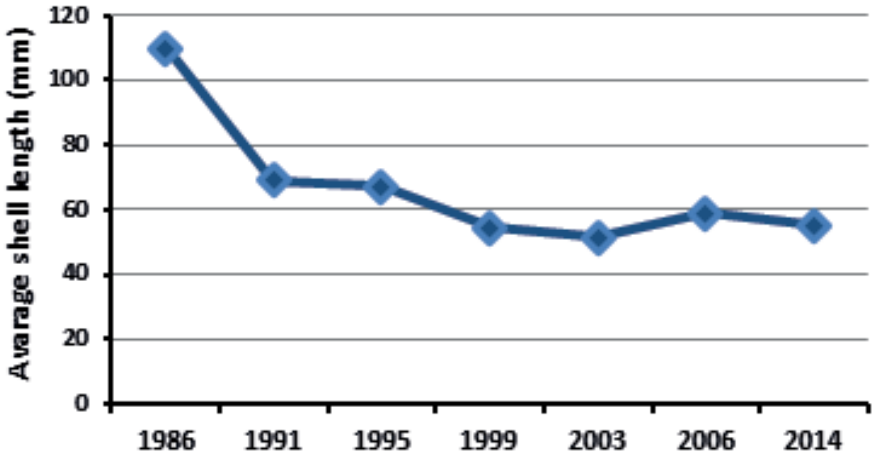


FIGURE A7.3
Time series data on the average rapa whelk length in the South-eastern Black Sea Turkey



started by the mid of 1990s, because the observations verified that *C. gallina* population was still dynamic until 1995 in the South eastern Black Sea (Zengin, 2003). In surveys planned to estimate the amount of bycatch in the rapa whelk commercial catches, the percent of empty shells was recorded as 73 percent and 85 percent for *Anadara cornea* and *Chamelea gallina*, respectively (Knudsen and Zengin, 2006). Recently, the *rapa* whelk starts to threaten some other mollusca and crustacean communities (*L. depurator, Donax* sp., Isopods, Amphipods and Decapods) (Dalgıç *et al*, 2010).

The mean size of sea snails has, since 2000, decreased significantly east of the Province of Samsun, especially around catching Eastern part of Black (Trabzon), from 62 mm in 1991 (Düzgüneş and Fevzioğlu, 1994) to 47 mm in 2005. Since the market prefers large harvest sea snail processing plants have stopped operating, and fishers have almost stopped dredging rapa whelk catching Eastern part of Black Sea. Sea snails in Samsun seem to regenerate very quickly and mean size of sea snails remained stable (mean 64 mm) until recently (2013–2014) despite increased catch effort. Data indicates that on recent development of Rapana average size in Samsun stock is the same decline as previously seen further east. When we talked to the owners/managers of the three largest sea snail processing plants in Samsun during the autumn of 2014,

all complained about the increasing difficulty of finding buyers for their produce since average size had declined considerably during the past ten years. In one processing plant more than 50 percent of the processed sea snails were in the smallest of the seven size categories [*Processed sea snail are sorted into the following size categories: 3L (extra large): ue15 pcs/kg, LL extra large): 15-20 pcs/kg, L (large): 20-40 pcs/kg, M (medium): 40-60 pcs/kg, S (small): 60-80 pcs/kg, SS (small): 80-120 pcs/kg, 3S (small): 120eup pcs/kg]* (Zengin *et al.*, 2014a). Fishers in Samsun also complained about the gradual, although geographically uneven, decline of sea snail mean size. They increasingly find themselves shovelling undersized sea snails back to sea.

2.1 Distribution of catch-per-unit effort (CPUE)

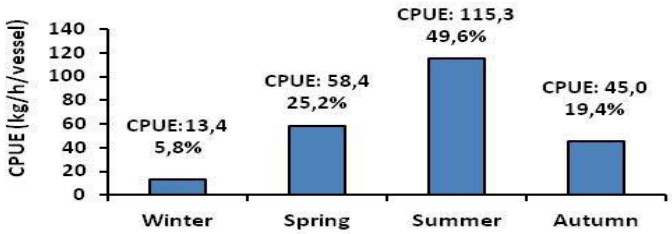
The case study on the rapa whelk was carried out between 2013 and 2014 and six different local stations characterizing the rapa whelk fishery in SSA defined as Terme, Fenerköy, Costal, Dereköy, Koşuköyü and Toplu (Figure A7.4 and Photo A7.1). The two of them; Yeşilırmak/Fenerköy and Kızılırmak/Koşuköyü is especially preferred to check out whether these estuarine zones make any significant difference for this fishery related to the type of substratum. In sampling operations, the commercial beam trawl vessels and nets with 70–90 mm mesh size were used. The size of vessels ranged between 6–12 m and the engine power between 35–350 HP. The samplings were made in all locations by at least two vessels in day or night time. In winter months, as the catch is extremely low, it was hard to find any operating vessel and therefore the samplings limited to three stations.

The amount of catch reaches its maximum in summer period. The seasonal variation in CPUEs is presented in Figure A7.5 and Figure A7.6. The summer period is also the banned season (May 1 – August 30) for beam trawl fishery targeting rapa whelk. The diversity and the abundance of by catch species seems to be higher in summer months when compared to fall and spring. The data about species diversity and abundance is an important matter in terms of a rational fishery management.

FIGURE A7.4
Map of the case study area in the Turkish Black Sea Coast in SSA

PHOTO A7.1
A typical rapa whelk fishing operation in the Samsun Shelf Area, in 2013–2014

FIGURE A7.5
Seasonal variation of CPUE values of rapa whelk fishery in SSA and at fishing period of 2013–2014



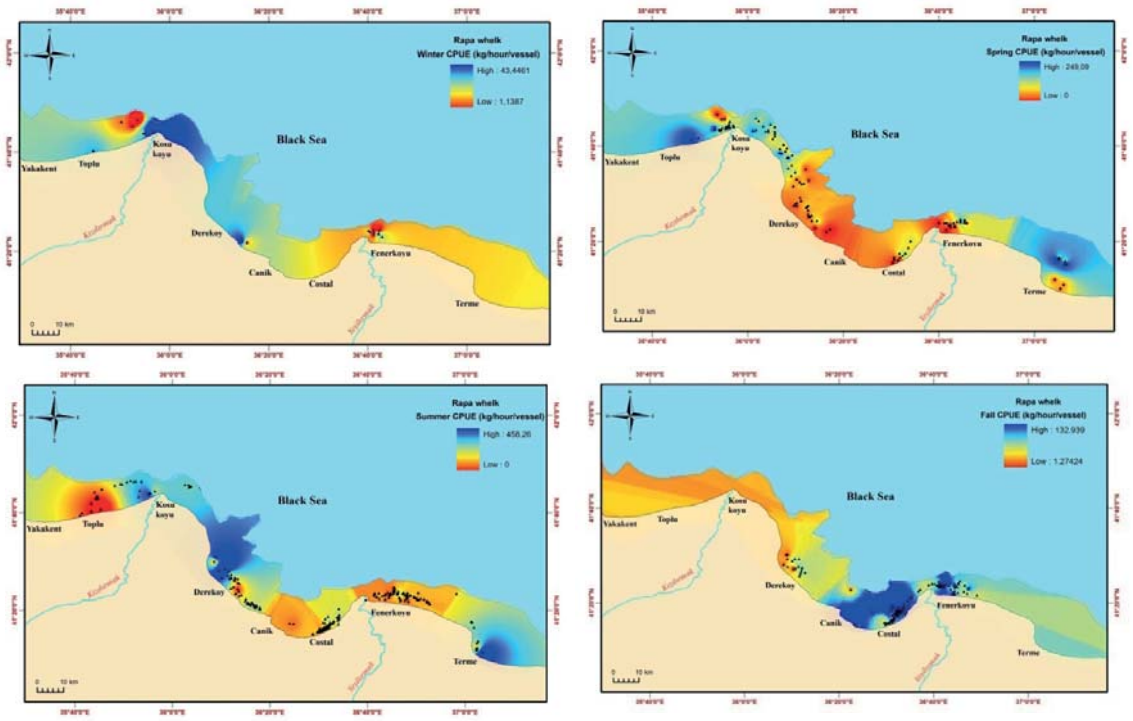
2.2 Composition of by-catch (untargeted species)

The fishing mortality caused intense algarna fishery is relatively high in summer months. This fishing effort has a significant effect on juvenile fish populations which used the nearshore benthic as nursery areas. The total catch of algarna fishery is composed of target species; rapa whelk (70.3 percent) and other by catch species (29.7 percent) in summer period. In this period totally 33 species identified belonging to four different taxonomic group. Their abundance is estimated as 25.7 percent Mollusca, 3.5 percent Crustaceans, 0.2 percent fishes (mostly juveniles) and 0.3 percent Tunicates. The species number in these groups is as 9, 7, 16 and 1, respectively (Figure A7.7 and Photo A7.2).

3. EVOLUTION OF FISHING EFFORT AND LANDING

According to the lists of fishing boat licenses at Samsun, Sinop and Ordu Province Agricultural Directorates respectively, there were 654 boats registered in 2005 for sea fishing with owners resident in Samsun. The head of the Fishery Control Section within Samsun Province Fisheries Section estimated that there are 200–300 unregistered

FIGURE A7.6
Seasonal catch per unit effort variation distribution of rapa whelk catch caught by traditional beam trawls

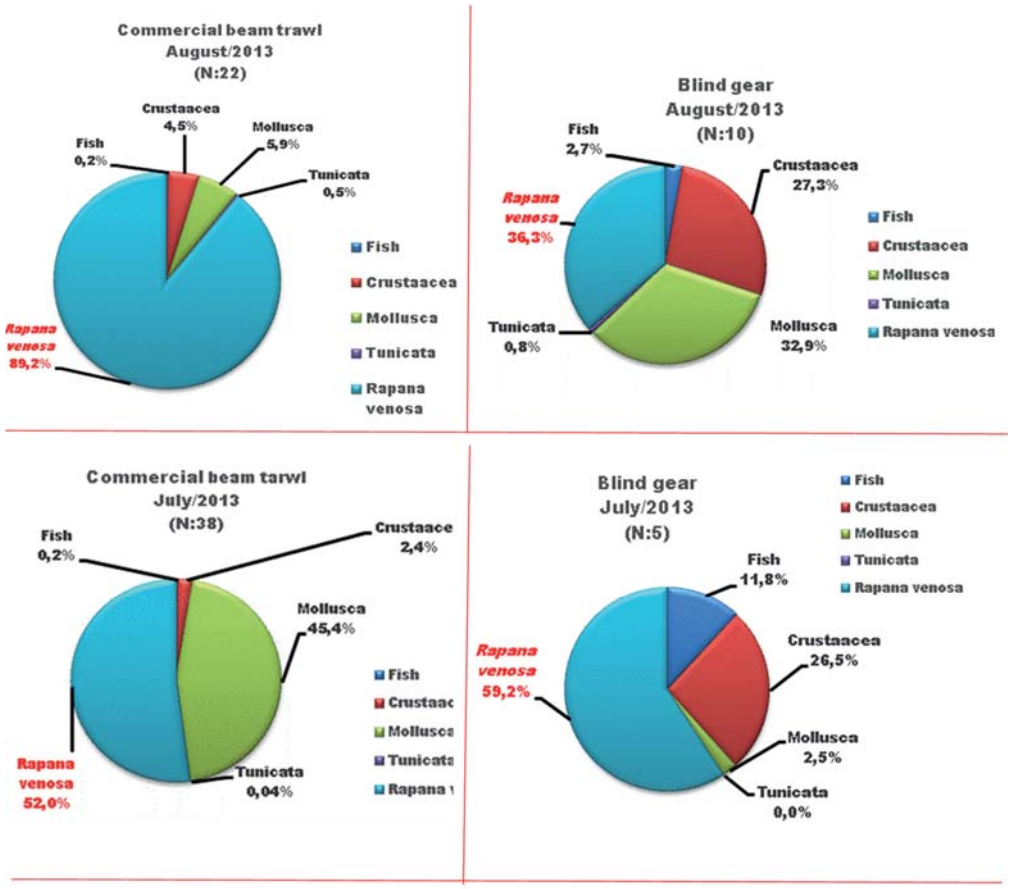


fishing boats in Samsun Province, mostly less than 6 m length/33 Hp. Information gathered by CFRI (Central Fisheries Resarch Institute, Trabzon, Turkey) provides some additional information. The Institute undertook surveys of boats in the Province of Samsun in 1992 and 2005, using the same method each time and registering boats irrespective of whether and where they were registered, and found that the number of small boats increased from 569 to 1 094 during the period. After 1997 most of the increase in the trawler fleet has been in the vessel group 100–200 Hp/11-14 m (Knudsen *et al*., 2010). These boats are typically also used specific designed beam trawl which is called beam tarwl.

In the beginning, 225 artisanal fishers were operating working on *Rapana venosa* mostly have vessels with 6–17 m in length. A single dredge is used in vessels smaller than 8 m and the larger ones generally used a pair of beams (Photo A7.3). Actually, the use of double dredges is prohibited by government regulations. But fishers generally uses them to obtain more product and they continue fishing also at night illegally. The number of vessels in Samsun district was 421 by 2005 and nearly half of them (232) had no licences for rapa whelk fishing. These vessels intensely operates in inshore benthic between depths of 5 and 33 m but mostly around 13 m.

Recently further investigation on the some quantitative and qualitative data about the fishing fleet operating with drag nets was collected between 2013 and 2014 respectively. The data sources were; (a) direct field observations (logbooks of trawl vessels, and landings for market), (b) official records (Turkish Statistical Institute-TUIK, Fisheries Information System-FIS) about the general specifications of the registered fishing fleet) (Zengin *et al.*, 2014a). Three size categories in vessels is defined according to fishing method and target species. There is 131 vessel in the first category (7–11.9 m), 38 in the second (12–17.9 m) and 114 in the third category. The total number of vessels is 283 (Figure A7.8).

FIGURE A7.7
Relative distribution of benthic organisms in algarna (beam trawl) catch in summer period (July–August) in SSA



It is determined that there are totally 43 fishing port or shelter between Samsun and Iğneada and 486 fishing vessels are active in 31 of them in 2013–2014 fishing season. 154 (31.7 percent) vessels in this fleet is belonging to SSA and 332 (63.8 percent) to the western Black Sea (Sinop-İğneada). Another 55 vessels are coming from the southern Marmara Sea (Bandırma: Çakılköy-Karşıyaka) and temporarily operates in the western Black Sea waters between Ereğli and İğneada during the fishing season as the trawl fishery completely banned in Marmara. The active fishing day of these fishers was estimated averagely as 120 per year.

In SSA, the algarna/rapa whelk fishery is more intense when compared to other locations throughout the whole Black Sea coast though the fleet is active in all area. There are 169 fishing vessels in SSA, 182 in western Black Sea (between Sinop-İğneada) and 105 in eastern Black Sea (between Ünye-Rize) currently operating as registered or unregistered. There is significant diffrence in the number of day-at-sea between SSA and the two other regions. The reason may be the more available bottom type of SSA for rapa fishery and the higher CPUE. The number of active fishing day per year is 115 in SSA and averagely 45 days per year for eastern and western Black Sea (Figure A7.12).

In Turkey, landing of sea snail has been firstly permitted by MFAL (Ministry of Food, Agriculture and Liwestock) in 1983. The fishery sector expanded including fishers, commission agents, industrial foundations such as fabrics etc., especially in South-eastern Black Sea. Rapa whelk landing has fluctuations since first starting time in Turkey. Its

PHOTO A7.2

Bycatch species from different taxa caught in beam trawl fishery beside the target species, rapa whelk in SSA

PHOTO A7.3

The general structure of traditional beam trawl/algarna used in SSA can be outlined. Chain rope (left picture): It is 3.5 m long and made of small bean-shaped rings. Each ring is nearly 30-35 g in weight and there are nearly 120 rings in each side of rope. Shoes (right picture): There are two shoes in each side of the beam opening. There is an iron-made protrusion (5-7cm thick) over the shoes called 'claw' contacting the bottom. The leadline is attached to the small notch on this claw. In the course of operation this part penetrates the substratum and forms a rift of its thickness (Kaykaç *et al.*, 2014).

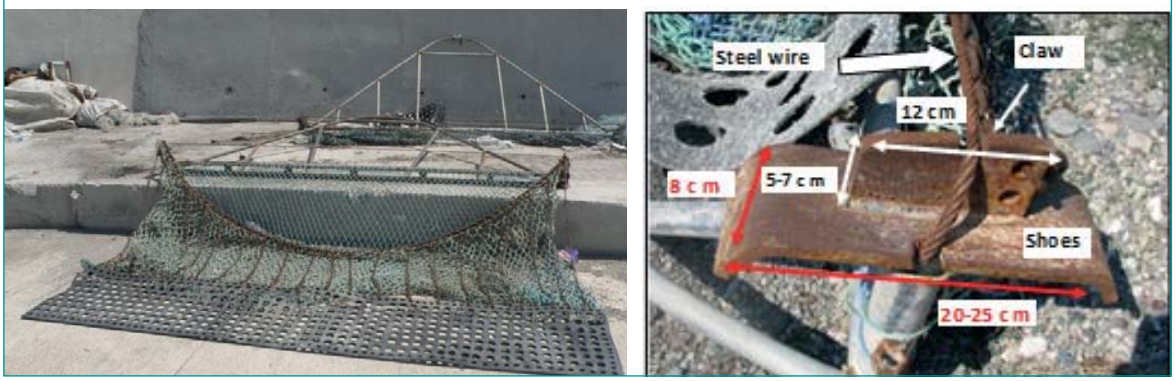


FIGURE A7.8
The size-frequency distribution of trawl fishing fleet in SSA for the 2013–2014 fishing season

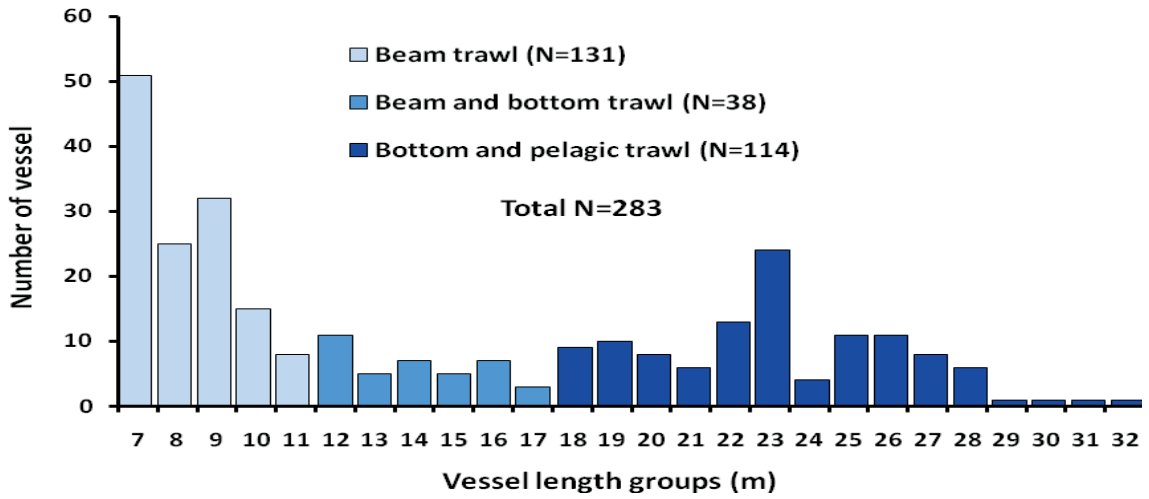
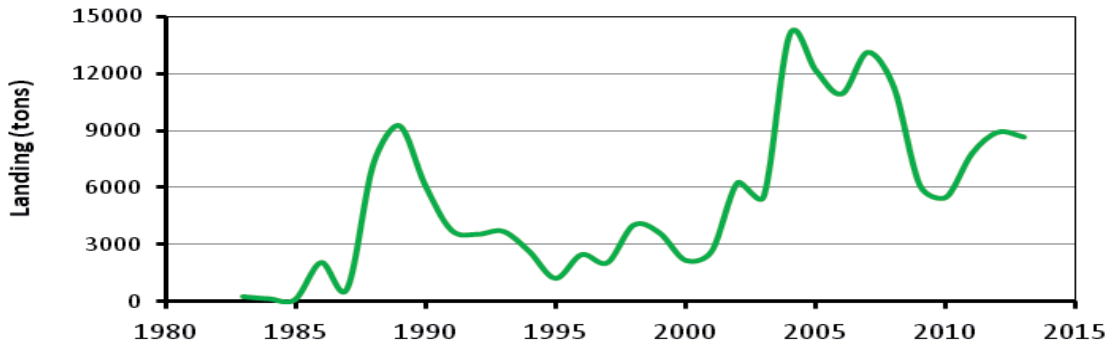


PHOTO A7.4
Typical rapa whelk fishing fleet in the Samsun Shelf Area. The boats were made wooden

landings in the Eastern Black Sea was 10 000 tons in 1989, changed around 3 000 tons in average (1 000–6 000 tons) between 1990 and 2000 according to national fishery statistics. In the following decade landing increased and reached its maximum as 14000 tons in 2004. This trend continued more or less stable (11 000–14 000 tons) until 2009. A sudden decrease was recorded in landing as 6 199 tons in 2014 (Figure A7.9).

The increase in 2000–2014 may be explained with the tending of fishers on rapa whelk fishery for better economic advantages because of the depletion in the major demersal stocks throughout the area. Today, there are 6 factories in the Black Sea Region processing sea snail. Forty percent of rapa whelk fishers are from Samsun province which is the most productive and the largest continental shelf in the Turkish Black Sea coasts flooded by the riverine outputs of Kızılırmak and Yeşilırmak (Zengin *et al.*, 2014a).

FIGURE A7.9
The landing of time series data in the Turkish Black Sea coast has been started for the first time to catch in 1983



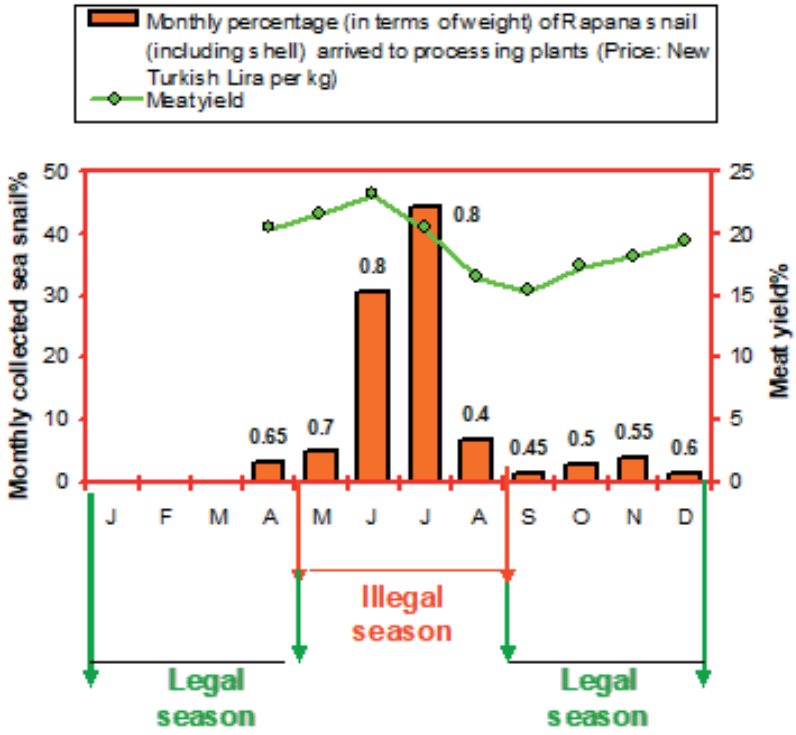
4. MANAGEMENT MEASURES

In Turkey, MFAL (Ministry of Food, Agriculture and Livestock) implemented some limitations to the fishery of rapa whelk by yearly circulars which can be mentioned under three items. The first was the fishing method that permits scuba diving in western part while dredges (mesh size as minimum 40 mm) are allowed in eastern part includes Samsun Shelf Area. The second was about fishing period. Scuba diving was allowed throughout all year but dredges are banned between 1 May and 30 August. In addition, fishing at night was also banned. The third one is about the area limitations such as closure of a zone 500 m from the coast. Actually, these limitations never came into use and illegal fisheries increased in following years. The possible reasons for illegal fisheries may be considered as: (1) The rapa whelk migrates to the coastal zone to reproduce in summer months (5–15 m depths) and the illegal fishery increases especially in this period due to abundance and the gear efficiency resulted in higher catches. The rapa whelk population moves to deep water in autumn when the temperature lowers and so the decrease of the catch in this legal period compels the fisher to practice illegal activities. (2) The meat yield reaches its highest percentage in summer and market prices get higher. In the legal period (autumn) the condition of rapa whelk declines. So the processing plants are reluctant to pay high prices. (3) In this legal period the artisanal fishers harvesting rapa whelk leave the dredges and focus on bonito fishing which is more profitable. (4) Except the banned period some of the small-scale fisher work as a crew in large vessels (trawls and purse seines). After the closure of the fishing season for the large vessels, they seek a profit from rapa whelk and fish during the illegal season (Figure A7.10).

5. STATE OF MARKETING AND ECONOMY

This fishery product is not consumed in Turkey, but instead, is exported to Asian markets. Demand for its meat on the international market has enhanced its commercial fisheries in Turkey by the 1980s. As the fish resources decline, rapa fisheries is getting much more importance due to its economic value. After the decline in turbot fisheries in the Turkish Black Sea coast, artisanal fishers have preferred to harvest rapa whelk as a source of new income since the 2000s (Knudsen *et al.*, 2010). Average export revenue in 2014 is about €4 million. According to the Turkish statistical data, revenues per vessel are still important for the rapa whelk fishers even though there is regular decrease since 2004. The average annual salary is approximately €5 600 per fisher. According to Eurostat, national minimum wage in Turkey was €425 per month in July 2014, which

FIGURE A7.10
Diagram of the relations between fishing season, landing, meat yield and price in SSA



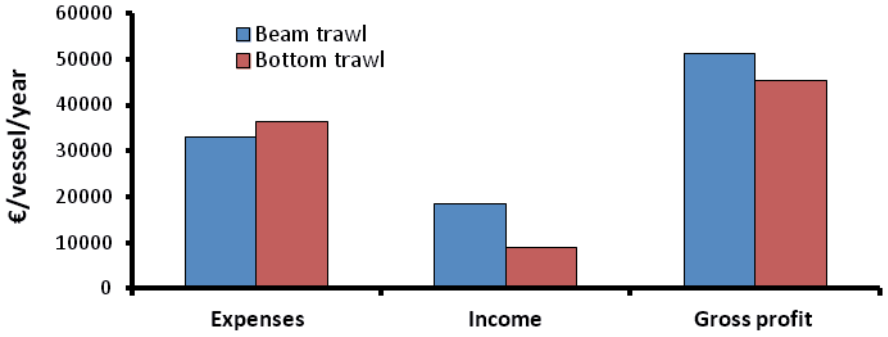
is €5 100 per annum. At current exchange rates, this would be just over €5 700. One reason for the low salary figure may be that the fishers were not full-time. However for the dominant 6–12 m group, vessels spent on average 115 days per annum at sea, which is close to a full-time occupation, even if the maximum was 160 days. However, it would appear that, on average, the fishers do not even earn national minimum wage and this is before taking into account the skill and danger involved in fishing. To make matters worse, the fishers do not have adequate levels of social security (Knudsen and Koçak, 2011).

A rapa whelk fishery is a vital economic power for small-scale fishing communities in this region. The export revenue of the processed rapa whelk plays an important role in Turkish fisheries economy. According to the preliminary data, the cost-benefit analysis of the fishing vessels were compared for two common fishing methods in the same region; bottom and beam trawl in 2014. It is determined that the beam trawl fisheries are more advantageous than bottom trawl because of the depleting demersal fish stocks in the last two decades. According to some estimations; the expense, income and gross profit for beam trawl is calculated as 32 899.9, 18 408.9 and 51 308.8 €/vessel/year, and for bottom trawl as 36 428.8, 8 879 and 45 307.7 €/vessel/year respectively (Figure A7.11) (Zengin *et al.*, 2014a).

6. COMMUNAL STRUCTURE AND SOCIAL EFFECTS

Rapa fisheries has been started first time in the Samsun shelf area and rapidly improved due to revenues of the fishers and processing plants established there. It still keeps its economic and social importance today in the region. There are some common communal similarities of rapa fishers coming from the history to the present time. The top feature is the immigration. A mere, 65 percent of rapa whelk fishers migrated as three generations to towns Terme and Dereköy from the Eastern Black Sea (Giresun, Ordu, Trabzon and Rize) and villages due to economic reasons (62 percent) from the

FIGURE A7.11
Annual cost-benefit (€/vessel/year) analysis of beam and bottom trawl vessels in SSA for the 2012–2013 fishing season



highlands just on the South of the region in the 1940s, 1950s and 1960s. Coastal land and highlands are mostly covered with forests and there is lack of area for satisfactory agricultural activities (Zengin *et al.*, 2016).

Before rapa fisheries has been started in 1980s immigrants from highlands were invited to the region by their relatives and had started to work in agriculture services conducted widely in the fertile lands between Yeşilırmak and Kızılırmak. Then, they met with the coastal fisheries and started to work seasonally as crew in the big fishing vessels. Later, they adopt in principle the sea and fishing, and adopted as a lifestyle.

Due to increasing commercial value in the early 1980s, first and second generation fishers had started to be involved in rapa fisheries. At first step it started with primitive harvesting but soon after the capital accumulation for new and bigger vessels, and harvesting gears, it became an attractive employment for the young generation living in the region by accepting rapa fisheries as a profession. Today, 69 percent of the population living on the Samsun coastal settlements has actively been involved in rapa fisheries. Especially when the population abundance is high in the coastal waters in summer months (May-July period), fishers intend to try all illegal ways to harvest Rapana though there is no fishing period for commercial purposes. During intensive fishing season for industrial fisheries in late autumn and winter seasons, rapa fishers mostly work as crew in the trawl and purse seine vessels. And after 4-5 month's, they continue their own rapa fisheries again. Some are involved in small-scale coastal fisheries; catch bonito and blue fish in September–October, shad and mullet in January, February and March, and turbot in April, May and October (Zengin *et al.*, 2016).

They start to harvest Rapana at their age of 12–13 (49 percent) in the region due to the availability of Rapana population and the economic reasons. On the other hand, investment and fixed costs are comparatively lower than that of other fisheries and profession as promising activity for the welfare of their families (Zengin *et al.*, 2014b). Meanwhile, most of the first generation Rapana fishers (65 percent) have changed their fishing activities after investing for bigger vessels and other fisheries i.e. bottom trawling at till the end of 1990's and industrial mid-water trawling for sprat fisheries (Zengin and Gümüş, 2014).

Boats of less than 7–8 m in length are landed routinely on beaches of small villages along the delta seaside. Boats of up to approximately 16 m can find shelter in the river mouths of two major rivers, where there are higher numbers of small trawlers (typically 12–16 m) (Photo A7.5) (Koşuköyü, Fener). Almost the total of fish caught by trawlers in this region are landed at the fishing ports of Samsun. The catch is sold by middlemen at an auction organized by the municipality. The catch is partly is marketed locally,

PHOTO A7.5
A typical rapa fishing fleet port and fisher village in Dereköy, Samsun Shelf Area

but the major part is sent to the large cities in Turkey. However the rapa landing is directly transported from boat to processing plants by means of middlemen in the local fishing harbour. Market price is controlled by factory owners. There are four major fishing harbours in Samsun that give shelter to both large boats and many smaller boats, from west to east (construction year in parentheses); Yakakent (1973–1994), Dereköy (Ondokuzmayıs) (1994s), Samsun centre and Terme (1994s). Yakakent and Samsun centre are the first harbours and fishing communities where trawl fisheries had been developed. Terme and Dereköy fishing centres gain importance during the last three decades with a substantial number of both small and large boats (Knudsen *et al.,* 2010).

Almost all fishing boats -larges as well as smalls- activating around Samsun, are owned and operated by families resident in the province. Family economy and the economy of the fishing business are often inseparable. When catches are poor fishing can be subsidised by other activities or by reducing household expenses. It is fairly common among owners of small boats (up to 10 m) to combine work on one's own boat, typically during sea snail and bonito seasons, with work as crew on trawlers or purse seiners during winter. Of the fishers interviewed for this research, 10.4 percent are working both on their own boat and also as a crew during the previous fishing season. 28.6 percent of the fishers had extra income from activities other than fishing, especially of farming (17.2 percent), but some were also seasonal workers (5.2 percent) or civil servants/tradesmen (3.8 percent) (Knudsen and Zengin, 2006). For unskilled young men it is not uncommon to combine or switch between fishing and construction work which are both hard, migratory, and poorly paid seasonal works. Poverty thus seems a major problem in the Turkish small-scale fishery economy and society with a very skewed income distribution. In Samsun the situation has been particularly difficult; industry has moved out of the province resulting in many unemployed people migrating to western Turkey or exploring other new opportunities. Locally, fishing is one of very few options (Knudsen and Koçak, 2011). All of the structural characteristics of the rapa whelk fisheries; social, economic and operational are summarized in Table A7.1.

TABLE A7.1
General profile of fishing fleet and main fisheries characteristics small-scale rapa whelk fisheries along the Black Sea coasts of Turkey

Fisheries characteristics
– Engine power is lower HP higher than trawl fisheries
– Fishing are is locally and regionally
– Single species
– Higher fuel use than artisanal/gill-net fisheries
– Adverse ecological impact (benthic ecology)
– Low number of crew
– Capital intensity is low/medium
– Ownership regime is individual/family
– Labour intensity is medium/high
– Control is difficult
– Human food, long distance from market
– Profitability on export income
– Based on family labour force
– Fishers from suburb and rural area
– Fishing fleet is individually
– Labour is high
– An informal organization structure
– Transition is very easily by fishers from small vessel to big one in a short period
– Alternatives are inadequately in terms of struggle of poverty
– Institutionalization is weakly (including fisheries)
– Fishing is simply prefer and practicable a work

7. SUSTAINABILITY

Introduction of this predatory rapa whelk into the ecosystem of the Black Sea turned out to be a catastrophe for mussel biocenoses. In the Black Sea it has almost no natural predators (Sağlam, 2003). This has made possible a very rapid population increase. Its dominant feeding strategy targets mussel species and its excessive predation on these species has resulted in the near disappearance of mussel stocks (*Mytilus galloprovincialis, Chamelea gallina, A. cornea*) in the region between the Turkey-Georgia border and Terme (Dalgıç and Karayücel, 2007). In 1995 the *C. gallina* population in this region was still healthy (Zengin, 2001). By 2005 the sea snail had started to threaten other species of mollusc and crustaceans (*Liocarsinus depratur*, *Donax* sp., Isophad, Amphipod and Decapode, snail juveniles), including the introduced Anadara cornea. The extreme increase in the sea snail population and the detrimental predation pressure it exerts on mussels has also had an impact on the structure of the sea snail population itself. This is of particular importance for the ecosystem of the Black Sea, as it has been revealed that rapa whelk is in the position of 'a predator without enemy' thus exercising great pressure on natural filters of sea waters like blue mussel (*Mythilus galloprovincialis*) and striped venus clam (*Chamelea gallina*), and seriously endangering the ecological balance of the Black Sea. Thus, the sea snail has caused important changes in the interaction between fishing and habitat in the coastal waters of the south-eastern Black Sea. While being an introduced species that has attained an important role in the demersal ecosystem of the Black Sea, Rapana has also become one of the most important commercial species.

There are some problems in management of ongoing rapa whelk fishery along SSA between depths of 5 and 30 m and becoming intense in summer months. The fishers always tend to break the fishing rules in terms of area, timing and the type of gear or its application. Though it is illegal, the most of the boats use two beam trawls simultaneously and often operate at night (also illegal). Formal state regulations to a large extent are circumvented with regards to the sea snail fishery of the Black Sea (Zengin, 2006). The CPUE seems to be higher in summer (115.3 kg/h/vessel) when compared to fall (45 kg/h/vessel), winter (13.4 kg/h/vessel) and spring (25.2 kg/h/vessel) seasons. The summer period is also the banned season (May 1–August 30) for

beam trawl fishery targeting rapa whelk. The fishing mortality caused by intense algarna fishery is relatively high in summer months. This fishing effort has a significant effect on juvenile fish populations which use the nearshore benthic as nursery areas. The total catch of algarna fishery is composed of target species; rapa whelk (70.3 percent) and other by catch species (29.7 percent) in summer period. In this period totally 33 species identified belonging to four different taxonomic group. Their abundance is estimated as 25.7 percent Mollusca, 3.5 percent Crustaceans, 0.2 percent fishes (mostly juveniles) and 0.3 percent Tunicates. The species number in these groups is as 9, 7, 16 and 1, respectively. The data about species diversity and abundance is an important matter in terms of a rational fishery management (Zengin *et al.*, 2014b).

In recent years, some research surveys on alternative fishing methods were carried out in order to reduce the environmental impact of beam trawls used for rapa fisheries (Photo A7.6 and Photo A7.7) (Sağlam *et al.*, 2008; Zengin *et al.*, 2016). In these surveys

PHOTO A7.6
Studies of rapa whelk pots in Dereköy, Samsun Shelf Area, July, 2014. The release of pots to the sea bottom around depths of 7-8 m

PHOTO A7.7
The pots on board are being taken to operation point, in Dereköy, Samsun Shelf Area

different pot designs had been used to determine catch efficiency comparing with the traditional beam trawls. Unfortunately the results were not found satisfactory by the rapa fishers. So, though they are financially supported by the fishery cooperatives and Rapana processing plants, pots in the most productive rapa whelk fishing area (Samsun; Yeşilırmak and Kızılırmak locations) were not found useful/productive by the fishers and they intended to continue to use traditional beam trawls.

After 2000, the rapa whelk was the most dominant species forming a large biomass in the nearshore coastal habitat causing a high fishing pressure with beam trawls resulting in significant physical disturbance on sea bottom. The maximum landing was obtained in summer months.

Actually, fishing with beam trawls is banned in this period in order to protect the nearshore benthic and demersal macrofauna (Knudsen and Koçak, 2011). This is one of the main constraints in the fishery of this region. Rapa whelk stocks and the impacts of harvesting gears and methods should be monitored continuously for the sustainability the Black sea ecosystem and stock assessment s should be done regularly. According to the multi-criteria analysis, the protection of natural habitats was found to be the best management alternative and the second best was the enforcement of beam trawl modification to reduce bycatch rate especially in summer time (Zengin *et al*., 2014b). If the responsible authorities wish to achieve good environmental and socio-economic results in rapa whelk fisheries then investments are needed for improved management including funding for research, for strict control and inspection, and subsidizing non-native species control and habitat friendly harvesting methods.

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PANEL 2

Strengthening the role of stakeholders in the context of management and co-management schemes

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PANEL 2
Strengthening the role of stakeholders in the context of management and co-management schemes

Saša Raicevich

EXECUTIVE SUMMARY

The first Regional Symposium on Sustainable Small-Scale Fisheries (SSF) in the Mediterranean and Black Sea (Malta, 27–30 November 2013), organized by the General Fisheries Commission for the Mediterranean (GFCM), paved the way for a thorough analysis of the status of SSF towards their proper recognition and development.

After this symposium, institutional and legislative changes affected the governance of SSF in the Mediterranean and Black Sea, in particular the adoption of the Food and Agriculture Organization of the United Nations (FAO) Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (FAO, 2015), the amendment of Article 5 of the GFCM legal framework and the European Union (EU) reform of the Common Fisheries Policy (CFP).

Considering these changes, this report builds on the recommendations and theoretical background of Session II of the First Regional Symposium. We assess the implementation process of co-management, based on a thorough investigation of six case studies. An overview and update of key attributes of SSF co-management is provided, including methods used to foster stakeholder participation and knowledge-based co-construction. The paper closes with a discussion of future needs for co-management implementation.

Six case studies were selected for investigation by in-depth survey, each characterized by the involvement of non-governmental organizations (NGOs) in their conception or implementation (particularly the World Wide Fund for Nature [WWF]):

1) In Algeria, the Taza National Park authorities, together with the WWF (through the MedPAN South project), the Ministry of Agriculture and scientists, have played an active role in the development of a participatory framework that engages fishers to establish a co-management scheme in parallel with the creation of a marine park. Together, they are working on a collaborative definition of zoning for the Taza marine protected area (MPA).

2) In Croatia, the Telašcica Nature Park involves local fishers in designing fisheries rules within the MPA. Through the MedPAN South project, the nature park administration, with the support of Sunce (Croatian association for nature, environment and sustainable development) and WWF and with the direct involvement of small-scale and recreational fishers, elaborated the management plan of the nature park.

3) A similar framework was applied in the context of the Lastovo Islands Nature Park (Croatia), although the focus here was on the involvement of the fishers' association in establishing notake zones (NTZs) within the MPA.

4) The sand-eel fishery (Catalonia, Spain) is a valuable example of how a bottom-up approach, fostered by a limited number of fishers and supported by WWF, the local administration and scientists, can help establish a co-management plan that achieves very positive results. This case study also triggers a reflection on the successes and challenges faced by the co-management committee during its four years of activity.

5) How to strengthen the role of SSF in decision-making through collective actions was investigated by examining the achievements of the Mediterranean Platform of Artisanal Fishers (MedArtNet). MedArtNet was launched, thanks to WWF facilitation, within the context of the CFP reform in order to help convey the interests of SSF to EU institutions.

6) The last case study is based on a study performed on a Mediterranean scale that identified five key governance features which have determined the success of SSF management within MPAs.

What emerges from the comparative analysis of these case studies is that fishers have been actively involved in the establishment and implementation of co-management using both top-down (dialogue established by the local/national administration) and bottom-up approaches (fishers promoting co-management). Participation in co-management schemes empowered fishers and offered them new skills. Barriers to co-management are still present in all the case studies and are primarily related to enhancing the cohesion and representativeness of fishers and to the need to resolve conflicts between different institutions that block the further adoption/implementation of rules.

Overall, analysis of the case studies show that strengthening the collaboration of all relevant stakeholders in co-management is one of the keys to achieving the overall goal of SSF sustainability. Several methodological approaches were successfully applied within a participatory research framework to establish fruitful collaboration and generate a new knowledge base for fisheries management. Such approaches are reviewed in this paper and should be considered as methodological benchmarks when engaging stakeholders in co-management schemes.

Based on the current phase of co-management implementation in the Mediterranean and Black Sea, and considering the outcomes of the selected case studies, it is possible to identify several needs that must be met to strengthen the role of stakeholders in management and co-management schemes, in particular:

- establish a path that ensures the engagement, vision and values of the stakeholders, to be considered when framing and enforcing management rules;
- capacity-building is critical to fishers' participation in co-management, but the capacity-building process should not be restricted to fishers only. It should encompass all entities that participate in co-management schemes, hence increasing the understanding of management and co-management processes, fishery resources and ecology, fishers' behaviour and values and participatory work dynamics;
- establish a coherent legal and administrative framework; and
- promote co-management schemes based on successful achievements and examples.

In summary, we have identified in this paper key actions that could be put forward by the GFCM to its contracting parties, in collaboration with relevant FAO departments and regional stakeholders (including NGOs), in order to create the enabling conditions to institutionalise stakeholder engagement in fisheries management through the adoption of co-management schemes. These actions are:

- to establish the institutional context, defining general rules for the engagement of fishers and stakeholders in co-management schemes and for compliance with these rules, including by defining the range of measures (e.g. community-based rights) and minimum institutional requirements;
- to develop and adopt a good practice guide for enforcing co-management schemes for SSF in the Mediterranean and the Black Sea;
- to establish a capacity-building programme devoted to supporting a variety of stakeholders' roles in co-management, i.e. institutional, MPA administrations, local administrations, resources users, natural and social scientists; and
- to provide support to existing co-management schemes and create a commitment to multiply them across the region.

RÉSUMÉ

Le premier symposium régional sur la pêche artisanale durable en Méditerranée et en mer Noire (Malte, 27-30 novembre 2013), organisé par la Commission générale des pêches pour la Méditerranée (CGPM), a posé les premiers jalons d'une analyse approfondie de l'état de la pêche artisanale en vue de faciliter sa reconnaissance et son développement.

À l'issue de ce symposium, certains changements institutionnels et législatifs ont modifié la gouvernance de la pêche artisanale en Méditerranée et en mer Noire. Il s'agit plus particulièrement de l'adoption des Directives d'application volontaire visant à assurer la durabilité de la pêche artisanale dans le contexte de la sécurité alimentaire et de l'éradication de la pauvreté de l'Organisation des Nations Unies pour l'alimentation et l'agriculture (FAO) (FAO, 2015), de l'amendement de l'Article 5 du cadre juridique de la CGPM et de la réforme de la politique commune de la pêche (PCP) européenne.

Compte tenu de ces changements, le présent rapport s'appuie sur les recommandations et sur le contexte théorique de la session II du premier symposium régional. Il évalue le processus de mise en œuvre de la cogestion à partir d'une analyse approfondie de six études de cas. Ce document propose une vue d'ensemble et des informations récentes sur les principales caractéristiques de la cogestion de la pêche artisanale, notamment les méthodes utilisées pour encourager la participation des parties prenantes et la coconstruction fondée sur les connaissances. Il conclut par un examen des besoins futurs en matière de mise en œuvre de la cogestion.

Six études de cas ont été choisies pour réaliser une étude approfondie, chacune étant caractérisée par l'implication d'organisations non gouvernementales (ONG) (en particulier le World Wide Fund for Nature [WWF]) dans leur conception ou leur mise en œuvre:

1) En Algérie, les autorités du parc national de Taza, aux côtés du WWF (par le biais du projet MedPAN Sud), du Ministère de l'agriculture et de plusieurs scientifiques, ont joué un rôle actif dans l'élaboration d'un cadre participatif qui encourage les pêcheurs à mettre en place un dispositif de cogestion parallèlement à la création d'un parc marin. Tous ensemble, ils travaillent sur une définition collaborative du zonage pour l'aire marine protégée (AMP) de Taza.

2) En Croatie, le parc naturel de Telašcica implique les pêcheurs locaux dans la conception des règles en matière de pêche au sein de l'AMP. Dans le cadre du projet MedPAN Sud, l'administration du parc naturel, avec le soutien de la Sunce (association croate pour la nature, l'environnement et le développement durable) et du WWF, et avec la participation directe des artisans pêcheurs et des pêcheurs pratiquant la pêche récréative, a élaboré le plan de gestion du parc naturel.

3) Un cadre semblable a été mis en place dans le parc naturel des îles Lastovo, en Croatie, mais dans ce cas, il s'agissait d'impliquer l'association des pêcheurs dans la création de zones de pêche interdite au sein de l'AMP.

4) La pêche à l'équille (Catalogne, Espagne) est un exemple qui montre parfaitement comment une approche partant de la base, portée par un nombre limité de pêcheurs et soutenue par le WWF, les collectivités locales et les scientifiques, peut faciliter la mise en place d'un plan de cogestion et donner des résultats très positifs. Cette étude de cas soulève aussi une réflexion sur les succès et les défis auxquels a été confronté le comité de cogestion au cours de ses quatre années d'activité.

5) Les solutions pour renforcer le rôle de la pêche artisanale dans le processus décisionnel grâce à des actions collectives ont été étudiées en examinant les réalisations de la Plateforme Méditerranéenne des Pêcheurs Artisanaux (MedArtNet). La plateforme MedArtNet a été lancée, avec l'appui du WWF, dans le cadre de la réforme de la PCP en vue de faire valoir les intérêts des pêcheries artisanales auprès des institutions européennes.

6) La dernière étude de cas porte sur une étude réalisée à l'échelle méditerranéenne qui a permis d'identifier cinq principes de gouvernance essentiels pour une gestion réussie de la pêche artisanale au sein des AMP.

L'analyse comparative de ces études de cas montre que les pêcheurs participent activement à la mise en place et à la conduite de la cogestion au moyen d'approches descendantes (dialogue instauré par l'administration locale/nationale) mais aussi ascendantes (promotion de la cogestion par les pêcheurs). La participation aux dispositifs de cogestion a donné aux pêcheurs les moyens d'agir et leur a apporté de nouvelles compétences. Des obstacles à la cogestion subsistent dans toutes les études de cas et sont essentiellement liés à la nécessité d'améliorer la cohésion et la représentativité des pêcheurs et de résoudre les conflits entre différentes institutions qui bloquent le processus d'adoption/de mise en œuvre des règles.

Globalement, l'analyse des études de cas montre que le renforcement de la collaboration entre toutes les parties prenantes concernées par la cogestion est l'un des leviers qui permettront d'atteindre l'objectif général de durabilité de la pêche artisanale. Plusieurs approches méthodologiques ont été appliquées avec succès dans le cadre de la recherche participative afin de mettre en place une collaboration fructueuse et de générer une nouvelle base de connaissances pour la gestion des pêches. Ces approches sont passées en revue dans le présent document et devraient être considérées comme des références méthodologiques lorsqu'il s'agit de faire participer les parties prenantes aux dispositifs de cogestion.

Compte tenu de la phase actuelle de mise en œuvre de la cogestion en Méditerranée et en mer Noire et des résultats des études de cas choisies, on peut identifier plusieurs besoins qu'il convient de satisfaire pour renforcer le rôle des parties prenantes dans les dispositifs de gestion et de cogestion, en particulier:

- définir une procédure permettant de garantir l'engagement, la vision et les valeurs des parties prenantes, à prendre en compte lors de l'élaboration et de la mise en œuvre des règles de gestion;
- le renforcement des capacités est un paramètre clé de la participation des pêcheurs à la cogestion, mais le processus ne doit pas se limiter aux seuls pêcheurs. Il doit englober toutes les entités qui participent aux mécanismes de cogestion, en améliorant ainsi la compréhension des processus de gestion et de cogestion, des ressources halieutiques et de l'écologie, du comportement et des valeurs des pêcheurs et des dynamiques du travail participatif;
- mettre en place un cadre juridique et administratif cohérent; et
- promouvoir les dispositifs de cogestion en mettant en avant des réalisations et des exemples positifs.

En résumé, nous avons identifié dans ce document les principales actions que la CGPM peut proposer aux parties contractantes, en collaboration avec les départements de la FAO et les parties prenantes régionales (y compris les ONG) concernées, afin de créer des conditions qui permettront d'institutionnaliser la participation des parties prenantes à la gestion des pêches grâce à l'adoption de dispositifs de cogestion. Ces actions sont les suivantes:

- mettre en place le cadre institutionnel, en définissant des règles générales portant sur l'engagement des pêcheurs et des parties prenantes dans les dispositifs de cogestion et sur le respect de ces règles, notamment en définissant un éventail de mesures (par exemple les droits enracinés dans la communauté locale) et des conditions institutionnelles minimales;
- élaborer et adopter un guide de bonnes pratiques pour la mise en œuvre de dispositifs de cogestion de la pêche artisanale en Méditerranée et en mer Noire;
- mettre en place un programme de renforcement des capacités visant à soutenir le rôle de diverses parties prenantes dans la cogestion: institutions, administrations chargées des AMP, administrations locales, utilisateurs de ressources, chercheurs en sciences naturelles et sociales; et
- apporter un soutien aux dispositifs de cogestion existants et susciter un engagement à les multiplier dans toute la région.

Background paper

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1. INTRODUCTION

The First Regional Symposium on Sustainable Small-Scale Fisheries in the Mediterranean and the Black Sea (Malta, 27–30 November 2013), organized by the GFCM, paved the way for a thorough analysis of the status of SSF towards its proper recognition and development. The idea of the symposium arose from the need to assess the current situation in the region and gather ideas from stakeholders to steer strategic and programmatic actions with a view to improving the livelihood of local communities engaged in SSF and encouraging sustainable exploitation of marine resources. The aim was to provide, at the regional level, a platform where the main recurring issues related to SSF in the Mediterranean and Black Sea could be duly addressed.

Accordingly, five thematic sessions were established, focusing on the following themes: 1) current situation of SSF in the Mediterranean and Black Sea: strategies and methodologies for an effective analysis of the sector; 2) management and co-management (CM) options for SSF in the Mediterranean and Black Sea; 3) integration of SSF in MPAs; 4) enhancing SSF value chains in the Mediterranean and Black Sea; 5) setting up a regional platform to promote implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries.

In particular, the report of Session II on management and co-management options for SSF in the Mediterranean and Black Sea (Gutiérrez, 2013) reviewed existing CM and participatory advisory schemes and provided an overview of traditional fisheries management in the region, social structures, institutions involved in CM, the functioning of CM committees, CM legal frameworks and capacitybuilding needs.

For the purpose of this report, the following are acknowledged as defining features of CM schemes (Gutiérrez, 2013):

a. CM refers to a suite of arrangements with different degrees of power sharing, allowing joint decision-making by the decision state and user groups about a set of resources or an area.
b. CM entails institutionalised arrangements for user participation in management and decision-making.
c. Ad hoc public participation in management decisions or mere consultation is often not regarded as CM.

In addition to these CM features, it is also useful to recall that CM is a collaborative and participatory process of regulatory decision-making between representatives of user groups, governmental agencies, research institutions and other stakeholders (Jentoft, 2003). This definition emphasises that CM is a collaborative and participatory process, a concept that guided the approach to the drafting of this report.

The above-mentioned Session II of the First SSF Symposium recommended a progressive implementation of fisheries CM in the Mediterranean region, built on the following elements (Gutiérrez, 2013):

1. establishment of an active network of fisheries CM pilot cases in the Mediterranean. Such a network should include at least one case per country, whenever possible. A particular effort should be made to ensure good coverage of the southern and eastern Mediterranean regions;

2. GFCM, working with its contracting parties and other partners, would facilitate a smooth functioning of the CM network, including the compilation of good practices, the internal flow of information among members and the wide external dissemination of main achievements with a view to encouraging and supporting the replication of best practices in other fisheries in the region.
3. Evaluation of capacity-building needs for fisheries CM based on the initial lessons learned from pilot case experiences and other sources. A capacity-building programme supporting CM in the Mediterranean region should then be established and adequately funded.

This background paper builds on such recommendations and focuses on methods and approaches to strengthen the role of stakeholders in the context of management and CM schemes, particularly in relation to models of collaboration and needs to support a full collaborative approach, with special focus on building the knowledge base for fisheries CM under a participatory approach.

To this end, three main topics are addressed in this paper:

1. an assessment of the features of the CM implementation process in the context of Mediterranean and Black Sea SSF fisheries, based on a thorough investigation of six case studies;
2. an overview and update of key attributes in SSF CM, also with a focus on experience and methods to foster stakeholder participation in management, both for co-constructing the knowledge base for CM and monitoring, control and surveillance (MCS);
3. The identification of future needs for CM implementation, particularly in relation to capacity-building and the legal framework.

Elements from this analysis contribute to the proposal of a roadmap to foster stakeholder participation in CM schemes in the Mediterranean and the Black Sea, which are presented at the conclusion of this report.

This analysis, however, must be rooted in the relevant institutional and legislative changes that intervened directly or indirectly, affecting the governance of Mediterranean and Black Sea SSF since the First SSF Symposium was carried out. Such recent changes are presented in the following paragraphs (Par. 1.1–1.3). Moreover, an overview of the main background approaches to the development of the report and the identification of the roadmap to foster stakeholder collaboration in SSF is given in the last introductory paragraph (Par. 1.4), to allow readers to better ascertain and contextualise the rationale of the approach that was used to this purpose.

1.1 The FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication

After a long consultative process carried out between 2010 and 2013 facilitated by the FAO, the thirtyfirst session of the Committee on Fisheries endorsed, in June 2014, the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines; FAO, 2015). These guidelines represent the first internationally agreed-upon instrument that provides consensus, principles and guidance for addressing SSF. Moreover, the SSF Guidelines complement the Code of Conduct for Responsible Fisheries, which, alongside the fishing provisions of the UN Convention on the Law of the Sea, is the most widely recognized and implemented international fisheries instrument. The SSF Guidelines are also closely related to other relevant FAO instruments (e.g. the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forestry in the Context of National Food Security, the Voluntary Guidelines to Support the Progressive Realization of the Right to Adequate Food in the Context of National Food Security and the Principles for Responsible Investment in Agriculture and Food Systems). Like these instruments, the SSF Guidelines place high priority on the realization of human rights and on the need to reach vulnerable and marginalized groups.

The objectives of the guidelines include: i) to enhance the contribution of SSF to global food security; ii) to contribute to equitable development of SSF communities and poverty eradication; iii) to achieve sustainable utilisation and conservation of fisheries resources; iv) to promote contribution of SSF to an economically, socially and environmentally sustainable future for the planet and its people, v) to provide guidance to be considered by states and stakeholders for the development of ecosystem friendly and participatory policies, strategies and legal frameworks for enhancing SSF; and vi) to enhance public awareness and promote advancement of knowledge of the culture, role, contribution and potential of SSF, particularly considering ancestral and traditional knowledge.

More prominently, the SSF Guidelines both explicitly and implicitly support the development of management and CM approaches that allow effective participation and inclusion of all stakeholder values, rights and needs (including capacity-building), particularly in relation to fishers and their communities. Indeed, human rights and dignity, respect of cultures, consultation and participation in social responsibility are some of the guiding principles of the guidelines.

In relation to the scopes of this background paper, we recall some articles and principles that are linked to four main themes: CM and participation, MCS, knowledge and capacity-building.

Co-management and participation: CM and participation are seen as joint processes, because CM needs roles and responsibilities of concerned parties and stakeholders to be clarified and agreed through a participatory and legally supported process (Art. 5.17 of the SSF Guidelines). In such a framework, "States should facilitate, train and support SSF communities to participate and take responsibility […] in the design, planning and, as appropriate, implementation of management measures, including protected areas, affecting their livelihood options. Participatory management systems, such as CM, should be promoted in accordance with national law" (Art. 5.15 of the SSF Guidelines). "States and all parties should elaborate participatory assessment methodologies that allow a better understanding and documentation of the true contribution of small-scale fisheries to sustainable resource management for food security and poverty eradication including both men and women" (Art. 13.4 of the SSF Guidelines).

Monitoring, control and surveillance: MCS systems are seen as essential to ensure the proper implementation of SSF management and CM schemes and therefore these systems should be supported by SSF as well as by state fisheries authorities. "States should ensure the establishment of MCS systems or promote the application of existing ones applicable to and suitable for small-scale fisheries. They should provide support to such systems, involving small-scale fisheries actors as appropriate and promoting participatory arrangements within the context of co-management. […] States should endeavour to improve registration of the fishing activity. Small-scale fishers should support the MCS systems and provide to the State fisheries authorities the information required for the management of the activity" (Art. 5.16 of the SSF Guidelines).

Monitoring systems should be recognized for their importance to allow "institutions to assess progress towards implementation of the objectives and recommendations in the [SSF] Guidelines" […] and "mechanisms allowing the results of monitoring to feed back into policy formulation and implementation should be included" (Art. 13.4 of the SSF Guidelines).

Knowledge: SSF communities are seen "as holders, providers and receivers of knowledge" and their need to access appropriate information (encompassing biological, legal, economic and cultural aspects of fishing) should be understood in order to "help them cope with existing problems and empower them to provide their livelihoods" (Art. 11.4 of the SSF Guidelines). Moreover, "all parties should ensure that the knowledge, culture, traditions and practices of small-scale fishing communities, including indigenous peoples, are recognized and, as appropriate, supported, and that

they inform responsible local governance and sustainable development processes" and "states should investigate and document traditional fisheries knowledge and technologies in order to assess their application to sustainable fisheries conservation, management and development" (Art. 11.6 of the SSF Guidelines).

Capacity-building: Capacity development is a key concept within the SSF Guidelines, as enhancing the capacity of fishing communities is needed "in order to enable them to participate in decision-making processes. To this effect, it should be ensured that the range and diversity of the small-scale fisheries subsector along the entire value chain is appropriately represented through the creation of legitimate, democratic and representative structures" (Art. 12.1 of the SSF Guidelines). Accordingly, "states and other stakeholders should provide capacity-building, for example through development programmes, to allow small-scale fisheries to benefit from market opportunities" (Art. 12.2 of the SSF Guidelines) and "all parties should recognize that capacity development should build on existing knowledge and skills and be a two-way process of knowledge transfer, providing for flexible and suitable learning pathways to meet the needs of individuals, including both men and women and vulnerable and marginalized groups […]" (Art. 12.3 of the SSF Guidelines). In particular, "government authorities and agencies at all levels should work to develop knowledge and skills to support sustainable small-scale fisheries development and successful co-management arrangements, as appropriate. Particular attention should be given to decentralized and local government structures directly involved in governance and development processes together with small-scale fishing communities, including the area of research" (Art. 12.4 of the SSF Guidelines).

1.2 Amendments to the Agreement for the establishment of the General Fisheries Commission for the Mediterranean (GFCM Agreement)

Another relevant novelty in the framework of SSF governance within the context of the Mediterranean and the Black Sea is related to the recent amendment of the GFCM legal framework. Notably, in relation to the objectives of the Commission, the first objective (Art. 5a) was amended according to the following (GFCM, 2015):

"Article 5: General principles
In giving effect to the objective of this Agreement, the Commission shall:

a. adopt recommendations on conservation and management measures aimed at ensuring the long-term sustainability of fishing activities, in order to preserve the marine living resources, the economic and social viability of fisheries and aquaculture; in adopting such recommendations, the Commission shall give particular attention to measures to prevent overfishing and minimize discards. The Commission shall also pay particular attention to the potential impacts on small-scale fisheries and local communities;
b. […]"

In this context, the role of SSF is officially recognized within the GFCM, along with the need to take into account the impact (i.e. effects) of GFCM recommendations on this fishing sector. Historically, GFCM activities mainly targeted the management of industrial fisheries without explicit recognition or consideration of the role of SSF, thus paying limited attention to the consequences of management decisions on this fishing segment. To our best knowledge, this is the first time that a regional fisheries management organization (RFMO) acknowledges the role and the need to take into account this fishing sector when defining or implementing management tasks.

It is worth mentioning that this act is legally binding for all contracting parties to the GFCM and, thus, could be used to generate ad hoc recommendations for the

development of SSF in the Mediterranean and the Black Sea and foster a more balanced assessment and resolution of the potential conflicts arising between this sector and industrial fisheries.

1.3 The new Common Fisheries Policy in relation to SSF

The new European Union (EU) Common Fisheries Policy (CFP) (*Reg.* (EU) No 1380/2013) was approved on 1 December 2013 after a long consultation process. The CFP applies to all EU countries, thus including the Mediterranean countries that have joined the EU (i.e. Croatia, Cyprus, France, Greece, Italy, Malta, Slovenia and Spain). The CFP aims to ensure that fishing and aquaculture are environmentally, economically and socially sustainable and that they provide a source of healthy food for EU citizens. Its goal is to foster a dynamic fishing industry and ensure a fair standard of living for fishing communities. The current policy stipulates that, between 2015 and 2020, catch limits should be set based on scientific advice to ensure sustainable exploitation that rebuilds (where necessary) and maintains fish stocks in the long term (i.e. to reach levels consistent with maximum sustainable yield). The CFP adopts a cautious approach that recognizes the impact of human activity on all components of the **ecosystem**. It seeks to make fishing fleets more selective in what they catch and to phase out the practice of discarding unwanted fish. The reform also changes the way in which the CFP is managed, giving EU countries greater control at the national and regional levels. Moreover, it includes new rules for aquaculture and stakeholder involvement. In particular, in order to foster more effective engagement and participation of fisheries stakeholders, the advisory councils (ACs) (which are stakeholder-led organizations) have increased their role. The ACs provide the European Commission (EC) and EU countries with recommendations on fisheries management matters. This may include advice on conservation and socio-economic aspects of management, as well as on the simplification of rules. ACs are consulted in the context of the so-called regionalisation and should also provide data for fisheries management and conservation measures. In particular, we recall the Mediterranean Advisory Council (MedAC), which represents the platform for fisheries stakeholders of EU Mediterranean countries to provide advice and technical proposals/solutions in order to better tailor EU fisheries management to local fisheries conditions, including, if required, joint recommendations developed in collaboration with Mediterranean Member States (according to Art. 18, Reg. (EU) 1380/2013). MedAC comprises several national fisher organizations, including recreational fisher organizations, international NGOs and Member States representatives (as observers). However, no single representative dedicated only to the SSF sector is present.

The financial instrument for implementation of the new CFP is the European Maritime and Fisheries Fund (EMFF) (Reg. (EU) 508/2014), which funds the EU maritime and fisheries policies for 2014–2020. The fund (which has been allocated to Member States based on the size of their fishing industry) is intended to help fishers in the transition to sustainable fishing, support coastal communities in diversifying their economies, finance projects that create new jobs and improve quality of life along European coasts. The fund is used to co-finance projects, along with national funding, following a detailed procedure that includes the definition of an operational programme by Member States, which needs to be approved by the EC.

The scope of the EMFF includes support for the CFP for the conservation of marine biological resources, for the management of fisheries and fleets exploiting those resources, for freshwater biological resources and aquaculture, as well as for the processing and marketing of fishery and aquaculture products, where such activities take place on the territory of Member States, by fishing vessels from the EU, or by nationals of its Member States, without prejudice to the primary responsibility of the flag State.

In this context, "the enhancement of the competitiveness and viability of fisheries enterprises, including of small-scale coastal fleet and the improvement of safety and working conditions" are included among the different EU priorities (Art. 6, 1d of Reg. (EU) 508/2014) that the EMFF will contribute to achieving. To these purposes, "small-scale coastal fishing" (SSCF) means "fishing carried out by fishing vessels of an overall length of less than 12 metres and not using towed fishing gear as listed in Table 3 of Annex I to Commission Regulation (Reg. No 26/2004)" (Art. 3, 2.14 of Reg. (EU) 508/2014).

Thus, within the EMFF, SSCF includes those fishing vessels below 12 m length overall (LOA) and adopting exclusively the following static or mobile fishing gear: surrounding nets (purse seines, lampara nets), lift nets (boat-operated lift nets, shore-operated lift nets), hooks and lines (troll lines, pots-traps, hand lines and pole lines [both hand-operated and mechanised], set longlines and drifting longlines), gillnets and entangling nets (set-anchored – gillnets, driftnets, encircling gillnets, trammel nets, combined trammel and gillnets). It is worth noting that within the GFCM legislative framework such a detailed definition of SSF is still missing; therefore two different acronyms (SSCF and SSF) are being used in the context of this report.

The measures dedicated to SSCF include, for instance, support for investments contributing to the diversification of income through the development of complementary activities, including investments on board, angling tourism, restaurants, environmental services related to fishing and educational activities on fishing, support to the modernisation and replacement of main and ancillary engines, provided that operators active in SSCF are given priority, support for networking and exchange of experiences and best practices between stakeholders, including, among others, under-represented groups involved in SSCF.

It is worth mentioning that, according to Article 18 (i) of EMFF Regulation, "in Member States where over 1 000 vessels can be considered small-scale coastal fishing vessels", should include a specific "action plan for the development, competitiveness and sustainability of small-scale coastal fishing" within their operational programmes.

1.4 Strengthening the role of stakeholders: a rationale

CM represents a process that entails the decentralisation of fisheries management from the national or international level to lower levels of management. CM is seen as an approach that could solve, at least in some circumstances, the ineffectiveness of traditional management schemes, which, in many cases, have proved ineffective in fostering sustainable exploitation of fishery resources and supporting the social and economic conditions of fishing communities.

The need for establishing CM schemes stems from the need for complementing the property rights approach to fisheries management. This approach was developed as a response to the recognition that open-access resources (commons) will be inevitably overexploited when individuals act only to maximise their pecuniary self-interest, as highlighted in the seminal paper *The Tragedy of the Commons* (Hardin, 1968).

Property rights consist of a collection of several characteristics, including security, exclusivity, permanence and transferability, which, exerted at different degrees, determine the completeness of property rights (Wilson *et al.* 2006). Examples of property right-based management in fisheries include area or territorial use rights in fisheries (TURFs), fishing input rights (e.g. rights granted to holders to use certain input or fishing gear in certain areas/fisheries/specified times) and output rights (e.g. individual transferable quotas). However, property rights themselves cannot guarantee the achievement of sustainable exploitation and effective fisheries governance.

Community approaches (which may embed different degrees or measures of property rights) are currently considered a possible improvement in the management approach. In particular, community right-based approaches have several (potential) merits:

- They have the potential of lower transaction costs related to management (e.g. savings in information, monitoring and enforcement costs).
- The availability of the best individual and collective preferences facilitates achieving mutually satisfactory management objectives.
- They entail a greater likelihood that right-holders respect and comply with management rules that were designed and agreed upon by them.

However, several conditions must be met in order to achieve the potential of the community rightbased approach. Ostrom (1990) analysed the general case of self-organizing and self-governing forms of collective action, focusing particularly on the range of variables for the successful governing of common pool resources (CPRs). Such a framework is applicable to the case of fisheries and, for the purposes of this report, to SSF.

According to Ostrom, governing CPRs implies the challenges of coping with free-riding, solving commitment problems, arranging for the supply of new institutions and monitoring individual compliance with sets of rules. The author identified the following design principles, arguing that "groups are more capable of organizing and governing their behaviour successfully if:

1. group boundaries are clearly defined;
2. rules governing the use of collective goods are well-matched to local needs and conditions;
3. most individuals affected by these rules can participate in modifying the rules;
4. the rights of community members to devise their own rules are respected by external authorities;
5. a system for monitoring a member's behaviour exists and the community members themselves undertake this monitoring;
6. a graduated system of sanctions is used;
7. community members have access to low-cost conflict resolution mechanisms; and
8. appropriation, provision, monitoring, enforcement, conflict resolution and governance activities are organized in multiple layers of nested enterprises when CPRs are parts of larger systems".

Such principles reflect the conditions that should (and could) be met in applying a CM scheme and could be easily transferred to the context of fisheries management. More prominently, it is clear that such ideal conditions could be met only when stakeholders are actively involved in the CM scheme, as Ostrom highlighted. This approach has a collaborative and participatory nature, thus involving not only administrations and scientists (which, in traditional top-down management schemes, provide the knowledge base for decision-making) but also user groups and other stakeholders (e.g. NGOs, citizens) (Hoefnagel *et al.*, 2006).

In this context, the rationale of CM and particularly the need for directly involving user groups, contains three main elements (Hoefnagel *et al.*, 2006):

1. resource users have in-depth knowledge of the fishery and its resources, which can be added to the information attained by fisheries scientists;
2. involvement of the community encourages compliance because they fully understand the policy and why it was created, thus leading to its commitment and support; and
3. the democratic theory would imply that those who are affected by a management decision should have their say.

Establishing a path to strengthen stakeholder participation in management and the CM scheme is, thus, essential to ensure its successful implementation. Such participation is not restricted to the contribution of their knowledge to the knowledge base used to define management rules, but also to their active participation in CM implementation. These two concepts are further explored in the following two Paragraphs (1.4.1 and 1.4.2).

1.4.1 The role of knowledge in fisheries co-management

The knowledge base needed to make fisheries management decisions includes information about fish stocks, ecological and economic information about the resource(s) and social information about the requirements for effective fisheries governance, including knowledge of the degree of their uncertainty (Wilson *et al.*, 2006).

Traditionally, and particularly under the rights-based approach, such knowledge is provided by scientists (i.e. research-based knowledge), with the underlying assumption that this science-based knowledge (SBK) would be objective.

Three relevant features should characterise science when it informs policy-makers for management purposes – saliency[1], credibility[2] and legitimacy[3] (Wilson, 2009).

In other words, "generating science that will effectively inform management decisions requires that the production of information (the components of knowledge) be salient (relevant and timely), credible (authoritative, believable and trusted) and legitimate (developed via a process that considers the values and perspectives of all relevant actors) in the eyes of both researchers and decision makers" (Cook *et al.*, 2013). All this also applies to the case of science supporting fisheries management and CM schemes with several implications, including the fact that other kinds of stakeholders, other than only researchers and decision makers, need to be involved in the process of generating knowledge (and science), including, in particular, fishers, fisher organizations and NGOs.

It is worth noting that, according to Sarkki *et al.* (2013), there is a trade-off between these three knowledge attributes when an interaction with policy makers is enforced. These trade-offs may affect several aspects – for instance, they could have effects in terms of personal time (interfacing versus doing other activities), clarity-complexity (simple messages versus communicating uncertainty), speed-quality (timely outputs versus in-depth quality assessment) and push-pull (supply-driven versus demand-driven research) aspects of ongoing activities. Such issues should be taken into account explicitly when planning CM activities.

When management institutions are seen as an interactive process, the central goal of creating knowledge is no longer objective knowledge and the emphasis shifts to transparent knowledge because an effective management process requires that participants give accounts to one another about how they know what they say they know. If a working agreement can be reached about some approximate truth on which to base decisions, actually making the decisions is often the lesser challenge (Wilson *et al.*, 2006).

In such a context, SBK still maintains a fundamental role and should strive to ensure maximum transparency in forming their assessments and advice. What changes is how the models provided by scientists are used for framing management decisions. Scientists would facilitate the management process, participating in the discussion and holding people accountable for their claims. This would take place, however, through participation in interactive fora, such as collaborative research and research into experience-based knowledge (EBK), as well as during key negotiations over management strategies.

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1 "Particular facts become prominent because of their usefulness in responding to the needs of policy development" (Wilson, 2009).

2 "Credibility is about making sure that the scientific result reflects nature as closely as possible; credibility comes from applying the scientific method (…) along with that method's guardians: quantification, replication and peer review. Credibility is the concept most closely related to the phrase "best available science" when it is used in a legal context as the required basis for policy" (Wilson, 2009).

3 "Traditionally, legitimacy has meant a valid claim to a status (…) What question can be raised about the rational legitimacy of a scientific process that is not a question about its scientific credibility derived from the application of the scientific method within that process? This problem is addressed here by arguing that one kind of rational legitimacy – process legitimacy – is best understood as the beholder asking precisely if the process meets a set of universal criteria. Those criteria encompass the scientific method but extend further into the social processes in which the scientific claims are made" (Wilson, 2009).

All this entails letting EBK be duly considered in the decision-making process. In this context, the term EBK emphasises knowledge that is embedded in stakeholder experience (in a broader sense), which could also include the transfer of cultural and intergenerational knowledge that forms part of the definition of traditional ecological knowledge (TEK). The attributes of such a knowledge base, its pros and cons, along with its potential use in different scientific contexts and the methods to integrate it with SBK have been discussed by several authors in different contexts (see, for instance, Hoefnagel *et al.*, 2006; Raicevich *et al.*, 2011; 2015; Gutiérrez, 2013) while methods for their collection and use in the CM context will be summarised in Chapter 3.

1.4.2 Models of stakeholder collaboration in fisheries management

Four basic models have been proposed to characterise the range of collaborative research approaches in fisheries science and management, according to Hoefnagel *et al.* (2006). Although they were conceived to represent the issue of collaboration between scientists and fishers, they can also be used to summarise the degree of collaboration that stakeholders could reach in the framework of CM planning and implementation.

These models are cumulative in that each one incorporates the basic perspective of the earlier ones (Hoefnagel *et al.* 2006):

1. Deference Model: In this model, fishers are expected to defer to scientists, essentially assuming the role of research assistants (e.g. tagging studies and logbook programmes have made such participation mandatory).
2. Experience-Based Knowledge Model (EBK): This model emphasises fishers' observations as a supplement to the research-based knowledge (RBK) of scientists. It builds upon the deference model but reflects that the thinking of the fishers, as EBK based on local information, is just as valid in that particular local context as is RBK. The scientist no longer has the final word.
3. Competing Constructions Model: This model arises from the regulatory aspects of fisheries management. Scientists are not only increasingly working with fishers, but they are also increasingly working for fishers and other interest groups. Various stakeholders select facts from fisheries science to put together an overall picture of the resource that fits their needs. The result is that scientists working in management agencies tend to construct a picture of nature that is more amenable to bureaucratic management than it really is, environmentalists construct a picture of nature that is more threatened than it really is, and fishers construct a picture of nature that can sustain more fishing than it really can.
4. Community Science Model: This model is where collaborative fisheries science is considered in the context of cooperative management. Efforts towards community science recognize that various constructions of nature will exist among stakeholders but that open communications can help move beyond them. Open communication makes management institutions more sensitive to new developments in the ecosystem, thus facilitating adaptive management (Wilson, 2003a).

The Community Science model incorporates the other three models. It defers to the expertise of the trained scientists, respects the importance of EBK, and takes into account that there will be different understandings of the resource and different ideas on what should be done (Jacobsen *et al.*, 2012). As pointed out by Hoefnagel *et al.* (2006), within a CM system, it is necessary to develop mechanisms to reconcile formal RBK and EBK belonging to the fishing community, so that acceptance and validity is maintained. In such a context, more than one paradigm is active, and tolerance and respect for different perspectives need to be developed. Because groups and their worldviews have the inclination to struggle for dominance, norms are needed to regulate the balance between those worldviews. Such a process, which is internally and externally influenced, needs to be dynamic and seeks a flexible CM institution that creates satisfying fishery management solutions through the democracy paradigm.

2. CASE STUDIES

2.1 Introduction and case study selection

In order to learn from ongoing experiences in fisheries CM in the Mediterranean and the Black Sea and to gather first-hand information to be used for the purposes of this report, six case studies were selected and investigated through an in-depth survey.

The six case studies were selected because they were related to the pre-implementation and implementation phases of CM fishing regimes with the aim of being representative of various conditions (geographical, cultural, fishing practises, etc.). More prominently, they were characterised by a deep involvement of NGOs, and particularly the World Wild Fund for Nature (WWF), in their conception or implementation, thus also ensuring the availability of earlier knowledge of their specificities and of fruitful contacts to be involved in the survey process.

Three case studies were characterised by being in a pre-implementation process in the context of MPAs – i.e. Taza National Park (Algeria), Telašćica Nature Park (Croatia) and Lastovo Nature Park (Croatia). Another case study was in its implementation phase – in this case, in a context where CM practices were carried out in a coastal area not under a protection or conservation regime (sand eel case study, Catalonia, Spain).

These four case studies underwent the full analysis through the survey, as shown below and in Appendix 1. Accordingly, the results of the survey of these four case studies are presented together, with a first description of each single case study location, fishery and CM plan/implementation (Par. 2.3–2.6), followed by an assessment presenting their features in relation to stakeholder involvement and empowerment, the role of knowledge and lessons learned (Par. 2.7).

Two other case studies were also considered, though they were not directly linked to a single experience of practical implementation of CM in a defined area, namely, the Mediterranean Platform of Artisanal Fishers (MedArtNet) and a study carried out to investigate the effectiveness of governance of sustainable fishing in MPAs. The first case study was selected as a follow-up of the First Regional Symposium on sustainable SSF in the Mediterranean and the Black Sea, in order to assess the latest developments and activities of the MedArtNet and its effectiveness. The second case study was chosen because it synthesises a broad-scale study at the Mediterranean level ascertaining which conditions foster the development of sustainable fishing practices within Mediterranean MPAs, with special emphasis on governance and CM. According to the specificities of these two case studies, the questionnaire we developed was used to guide the conversation with informants for the collection of the relevant information in relation to the themes of this report (see Par. 2.2). While such an approach impeded an analytical assessment as compared with the four case studies related to empirical application of CM schemes, it allowed us to gather relevant information that further increased the range of content and reflections addressed in this report.

2.2 Methodological approach

Experience gained in relation to management and CM options for SSF was acquired through direct surveys conducted in the field by M.E. Guélé (WWF consultant) using an ad hoc structured and semistructured questionnaire developed by S. Raicevich, M.E. Guélé and S. Saintz-Trápaga (see Appendix 2, for the detailed contents and structure of the questionnaire). The questionnaire, which partially relies on the classification scheme for CM attributes adopted by Gutiérrez *et al.* (2011), collected information on the following main themes:

1. case study setting (name, location, SSF features, conflicts for uses of marine resources within and outside the case study area, etc.);
2. CM plan or activities (CM phase and plans, process applied to implement rules, role of national or international legislation, etc.);

3. CM implementation process (role of different stakeholders, objectives and expectations, process enforcement, etc.);
4. role of knowledge (use of scientific, social science, EBK for planning and running CM activities, etc.);
5. role of fisher stakeholders and their empowerment (role of fishers, fisher organizations, empowerment and change in their responsibilities or participation, etc.);
6. conditions and needs to strengthen fisher roles in CM (essential, useful and not relevant conditions; needs, incentives and skills to foster the engagement of fishers);
7. lessons learned (take-home messages from fishers and other stakeholders);
8. references (reports, papers, legislative acts, etc. which substantiate the case study features, process and outcomes).

For the purpose of the survey, fishers, managers, scientists, NGO officers and other stakeholders were interviewed at each case study location. Formal contacts were also maintained in order to clarify, where needed, concepts and information after their preliminary elaboration.

The CM attributes of each case study are reported in relation to the geographical context, professional, recreational and subsistence fisheries, historical background of fisheries management, the process of triggering and building the CM scheme and the future or present CM setting (Par. 2.3-2.6). This documentation describes the main context of the case studies and illustrates how, in their local conditions, a process for establishing and implementing a CM scheme was enforced.

Then, a direct comparison among selected features of each case study is provided in Paragraph 2.7, focusing particularly on the role of fishers and their organizations, the empowerment of the role of fishers through participation, the conditions which strengthen the role of fishers in CM and the barriers that prevent the full involvement of fishers. This paragraph is concluded by an assessment of the potential or effective success of the case studies, as evaluated through the application of the approach by Gutiérrez *et al.* (2011), which is followed by a concluding section on lessons learned from these case studies.

2.3 Fishers participation in the establishment of an MPA in Algeria (Taza National Park)

2.3.1 Geographical context

The Taza National Park is located in the province of Jijel, in northeastern Algeria in the geographical subarea (GSA) 19. It is currently a terrestrial park. Its adjacent marine area hosts important spawning and nursery grounds for commercial fish, and a remarkable coralligenous community in a healthy state.

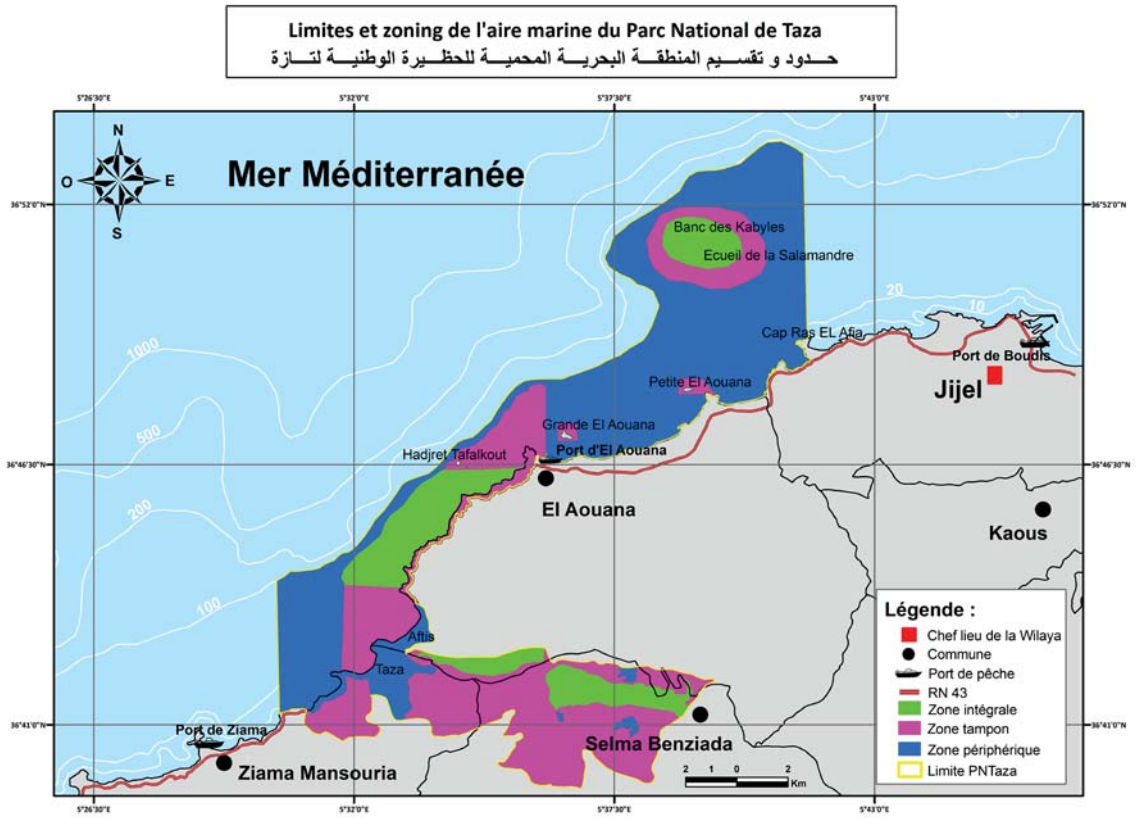
The national park, which was created in 1923, aims to cover 96 km^2 of MPA, with 10 percent of notake zone (NTZ) (Figure 2.1). The local community economy depends largely on fishing activities, which represents a critical source of income.

2.3.2 Professional, recreational and subsistence fisheries

Three fleets are identified in the area: SSF, trawlers and seiners. All operate in the same fishing zones, as the continental shelf is very narrow (3 nautical miles [nm]) and none of the fishers have the capacity to fish beyond this limit.

The SSF fleet is composed of 230 small-scale fishing vessels (LOA comprised between 4 to 9 m) adopting nets and longlines with multi-species targets, including both demersal and pelagic species. The trawlers fishing fleet comprises 17 fishing boats and targets both demersal and pelagic species. Sixty-two seiners (LOA: 9 – 22 m) are also working in the area, targeting mainly sardine.

FIGURE 2.1
Location of the Taza park marine protected area (Algeria), according to current implementation proposal [*Source*: Taza National Park]



Notable conflicts occur among the three fishing fleets. SSF fishers complain especially about the activities of the trawlers, which, according to the SSF fishers, deplete stocks and destroy habitats and artisanal gears, such as nets. Moreover, only a few trawlers seem to respect the national rule prohibiting trawler activity within the first 150 meters of the shoreline; thus, trawlers operate with impunity, as none of the offenders are controlled or sanctioned.

Trawlers were not involved in the consultation process of the national park to establish the MPA, which covers zones where such activity is prohibited by national law. Fish products are sold directly to traders as fresh products and reach the local, national and international markets. Fish traders have an important power in such a context, a role that is questioned by fishers in relation to an inequality of the share of benefits from traded fish.

Recreational fishing activities are important and involve about 400 fishers. This fishery is multi-specific although the main target species is grouper (Epinephelus marginatus). They are allowed to fish (not exceeding 3 kg per day) and are authorized to use no more than ten hooks. Also, the use of spear-guns is frequent and not well-regulated. SSF fishers denounce illegal, unreported and unregulated (IUU) fishing activity in this sector. The representative of the recreational fishing sector recognizes many drifts as well.

Coastal development, related mainly to tourist activities, also threatens the fishing sector, creating considerable pollution.

2.3.3 Historical background on fisheries management

Before the project of establishing an MPA, there were no specific rules for fishing activities aside from the ones provided by national laws. The MCS, as well as traceability schemes, were and still are very weak. Thus, fisheries management depended mostly on fishers, whose older generations proved to be more sensitive to sustainable fishing than the new ones. Fisher associations also existed and most of the fishers underwent professional training.

The project to create an MPA in the Taza park started in 2002, when the park institution launched a marine species and habitat inventory with the technical support of ISMAL (Marine Scientific Institute). However, the completion of the study was not sufficient to introduce to the *wàli* (the governor and administrative head of the province) the classification of the national park integrating an MPA.

In 2006, the park started collaborating with the Network of Marine Protected Areas managers in the Mediterranean (MedPAN), which was at the time financed by WWF. A strategy was designed in 2008 and WWF started to support the implementation of a Taza MPA project from 2009 to 2012 (MedPAN South project). WWF accepted to be part of the Taza MPA project for four years, emphasising the importance of developing a participatory approach in decision making. From 2014, through the SEAMed project, WWF is continuing to support the Taza Park in implementing priority management strategies. The Park is also assisted in the development and implementation of eco-tourism initiatives.

2.3.4 Triggering and building co-management

To ensure that local stakeholders would endorse the creation of the MPA and could benefit from effective management, the park authority, together with the administration in charge (Direction Générale des Forêts under the Ministry of Agriculture), was interested in adopting a participatory approach to the development of the management plan and the identification of user zones. To this end, they sought technical support from the WWF Mediterranean Programme Office, through the MedPAN South project, to produce all necessary documents for the official MPA designation by promoting the involvement of local communities in the development of the management plan and its future implementation. A large range of stakeholders was identified and involved in the process of developing the CM plan, including SSF fishers and recreational fishers, divers, natural and social scientists and scientific institutions. The most active role was played by MPA administrators and local administrators and NGOs (WWF), who acted as facilitators of the process. It is worth mentioning that such a consultative process started because there was a common objective (i.e. to include a marine area in the Taza National Park) and a general consensus on the interpretation of current problems facing the fishery sector in the area – i.e. crisis in the catches, presence of IUU fishing, reduction in revenues, conflicts with other fisheries, awareness on the environmental impact of fishing (trawlers), failure in fisheries management, lack of involvement of fishers in the management of resources, lack of capability to influence the market and the negative effects of pollution. On this basis, the CM process was triggered by manifold expectations to be met through the CM plan, including an increase in species' abundances, catch per unit of effort (CPUE) and prices, sustainable fisheries also achieving conservation benefits, empowerment of stakeholders and reduction of conflicts, increase in social welfare and empowerment of the local community, preventing fishers from abandoning their activities as well as increasing the scientific understanding.

Once the stakeholders were identified, three committees were established to develop the participatory approach:

1. an inter-sector pilot committee headed by the *wàli*, gathering all involved administration from Jijel's *wilaya* (i.e. province). All administrations took responsibility to support the project;
2. a consultative committee (Commission de Consultation et de Concertation). The first objective of this committee was to consult fishers. The consultation process was then enlarged to other stakeholders as part of the socio-economic approach; and
3. a scientific committee.

The park institution and its partners managed to engage fishers using various tools to raise awareness about the project. This is a sensitive and time-consuming task placed as a top priority for the authority. At first, the consultative committee addressed the issue to the most receptive fishers to ensure their support. Then, to better inform fishers about the project, the authority mobilised the local community (mostly composed of fishers) through a day of open debates, after which such discussions were then relayed to media outlets, such as radio and press). The national park and its partners tried to highlight the social and economic benefits that such a management tool could provide to fishers and the local community. The process was successful thanks to the support of many experts who intervened with the fishers.

In particular, the process involved fishers who were engaged in:

1. capacity-building training (i.e. missions abroad to exchange fisher experience and to review the zoning plan with the fishers, to which they agreed after the first five reviews); and
2. consultation on the management objectives to achieve and on the monitoring indicators to be applied.

As the local communities largely depend on direct exploitation of marine resources and as fishing is a key source of income, a second phase of the MedPAN South project was launched in 2013 to develop and implement strategies to better match conservation objectives with long-term socio-economic benefits for local communities, ensuring the support of fishers for the new MPA and eventually enabling CM of the future MPA. New projects are being developed to further the implementation and to support the local community (e.g. tourism, eco-tourism, fishing tourism, underwater trails, etc.).

Despite all stakeholders approving of the management plan, including the zoning rules, the MPA still needs to be adopted at the local and national levels to obtain legal status. There has been an administrative blockage since 2012 because of an administrative conflict regarding which ministry holds competence over the project (Agriculture or Environment).

The legal and institutional framework in Algeria has been, for many years, the main obstacle for the implementation of effective marine conservation measures. Responsibility for the creation and management of protected areas was shared between the Direction Générale des Forêts, within the Ministry of Agriculture that has authority on coastal national parks and the Commissariat National du Littoral, within the Ministry of Spatial Planning, the Environment and Tourism, that is responsible for the management of marine and coastal areas. As a result, in 2008, several MPAs were still in the process of being created and existing ones needed more consistent management measures. In 2010, a law on MPAs was finally approved, clarifying the responsibility of each relevant institution and improving governance and implementation of management of marine resources. Despite the 2010 law, which identifies the manager of an MPA as the administration which opened and submitted the project first (the Ministry of Agriculture), both the Ministry of Agriculture and the Ministry of Environment are still competing for management responsibility. The law also provides for the creation of two inter-ministerial commissions before the adoption of any MPA. Neither of the two commissions has been established so far.

2.3.5 Future co-management setting

With the project of declaring the marine areas adjacent to the park an MPA, a participatory approach between all stakeholders has been used for the first time in Algeria. All stakeholders, including fishers, are keen to commit to the design of fishing rules as well as to implement them. The administration and the park institution ensure that the voices of the fishers are taken into account.

In addition, the project is based on scientific advice and driven through a socio-economic approach, identifying benefits for the local community and ensuring better adhesion of fishers to the MPA project.

The MPA management plan provides for three-levels of maritime zoning, with 10 percent covered by NTZs, as follows: first level – NTZ; second level – SSF; third level – recreational activities and aquaculture (excluding cage farm and the introduction of new species).

Maritime activities, such as diving and underwater trails, are introduced with the intention of diversifying fishing activities with fishing tourism. Furthermore, the MPA project aims to closely regulate recreational fishing and exclude trawlers from the marine area (as already provided by law but not respected by the concerned fishers).

There are no defined rules on the fishing effort. However, in a second phase, a reduction of the fishing effort might be introduced consistent with the national strategy.

As soon as the ministries agree and approve the classification of the national park as integrating an MPA, the management plan and the zoning will be enforced. In the meantime, the Ministry of Agriculture encouraged the local administration to adopt the management plan at a local level in order to unblock the situation.

2.4 Involvement of local fishers in designing fisheries rules within MPAs (Telašćica Nature Park, Croatia)

2.4.1 Geographical context

The Telašćica Nature Park was created in 1988 and is located on the eastern side of the central Adriatic (GSA 17) in Croatia (Figure 2.2). The park covers a total area of 70.01 km^2 (both land and sea). With 44.55 km^2 of MPA, the sea surface of the park represents 64 percent of the total surface. Telašćica was part of the Kornati National Park until 1988. Only subsistence fishing was authorized under the national park regime, operating in a very traditional way with low impact on fishing grounds and habitats.

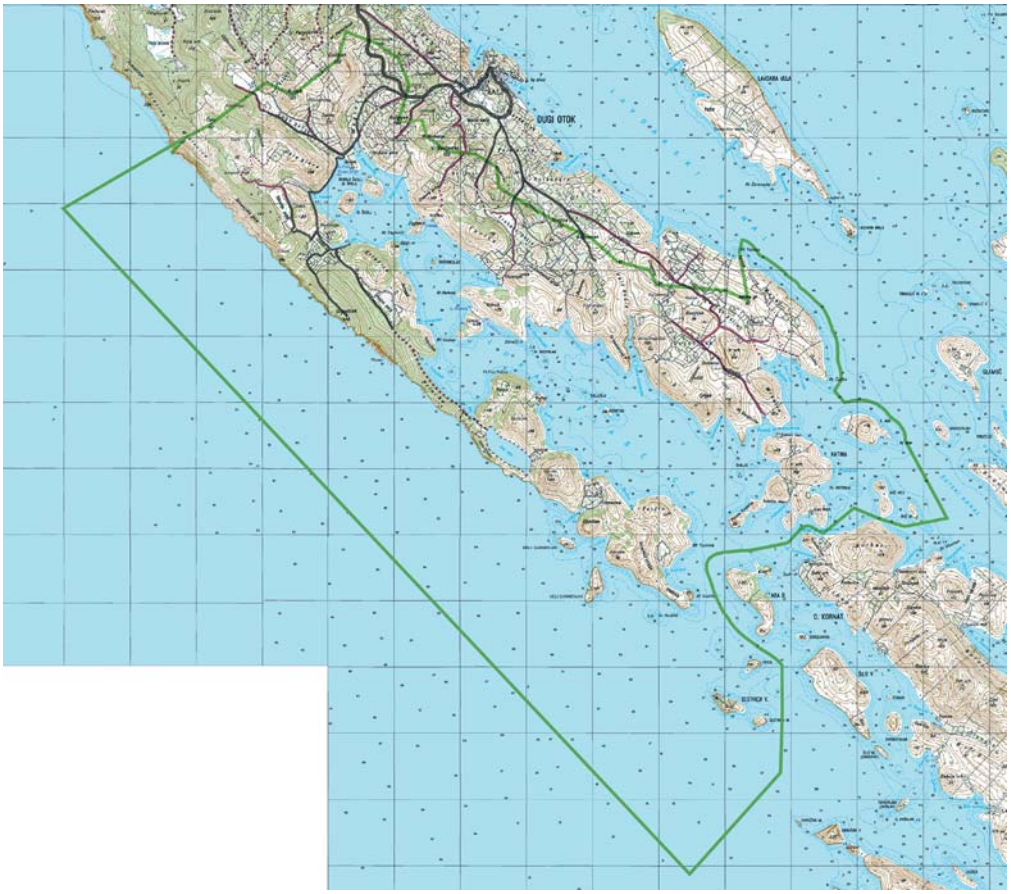
In 1988, the national park was divided into two parts, splitting away Telašćica from Kornati. As a result, Telašćica changed status and was categorised as a nature park, which involved the obligation to regulate professional fishing activities (Law on Designation of the Telašćica Nature Park, 14/88). Therefore, prior to the creation of the park, there was no strong historical use of the areas by fishers.

The case study area consists of all the marine areas of Telašćica Nature Park, on the southern part of the Dugi Otok island with the following geographical coordinates: from 43°52`52.23''' N to 43°56`18.83'' N; from 15°07`53.26`` E to 15°12`36.14`` E.

2.4.2 Professional, recreational and subsistence fisheries

Two professional fleets operate in the case study area: a local SSF and an industrial fleet. The local SSF fleet is composed of a maximum of ten fishing vessels (LOA < 8.0 m). They target mainly white fish, such as scorpion fish (*Scorpaena* spp.) and sea bass, using static nets. Their catches are intended to supply local consumers as well as restaurants during the summer. During winter, when restaurants are closed, fishers sell their fish through the Zadar fish market. All SSF professional fishers do additional work to supply their living costs. Some fishers combine both occupations throughout the year and then do not go at sea every day. Others fish for part of the year, going to sea every day during the non-tourist

FIGURE 2.2
Location of the Telašćica Nature Park (Croatia)
[*Source*: Telašćica Nature Park]



season (October–May); in the summer, they shift to tourist activities such as fishing tourism or performing trips at sea with tourists.

The industrial fleet (n = 30–35 fishing vessels) is composed of big fishing vessels (LOA > 20.0 m) coming mainly from Zadar and operating further from the coasts with incursion within the border of the Telašćica marine areas. They use seines to target migratory species, such as small pelagics, particularly sardine (*Sardina pilchardus*) and anchovy (*Engraulis encrasicholus*), although they may also target amberjack (*Seriola dumerili*) and common bonitos (*Sarda sarda*). Catches are mostly sold to the Zadar fish market or supplied to process plants along the Croatian coast, one of which is present on the main Telašćica Island. There is no direct conflict between the two fishing fleets, although the bycatch of seines may include species targeted by the SSF. Both fleets may operate outside the nature park area.

Quantitative descriptions of catches, landings and/or CPUE are not available to characterise such fisheries at the nature park administration level, although they recently started performing such data collection.

Recreational and subsistence fishing remain common activities within the park, but only a few persons are involved. Both activities require a permit from the park. Since Croatia joined the EU, fishing for subsistence purposes without a fishing licence is not allowed (although this is still in transition). In 2011, about 40 recreational fishers were authorized for fishing and, nowadays, about ten to 15 permits are issued each year; fishing activities are multi-specific and carried out by means of hooks and lines. Subsistence fisheries are operated by about 25 persons, using hooks, lines and small

nets. There does exist some limited conflict between the recreational and subsistence fisheries and the local SSF, as some recreational or subsistence fishers may sell fish to local restaurants, thus competing with the commercial fisheries.

Moreover, there are five diving clubs (250 divers per year) that spot some marine areas of Telašćica for their activity.

2.4.3 Historical background on fisheries management

From 1996 to 2011, a first rules book was applied to manage fishing activities within the nature park. The Ministry of Environment adopted the first rules book without consulting stakeholders, making this the result of a top-down decision. The first rules book provided measures such as fishing licenses delivered by the Ministry of Agriculture and permits delivered by the Ministry of Environment, with additional technical measures on gear, length and minimum landing sizes, as required by national regulation (sometimes more restrictive than national regulation). The fishers agreed on the first rules book. However there were no operational MCS schemes in place. The management of fishing activities was therefore not effective. In 2010, the National Marine Fisheries Law regarding Nature Parks changed, for political reasons, creating a legal loophole. Under the new Law, the first rules book lapsed (relating to fisheries) and measures under it were no longer legally binding. Fishing zones in the nature park were no longer under the Ministry of Environment but fell under the Ministry of Agriculture's authority and marine park areas were integrated into much broader fishing zones on the national scale.

As a result, outsider fishers started to operate within the park area without permits and without respecting the rules book measures. In particular, during two years, one fisher from Zadar came fishing in the nature park using trawl nets that had a tremendous impact on habitats and resources, as reported in scientific studies (see the reports: Mapping of noble pen shell [*Pinna nobilis*] habitat in the Telašćica Nature Park, 2012; Mapping and monitoring of noble pen shell [*Pinna nobilis*] habitat, 2014). Despite complaints, supported by scientists, from the local fishing community, this particular fisher operated with impunity until 2013 with the transposition of the Council Regulation (EC) No. 1967/2006 (hereinafter referred to as Mediterranean Regulation), which prohibits the use of such gear in protected areas.

2.4.4 Triggering and building co-management

The central state did not delegate power to the CM on purpose. There was just no action and no collaboration at the ministerial level for some time. So, stakeholders took on the responsibility to attempt managing fishing activities on their own. The Telašćica initiative was successful thanks to the support of the MPA and in collaboration with NGOs and scientists, who contributed – thus directly involving fisheries' stakeholders – to the elaboration of the management plan. It is worth mentioning that the entry of Croatia into the EU also facilitated transparency within the decision-making process. In transposing the CFP within the national legislation, a clear and official consultation process has been established involving all stakeholders. Stakeholders such as NGOs welcomed this new rule. Since 2015, the Ministry of Agriculture has been proactive in adopting fishing regulations such as the rules book for Lastovo and Telašćica Nature Parks. As a result of the implementation of the Mediterranean Regulation, practices such as using trawl nets above protected habitats had to cease. Moreover, persons involved in subsistence fishing will have to progressively stop using this net, which is categorised as professional gear by the Mediterranean Regulation. Such new opportunities, however, are balanced by fisher complaints that the new rules imposed by the EU increase the administrative burden.

Under such circumstances, from 2009 to 2012, through the MedPAN South project, the nature park administration, with the support of Sunce and WWF, started

to elaborate the management plan of the nature park, including the park's zoning. In 2010, the first workshop was launched. The nature park administration mobilised the local community but no one understood at the time the actual legal status of the park regarding fisheries management.

Fishers were directly involved in the zoning part of the plan. Not only did professional fishers take part in this process, but subsistence and recreational fishers (representing about 20 persons), as well as fisheries inspectors, were also included in the process. An agreement was reached on the zoning based on scientific advice and several NTZs were defined.

At the time that the draft zoning plan was finalized in 2011, the Croatian Ministry of Agriculture started elaborating the new rules book to regulate fishing activities in the nature park, though without any prior dialogue and consultation with stakeholders, possibly owing to the pressure by the EU to implement many rules and transpose them in a short amount of time (which could explain the will to settle legal loopholes quickly). Due to the omission to consult stakeholders, the content of the rules book was not consistent with the issues of the Telašćica Nature Park or with the already achieved work, such as the zoning design in the Telašćica case. Therefore, ultimately, the draft remained unconsidered.

Based on the zoning plan, developed together with fishers, which was now part of the management plan, the Telašćica Nature Park prepared a (second) draft new rules book in 2012. The aim was to obtain a document that was ready to present to one of the two ministries (Ministry of Environment or Ministry of Agriculture). All stakeholders were waiting for the Ministry of Environment to adopt it, but the ministry remained silent.

In 2013, the Ministry of Agriculture finally stepped in, possibly due to the inclusion of Croatia as an EU member; in this context, the consultative process was to apply as required by the CFP. The Croatian Government adopted a new Marine Fisheries Act in 2013 according to which fisheries in nature parks were regulated by the nature protection rules book, with the approval of the Ministry of Agriculture; the Ministry of Environment still remained silent.

In 2015 the Ministry of Agriculture, which established an *ad hoc* Regulation Committee gathering representatives of the Ministry of Environment, fishers, scientists, NGOs and a representative of nature parks (who joined the meeting at their own demand), approved the Telašćica rules book, without any additional condition. The second rules book regulating fishing activities in the Telašćica Nature Park should be adopted within the coming months by the Ministry of Agriculture. However, no calendar on the adoption has been clearly defined yet.

Accordingly, the CM setting in the Telašćica Nature Park assumed two parallel approaches, both consultative and cooperative, being top-down from the national administration and a bottom-up approach, fostered by the nature park administration.

Several stakeholders contributed to the definition of the CM plans, including SSF fishers (on a personal basis), recreational and subsistence fishers, divers, MPA authorities, NGOs (Sunce and WWF), the Ministry of Agriculture and scientists.

A consensus on the problems to be tackled was present in this stakeholder group, particularly on the presence of crisis in the catches, IUU fishing, conflicts between fisheries, the ongoing enforcement of new regulation and awareness on the environmental impact of fishing.

With the setting of the CM plan, the stakeholder group envisages achieving a transition to suitably exploited stocks, the increase in target species abundance and CPUE, evidences of long-term sustainability of fisheries and conservation benefits, the empowerment of fisher stakeholders, an increase in scientific understanding and reduced costs of monitoring and surveillance.

2.4.5 Future co-management setting

So far, there is no enforcement in place. Surveillance at sea only occurs to collect entrance fees. Rangers of the nature park do not have the competence to exercise all powers and function as required to monitor, control and survey fishing activities within the park. When they notice infringements, rangers contact the police or the fisheries inspectors from Zadar, who decide to intervene or not against the offender. There usually is no follow-up to the ranger's observation. One of the reasons lies in the difficulty for the competent official to remain impartial, most of them being relatives of the offenders. Such conditions should sharply change when the second rules book is accepted and becomes operational.

The second rules book restricts access of fishing zones to the use of specific gear, with authorized zones only using hook, lines (recreational) and small nets (subsistence fishery) and open fishing zones authorizing the use of nets for professional fishers. Industrial boats are allowed to fish beyond the limits of the park. In addition, the second rules book established a few small NTZs. Moreover, the rules book prohibits big fishing vessels from entering the nature park at night to avoid light pollution. The use of spear-guns is prohibited. The rules book provides other technical measures relating to the use of gear as well as the authorized length and size of species.

During the discussion within the Regulation Committee, the Ministry of Agriculture agreed to train rangers as competent officials to monitor, control and survey fishing activities, as fisheries inspectors should do. This element has not been inserted in the draft so far, though required by the nature park administration. The industrial fleet targeting small pelagic at the borders of the park were informed by the fisher organization of the rules book content. None of them objected. Once the rules book is adopted, the nature park administration plans to implement it with a one-year transition, during which any offender will be warned but not sanctioned.

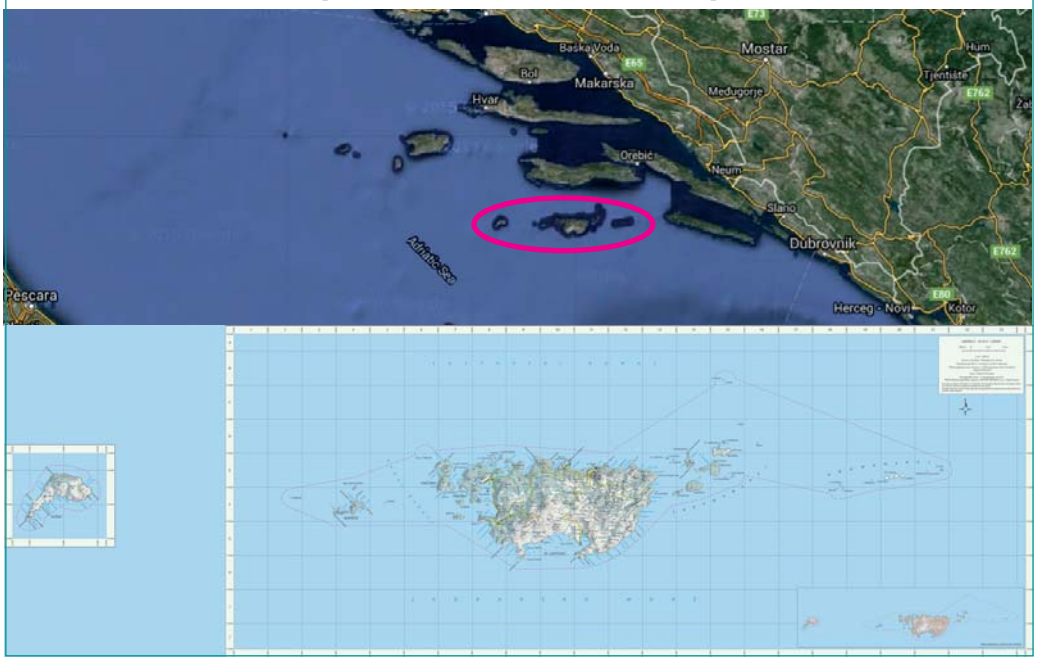
2.5 Active role of a fishers organization in developing no-take zones within MPAs (Lastovo Islands Nature Park, Croatia)

2.5.1 Geographical context

Lastovo Islands is the youngest nature park in Croatia, having been established in September 2006. It is located in the central Adriatic Sea along Dalmatia (GSA 17) and represents the farthest inhabited Croatian archipelago, comprising 45 islands (Figure 2.3). The park extends over a total surface of 195.83 km^2, most of which is an MPA (143.12 km^2). The protection of Lastovo was planned in strategic documents of the Republic of Croatia in 1999. Not long after, this intention was supported by WWF. Actually, WWF declared Lastovo Islands a priority for the preservation of Mediterranean biodiversity in 2003. Then, thanks to the collaboration of the local association Sunce, the local community, the ministry and numerous scientists and volunteers, the Croatian Parliament passed the act declaring Lastovo Islands to be a nature park.

Because of the direct impact of the southern Adriatic high seas, the proximity of the Deep South Adriatic Pit and the position of the archipelago in relation to the direction of the Adriatic Sea currents, this area is less productive, but it is marked by a large number of various plant and animal species. The frequent occurrence of upwelling brings forward mesoplankton and deep-sea species from the Deep South to the Adriatic coast. The diversity of planktonic organisms then causes a great diversity of benthic organisms. So far, 150 species of fish have been found in the park, of which 11 are on the Preliminary Red List of Endangered Vertebrates of Europe and 25 are considered endangered in Croatia.

FIGURE 2.3
Location of the Lastovo Islands Nature Park (Croatia)
[*Source*: Lastovo Islands Nature Park]



2.5.2 Professional, recreational and subsistence fishing fleets

Fishing has a long tradition in Lastovo islands and still represents important sources of revenue for some inhabitants. Although outsider fishers may fish within the park, most fishers are from Lastovo. High spatial resolution data on fishing activity operating within and outside the CM area are unavailable.

In general terms, a large part of fishing activities are carried out by about 45 professional small-scale fishing boats (usually with one fisher per boat; fishing vessels LOA < 10 m) operating on Lastovo Islands fishing grounds, with only 15 among them fishing actively on a daily basis. Most of the professional local fishers have other jobs, with fishing practices being a minor activity. As a result, many of them are unable to go out at sea two or three days in a row, leaving catches dead and inedible. The most active fishers, for whom fishing provides their primary income, complain about this practice.

Fishing is carried out mainly by fishing vessels belonging to Lastovo (40) while five other fishing vessels belong to other islands. This is because the location of the Lastovo archipelago is very distant from the Croatian coast, making the marine area quite unattractive to outsiders and, *de facto*, limiting the fishery access mostly to local fishers.

The Lastovo fishers adopt static gear (nets up to 2 km in length for each boat) mainly to target the scorpion fish (*Scorpaena* spp. which represents about 90 percent of the total catches) and other noble fish like John Dory (*Zeus faber*), common dentex (*Dentex dentex*) and monkfish (*Lophius* spp.) and set traps to catch lobsters (*Palinurus vulgaris*). Lobsters are a relevant target species and are exploited on a seasonal basis. Fishing activities last mainly from February to August. Some fishers recognize that the income resulting from their fishing activities are sufficient to sustain them and their family for the whole year. From September to January, fishers live on their savings and on income from other businesses. Most of them own a restaurant, bar, apartment to rent, etc., while none of them is currently involved in fishing tourism.

Fishers from other islands (about three fishing vessels) operate in the Lastovo area using trawl nets (and/or seines) very close to the shore. Local fishers complain

about this fishing practice, also because it targets the greater amberjack (*Seriola dumerili*) during the migration/reproduction season. Since 2013, the implementation of the Mediterranean Regulation has restricted the scope of this activity, which is now prohibited in protected areas. The nature park administration is trying to insert in the second rules book measures limiting the use of trawl net at more than 500 m from the shoreline and outside the migration season.

50 percent of fishery products are directly sold to supply local restaurants, the remaining catches go to the Split fish market. However, fishers try to prioritise direct sale and fishery products are mostly sold fresh. Some catches are frozen to be sold in the winter.

Recreational fishing is allowed in the nature park mostly for tourists. Such fishers use spear-guns and lines. Spear-gun use is only allowed in five small areas. The targeted species are mostly groupers and John Dory. Persons involved in recreational fishing also need to apply for a permit. Professional fishers do not complain about recreational fishing activity, mostly because the two types of fishers do not use the same fishing grounds and do not target the same species, thus, there is no competition on catches. However, rangers as well as professional fishers reported that IUU fishing from recreational activity occurs, such as fishing in prohibited zones. Moreover, it seems that tourists directly sell catches to restaurants, which leads to illegal competition in the market – an issue that is causing high conflict in the area. There is no control and inspection of restaurants with regard to the origin of the catch so far.

About 80 persons are involved in subsistence fishery. Professional fishers complain often about this activity not respecting management and conservation measures. Subsistence fishing seems to occur within all designed zones mentioned in the first rules book. SSF fishers complain about illegal practices, such as using nets with smaller mesh size than allowed, leaving the fixed gears at sea during two or three days without collecting catches, catching juveniles and fishing in prohibited zones. A person wishing to practice subsistence fishing needs to apply for a permit to the nature park as well as a fishing licence delivered by the Ministry of Agriculture.

Tourism is important for the island economy during the summer, as more than 40 000 land tourists and 37 000 nautical tourists travel here annually. This number is continuously increasing from one year to the next. Tourists from the nautical sphere represent 80 percent of the nature park's income. The local community complains about nautical tourism not providing much income to the local community and to the life of the island, as the expenditure only pays for entrance fees and restaurants.

2.5.3 Historical background on fisheries management

When the country was still part of Yugoslavia, the island hosted a military base with defined military marine zones having the same effect as a NTZ (even though it was created for other purposes). Fishing measures applied in Lastovo Islands were basic but stricter than the existing legislation. However, the fishing practices were more artisanal with less fishing gear, no technology and more fishing resources. There was no operational MCS scheme in place. The management of fishing activities was not effective.

In 2006, the Lastovo Nature Park was created. Ninety percent of the local fishers were in favour of the nature park and decided to define their own fishing rules. They drafted the first rules book with the passive support of the nature park. The pre-implementation process did not involve other stakeholders, such as other fishers or NGOs and scientists. The first rules book was adopted by the management board of the nature park in 2009, with an approval of the Ministry of Environment, Ministry of Agriculture and Ministry of the Maritime Affairs, disregarding the legality of the measures enforced.

As mentioned in the Telašćica case study description, the Croatian National Marine Fisheries Law regarding nature parks changed in 2010, creating legal loopholes.

Under the new law, fishing zones in the nature park were no longer under the Ministry of Environment but fell under the Ministry of Agriculture's authority. The marine areas were integrated into much broader fishing zones at the national level. This change in the competent authority had no incident at first with regard to the implementation of the first rules book, although the Ministry of Agriculture, as in the case of Telašćica, unsuccessfully tried to adopt a new rules book in 2011. As explained in Paragraph 2.4., the Ministry of Agriculture started elaborating the new rules book to regulate fishing activities in the nature park, though without any prior dialogue and consultation with stakeholders, possibly due to the pressure by the EU to implement many rules and transpose them in a short amount of time (which could explain the will to settle legal loopholes quickly). Due to the omission to consult stakeholders, the content of the rules book was not consistent with the issues of the Lastovo Islands Nature Park. Finally, the draft remained unconsidered.

The first rules book provided technical measures for targeted species with regard to length and minimum landing size, as well as closed season. These measures are almost completely the same as the ones provided by national legislation (Marine Fisheries Act) – some are slightly stricter. More relevant are restrictions regarding the nets (length, mesh size, no. of hooks, etc.), as they are definitively stricter within the nature park than outside it. It is worth mentioning that most of the provisions of the Croatian national legislation are actually stricter than the Mediterranean regulation.

Within this first rules book, fishers designated four fishing zones where professional fishing activity was conducted in turns of three years. Zones were used in such a manner that the first and the third fishing zones were used simultaneously for three years and then the second and fourth zones were fished during the following three years. This system was established in opposition to scientific advice that such regulations will not have an effect on recovery of the fish stock and that only permanent NTZs can achieve better status of fish stocks. In 2013, both scientific monitoring results and fishers' experience showed that existing fishery management has no effect (i.e. after the zones were switched, increased catches were registered only for a short while) (IOF, 2010-2011; 2011-2012; 2012-2013).

One explanation identified by fishers was that control and surveillance were non-existent, leading to ineffective management. Rangers did not have the capacity, competence or power to inspect fishing activities at sea or on land. Moreover, conflict of interest made impartiality difficult to respect for rangers, as most of the inhabitants including rangers and fishers are relatives or involved in the same business. The sanction scheme also appeared ineffective with no incentives and very low fines.

Fishers did not take responsibility and committed IUU fishing activities. Finally, when defining the rules, fishers did not take other stakeholders' activities into account, such as recreational and subsistence fisheries, both of which have a non-negligible impact on resources.

In addition, the rules book provided measures to limit fishing ground access. The concept was to restrict access through the 45 fishing licenses (or permits): 40 licenses were intended for local fishers and five for outsiders willing to fish in the area. The 40 local licenses were not based on historical activity within the area, as there never had been any data collection and no evidence of such activity. Again, the marine areas of Lastovo Islands belong to a much broader national fishing zone (actually, 3 zones). As a result, outsider fishers started to complain about this exclusivity clause and took the case to court. In 2013, the National Court of Justice declared three articles of the first rules book unconstitutional, recalling the impossibility to limit the number of fishing licenses in parks according to the existing law. Since 2013, a few outsider fishers, in addition to the local fishers, have operated within the nature park, as it is now an open space. Other articles of the rules book (e.g. minimum landing size, gear features) are still applied. Local fishers asked for help from both ministries and the nature park administration, but two years passed without the situation being resolved.

2.5.4 Triggering and building co-management

From 2009 to 2012, through the MedPAN South project, the nature park administration, with the support of Sunce and WWF, started to elaborate the management plan of the nature park, including the park's zoning. Fishers were directly involved in the zoning part of the plan. Because the fishers wanted to wait for the results of the rotational zoning experiments, only two NTZs were defined jointly with fishers, based on scientific advice. The Management Plan went through the public hearing procedure in 2012 and no comments related to fisheries were obtained, but the management plan has still not been adopted. After the fact mentioned above that in 2013 both scientific monitoring results and the experience of fishers showed that existing fishery management had no effect, the nature park initiated a process of revising the four fishing zones. One meeting and two workshops were held in 2014 jointly by the scientists, fishers, nature park and NGOs and a first draft containing 15 NTZs (covering 11.05 percent of marine area) was agreed. However, because of the above-mentioned situation regarding the unwillingness of the both ministries to regulate fisheries on Lastovo Islands and internal restructuring within the fisher organization, the process was not continued. Pressured by the fishers, in 2015 the Ministry of Environment retreated and recalled fishing zones in the nature park, although the decision was never backed up by regulation.

The Ministry of Agriculture stepped in eventually in 2015, proposing a draft rules book that did not satisfy stakeholders' expectations. The rules book was being designed by the Ministry of Agriculture through an official consultative process, as required by EU CFP, establishing a consultative Regulation Committee to design the Lastovo rules book as well as the one for Telašćica (see further details on this case study at Paragraph. 2.4). Four meetings have been conducted so far, gathering representatives from the fishing sector, the Ministry of Environment, NGOs and scientists. The nature park administration was not foreseen in the discussion but joined the committee at its demand.

Owing to an unsteady fisher organization unable to propose a common position, as well as a powerless nature park administration and general frustration from NGOs regarding the Lastovo case, the draft rules book was eventually defined by the Ministry of Agriculture. As explained above, the Ministry of Agriculture chaired a consultative Regulation Committee that was launched to gather proposals from the various stakeholders and insert them in the rules book. However, no recommendation was proposed by fishers due to internal conflicts and the incapacity to reach a common position. The nature park administration sent their proposal to the Ministry of Agriculture and presented it at the Regulation Committee. The park proposal was based on the above-mentioned series of workshops with fishers that were held in 2014, but the proposal was reduced to seven NTZs covering 4.46 percent of marine area. Scientists, the Ministry of Environment and NGOs backed the nature park proposal. The Ministry of Agriculture also pushed for the inclusion of NTZs, but the representative of the fisher organization did not agree.

A range of stakeholders participated in the consultative process established by the Ministry of Agriculture, including SSF fisher representatives, MPA authorities, NGOs (Sunce and WWF), the Ministry of Environment and scientists.

No clear consensus on some of the problems to be tackled was present in this stakeholders' group. They all agreed on the crisis of catches, the need to combat IUU fishing activities, the issue of the environmental impact of fishing, the general failure in fisheries management as well as in poor nature park regulation due to staff capacity and lack of equipment, including the lack of a traceability scheme (no data on fishing activity).

However, different opinions (particularly between fishers) arose in relation to the presence of a reduction in revenues, conflicts with other fisheries, as well as in the approach to the enforcement of new regulations. The lack of a common understanding of the current situation and the lack of agreement on the approach to tackle such issues

resulted in the impossibility to provide a tangible contribution to the definition of the second rules book, thus resulting in the application of a typical top-down approach from the managing authorities.

2.5.5 Future co-management settings

The Ministry of Agriculture submitted a first draft to the fishers of Lastovo. The first draft did not seem to take any elements required by the local fishers into account. However, some proposed measures provided seven concession rights to one outsider fisher from Split, thanks to efficient lobbying to the Ministry of Agriculture. The measures were considered inappropriate by the local fishers and were then withdrawn. However, fishers did not take the opportunity to submit recommendations to improve the draft.

The rules book draft regulating fishing activity in Lastovo seems to include nothing different from the general code of fishery. Some technical measures might be stricter than the national regulation but nothing refers to specific zoning or limited access. The fishers, unable to agree on a common position, did not provide any constructive elements to work on in the consultative process. Internal conflict impedes the fisher organization to present constructive comments. The organization is divided into two groups, one promoting the NTZ (as all used to promote in the past). On the other hand, the majority of fishers are sceptical of any changes and do not want to adopt any other measures than the ones provided in the fisheries code, unless the draft includes a clause of limited access only to local fishers. The representative of the fisher organization has the majority and is not in favour of an NTZ.

The second rules book regulating fishing activities in the nature park should be adopted within the coming months by the Ministry of Agriculture. A draft was sent to the public hearing in September 2015, but it has still not been adopted, due to the fact that parliamentary elections were held in November 2015 and the new government was only recently set up in January 2016.

There is no improvised cooperation at the local level. Fishers are not motivated to be involved, as they were for the first rules book. They have lost confidence and the nature park administration does not communicate sufficiently with them.

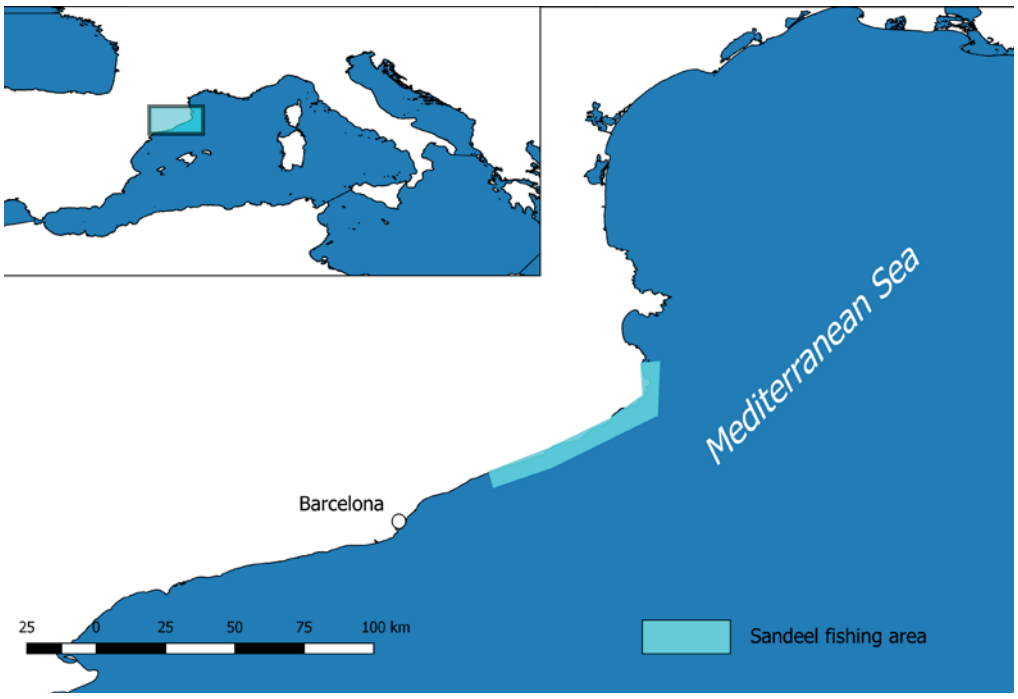
Since 2013, local fishers have lost faith in the legal framework due to confusion at the ministerial level and passivity at the nature park level. The administration was unable to intervene and support them. Moreover, the lack of support led to a division within the fisher organization and the emergence of opponents to NTZs. Most of the fishers are now trying to blackmail any initiative, asking primarily for limited access to the fishing grounds at their advantage before agreeing on any other action. The fisher organization is represented in the Regulation Committee as well as the nature park administration, however, their participation lacks constructive opinion, as the fishers struggle with divergent opinions and the nature park is unable to communicate effectively. As for the rangers of Telašćica, the Ministry of Agriculture committed to train rangers of Lastovo and empower them to fulfil the duties of fisheries inspectors.

2.6 Success and challenges faced by the sand eel fishery co-management committee within its four years of existence (Sand eel fisheries, Catalonia, Spain)

2.6.1 Geographical context

The sand eel fishery occurs within Spanish territorial waters in the Catalan region, from the north of Barcelona to the French border (Figure 2.4). The fishing ground occupies a quite narrow area along the coast due to specific geographical constraints, given both the limited size of the continental shelf and the spatial distribution of the target species. Fishers typically operate in shallow water, using boat seines within

FIGURE 2.4
Location of sand eel fishing activities (Catalonia, Spain)
[*Source*: S. Raicevich, based on B. Company picture, redrawn]



three nm of the coast or within the 50 m isobaths, where that depth is reached at a shorter distance from the coast. The fishing ground is constituted mostly of sandy bottoms.

2.6.2 Professional, recreational and subsistence fisheries

The sand eel fishery consists of 26 fishing vessels using the boat seine (locally named *sonsera*). The 26 fishing vessels are small (i.e. LOA < 10.0 m, about 75 KW engine) and belong to seven ports of the central and northeast coasts of Catalonia (Barcelona, Badalona, Arenys de Mar, Blanes, Palamós, Sant Feliu de Guíxols y L'Estartit). Boats operate on a daily trip basis, going to fish five days a week early in the morning when sand eels leave the seabed. Fishers search for schools using echo sounding and after one to three hauls, return to port to sell the catch (Lleonart *et al.*, 2014).

The annual quota is set at 819 tonnes per year. There are two species of sand eel in Catalonia: Mediterranean sand eel (*Gymnammodytes cicerelus)*, by far the most abundant species and smooth sand eel (*Gymnammodytes semisquamatus*). Both individual species rarely reach 15 cm in length and are caught on shallow sandy bottoms (between 5 and 10 m depth).

Fishing vessels operate throughout the season, except during the closure season for reproduction (16 December to 28 February). Bycatch is low and most of it can be released alive.

With minor gear adaptation, most of the fishing boats also catch small gobies (*Aphia minuta*, *Crystallogobius linearis and Pseudaphia ferreri*) between November and May, partially overlapping with the sand eel closure. This activity is carried out on muddy or sandy-muddy bottoms on deeper fishing grounds, as compared with the sand eel fishery (until 30 m).

Sand eels are used for human consumption and are consumed fresh. A very small proportion of the catch is intended for bait. They are sold at the local, national and international markets (mainly exported to Italy and Greece).

In the period 2000–2012, prices ranged between 1 and 5 €/kg, with a mean price of about 2 €/kg. The price increased to 3.50 €/kg in 2013, the highest annual mean on record (Lleonart et al., 2014). The following season, 2013–14, the price kept rising up to an average of 4.60 €/kg allowing a stable profit per vessel despite diminishing catches. Unfortunately catches crashed and the fishery was closed on 17 June 2015. Due to the low catches (61 tonnes in 2015, compared with the 819 tonnes annual quota), the average price reached 11.26 €/kg.

Other fleets, both artisanal and industrial, operate in the same fishing ground but none of them are authorized to catch sand eels. There seems to be no direct conflict with the other fleets, except with a few artisanal fishers who wish to access the sand eel fishery. Those fishers could have fished sand eel before the enforcement of CM with investment in the appropriate gears, but did not. After 2012, fishery access was limited only to the 26 fishing vessels who were previously involved, based on five historic years, as required by the Mediterranean Regulation. Other fishers wanted to join this fishery only after noticing the economic benefit.

Recreational fisheries and diving are in great demand in the area, but do not cause any conflicts with sand eel fisheries. Subsistence fisheries are not present in the area.

2.6.3 Historical background on co-management setting

The first regulatory framework specific for the fishery was adopted in 1987 thanks to a fishers' initiative. The seasonal closure during the reproduction period (15 December to the end of February) was a key element decided by fishers based on their TEK. Management measures adopted in recent years also include a closed census of authorized boats with technical measures on gears.

Fishers admit that before the adoption of the CM plan, only technical measures on gear and the seasonal closure were respected by fishers. IUU fishing activities at sea emerged as a consequence and more than 80 percent of catches supplied the black market. Control was not efficient and sanctions were not deterrent.

In 2006, the Mediterranean Regulation came into force, prohibiting the use of boat seines, as these were used in terms of mesh size, depth and distance from the coast. The Catalan sand eel fishery fell under this provision and was, thus, not authorized anymore. The Mediterranean Regulation provides derogation under the following conditions:

- the fishery zone is justified by particular geographical constraints;
- the fishery has no significant impact on the marine environment;
- the fishery affects a limited number of vessels;
- the fishery cannot be undertaken with other gear; and
- the fishery is subject to a comprehensive management plan based on adequate scientific monitoring.

Between 2006 and 2012, no management plan was presented to the EC, which led Spain to face the threat of heavy sanctions imposed by the EC. In March 2012, the Spanish administration decided to close the fishery one day before the start of the fishing season without notice. Fishers were completely disconcerted by the announcement, as they were unaware of the political situation.

2.6.4 Triggering and building co-management

The CM activities were triggered by the EU restriction on fishing activities, according to the Mediterranean Regulation. The application of such regulation and the inactivity of the central administration to solve the problem induced a small group of fishers to engage the local administration, NGOs and scientists to solve this problem. In this stage of the process, fishers played a proactive role while NGOs acted as facilitators. This approach ensured that local and central administrations and scientific institutions played an active role in the CM implementation phase.

After the administration's decision to close the fishery, a few fishers took on a very active role to solve the issue. From 1 March to 23 April 2012, a few fishers involved in the sand eel fishery mobilised NGOs, scientists and the local administration to gather and co-manage the fishery. Once they succeeded, they motivated the remaining fishers to join the process. A committee co-managing the sand eel fishery was created on 23 April 2012.

For less than two years, scientific studies were undertaken through a scientific fishery. A management plan based on scientific advice was adopted and approved by the EC in 2014.

In June 2012, the CM committee obtained EC approval to undertake a scientific fishery under highly strict and precautionary rules over a period of 18 months. The purpose of the scientific fishery was to carry out the scientific study needed to develop the management plan as required by the 2006 Mediterranean Regulation. A Co-management Committee was created in order to manage this scientific fishery. During this period everything worked as if a proper long-term management plan (LTMP) had already been approved; actually it was sort of a LTMP trial period. The scientific monitoring was 60 percent funded by sand eel fishers, while the autonomous government funded the remaining 40 percent. The financing system is sustained for control and enforcement. Fishers as well as other stakeholders want to ensure continuity of the model.

The scientific fishery indirectly enabled fishers to continue with their activity. The Mediterranean Regulation (Article 7) allows a community fishing vessel to fish for scientific purposes only if indicated in a valid fishing authorization. The same regulation also allows for commercialisation of the catches when they are carried out for scientific purposes (Article 33). Finally, fishing activity for scientific purposes is exempted from the obligation to comply with the technical measures provided by the Mediterranean Regulation.

Fishing effort was reduced by 40 percent in comparison with previous seasons, when 25 fishing boats were operating regularly. A rotating procedure was established in order to avoid imbalances with ten boats per day for five days a week on all working days during the fishing season. Fishers started to see benefits right from the start, going out to sea less and catching more. This was a good incentive to encourage them to believe in the success of CM. A management plan was adopted based on the scientific study. The fishery was officially re-opened in 2014 once the EC approved the management plan.

The management plan for boat seine fishery was approved for a period of five years, with a revision after three years from the start (2016). After formal approval of the management plan from the EC, the sand eel CM committee continued close follow-up and monitoring of the fishery. The scientific monitoring will also support compliance with the European legislation requirement of revising annual management measures that affect short-life species such as the sand eel. The commitment for financial support by fishers is essential to guarantee continuity of the committee's activities and, therefore, the long-term sustainability of the fishery.

Several key elements contributed to the success of this experience: i) the fishery crisis put both fishers and managers on the edge and they agreed to walk together towards a shared solution, fuelling proactive participation; ii) the CM Committee is a real decision-making body, meaning that the meetings and the whole process has an obvious ability to influence reality (i.e. fishing activity): real time adaptive management has been achieved, including the possibility to sanction (see below for further details); and iii) an atmosphere of mutual trust between the various stakeholders has been built within the permanent working group of the CM Committee. This allows open discussions where real problems are brought to light and new solutions are sought.

2.6.5 Current co-management setting

The fishing activities are covered by a three-year management plan that needs to be renewed next year. The CM plan is steered by the CM Committee which includes representatives of various stakeholders, including managers, NGOs and scientists (i.e. Catalan Administration – Direccio General Pesca i Affers Maritims, Spanish administration – Dirección General de Pesca, Institut de Ciencies del Mar, WWF, Greenpeace). Moreover, within the permanent working group there are two fishers, one representing fishers from Barcelona province and another from Girona) while in the plenary the institutions represented are the Catalan Federation and the Girona and Barcelona Federations. The permanent working group of the CM Committee meets every month to monitor the performance of the fishery and take decisions. Representatives have a collaborative and trustful attitude that allows fruitful discussions, resulting in effective and adaptive management. Fishers record their fishing activities and catches (i.e. haul by haul catches, discards, time and position of fishing activities) in a detailed catch form which is then sent to the managers and scientists for monitoring. Moreover a fisher representative is in charge of collecting, digitalising, analysing and presenting fishery dependent information for its evaluation during the CM Committee's working group meetings. Further to this, scientific monitoring is carried out by the ICM-CSIC (Marine Science Institute of the Spanish Research Council), with weekly onboard observations and the delivery of scientific advice to support the implementation of the CM plan. Before the fishing season starts, the CM Committee call a meeting with all the fishers to review the previous fishing season and to ensure proper communication and understanding. Moreover, the CM committee may call for an extraordinary meeting when needed. The CM Committee, in the case of an accredited lack of compliance, can temporarily withdraw the fishing permit from 3 to 5 years depending on the severity of the infractions. Non-compliance with the rules is evaluated by the Permanent Commission. However, in order to ensure adaptive management, the LTMP establishes that the CM Committee can take precautionary measures while the disciplinary procedure is being submitted. This procedure was established because, during the experimental fishing period, the CM Committee noticed how important it was to have the capacity to impose disciplinary measures immediately after the infraction occurs.

The current CM plan implemented for the sand eel fisheries includes several measures:

- technical measures:
  - fishing gear restrictions and seasonal closure during the reproduction season. The fishing gear can only operate in sandy bottoms and never over marine sea-grass beds or rocky bottoms; and
  - Fishing vessels capacity restrictions (only 26 are allowed to operate with a historic track record of more than five years in the fishery, as required by Art. 13.9) of the Mediterranean Regulation.
- minimum sizes: although this does not apply to the case; fishers agree to catch less at the beginning of the season to let juveniles grow;
- individual community catch quota: quotas are set up at a minimum for the first months of the fishery as the stock is more constituted of juveniles; the quota increases with the yield level. Fishers can share their quota among the 26 fishing vessels having the same base port per boat and based on the number of crew. Daily quotas per vessel are revised and adapted monthly;
- global catch quota: 819 tonnes and monthly quotas;
- individual community effort quota: fishing time from 6:00 or 7:00am (according to the month) to 2:00pm;
- licence: one general licence per artisanal fishing boat and one specific licence for the sand eel fishery; and
- MCS by CM institutions: the management control rules for the sand eel fishery were based on standard methodologies and take into account the precautionary

approach (Caddy, 2009). All stakeholders are involved and fishers cooperate with fisheries inspectors. Also, to ensure transparency and control efficiency, all catches shall be landed in designated areas for the first sale. Moreover, the CM plan provides strict measures for the association of vessels and is only possible for vessels from the same base port. Daily catches are strictly controlled: 10 percent excess allowed from Monday to Thursday to be then adjusted on Friday. Fishers are sanctioned a double penalization when catches exceed 10 percent (on profits and on the following monthly catch).

In addition, market measures are enforced. As a general rule, the fish should be sold at the market associated with the base port where the first sale note is generated. If this is not possible, then the fish should travel together with a transport document to another fish market, always within the Catalan territory. Also, in order to optimize the catch value, the committee tries to influence the market price in order to avoid overexploitation and create more demand than supply. The full commercial catches must be sold by official auction.

The results of this CM seem very positive, with all stakeholders supporting the project. Since the creation of the CM Committee as well as the adoption of the management plan, economic profitability has increased. Fishers earn and catch more (30 percent increase) with lower fishing effort.

The CM Committee also ensures sustainable exploitation of both sand eel and goby species. The main issues regarding the sustainability of boat seining are the following:

- the fishery of both, the main target species (sand eel) and the minor one (transparent gobies), must be sustainable with respect to the target species;
- the activity of the *sonsera* must not be detrimental to vulnerable habitats, and must avoid fishing on sea-grass meadows; and
- the bycatch, if any, must be very low (i.e. up to one percent and no more than 5 kg).

The CM of the sand eel generated mutual trust and collaboration, ending internal conflict and competition among fishers targeting the same species. However, in setting up measures such as freezing fishing effort, some fishers not targeting the sand eel started to contest the system. They now wish to be part of this fishery and to benefit from the same profitability.

However, the fishery has been closed for two months. Fishers are struggling with the fish which stay hidden. This phenomenon happened in the past as well. According to scientists, the temperature of the warmer winter waters may explain this phenomenon.

The CM committee is currently facing a crucial phase. Despite the success of the management, the fishery has been closed since mid-June 2015 and the economic situation is becoming less and less viable for fishers. This closure was taken due to a sharp reduction in catches. According to scientists, this phenomenon (which is not new in the area) could be explained by the warmer seawater temperature faced in the last period, which might have influenced fish behaviour and, thus, catches.

Fishers could have lost their patience and motivation and decided to fish no matter what or to go out sea targeting various species. However, for now, they show presence of mind and try to propose suitable solutions. Discussions within the committee are very constructive among all stakeholders.

2.7 Comparative assessment of case studies

In this section, we provide a comparison of case studies with the aim of highlighting some peculiar aspects that were previously not fully addressed in the earlier paragraphs. In particular, the focus is on aspects that are considered fundamental for enhancing stakeholder participation in management and CM. More prominently, a first focus is related to the knowledge base (Par. 2.7.1; see also Par. 1.4.1) used for fisheries management before and after the CM implementation, to assess how different kinds of knowledge were used in such a context. We later assess the role played by fishers

and fisher organizations within the CM definition and implementation process, to assess the degree of involvement reached in such a context (Par. 2.7.2). The outcomes of participation in terms of fisher empowerment are also considered (Par. 2.7.3) along with the conditions that foster stakeholder participation (Par. 2.7.4) and the barriers that still prevent the full involvement of fishers in the CM schemes within each case study (Par. 2.7.5). Based on the application of the framework proposed by Gutiérrez *et al.* (2011), the potential and effective success of each case study is assessed.

All this information feeds a final assessment of the lessons learned from the ongoing experiences on CM in the Mediterranean SSF.

2.7.1 The knowledge base used for fisheries management and CM

The case studies showed differentiated use of knowledge used for fisheries management prior to the setting of the CM plans, with EBK being the most widespread source of information used for this purpose (Table 2.1). Indeed, fisher knowledge of species seasonality and ecology was the only knowledge that was used within all case studies, while empirical knowledge of catch trends, habitat distribution and fisher behaviour and strategy contributed to the CM setting in three out of four case studies. Self-sampled data and fisher logbook data were used in three case studies – Taza (Algeria), Telašćica (Croatia) and sand eel (Catalonia), respectively.

TABLE 2.1
Knowledge based categories and topics used for fisheries management within the selected case studies before and during co-management implementation

KNOWLEDGE BASE USED FOR FISHERIES MANAGEMENT WITHIN THE SELECTECT CASE-STUDIES	BEFORE co-management implementation				DURING co-manag. implem.
Knowledge base category/topic	**Taza (Algeria)**	**Telašćica (Croatia)**	**Lastovo (Croatia)**	**Sandeel (Spain)**	**Sandeel (Spain)**
Natural science knowledge					
Stock assessment					■
Trawl surveys		■	■		
Trends in fisheries catches and CPUE			■		■
Species' seasonality and ecology		■		■	■
Habitat distribution	■	■			■
Studies on environmental effects of fishing	■		■		■
Social science knowledge					
Fishermens' behaviour, values and strategy	■	■	■		
Ethnobiology					
Analysis of fishers communities		■			
Societal perceptions on fishery impact	■				
Economy and market processes	■				
Administrative knowledge					
Incomes	■			■	■
Number of fishers and fishing vessels	■		■	■	■
Fishing capacity	■			■	■
Rules and regulations				■	■
Experience-based knowledge (EBK)					
Empirical knowledge on trends in catches		■	■	■	■
Species' seasonality and ecology	■	■	■	■	■
Habitat distribution	■	■		■	
Fishermens' behaviour and strategy	■	■	■		■
Self-sampled data on CPUE					■
Self-sampled data from trawl-survey		■			
Fishers' logbook data	■				
Trade in fish					■

In contrast, the use of natural science knowledge was somehow limited and differed among case studies comprising trawl surveys data, trends in the seasonality and ecology of CPUE, species, habitat distribution and studies on the environmental effects of fishing. No knowledge based on stock assessment was used prior to the implementation of CM. It is worth noting that in the context of the sand eel case study (the only one where the CM implementation was carried out), the use of natural science knowledge became extensive compared with the pre-implementation phase. In particular, stock assessment, trends in CPUE, species seasonality and ecology, habitat distribution and studies on the environmental impact of fishing were used. This shows how the actual implementation of CM needs continuous monitoring of the status of the resources adopting both fishery-dependent and fishery-independent assessments.

Social science also played a role in fisheries management before the CM setting. However, its use was mainly restricted to knowledge of fisher behaviour, values and strategy (used in all case studies, apart from the sand eel case study), while in two single case studies, the analysis of fisher communities regarding the societal perception of fisheries impact and economic analysis were also considered. Notably, within the sand eel CM implementation, no social science knowledge was acquired or used.

The use of administrative knowledge was mainly restricted to two case studies – the Taza and the sand eel ones – which considered incomes, the number of fishing vessels (also used in the Telašćica case study) and fishing capacity. The sand eel case study also used knowledge of rules and regulation. In this case study, administrative knowledge was used both in the CM pre-implementation and implementation phases.

2.7.2 The role of fishers and their organizations

The role of fishers and their organization in the CM plan definition and implementation differed according to the case studies (Table 2.2).

In Taza (Algeria), fishers were reluctant at first because they considered the MPA as a constraint without seeing its potential benefits. For them, the most important threat to resources was pollution. However, thanks to the dialogue established by the administration, they later engaged in the CM proposal. The attribute that mainly qualified the fisher community in the CM process was the agreement on establishing the MPA and a prominent role played in decision-making, especially for the definition of zoning rules. Many leaders were present among the fishers, identified according to their years of experience and their proactive roles. However most of the fishers considered themselves as leaders. No active fisher associations are currently established in this area (although they did exist in the past); therefore, fisher organizations did not participate in the CM plan definition.

In Telašćica (Croatia), fishers were mobilised by the MPA administration and were actively involved in defining the proposal for the second rules book and the zoning of the MPA. They are now active and collaborate easily. Possibly due to the lack of a strong fisher community, there are no fisher organizations. The agreement on the

TABLE 2.2.
Role of fishers within the selected case studies in the co-management implementation process. Green = positive answers.

Which is the role of FISHERS in the CM implementation	Taza (Algeria)	Telašćica (Croatia)	Lastovo (Croatia)	Sand eel (Spain)
Passive				
Just respecting the plan				
Fully involved in the enforcement of Monitoring (data collection)				
Fully involved in the enforcement of Data analysis and interpretation				
Fully involved in the enforcement of Surveillance				
Fully involved in the enforcement of Control implementation				
Fully involved in the enforcement of Decision making				
Fully involved in the enforcement of Promoting sustainable fishing				

opportunity to participate in the definition of the second rules book was the main attribute of the fisher community in the CM process.

In Lastovo (Croatia), about half of the fishermen joined a fisher organization and the others were used to following the position of this organization. While the organization was strong and voted unanimously in favour of the first rules book, its role weakened over time, particularly in 2013, when the rules book was declared unconstitutional. The following change in the fisher representative did not increase trust and collaboration among fishers, and the fisher organization was unable to provide a common position on the second rules book because they acted against NTZs (differently from the past), proposing only exclusive territorial rights, a proposal that was not agreed upon by all fishers. Thus, while the fisher community was characterised by a tradition of self-implementation of rules in the past, the current disagreement with the second rules book did not result in constructive, agreed-upon proposals despite the general agreement on the need to take part in the process.

In Catalonia (Spain), six fishers (all MedArtNet members) initiated dialogue with several stakeholders, NGOs and the administration to solve the issue of the sand eel fishery. They expressed their willingness to improve the fishery and all fishers agreed on the rules and on the possibility that their licences could be withdrawn in case of non-compliance with the rules. Many leaders (i.e. fishers) were present in this process. During the implementation of the CM plan, new attributes of the fishing community emerged, encompassing leadership, self-organization, self-enforcement, social cohesion and the capability to influence the local market. It is worth mentioning that the profitability of the sand eel fishery and the restricted number of licences is now attracting other fishers who are excluded from such activity and claim the right to join it.

2.7.3 Empowerment of the role of fishers through participation

The participation in CM planning (and implementation) empowered fishers, enhancing their role in several contexts (Table 2.3). However, differences among case studies have been detected.

All the case studies reported that fishers, through the CM process, increased their understanding of scientific knowledge and management approaches, and increased their role in the decision making. In addition, the establishment of mutual trust and collaboration was seen as empowering fishers in all case studies. In terms of MCS, only fishers joining the sand eel case study showed an increased role in such activities,

TABLE 2.3

Results of fisher participation in co-management planning and implementation according to various case studies. Green = empowerment achieved

The participation to the CM planning and implementation empowered fishers role increasing:	Taza (Algeria)	Telašćica (Croatia)	Lastovo (Croatia)	Sand eel (Spain)
Understanding of scientific knowledge				
Understanding of management approaches				
Role in decision making				
Role in monitoring				
Role in surveillance				
Role in control				
Promotion of sustainable fishing				
Influencing the fish market				
Increase product value and quality (labelling, size selection, etc.)				
Capability to influence other fishery sectors				
Capability to influence other sectors (e.g. tourism, divers, etc.)				
Mutual trust and collaboration among fishers				
Mutual trust and collaboration with scientists				
Mutual trust and collaboration with NGOs				
Mutual trust and collaboration with administrations				
Enhance the role of fishers in the local community				
Provide a better “image” of fishermen in the society				

while for the two case studies from Croatia, only an increased role in monitoring was revealed or expected for the future. It is worth noting that some fishers from the Croatian case studies reported that they were not willing to play a role in relation to control and surveillance, because they preferred or were expecting an independent authority (e.g. park rangers) to carry out such activities, possibly to avoid personal conflicts among them. The promotion of a sustainable fishery was also shown to empower fishers in all case studies, apart from Telašćica (Croatia). The increase in mutual trust and collaboration with NGOs and the administration characterised all case studies apart from Lastovo, while in two out of four case studies, fishers felt empowered by an increase in mutual trust among fishers (Telašćica and sand eel). Notably, in most of the case studies, participation in CM planning and implementation did not affect the fisher's ability to influence other fishery sectors, or other economic sectors, and did not enhance substantially the role of fishers in local communities or provide a better image of fishers in society. In this context, the sand eel case study represents a notable exception because this case study reached a remarkable impact on Spanish and Catalan media. Moreover the CM Committee members were invited to national and international events to present their experience. The Committee was also awarded the WWF Award for Conservation merit in 2013, contributing to improving the image of fishers in society.

2.7.4 Conditions that strengthen the role of fishers in CM

Informants participating in different case studies were asked to provide their vision on the conditions that they considered fundamental to strengthen the role of fishers in CM, based on their experience (Table 2.4). Various topics were proposed, subdivided into three main categories: the case study context, process and legal framework. In general terms, the answers from the Telašćica case study differed significantly from others; only two features were mentioned as being essential and most of the others as useful. The Taza and Lastovo case studies provided similar answers while the sand eel case study differed, mentioning almost all the topics proposed as essential. Overall, an agreement emerged (at least three case studies out of four) that the conditions which strengthen the role of stakeholders are: i) context: failure in fisheries management, presence of leaders, interest in collaboration of stakeholders and policy makers, bad status of fisheries resources and fisher cohesion; ii) process: establishment of mutual trust and collaboration of fishers with scientists, administrations and decision-makers; and iii) legislative framework: presence of national legislative acts and derogation of power, the setting of access rule, effective enforcement of rules and MCS. Further details are reported below (see also Table 2.3).

Context

All case study informants reported that most of the conditions listed were essential to strengthen the role of stakeholders. In particular, the failure in fisheries management, presence of leaders, the interest in collaboration of stakeholders and policy makers, bad status of fisheries resources and fisher cohesion were seen as essential by three out of four case studies. Only the Telašćica case study indicated that such conditions are useful but not essential. The presence of an MPA/NTZ was seen as not relevant in the sand eel case study, the only one which dealt with CM implementation outside MPA. Interestingly, the presence of facilitators was mainly seen as useful, but not essential, apart from the Taza case study. It is worth noting that three case studies reported both bad and good status of resources to be fundamental to strengthen the role of fishers stakeholders. This apparent incoherence can be rationalized considering that, as reported by some case study participants, the bad status of resources may trigger stakeholder participation, while reaching a good status of the resource helps keep fishers engaged in the CM process, allowing them to see tangible results from their participation.

TABLE 2.4
Conditions that are considered to be fundamental to strengthen the role of fishers in co-management. E = essential (green); U = useful (yellow); NR = not relevant (orange)

Conditions considered to be fundamental to strengthen the role of fishers in co-management?	Taza (Algeria)	Telascica (Croatia)A	Lastovo (Croatia)	Sand eel (Spain)
Context				
Failure in fisheries management (as a trigger to collaborate)	E	U	E	E
Crisis in economic viability of the sector (as a trigger to collaborate)	E	U	U	E
Presence of leaders	E	U	E	E
Strong representativeness of fishers organizations	E	U	E	U
Interest in collaborating of stakeholders	E	U	E	E
Interest in collaborating of policy-makers	E	U	E	E
Presence of an MPA/ZTB (restricted access)	E	U	E	NR
Good status of resources	U	U	E	E
Bad status of resources	E	U	E	E
Fishers cohesion	E	U	E	E
Presence of facilitators	E	U	NR	U
Process				
Establishing mutual trust and dialogue	E	U	E	E
Working together with other fishers	E	U	U	U
Working together with scientists	E	U	E	E
Working together with administrations	E	U	E	E
Working together with decision makers	E	U	E	E
Working together with NGOs	E	U	U	E
Involving fishers in surveillance	U	NR	NR	E
Involving fishers in control	U	NR	NR	E
Involving fishers in monitoring	U	U	U	E
Involving fishers in data interpretation	NR	U	U	E
Other (please specify)			*	
Legal framework				
In situ formal regulation (e.g. MPA rules)	E	U	NR	E
Local legislative act	U	U	U	U
National legislative act	E	E	E	E
Power derogation from central administration to local CM and stakeholders	NR	E	E	E
Setting of access rules (please specify)	E	U	E	E
Setting of property rights	NR	N	NR	U
Setting technical measures	E	U	E	E
Formal recognition of self-regulation proposed by fishers	E	NR	U	E
Effective enforcement of rules	E	U	E	E
Effective enforcement of control/surveillance	E	U	E	E
Effective enforcement of monitoring	E	U	E	E

Process

Regarding the process to be adopted to strengthen the role of stakeholders, establishing mutual trust and working with scientists, administrations and decision-makers are considered essential features by three out of four of the case studies. Notably, the involvement of fishers in MCS and data interpretation was considered not relevant or only useful by three out of four case studies, with a marked difference in opinions from the sand eel case study, which considered such items as essential. Working together with other fishers was considered to be useful by most of the case studies, with only Taza case study referring to it as essential. Fishers from all the case studies shared the same positive point of view on the added value of learning from other co-management experiences. Moreover the participants in the Lastovo case study highlighted the value of learning from other successful CM experiences through exchanges that allow fishers from different areas to share their experience.

Legal framework

All case studies agreed on the essential role of a national legislative act to strengthen the role of fishers, while local legislative acts were seen as useful but not essential by all case studies. Moreover, the derogation of power from the central or state to local authorities was considered essential by three out of four case studies, with the exception of Taza, which considered such an attribute to be not relevant. However, in Taza power

derogation to local authorities is not a real issue with regards to fisheries; this process already occurs from the central state to the *wilayah*. The effective enforcement of MCS was reported as essential in the majority of case studies, along with the setting of access rules and technical measures. Interestingly, the formal recognition of self-regulation property rights was seen as essential only by half of the case studies, and the setting of property rights was not considered essential by any of them.

2.7.5 Barriers that prevent the full involvement of fishers

The barriers that prevent the full involvement of fishers in CM differ according to each case study.

In Algeria (Taza case study), the lack of fisher organizations hampers the functioning of the fishers' chamber, which aims to link the sector with the organization. Case study informants remarked on the need to establish a form of association (possibly an association per single fleet/gear) that could also act with new generations of fishers to enhance their long-term vision and consciousness regarding the need to achieve sustainable practices.

In Telašćica, no apparent barriers are present at the local level, although overall a need to protect SSF from industrial fisheries was reported. Moreover, there would be the need to authorize direct sale of the products to fishers, to avoid passing by middleman who keep prices low.

The Lastovo case study reported the presence of many barriers. These included conflicts among fishers, the lack of effective leaders due to low social cohesion in the community, the disengagement or lack of support and communication from nature park administration to fishers, legal loopholes and the administration's passivity, the lack of an effective MCS and traceability scheme and the lack of fishing tourism activities due to lack of capacity and support.

In spite of the notable achievements of the sand eel case study, the presence of barriers in the framework of its CM implementation process have been reported. In particular, the closed census (determined by Art.13.9 of Mediterranean Regulation) and high revenues during the first two fishing seasons has created a deep discomfort (leading to confrontation and even formal litigations) among the rest of the fishers from the same harbours. Moreover it is still difficult to establish a legal framework which fully supports the CM Committee as a decision making body (which is a key element for success). So far the autonomy gained by the CM committee relies on a deal with the local authority (and the implicit acquiescence of the national one). Further to this another challenge is represented by the recent reduction in catches (possibly due to climatic effects) which was mentioned above.

Beyond peculiarities, some other relevant information arises from the survey. In particular, administrative blockage between entities that share roles in the fisheries sector could have a detrimental effect. A typical case is the issue of parallel responsibilities of various ministries – for instance, the Ministry of Agriculture and the Ministry of Environment – or between national and regional administrations, as in the case of the sand eel case study. Conflicts between their roles could result in a lack of understanding of the rules to be applied, as well as in the process to be established to enforce a CM scheme, thus reducing the willingness of fishers to participate in the establishment or CM and its implementation.

2.7.6 Potential and effective success of case studies

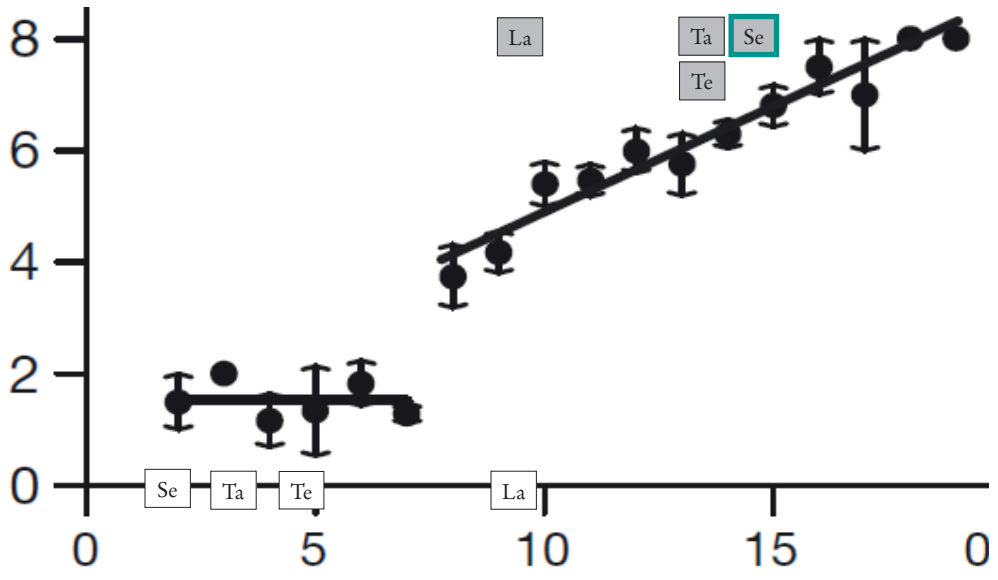
The framework developed by Gutiérrez *et al.* (2011) was used to assess the potential and effective success of CM plans. For this purpose, the CM attributes of each case study were compared based on the survey outcomes considering 19 variables. These variables refer to the approach developed by Ostrom (2009) for the analysis of socio-ecological systems, encompassing information on the resource system, resource

unit, governance system and user systems (see Appendix 2 for a full report of variables and scores assigned to each case study). For each variable, a dichotomic value (0–1) was attributed. Moreover, a success score was built considering eight variables related to social, biological and economic features, where, again, for each variable, a dichotomic value was assigned. The sum of CM attributes was then related to the success score (sum of success variables) and compared with the outcomes of the study by Gutiérrez *et al.* (2011). The authors found a significant correlation between CM attributes and CM success, showing that above eight CM attributes there is an increase in CM success. According to this analysis (Figure 2.5), it is possible to show that the four case studies, prior to the implementation of CM, presented a limited number of CM attributes, ranging from one (sand eel) to four (Taza), five (Telašćica) and eight (Lastovo), with a success score equal to zero in all cases. According to the actual implementation of the CM plan, the sand eel case study increased its number of attributes to 14 and reached the maximum success score (eight). For the other case studies, it is only possible to estimate the potential success of CM implementation according to the number of CM attributes that will be achieved through application of the CM plan and the expected outcomes. In particular, the Lastovo case study will not increase its number of attributes but is expected to reach a high success score. On the opposite end, Telašćica and Taza case studies will increment their CM attribute to 13 and potentially reach high success scores (seven and eight, respectively). It is worth noting that, given the findings of Gutiérrez *et al.*, the likelihood that the Lastovo case study will succeed in achieving the expected high success is very low.

Accordingly, it is possible to conclude that sand eel case study has already met high success, while Taza and Telašćica are expected to reach very positive results; Lastovo case study could be considered the weakest, with the lowest probability of success.

FIGURE 2.5

Comparison of case study attributes (sum of attributes according to Gutiérrez *et al.*, 2011) and success score in CM prior (white quadrats) and after (grey quadrats) CM implementation. Case study features are super-imposed to the graph based on Gutiérrez *et al.* (2011), which shows the dependency of CM success (success score) referred to the number of attributes according to an extensive literature review. It is worth mentioning that only the sand eel case study presents the actual results of CM implementation while for the other case studies, the expected outcomes of CM are considered. La: Lastovo; Se: Sand eel; Ta: Taza; Te: Telašćica



2.7.7 Lessons learned

The four case studies selected for the assessment of real processes of collaboration between stakeholders for the establishment and implementation of CM schemes in the Mediterranean and the Black Sea provide insights into how to strengthen the role of fisher stakeholders in such a context. In particular:

- the engagement of fishers stakeholders can be built both from a top-down or a bottom-up approach. In both cases, they can be triggered by the adoption of new legislations and rules that will affect the sector;
- while the process can be initiated by various actors, it is necessary for local administrations to take a proactive role in fisher engagement. This process must be open and include several stakeholders, not only professional fishers but also recreational and subsistence fishers;
- central administration needs to be open to recognizing such processes, and the legislative and administrative context needs to allow stakeholder engagement and participation to be effective;
- in these circumstances, conflicts between local and central administrations, as well as within central administrations (as in the case of different perspectives between, for instance, the Ministry of Agriculture and the Ministry of Environment or similar entities) must be removed or reconciled because they could cause confusion among stakeholders and lead to an impasse in the CM implementation;
- once a participatory process is established, some stakeholders must take leadership and others (or the same) should act as facilitators of the process, allowing entities of different backgrounds, cultures and interests to enforce open dialogue and mutual trust; in this context, for instance, the role of NGOs and scientists could be particularly relevant;
- failure to reach consensus most often implies failure to establish CM schemes, particularly if fishers are unable to find synthesis on their different visions;
- the role of fisher organizations in this context could be very beneficial. However, case study experience shows that, on a small-scale level, fishers can self-represent their interests. This could determine tensions with traditional fisher organizations, possibly leading to the feeling of losing power. In contrast, if traditional fisher organizations were to participate in CM, they may see their role enhanced;
- the knowledge base for establishing management and CM schemes needs several sources of knowledge to be shared. RBK and EBK must both be included, along with detailed knowledge of fishers' behaviour and administrative processes. It is worth noting that many case studies failed in many cases to provide quantitative descriptions of catches and fishing fleet activities. Without such information, it is difficult to effectively manage any fishing activity and to assess the effectiveness of management procedures;
- when a CM scheme is established, it is necessary to enforce an MCS scheme. The involvement of fishers could be easier in the context of monitoring, while for control and surveillance schemes, fishers could be reluctant to assume a role, due to social pressure;
- establishing a CM process empowers fisher stakeholders, providing new skills and understanding of both scientific and administrative processes. However, capacity-building activities need to be enforced to allow stakeholders to fully understand, contribute and commit to a CM scheme;
- several conditions strengthen the role of stakeholders in CM, ranging from providing an open and collaborative environment and valuable EBK, using it for definition of a management scheme, establishing mutual trust and collaboration with other stakeholders. However, all these circumstances need a legislative or administrative framework that recognizes the role of fishers

and allows them to make a real impact, resulting in the establishment of rules that take into account local conditions, as well as an MCS process ensuring that the rules are respected; and
- the presence of an MPA could somehow facilitate the building of CM schemes, because it provides an administrative player that is interested (and most often committed) to solving conflicts in the fishery sector. However, the presence of an MPA is not a prerequisite to establishing a CM scheme. In this context, local authorities could play a similar role. What is important is the establishment of consultative or collaborative committees where major stakeholders are included, along with the capacity of the local or national administration to enforce collective fishing rights and MCS schemes.

2.8 How to strengthen the role of SSF in decision-making through organization and collective action? The Mediterranean Platform of Artisanal Fishers (MedArtNet)

2.8.1 Background information

MedArtNet is a group of professional small-scale fishers that was established in 2011 by six fishers from Greece, France, Italy and Spain. MedArtNet currently also includes representatives from Morocco and Algeria. MedArtNet aims to unite small-scale fishers from all over the Mediterranean with the goal of supporting a more balanced inclusion of SSF into the decision-making and fisheries management process in the Mediterranean Sea.

MedArtNet developed its own definition of SSF, which comprises a set of features, including environmental, social and economic aspects:

1) Environmental aspects:
   - high selectivity
   - very low or no percentage of discards
   - mainly passive gear, with low direct impact on the ecosystem
   - very low levels of CO2 emitted and low fuel consumption
   - low scale of production and mechanisation
   - great knowledge of the ecosystem by the fishers
2) Social aspects:
   - strong link with the territory
   - strong social roots
   - facilitates incorporation of women
   - minimum degree of tasks division
   - high degree of equity
3) Economic aspects:
   - great contribution to the socio-economic fabric of coastal communities
   - short commercialisation circuits, familiar-type of businesses
   - low capital investment

In addition to this, they also propose a set of criteria to identify and define artisanal fisheries as a productive unit in the Mediterranean, according to different countries.

The main objectives of MedArtNet are the following:
- achieve a real commitment to sustainability in the CFP and promote it locally;
- increase the representation and participation of SSF in decision processes;
- enhance the social recognition of traditional knowledge;
- foster the adoption of fair trade committed to the seas; and
- increase awareness and cooperation between SSF and other fisheries stakeholders.

MedArtNet was launched in the context of the CFP reform to enhance the SSF voice and to express SSF interests to EU institutions. WWF facilitated the first meeting by

gathering a few fishers operating in the Mediterranean Sea. The fishers from different countries rapidly felt like a cohesive group and managed to define objectives and a common position for the CFP reform. Supported by WWF and Loxanet, MedArtNet was involved as a stakeholder in the CFP reform. Fishers submitted amendments and participated in meetings with Members of the European Parliament and NGOs. The CFP reform was the common objective, which maintained the cohesion and motivation of the group. Moreover, fishers started to realize that their situation interested politicians, and that their actions and mobilisation could have consequences within the CFP reform, an outcome that motivated them further.

This first result strengthened the will of SSF fishers to collaborate and extend the scope of their activities beyond EU and the CFP reform. After the First GFCM SSF Symposium, MedArtNet enlarged its membership to fishers from Morocco and Algeria, two countries where SSF is very active and smallscale fishers are numerous, thus broadening their scope within the Mediterranean. There are currently two co-presidents representing MedArtNet – Christian Decugis (France) and Hacene Hamdani (Algeria, who is also the representative of the Northern African Platform).

Fishers signed an agreement establishing MedArtNet as a regional organization or a federation of national institutions. However, MedArtNet remains without an official legal status so far. Most of the fishers already belong to a national organization and realize the burden of placing an additional organization at the top of the hierarchy. The Spanish fishers, however, have created MedArtNet Spain. More recently, fishers have projected setting up an organization in France that will host all national organizations. MedArtNet members are also asking for support from the NGO Low Impact Fishers of Europe (LIFE). MedArtNet intends to be the Mediterranean representative on the LIFE board. However, there is no current legal status for the group and no registered office. The lack of legal status currently hampers MedArtNet development.

MedArtNet is alive as long as fishers remain active, however, MedArtNet also struggles with the lack of means and capacity to perform its objectives. Moreover, some fishers face difficulty in their own country, which impedes full participation.

The Spanish branch is not active at the moment, the two leaders being overwhelmed by other priorities and unable to lead the movement anymore. The Italian members are struggling to find a leader to create an organization or to enrol other fishers to be part of MedArtNet. Only the Greek member ceased to be involved in the MedArtNet process due to the economic crisis. French members, however, remain very active in their country, interacting with LIFE and other platforms. The Maghreb branch seems to develop local initiatives.

2.8.2 Promotion of co-management by MedArtNet

Promoting CM is one of MedArtNet's objectives. Since the CFP reform, MedArtNet has promoted CM and the active participation of fishers within the decision-making process, thus developing responsibility skills. Fishers not only acknowledge rules but also ensure their good implementation. MedArtNet also emphasizes the importance of taking into account the knowledge of fishers in designing rules and building cooperation between administration and the sector.

It is worth noting that the involvement of MedArtNet in the CFP reform was a first step and a success in the CM process, as fishers were now able to express their opinion and some of their recommendations and amendments were considered. One of the key aspects of the fisher collaboration and movement was the crisis in fish, which alerted fishers and pushed them to act. Fishers also underlined the importance of collaborating with scientists, most of whom were hosting monitoring and survey activities on their boat (individual action and not on behalf of MedArtNet).

2.8.3 MedArtNet achievements and lessons learned

So far, the main achievements of MedArtNet have been the following:

- For the first time in EU policy, small-scale fishers were directly involved in the decision-making process and contributed to CFP reform.
- Fishers who did not know each other, joined together and agreed on common objectives.
- Fishers managed to understand a broader picture of fishing sustainability; they developed an open mind and stopped focusing only on their own activities.
- Fishers managed to influence the EU's artisanal definition, which is not formally fixed yet. However, trawlers were excluded from this category, as required by MedArtNet.

These achievements provided the opportunity for a relevant learning process. In particular, the following items were emphasized by MedArtNet members:

- Members meeting physically is crucial to build trust and collaboration between fishers.
- It is important to have leadership to launch the initiative, however, a project shall not rely on one leader only. It is essential to share protagonists in driving the project, to delegate, to involve most of the fishers, to build collaboration and to not depend on the goodwill and opinion of one leader only. The more fishers that share experiences and leadership, the better they consolidate as a group.
- It is difficult to mobilise and involve other fishers in MedArtNet objectives because the process remains time-consuming and money-intensive.
- It is essential to find an appropriate and diplomatic way to communicate experience.
- It is essential to open up the CM process to everyone and to impose transparency in the process.
- In sharing experience, fishers realize that they were not the only ones facing difficulty.
- In noticing the results and the attention of institutions, fishers became more confident and realized something could be achieved, such as by participating in the process. Fishers feel they can push and influence policy and gain positive results. This gives them confidence in their action to foster changes and in the activities to attempt to do so. In this context, it was important for fishers to sense support and feel that their politicians, including Members of the European Parliament, were listening.

2.8.4 Need to strengthen MedArtNet objectives and fisher collaboration

According to the current status of activities, which have been slowing down in the recent period, MedArtNet members identified several needs that should be met in order to foster increased and more effective activity of the group:

- capacity, budget and more opportunity to ensure continuity in action and collaboration. Fishers struggle to gather together. MedArtNet members have officially met twice since the launch of MedArtNet but fishers do not have a structure or a budget to organize official meetings. They manage to meet most of time through participation at common meetings, workshops or conferences. Maintaining continuity would also enable fishers to exchange experience on a daily basis;
- a person to dedicate time to building liaisons between all members and to bring translation support. Fishers were mainly relying on WWF and the secretariat, as well as on guessing what other fishers might say. The Greek fisher was the only one who spoke English, which was useful during the EU meeting;

- agree on common objectives on how to conduct CM, design projects together and define an agenda;
- more visibility and to be present in the decision-making process of, for example, a symposium, a conference, etc.; and
- MedArtNet wishes to be part of MedAC that will put forward the management plan in their local fishing areas.

2.9 The engagement of fishers: a key attribute to improve management of SSF in Mediterranean MPAs (results of the FishMPABlue project)

2.9.1 Background of the study

The last case study is based on an analysis carried out on a Mediterranean scale and whose results are presented in the paper *Building a "win-win" governance of sustainable fishing within marine protected areas* (Di Franco *et al.*, submitted).

The study provides insights into the role of fisher engagement to support efficient and sustainable development of fishing activities within MPAs in the Mediterranean basin. The research is rooted in the consideration that SSF play a crucial role in both the economy and the society of the Mediterranean basin, directly employing more than 137 000 fishers. The Mediterranean Sea hosts a considerable number of MPAs (about 170), but yet 85 percent of fish stocks are overfished and traditional fisheries management has proven ineffective.

In this context, the Ecosystem Approach to Fisheries (EAF) has largely increased its relevance, aiming at balancing ecosystem health with socio-economic needs. MPAs are considered an important element of EAF. Although not necessarily a one fits all solution to the fisheries crisis, MPAs are multiple-use areas aiming at protecting natural populations and ecosystems (including the goods and services they provide to society), enhancing local fisheries (particularly SSF) and promoting local socio-economies through sustainable development. To achieve these goals, human activities, including SSF, are regulated within MPAs.

Indeed, MPAs can play a crucial role in SSF management, being spatially explicit conservation and management tools with a local (decentralised) decision-making system capable of coping with the heterogeneous nature of SSF communities.

The study was based on a survey involving a selected number of Mediterranean MPAs and on interviews of MPA directors as well as an additional search of scientific and grey literature to gather information on the governance structure and the effectiveness of SSF management within each selected MPA. The study identified five key features determining overall management success (encompassing ecological effectiveness, economic benefits for fishers and add-on stewardship benefits) within MPAs in the Mediterranean Sea. Due to the large scale investigated and the short time frame of the project the study did not consider the perceptions and opinions of fishers and, instead, relied on official information without going into a perception assessment.

2.9.2 Conditions that foster effective SSF in the Mediterranean MPAs

The study allowed the identification of five different attributes or conditions that are closely linked to the success of fishery governance in the Mediterranean MPAs:

1. MPAs with high enforcement. By stressing the importance of enforcement also on economic and social effectiveness, this evidence further extends the relevance of enforcement beyond the recognized beneficial effect on MPA ecological effectiveness and stresses the need to combat IUU fishing, which annually leads to an estimated loss of US$10–23 billion for bona fide fishers, thus impeding the sustainable management of fish stocks (Agnew *et al.*, 2009).
2. MPAs actively engaging fishers in management. Such MPAs show much higher overall management success than MPAs, where fishers have a minimal and passive

role. However, no CM process exists so far within Mediterranean MPAs. At best, fishers are involved in the MPA management through a consultative process (in 60 percent of the MPAs this is successfully managed).

Moreover, there is no legal framework providing a CM process for stakeholders and ensuring fisher involvement. Mediterranean artisanal fishers need enhanced recognition and engagement. An adequate legal framework that recognizes and legitimises the role, rights and responsibilities of artisanal fishers needs to be developed and implemented on a Mediterranean scale. Fisher involvement remains mostly dependent on the goodwill of MPA managers. The task is difficult and time-consuming on a daily basis. Fisher engagement can be envisaged in multiple steps and requires a major effort in building trust between fishers and MPA management bodies, as highlighted by MPA managers during the study. Some managers can also lose motivation and patience, especially when fishers are not responsive. In this context, the role of civil society organizations is extremely valuable to drive the process. Furthermore, many small-scale fishers are not federated in professional organizations, impeding the consultative process.

An additional element that could foster fisher engagement and drive successful management is the leadership of influential fishers, who are able to convince the other fishers in the community of the benefits of participating in CM schemes (Gutiérrez *et al.* 2011). However, the study did not identify this element as a key success feature probably due to the role played by MPA managers that can facilitate fisher cohesion when these are engaged into management.

3. The presence of a fisher representative on the MPA management board. This is associated with successful cases of SSF management. However, only 52 percent of MPA fishers that were examined have a representative on the board and the representative is largely outnumbered by the other board members (e.g. policy makers, tourist operators, diving centre managers, sometimes scientists). This results in the lack of direct involvement of fishers and their organizations/communities in MPA management.
4. The presence of a management plan in the MPA. Such a management plan is highly relevant in enhancing overall management success. This evidence stresses the need to develop management plans specifically addressing the ecological and societal needs of each MPA and ensuring the participation of stakeholders (like fishers) during the process.
5. MPAs allowing and promoting sustainable fishing (e.g. through labelling, awareness campaigns). This evidence highlights the high potential that collaboration between MPAs and ecolabelling could achieve; moreover it contributes to reverse the bias of sustainable fisheries initiatives against SSF, which are largely criticised. This goal could be achieved by capitalising data collection, assessment and management activities carried out in well-managed MPAs, and that often represent a budgetary limit for SSF that want to be ecolabelled. However, only a few case studies showed fisher involvement in MCS or ecolabels, and only on a voluntary basis. So, the key element defines a broader scope incorporating activities such as workshop, market initiative and consumption awareness.

Other relevant attributes identified in the study are the Human Development Index (HDI; a proxy for country development), the portion of each MPA covered by an NTZ and the restriction of fishing rights exclusively to local fishers. In particular, it was observed that successful management is more difficult to achieve in countries characterized by low HDI, possibly due to the scarcity of funds dedicated to enforcement and management of MPAs. The study also shows that the engagement of fishers within the MPA, by increasing their responsibility and commitment to achieve a sustainable use of marine resources, can result in positive effects on the MPA management itself. In this context we highlight that, according to several fishers, the

main condition to enforce a successful management scheme within MPAs would be the restriction of access to its resources to local fishers.

2.10 Local management plans and other co-management experiences in the Mediterranean and the Black Sea

Several CM experiences, beyond those analysed in this report, are already present (implemented or under implementation) in the Mediterranean and the Black Sea. Most of these were presented and reviewed in previous background reports presented at the First Regional Symposium on Mediterranean SSF. Such experiences are widespread in various countries and include (among others):

- Turkey: cooperatives in the Aegean Sea; small-scale fishery in Alanya (Gutiérrez, 2013);
- Italy: Venus clam fishery; Torre Guaceto MPA (Gutiérrez, 2013);
- France: Grenelle de la Mer; les assises de l'Economie et de la Mer; natural reserves of Bonifacio and Scandola, natural marine reserve of Cerbere-Banyuls; Blue Coast Natural Marine Park (Gutiérrez, 2013; Cazalet, 2013);
- Spain: Networks of fishing reserves in Spanish Mediterranean Medes (Cazalet, 2013).

However, it must be highlighted that Torre Guaceto, Bonifacio and Scandola experiences are not characterised by a formal sharing/derogation of power, and thus cannot be considered proper CM frameworks.

Further to such experiences, and those whose futures are addressed in other background papers within the Second Regional Conference on Mediterranean and Black Sea SSF, another example deserves attention – i.e. implementation of local management plans in Italy. Their main features are reported in the following paragraph.

2.10.1 EU legislation and local management plans in Italy

The European Fishery Fund (EFF) Regulation (Reg. (EC) No. 1198/2006), within collective actions (Art. 37, m), provided the possibility to improve management and control of access conditions to fishing areas, in particular through the drawing up of local management plans approved by the competent national authorities. This entailed the possibility for a collectively managed body, accounting for at least 70 percent of the enterprises registered in the area, to design a local management plan also providing financial contributions for its formulation. This opportunity was used, particularly in Italy, for the establishment of local management plans (LMP), which, according to the decree of the Italian Ministry of Agricultural, Food and Forestry Policies (MIPAAF, 2012), should be aimed at: i) preserving the recovery potential of commercial stocks; and ii) reducing fishing effort to preserve fishery resources and reducing the impact of fishing on marine ecosystems within 12 nm from the coastline (i.e. Italian territorial waters). The LMP could include technical measures to be applied in the area of interests comprising exclusively i) technical uses of fishing gear; ii) time closures for each fishing fleet; and iii) spatial closures of nursery and restocking areas (MIPAAF, 2012).

This framework was used by Italy to foster the application of use rights, providing an interesting example of procedures used to promote the management of coastal resources through TURFs involving fishers. According to Spagnolo (2012), the steps adopted for the definition of LMP were the following:

1. The local authority responsible for implementing the EFF launches a tender to draft a local management plan. Fishers associations as promoters of a management consortium pull together and make sure that at least 70 percent of the local enterprises, as requested by the regulation, become members of a "collective management body" (CO.GE.PA.). The establishment of the Consortium coincides with the definition of the area and the selection of its members.
2. In cooperation with one or more research institutes, the Consortium confers with its members to define objectives and regulations of the management plan to reduce fishing effort and rebuild biological resources of local interest. This is

the most sensitive phase in the procedure, when the unity and motivation of the members is tested.

3. The local management plan, based on guidelines issued at a central level, includes an analysis of critical issues in terms of biological, economic and social viability and proposes possible solutions as projects based on the implementation of measures provided in EFF Regulation. This plan takes priority in the allocation of funding requests in EFF tenders. This phase coincides with the definition of incentives targeted to members of the consortium.
4. A commission nominated by the public authority evaluates the local management plan and, if approved, submits it to the Ministry to be adopted.
5. The Ministry adopts the plan and its management regulations by issuing a Ministerial Decree. In this way, rules have the force of law and become valid *erga omnes*, therefore being monitored and enforced by police authorities.
6. Research institutes monitor the plan for three years, producing a yearly report on the advancement of activities and, where necessary, propose necessary adjustments jointly with the management.

So far, Italy has adopted a number of LMPs, covering particularly the southernmost part of Italy – i.e. the regions of Sicily, Calabria and Campania.

Some LMPs apply only to SSF while others are focused on trawling and dredging. Other LMPs apply to multiple sectors encompassing both SSF and trawling.

In general terms, all LMPs provide the following information:

- description of the area and its ecological/biological/oceanographic features;
- description of fishing activities, fishing gear technologies and current management schemes;
- identification of LMP sustainability objectives and related indicators to assess the effectiveness of measures implemented;
- definition of LMP rules and measures (e.g. temporal and spatial closures, technical measures to limit fishing gear size/numbers and/or improve selectivity, etc.);
- approach to assess biological and economic benefits;
- approach for the implementation of MCS;
- financial incentives in support of the LMP;
- financial plan of the LMP;
- identification of the LMP management committee and rules book;
- identification of the scientific institute that will monitor biological effectiveness of the plan.

The most frequent management rules include technical measures (e.g. reduction in the length of nets, number of hooks, increase in mesh size), temporal restrictions (e.g. application of a further fishing closure during the spawning season of some species), spatial restrictions (e.g. identification of NTZ to be established to protect nursery areas).

The LMP also defines the composition of CM committees which includes the regional representatives of national fisheries organizations, one fisher per fishing metier subject to the rules of the LMP, local and regional authorities, Coast Guard representatives and scientists.

Because the adoption of the LMPs is very recent (2012–2015), it is still too early to assess the real effectiveness of such measures in achieving sustainable fisheries and their role in providing a support to local SSF. Moreover, the mere existence of a regulation does not guarantee its implementation. However, the process itself, so far, deserves attention. The management rules were defined thanks to the engagement of fishers who contributed with their local ecological knowledge, and the measures adopted point to the reduction of fishing effort and capacity in a framework that was accepted and supported by fisher organizations.

Moreover, the geographical scope of the application is relevant. For instance, only considering Sicily, after this initial phase, there are now ten consortia

representing 1,413 vessels equivalent to 78.6 percent of those registered in the relevant areas (n. = 1,820), 46.2 percent of the whole Sicilian fleet (n. = 3,098), 56.2 percent of the Sicilian fleet excluding trawlers (n. = 2,545) (Bertolino, 2012; Spagnolo, 2012).

Spagnolo (2012) also reported that "[LMPs] established credibility, fishermen do get involved in the process; and once they are engaged, they constructively contribute their knowledge and traditions to reach the best solutions. It is imperative to involve environmental, biology and economic research institutes at an early stage, especially where there is a tradition of respect and cooperation between researchers and fishermen. A decisive element in implementing this strategy is a strong coordination between all levels of institutions, national and regional administrations, monitoring authorities. This mechanism is fairly complex and requires meticulous understanding of the problems, readiness and flexibility in finding solutions, strict adherence to time schedules – or this scheme can grind to a halt, compromising all previous actions."

While the LMP approach is not a typical TURF implementation, it has the merit of being implemented into spatially defined areas, and to increase the degree of spatial and temporal regulation of fishing effort, enforce restrictive technical measures on fishing gear, also identifying, in many cases, NTZs or nursery areas to be protected.

The presence of economic incentives for implementation of the plans (both for compensating fishers for short-term loss in incomes, but also for the management committee to act and monitor the effectiveness of fishing management rules as well as to sustain technological improvements) are possibly a key to success in the adoption of such measures in the short term. Only in the medium term will it be possible to assess how this approach is self-sustaining beyond financial incentives and its real ecological, social and economic effectiveness.

3. STRENGTHENING COLLABORATION AMONG STAKEHOLDERS

Strengthening the collaboration of stakeholders in CM is one of the keys to succeed in achieving the overall goals of fishery sustainability, whether ecological, social or economic. However, this essential feature does not guarantee, on its own, that all these goals will be reached. CM schemes imply that all the various stakeholders (not only fishers, but also administrations, NGOs, other local stakeholders and scientists) are engaged in a common process aimed at achieving fisheries sustainability. In this sense, what should be established is participatory leadership – i.e. a paradigm based on respect and engagement. It constructively focuses energy in every human to human encounter. A more advanced, more democratic and more effective model of leadership, it harnesses diversity, builds community and creates shared responsibility for action. It deepens individual and collective learning yielding real development and growth.

Such an approach entails all stakeholders being empowered in order to actively participate in the definition and implementation of management rules, so that they can contribute with their knowledge and joint actions to these purposes.

As already mentioned (Chapter 1), this entails bridging the gap between different knowledge systems (i.e. SBK and EBK, but also administrative knowledge; Reid *et al.*, 2006), a process that needs the establishment of mutual trust and dialogue, application of different methodologies and working together.

Knowledge integration is a process whereby information belonging to different knowledge systems is expressed in comparable metrics[4]. This implies, as a first step, to collect knowledge (both EBK and RBK) and then code this into a common currency. This process is never straightforward and quite often (but not always) may result in

[4] Holm (2003) also highlights that, when dealing with the issue of the use of fishers' ecological knowledge (FEK) as a complement to science within the management context, there is an ambiguous process which is related to the translation of what he calls in situ FEK into ex situ FEK that is decontextualizing FEK from cultural and political baggage.

simplification of the most informative knowledge you are dealing with (e.g. loss of details). Moreover, integration does not necessarily mean agreement on a common vision, although seeking consensus and common synthesis should be envisaged. While consensus is desirable, disagreements that cannot be reconciled should be highlighted (and understood) rather than hidden.

A number of research studies and projects have focused particularly on providing supporting information and experience on the effectiveness and limitations of the involvement of fisher stakeholders in fisheries and marine environmental management. In particular, the inclusion of fishers' EBK (or TEK) to contribute to the knowledge base for fisheries management is seen as one of the most effective processes to foster stakeholder collaboration (see also Chapter 1). In this section, reflections on the nature of TEK (its features, pros and cons) are presented, followed by an introduction to various participatory frameworks and tools that could be used to collect and integrate knowledge. Later, approaches to enhance stakeholder involvement in data collection and MCS schemes are discussed further, as tangible examples that foster fruitful stakeholder participation in CM.

3.1 Traditional ecological knowledge

Some of the features of TEK in relation to its potential contribution for the implementation of data collection in CM schemes have been addressed by Gutiérrez (2013). In this paragraph, emphasis is placed on understanding the pros and cons of the use of such knowledge, particularly its general value and potential limitations (see also Raicevich *et al.*, 2011 for further insights regarding this topic).

Local ecological knowledge (LEK) has been defined as a body and system of understanding and knowhow that arises through time from a variety of individual and shared experiences and observations, mediated by culture, with regard to environmental factors, behavioural attributes and ecological dynamics (Shackeroff and Campbell, 2007). This terminology is often used as a synonym of TEK, although it has a slightly different meaning. Indeed, TEK, the "cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment", is considered to be "an attribute of societies with historical continuity in resource use practices; by and large, these are non-industrial or less technologically advanced societies, many of them indigenous or tribal" (Berkes, 1993). Thus, the term TEK emphasises aspects of knowledge that are acquired through experience and handed down through generations in non-industrial societies (Berkes *et al.*, 2000).

Fishers have long-term experience with marine/brackish/freshwater species that, according to their age, can reach up to 60 years. At the same time, fishing can be considered an extensive sampling of marine fauna; hence, fishers might be considered expert samplers of marine fauna, although sampling (i.e. commercial or subsistence fishing) is not carried out by applying an appropriate experimental design. Fishers, thus, have information ranging from the description of changes in the presence, abundance, size and spatial distribution of species over time to insights into ecology and behaviour. Moreover they have information on the exploitation of marine resources (e.g. description of fishing boats and gear, fishing effort, etc.). Beyond such data, they possess experience and knowledge of the evolution of human-environment interactions, as well as the structure and functioning of fisher communities, traditions, cultural habits, values and beliefs.

Such knowledge is relevant both to assess the status of fishery resources and to define management rules for their sustainable exploitation.

Before discussing various field approaches to create TEK and integrate it with RBK, it is necessary to remark that such knowledge may have limitations. Acknowledging these limits does not point to underestimating the value of EBK, particularly because

even RBK is affected by bias (although natural scientists are often not keen to recognize this issue, and consider RBK to be the truth). Moreover, some of these limitations can be partially controlled for by the adoption of a rigorous methodological framework for its collection and validation.

Among the potential limitations, one issue is related to misreporting. It is possible that informants (e.g. fishers) deliberately provide biased information, especially when they suspect that negative management consequences (e.g. effort limitation, taxes, etc.) might arise due to the interview content. On the other hand, they might over-report data on catches or species size in order to appear as better fishers than others. Eventually, informants may also provide erroneous information due to personal or generational amnesia (Papworth *et al.*, 2009). A more subtle and often neglected problem is related to the fact that a fisher's perception of stock abundance may differ from the real stock status. This is possible because the fisher experience is based on commercial fishing activities, and not on ad hoc experiments carried out with a proper sampling design. Therefore, observed CPUE (e.g. the number or weight of fish caught per hour of fishing) might not be directly proportional to stock size. For instance, if fishers are exploiting an aggregating species and are able to identify fish shoals, they might experience high catches even though stock size is diminishing. This phenomenon is named hyperstability and may occur when there is a density-dependent use of habitats by target species (Hilborn and Walters, 1992; Sadovy and Domeier, 2005). In contrast, when the target species is mainly spread in areas or habitats that are not easily accessible to fishers, who catch them only occasionally elsewhere, a steep reduction in CPUE might be experienced although the true stock size does not decline significantly (hyperdepletion) (Hilborn and Walters, 1992; Sadovy and Domeier, 2005). Moreover, CPUE varies according to technological improvements in fishing gear and devices, as well as changes of fishing grounds and target species, which can be affected by changes in species profitability. A lack of change in CPUE might be determined by an increase in fishing efficiency due to technological creeping rather than by stability of the exploited stock size (Pauly *et al.*, 2002).

Some of the above-mentioned limitations can be, at least partially, controlled for when mutual trust and collaboration are established, and when several informants are involved to gather information and validate it. Cross-checking with scientific and market data could be also beneficial. A participatory research framework, where fisher stakeholders are not only informants but also play a role comparable to that of scientists and other stakeholders, is possibly the best condition to ensure EBK reaches its high potential and contributes to CM schemes.

3.2 Participatory research framework and tools

Participatory research has attracted much attention worldwide in the last decade as an approach able to support better fisheries management and stakeholder inclusion in the management discourse (Mackinson *et al.*, 2011). Among the projects developed in such a framework, we recall, in particular, several EU FP7 (7th Programme Framework) projects: GAP2 (Bridging the gap between science, stakeholders and policy makers. Phase 2: Integration of evidence-based knowledge and its application to science and management of fisheries and the marine environment; www.gap2.eu), Myfish (Maximising yield of fisheries, while balancing ecosystem, economic and social concerns, www.myfishproject.eu), Ecofishman (Results-based management to contribute to the reform of the Common Fishery Policy; www.ecofishman.com), Mareframe (Co-creating ecosystem-based fisheries management solutions; www.mareframe-fp7.org), MEFEPO (Making the European Fisheries Ecosystem Plan Operational), Jackfish (Judgement and knowledge in fisheries management; https://www.wageningenur.nl/en/show/JAKFISH-Judgment-and-knowledge-in-Fisheries-Management.html), DiscardLess (*S*trategies for the gradual elimination of discards in European fisheries; www.discardless.eu).

These projects, while having specific target themes on the domain of fisheries management, all share the approach of involving stakeholders at different levels to use their EBK to contribute to fisheries management. Thus, they entail the participation of fishers, their organizations, scientists and other stakeholders in a participatory research framework. While such collaboration may assume different features depending on the model of collaboration adopted (see Par. 1.5), the activities are meant to provide agreed solutions and foster stakeholder empowerment.

Several participatory methods can be applied in such a framework. Raicevich *et al.* (2014) summarised a number of methods related to experience and tools for participatory actions in research and decision-making in the fisheries context, providing a toolbox based on the experience gained in the framework of the GAP2 project. This project mobilised knowledge and joint work between fishers, scientists and other stakeholders in 13 case studies in Europe (three of which were based in the Mediterranean Sea – i.e. Italy, Spain and Malta). Two different groups of techniques were considered – i.e. methods to collect knowledge and methods to integrate knowledge.

Methods to collect knowledge. These methods encompass both social science and natural science methods:

1) Oral history: It is the systematic collection and study of historical information about past events through interviews conducted with people who participated in or observed these events. Oral history is not folklore, gossip, hearsay, or rumour. Oral historians attempt to verify their findings, analyse them and place them in an accurate historical context (Leavy, 2011; Ritchie, 2010).

2) Semi-structured interviews: These are topical, information-rich conversations conducted with an open framework that allows for two-way communication. They are used both to give and receive information. A semi-structured interview is modelled more after a conversation between equals than a formal question-answer exchange. The role of interviewer entails not merely obtaining answers, but learning what questions to ask and how to ask them (Taylor and Bogdan, 1984).

3) Focus groups: They are moderated discussions involving five to ten participants. Focus groups are a form of qualitative research, a method for exploring people's attitudes, beliefs, desires and reactions related to a specific topic. A focus group is a kind of group interview, usually conducted by a moderator in an unstructured and natural way, where respondents are free to give views from any perspective. They are typically conducted face-to-face, but may also be organized via telephone conferencing or the internet (Greenbaun, 2000; Harding, 2013; Morgan, 1993).

4) Participatory sampling: This is a participatory process towards establishing joint activities between fishers and stakeholders for the collection of samples or data at sea. In this sense, participatory sampling relies on joint definition of the objectives of the sampling activities and on a common preparatory work that identifies the methods to be applied, the respective roles of fishers and scientists, the available resources and any practical details (Johnson and van Densen, 2013; Kraan *et al.*, 2013; Mangi *et al.*, 2015).

5) Self-sampling: This activity is carried out by fishers gathering data or samples during their fishing trips. The method is closely linked to participatory sampling. Its general setting should be conceived in the framework of participatory activities. In this case, fishers have a prominent role in collecting samples or data. Indeed, the full responsibility for the collection of data or samples relies on fishers, who should apply a methodological approach jointly defined with scientists (Mangi *et al.*, 2015; Mion *et al.*, 2015).

Methods to integrate knowledge. These are mainly linked to participatory research activities, where scientists work together with fishers in a framework that allows EBK to be integrated with RBK:

1) Participatory mapping: It is the most widespread visual participatory method. In marine studies and social research, it has been used for many different purposes, especially for natural resource management and to collect indigenous and cultural knowledge. Knowledge of informants (e.g. fishers) about a spatial issue is collected, integrated and possibly validated with that from another group of informants or scientific data, to establish maps that synthesise knowledge layers and, where needed, reconcile possible disagreements (Anuchiracheeva *et al.*, 2003; Chambers, 2006; Hall and Close, 2007)

2) Participatory modelling: Participatory modelling relies on the integration of stakeholder knowledge into the process of model construction (e.g. select relevant variables) and hypothesis testing (e.g. selection of different scenarios to be investigated) (Haapasaari *et al.*, 2009; Röckmann *et al.*, 2012; Voinov and Bousquet, 2010)

3) Participatory planning: Participatory planning is a participatory process aimed at defining, proposing and enforcing a management plan on issues of common interest. The example of fisheries management plans is here used as an example of participatory planning. Emphasis is placed on a management plan as an approach that allows for integration of the knowledge of stakeholders, scientists and policy makers, thus stimulating participatory research and action. Typically, participatory planning is an opportunity to tailor management rules at the local or regional level according to stakeholders' needs (Fisher 2001a, b; Reid *et al.*, 2006).

The full description of methods, their output, as well as advice for their practical implementation can be found in Raicevich *et al.* (2014).

3.3 The participatory research process

The methods to collect and integrate knowledge presented above represent tools that could be used under a participatory framework. They have the merits of allowing to take the most from collaboration between scientists, other stakeholders and resource users. In particular, these approaches are rooted in methodologies developed within natural and social sciences according to up-to-date standards. Their use and application also ensure a clear documentation of both the knowledge, approach and outcomes gained from stakeholder engagement, which is fundamental in order to learn from experience and capitalize on investments in participation. However, beyond this list of tools, what appears to be even more relevant is the approach to be undertaken in the practical implementation of the collaborative approach in engaging and strengthening stakeholders' participation. The GAP2 project represents a valuable source of standards also in this context. In particular the Good practice guide for participatory research in fisheries science (Mackinson *et al.*, 2015), along with the Good practice guide to participatory research between fisheries stakeholders and scientists (Mackinson *et al.*, 2008) provides insightful information and guidance on how, in practice, a fruitful collaboration between stakeholders could be enforced and developed. Such reflections, based on experience gained in the practical implementation of different case studies in many European areas (and thus different cultural, administrative, ecological and fishery context) are potentially very relevant also in the case of the implementation of CM and could be used to guide action, for instance, in the context of CM committees or other institutional or informal setting established to foster the adoption of CM schemes.

What emerges from the GAP2 experience, is that particular attention should be given to process maintenance (e.g. build trust, allow time for dialogue, communicate frequently, facilitate exchange of knowledge, review the participation process together).

At the same time people and their behaviour have a prominent role: ensure integrity and honesty; openness; share experience; respect each other and also enjoy working together are attitudes that must be present when implementing collaborations.

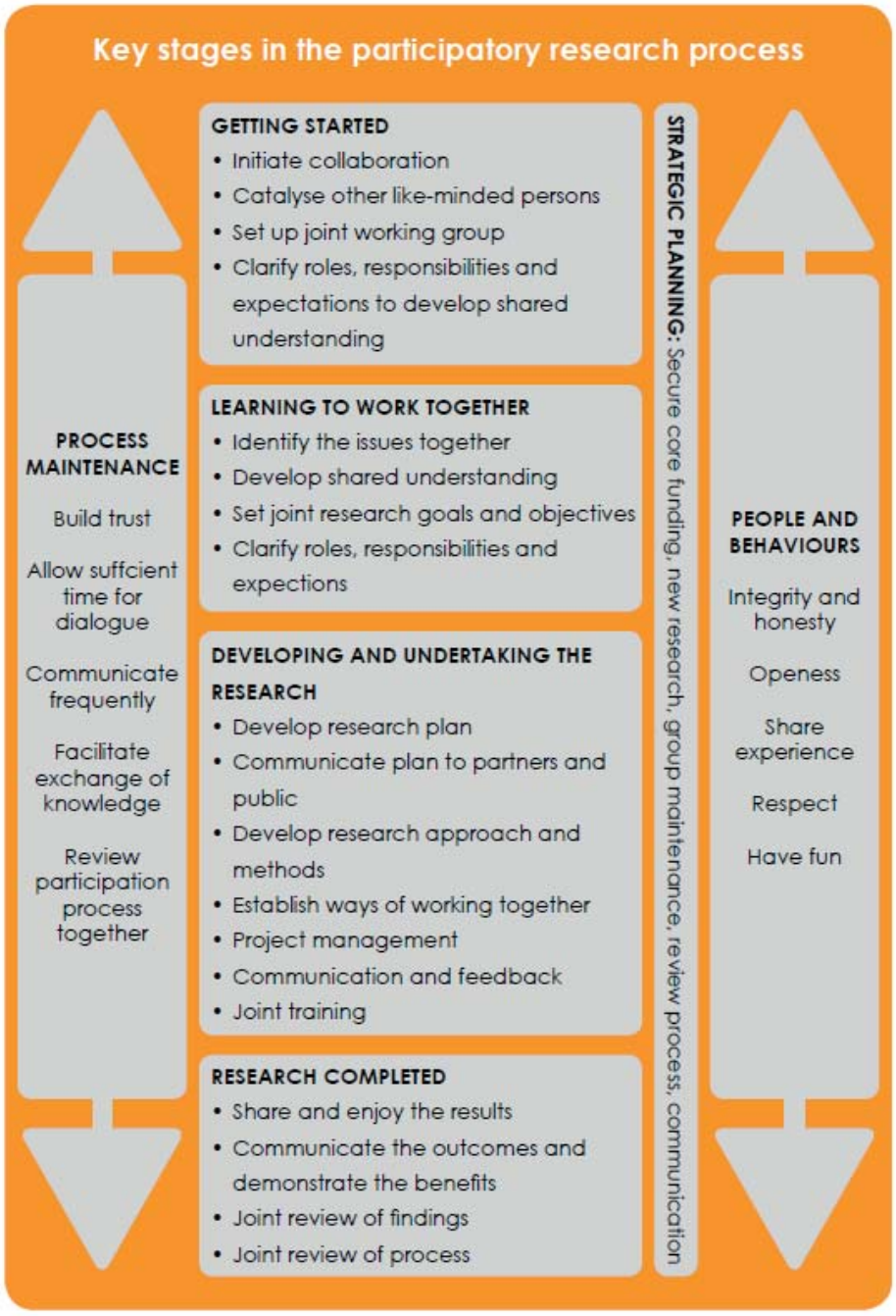
The process could be seen as circular, from initial activities of working together, developing joint activities, reflecting and communicating results. All these steps need attention to be given to both the process and the people involved in it, along with a democratic approach allowing the engagement of all stakeholders.

According to Mackinson *et al.* (2015) several principles should be followed to foster a "true" spirit of collaboration, i.e. the willingness to engage with, and incorporate, a range of players and offer equal credence to a range of knowledge types.

These principles are reported below, having been partially readapted to the special case of participatory establishment and implementation of CM schemes:

- Inclusivity: the process of gathering participants should begin as soon as possible, should be transparent and should be extended widely, especially to include stakeholders that might have contrary views.
- Effective facilitation: the use of good, neutral facilitators throughout the research process can ease tensions and create a sense of equality amongst participants. Honesty, integrity and open mind are essential in anyone seeking to facilitate this kind of process.
- Joint ownership of knowledge: fishers and industry representatives are often concerned that scientists deliberately fail to take account of information that may be unsupportive of existing management rules. Overcoming such issue requires that the concerns, motives and expectation of fishers, scientists and other stakeholders can be discussed openly during collaboration, as well as that to ensure building trust and continuous transparency on the use of knowledge developed in the collaborative framework.
- Overcoming institutional barriers: several institutional barriers can be encountered during participatory process, for instance lack of adequate findings, reluctance of fishers to participate, lack of incentives to scientists or other stakeholders, lack of political willingness to remove institutional obstacles to CM implementation, etc. These barriers should be considered in advance and overcome collaboratively.
- Prioritizing communication: developing and maintaining effective communication between participants is essential for successful collaboration. Opportunities of engagement should be maintained at good frequency using the most personal means available. Reflection, feedback and critical evaluation of the process all help to make improvements and maintain the longterm relationships necessary for success.
- Planning in a participative way: all stakeholders, and in particular fishers, should be involved in all aspects of the process, but in particular in the initial stages when the scope of the activity is being decided upon. This implies jointly defining objectives, selecting methodologies and approaches, assessing the outcomes and evaluating them as well as redirecting the process when necessary.
- Battling participation fatigue: working together can be time-consuming and tiring. Especially for fisheries stakeholders, it could be a new process that is tiring just because of the new setting and of the need to enhance skills that were previously not developed. Moreover, the lack of tangible results in the short term could be another source of participatory fatigue and frustration. Accordingly, it is necessary to develop processes that respect the available time of participants, and that are efficient and effective. Paying particular attention to signs of fatigue and jointly defining how to cope with this, is a necessary step to ensure the effectiveness of the process.

FIGURE 2.6
Key stages in the participatory research process (Mackinson *et al.*, 2015)



3.4 Working together: data collection programmes

SSF are typically a case of fisheries that are characterised, most often, by the lack of data, both in terms of a thorough assessment of fishing fleet and its behaviour and in terms of catches and fish stock status. This issue is more or less pronounced depending on the different countries. Moreover, the high dynamics of this fishing sector (e.g. rotation of fishing gear and areas according to target species seasonality) further reduces the capability of central states to monitor it and gather comprehensive information. Given the fundamental role of these variables for setting management and CM schemes (and assess their effectiveness), a potential and effective approach would be the enforcement of community-based data collection programmes (CBDC; see Gutiérrez, 2013).

While such data collection programmes might be both economically and practically feasible, usually their enforcement is not achieved for two different reasons: low attractiveness of the data in the scientific and administrative domains (most often being criticised as biased due to misreporting, or incomplete or potentially wrong due to the lack of scientific skills among fishers) and lack of involvement of fisher stakeholders.

Pertaining to the low attractiveness of data collected by fishers themselves, the reasons for concern from the scientific community have already been mentioned (e.g. misreporting, generational amnesia, lack of linearity between CPUE and actual stock abundance).

A major problem in the use of self-sampled data for management purposes is related to the fact that self-sampling by fishers is considered by some scientists and managers to be lacking rigor and as potentially biased due to misreporting (Hoare *et al.*, 2011; Kraan *et al.*, 2013). Moreover, fishers are usually not keen on sharing their own data, because they fear it could be used as evidence for enforcing restrictions in their activities (Kraan *et al.*, 2013). For these reasons the potentiality of self-sampled data remains questionable and there is a need for direct assessment and validation of its reliability and representativeness, along with development of methodological standards and procedures for their collection and analysis. Such an assessment could be achieved only when a fruitful collaboration between scientists and fishers is enforced. For instance, the recent experience of collaboration between scientists and fishers in the northern Adriatic Sea shows that, under a truly participatory research approach, data self-sampled by fishers can be unbiased and match that collected independently by scientific observers (Mion *et al.*, 2015). In this case, within the EU participatory research project GAP2, electronic logbooks were installed onboard otter trawlers to collect haul-by-haul geo-referenced catch data. Catches of some of the most important otter trawler target species (eight species including teleosts, cephalopods and crustaceans) were recorded in 3,588 self-sampled hauls by fishers. Self-sampling was run concurrently with a scientific observers' programme, which allowed detailed monitoring of catches from 249 hauls. This dataset was used to test the reliability of fishers' self-sampled data and for their validation showing an almost perfect agreement of data. This result shows that fishers can gather reliable data, with high frequency (haul-by-haul).

But, more prominently, this research shows that data is reliable when fishers are involved in participatory research activities. In this sense, the problem of fisher engagement is linked to the adoption of a community-science approach (Par. 1.4) that values their knowledge and contribution. But to foster fisher engagement, it is necessary that the full process of data collection be jointly defined (Mion *et al.*, 2015).

This includes the selection of species to be monitored, the frequency of data collection, the means to collect data, as well participation in data interpretation and usage in the management process. In this context, CBDC should be seen not only as a means to monitor fishing activities and its resources, but, more prominently, as a means for engaging fishers, empowering them and letting them contribute to the management setting [5]. The willingness of fishers to contribute to the collection of data should also be seen as a real and tangible commitment to participation.

Self-sampling is not the only approach to data collection in the CM context. Another approach that should be integrated in self-sampling is participatory sampling. In this context, participatory sampling relates to joint sampling activities, like data collection of scientists onboard fishing vessels or the realization of trawl surveys onboard fishing vessels.

Usually, such an approach is used in the context of the deference model of collaboration (fishers just host scientists for sampling) but when fisher EBK is activated, the stakeholder involvement increases. By working together, participatory sampling allows the sharing of experience, the building of mutual trust, the establishment of

[5] Most often, in my experience of collaboration with fishermen, fishermen complained about data used for fisheries management collected under the Data Collection Framework, saying that they are not really representative of the real conditions of fisheries resources at sea.

personal relationships and the empowerment of both fishers and scientists through better understanding of the respective knowledge bases and skills. Moreover, through joint discussion and interpretation of data, it allows building common knowledge and making available new data the value of which is recognized by both the groups, having been jointly collected. In turn, this increases the credibility, legitimacy and salience of science produced as a support for fisheries management. The outcome of participatory sampling goes well beyond the simple collection of data and samples through direct collaboration between fishers and scientists. Indeed, participatory sampling entails joint definition of sampling objectives and methodologies, assessment of data quality and their joint interpretation. This process allows the sharing of knowledge (both science-based and experience-based knowledge), building mutual trust through direct collaboration and a new knowledge base that is agreed upon by fishers and scientists being jointly collected.

3.5 Participatory research and action in the Mediterranean Sea. Experiences within the GAP2 project

Participatory research activities can activate and strengthen the collaboration between fishers, scientists, policy-makers, NGOs and other stakeholders. In this section we provide an overview of experiences carried out within the GAP2 project in the Mediterranean context, in the 2011-2015 period. Although such experiences are related to trawling activities (and thus they fall beyond the SSF domain), the objectives, methods, processes and outcomes are considered relevant to foster stakeholder participation in the Mediterranean and Black Sea context. In particular these practical examples could inspire further application and replication, along with the case studies already presented in Chapter 2. Further information could be obtained from the GAP2 website (www.gap2.eu).

Malta –Trawl fisheries management (Identifying nursery and spawning grounds of key target species by combining fishers' and scientists' knowledge).

The project has involved a total of six scientists, three policy makers and twelve fishing vessels, coming from Malta's Department of Fisheries and Aquaculture, the Malta Fishing Trawler Owners Association and Ghaqda Kooperattiva tas-Sajd (a Maltese fisheries cooperative). The purpose of this case study was to identify the nursery and spawning areas of the seven main species targeted by trawl fisheries within Malta's 25 nm Fisheries Management Zone (FMZ), and to determine any seasonal changes in their distribution. This will serve to give a better idea of the state of key stocks within the FMZ and enable better management of Maltese trawl fisheries. In addition to scientific methods for analysing data and sample design, the approach applied involved a combination of participatory planning, CBDC and oral histories methods. The Maltese case study is currently in the process of publishing two scientific papers – one dealing with the three crustacean target species and a second with the three target fish species. A series of maps will be published, showing the temporal changes in the distribution of these target species within Maltese waters. The legacy of the case study is expected to be improved knowledge of the fisheries resources around Malta, in addition to paving the way towards better collaboration between fishers and scientists. The knowledge gained from the study will be used to update Malta's national management plan for trawl fisheries. The fishers themselves have shown eagerness to participate in other, similar studies in the future.

Spanish (northwestern Mediterranean Sea) – Deep-sea red shrimp management. Ecological impact and alternative management strategies for the northwestern Mediterranean red shrimp fishery.

This case study aimed to identify the main recruitment areas and main season for juvenile capture of the deep-sea red shrimp, Aristeus antennatus. The final objective was to establish a long-term policy that will allow the fishery sector to sustainably exploit the

most important fishery resource of the region (Catalonia, Spain), and one of the most valuable of the entire Mediterranean Sea. By doing this participants wanted to validate the knowledge obtained by fishers. Together with scientists from the ICM-CSIC, the partners that participated in this case study were: the Regional Federation of Fishers Organizations of Girona; the Mediterranean Fisheries Programme for the World Wide Fund for Nature (WWF Med) and the General Directorate for Fisheries and Marine Affairs of the Regional Government of Catalonia. The case study applied a participatory approach that was structured in two main actions:

1. Collaborative observations onboard fishing vessels. After more than two years of working together, scientists now better understand the everyday problems of fishers, while fishers have learned from scientists how scientific methodology can help solve (or mitigate) their problems.
2. Conferences, meetings and workshops. Many meetings have taken place since the GAP projects first started (GAP1 and GAP2). Stakeholders continuously working throughout the entire GAP period has led to a strong, long-term relationship and sense of trust.

The main achievement has been the publication of a LTMP for the north-western Mediterranean Sea deep-sea red shrimp fishery, in the official state bulletin of the Spanish Government – the *Boletín Oficial del Estado* (BOE). Initiated during the GAP1 project, a working document of a Management Plan for the *Aristeus antennatus* fisheries was discussed and drafted by three parties: the Catalan Autonomous Government; the Regional Federation of Fishery Associations of Girona and the ICM-CSIC. The official document of the LTMP was published in the BOE on May 27, 2013.

The LTMP publication in the BOE made a significant impact on the mass media. Several articles appeared in Spain's most important national and regional newspapers, meaning that GAP2 tasks and aims have received *wide-ranging attention*. The main impact of the case study is that scientists and fishers and other stakeholders (NGOs and policy makers), have learned how to share information and how to implement specific actions with the common goal of making this fishery (as well as the overall resource exploitation of our seas) more sustainable. When a clear final objective is shared and agreed amongst all actors, everyday activity becomes easier and the path to success more feasible. The main legacy of the case study is that after all these years of fishers, policy makers, NGOs and scientists working together, the future of this fishery is now more sustainable. Issues such as more selective nets, closed seasons in the fishing grounds, restrictions on fishing engine power, total number of vessels and more, have all been discussed and agreed. Although there is still a way to go, this participatory work has allowed significant progress working together.

Italy – northern Adriatic Sea (Building a common knowledge-base to foster innovative fisheries management by involving fisheries stakeholders through a bottom-up approach)

The aim of the case study was to stimulate and support a bottom-up approach for the inclusion of fishers' proposals into the management discourse. To this aim, participatory research, activities to collect data on the distribution of biological resources and fishing effort in the northern Adriatic Sea were carried out. Data were integrated with fishers' EBK in order to formulate joint proposals which contribute to local and regional fisheries management practices. Eleven skippers and fishers from Chioggia's trawling fleet took part in the project's core activities, alongside ten scientists from ISPRA (Italian National Institute for Environmental Protection and Research) and three researchers from the stakeholder partner Consorzio UNIMAR. The stakeholder group also included personnel from the Veneto Region's fishery office, MedAC and the FAO AdriaMed project. Alongside the above-listed participants, fishers and the representatives of National Fishermen Organizations Federcoopesca, Legapesca, Associazione Generale Cooperative Italiane, Agrital, Federpesca and Marinerie d'Italia e d'Europa were also involved.

Field activities included: i) the collection of catch and biological data by scientific observers during commercial fishing activities (89 fishing trips monitored; 7 trawlers); ii) the development and adoption of electronic logbooks to allow fishers to self-sample geo-referenced data on commercial catches (4800 self-sampled hauls so far; 7 trawlers); and iii) the realization of a trawl-survey in the Veneto region administrative waters (3 trawl-surveys from 2012 to 2014, 21 stations). Open meetings and interviews aimed to discuss management issues, verify the progress of activities and share information and knowledge, reflecting the typical collaborative approach of our case study.

This project has established a truly collaborative group of fishers and scientists, from which empirical and research based knowledge is transferred to the managers of the fishery. In particular, the main impacts of the case study are: the joint validation of both scientific and traditional knowledge; the involvement of fishers in gathering data (self-sampling); and 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 fishers 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, 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 fishers 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, natural science publications dealing with field work results and social science papers representing the participatory process. Meanwhile a book inspired by GAP2 and dealing with fisheries management and anthropology and a book summarizing this experience were published (Bulian and Raicevich, 2013; Raicevich *et al.*, 2015). The legacy of the case study work is the establishment of an equal group of scientists and fishers sharing common goals. The group still works to define and propose sustainable and innovative management measures based upon a combination of scientific data and fishers EBK. The aim is to ensure the sustainable exploitation of marine resources, from an economic, social and environmental perspective. Through this group and the working group called "Reti di conoscenza" ("Nets of knowledge"), established within the Fisheries Foundation of Chioggia, the GAP2 participants are acting at the interface between fisheries stakeholders at local and regional levels, to promote participatory research and action contributing to the management of fisheries resources.

4. IDENTIFICATION OF FUTURE NEEDS FOR CO-MANAGEMENT

This report dealt with both the theoretical analysis and the practical implementation of CM schemes, focusing in particular on the role of participation, participatory research and the engagement of fisher stakeholders in the Mediterranean and the Black Sea region.

The analysis of the case studies related to the processes of the actual implementation of CM provided practical information on the merits, difficulties and challenges related to the establishment of such a framework.

However, when assessing the case study results (Chapter 2), it is necessary to bear in mind that their positive outcomes are rooted in the long-term efforts of collaboration among fisher stakeholders, administrations and scientists, and it is necessary to recall

that participation was facilitated by the active role played by WWF and other NGOs and some other stakeholders (depending on the case study specificities). Thus, while the overall message that can be derived is that the conditions to enforce CM in the SSF context are now present and that such a process is successful, we should duly take into account the circumstances and the hard work (and the financial support) that ensured that the achievements were reached.

Moreover, when reflecting on the needs related to fostering the implementation of a CM scheme for SSF in the Mediterranean and Black Sea, the general issue related to the scale of the case studies that were considered emerges. Indeed, the number of fishing vessels (as well as their geographical scope) involved in the four examples of the practical planning/implementation of CM schemes is very limited, ranging from ten fishing vessels of the Telašćica case study to 26 in the sand eel fishery, 40 in the Lastovo case study and 230 in the Taza case study. In relation to the impressive number of SSF fishing vessels and fishers present in the Mediterranean regions (Ferrugio, 2013), and considering their geographical spread along the coastal areas and islands, the question related to the actual potential of establishing CM schemes in the whole region is highly sensitive.

Moreover, in three out of four case studies, the presence of an MPA (established or under establishment) showed somehow the ability to facilitate the introduction of common property rights and CM schemes. In this light, it is also necessary to recall that even the presence of an MPA does not, itself, guarantee that successful fisheries management will be achieved. Indeed, as has emerged from the comparative study of the effectiveness of MPAs in fostering a sustainable exploitation of fisheries resources (Par. 2.9), an effective MPA enforcement, the active engagement of fishers and fisher representatives in the management boards and the continuous promotion of sustainable fisheries are conditions that are closely linked to the success of fisheries governance; however, such conditions, are not met within all Mediterranean MPAs. In addition, although MPAs are present throughout the Mediterranean basin (and their number and geographical scale are likely going to increase in the near future), it cannot be assumed that this tool could be effective for promoting sustainable fisheries and the viability of the SSF sector in this region.

In parallel, the sand eel case study in Catalonia (Par. 2.6) demonstrated that CM can be effectively enforced beyond the presence of an MPA, thanks to the introduction of community-based property rights and clear institutional support of power derogation to resource users under a participatory scheme. However, again, this is still a small-scale example, which is very positive, of 26 fishing vessels within an almost single-species fishery.

Other approaches could be explored, such as those implemented in Italy, with the establishment of LMPs (Par. 2.10). In this case, the number of SSF fishing vessels involved in such management tools and the area of application seem to be more consistent with the goal of achieving sustainability at a pan-Mediterranean scale. However, the LMPs do not implement clear property rights, although they foster the adoption of several spatially explicit measures to reduce fishing effort and establish NTZs. To date, it is too early to assess the effectiveness of such an approach. Moreover, such an analysis should also consider the financial costs associated with the implementation of the measures (partially supported by EU policies, which do not apply to the whole GFCM domain), along with the actual effectiveness in terms of ensuring SSF viability and the sustainable exploitation of fisheries resources.

On these bases, the central theme of this section is not to present a list of needs based on the theoretical background for CM (see, in particular, Gutiérrez, 2013 for an overview) and participation (this report, Chapters 1 and 3), but rather to provide practical advice to support the transition of Mediterranean and the Black Sea SSF to sustainability by enhancing stakeholder engagement, a process that, as is now acknowledged, could be achieved, fostering the establishment of communitybased

property rights under a participatory approach, i.e. the adoption of CM schemes. For this purpose, two major items are addressed below, the institutional and legislative context and the empowerment of fisheries stakeholders through capacity-building. The identification of such needs and of the current institutional and legislative contexts support the roadmap proposed for the next years to strengthen the role of stakeholders in the context of management and CM schemes.

4.1 Institutional context and legal framework

From the case study analysis, it has emerged that the role and engagement of stakeholders can be either activated by a top-down process that affects the SSF sector (such as a legislative process for the adoption of new rules that are seen as potentially or effectively detrimental by fishers) or conceived without taking into account the specificities of the sector (see the Telašćica, Lastovo and Sand eel case studies). Another complementary condition could be the explicit willingness of central/local administrations to enforce community rights-based management or access limitations and the inherent interest in involving fisher stakeholders in the definition of related rules (see, for instance, the Taza case study).

However, once these conditions are met, it is necessary that the legal and institutional frameworks be open to recognize stakeholder's roles and suggestions. This condition does not guarantee in itself that a truly participatory collaboration will be enforced, nor that the process will lead to agreed-upon outcomes, as seen in the context of the Lastovo case study pertaining to the difficulties shown in reaching an agreement between fisher stakeholders.

What emerges is the need to establish a path that ensures that stakeholders' engagement, vision and values are taken into account when framing management rules. This need has also been recalled in the SSF Guidelines (FAO, 2015). To this end, it is necessary to establish fora (e.g. CM committee) that include relevant stakeholders, particularly resource users (fishers and their representatives), local administrations, scientists and NGOs, wherein participation can be activated. Such a process should establish mutual trust and empower all participants. Working together can thus allow for an explicit comparison (and where possible reconciliation) of the vision of the problems to be addressed and how to act to achieve such purposes, benefiting from the generation of a knowledge base that integrates and values EBK, SBK, administrative knowledge and the values of all participants.

The process of power derogation through the adoption of CM schemes is already achievable in the Mediterranean and the Black Sea institutional and legal contexts, at least in some countries, as shown by the case studies considered in this report and presented in chapter 2. However, to ensure that such a process is replicable in the whole region, it would be necessary to assess, at each national level within the Mediterranean and Black Sea domain, their operational applicability, identifying bottlenecks and removing issues, such as parallel competencies in the field of fisheries and related subjects. This item, for instance, clearly appeared in the analysis of different case studies (those based in Croatia and Algeria), where institutional conflicts between different Ministries hampered or slowed down the process of CM establishment. Such an analysis should also consider a different range of property rights tools and different contexts, such as the presence of MPAs, NTZs, etc.

As stated by Gutiérrez (2013) "the existence of specific legal frameworks are not a prerequisite for the implementation of CM *per se*", but rather "political will is the key to the establishment of CM mechanisms". This implies that once the institutional barriers are removed and legislation offers the possibility of establishing CM and actively engaging fisher stakeholders in the process, it is necessary that this framework be recognized and supported at each national level.

What appears to be missing, therefore, is a framework supporting SSF in a CM context, along with a coherent institutional and legislative approach that could be adopted to boost a functionally equivalent process within all Mediterranean and Black

Sea countries. Such a framework could be based on cross-cutting rules and obligations (still maintaining the flexibility that is needed for the implementation at each national level) and could be defined and enforced, for instance, by the GFCM in collaboration with its contracting parties and cooperating non-contracting parties, and other partners and regional stakeholders.

4.2 Capacity-building: empowering fishery stakeholders

Capacity-building is also critical to allow fisher stakeholders to participate in CM. This theme has also been recognized by the SSF Guidelines (FAO, 2015) as a key issue that deserves the attention of national administrations. Gutiérrez (2013) also discussed this theme in the Mediterranean and the Black Sea context, enlisting a series of steps and needs and concluding that the most relevant skill is related to the willingness to participate and act together, a skill that could hardly be taught.

However, it is relevant to recall that the willingness of stakeholders to participate can be generated when a potential positive outcome is achievable and the framework is defined and understood. This item is linked to the need to establish a coherent legal and administrative framework mentioned in the previous paragraph. It also relates to the need to promote CM schemes and applications, based on successful achievements and examples. For instance, participants in the Taza case study mentioned the very positive effect that was reached in terms of motivation thanks to the exchange of experiences with other stakeholders, an approach that has also been successfully applied in other contexts, such as the participatory project GAP2.

Moreover, participation should be considered a means of reaching an objective (i.e. CM), rather than the objective itself. This is also clear from the analysis of the case studies: once there is a common goal (e.g. influence fisheries management, empower fishers) and there is a clear opportunity to see bottom-up proposals to be considered (e.g. willingness of local and national authorities to apply a participatory scheme), the interest of fisher stakeholders is activated and, through the application of a transparent and open approach, stakeholder participation and commitment can be achieved, leading to the planning/enforcement of CM schemes.

However, even under ideal conditions, the engagement of fishers may not be effective if the range of skills needed to contribute effectively to the process and interact with other stakeholders is missing (e.g. understanding of the management process, understanding of administrative needs, understanding of SBK, understanding of team worming, synthesis capability, etc.).

From the practical implementation of case studies, we learned that some of the skills, particularly those related to understanding the administrative process, to SBK and the capability to work together, can be developed (at least partially) through the direct engagement of stakeholders in participatory research and actions. Moreover, it must be noted that the capacity-building process should not be restricted to the domain of fishers stakeholders, but should encompass all the entities that are envisaged to participate in CM schemes (administrators, scientists, NGOs, etc.).

Given the differences between local conditions, it is difficult to detail the capacity-building needs in relation to each kind of stakeholder; rather, it is considered more relevant to outline the main themes for which capacity-building is needed in the Mediterranean and the Black Sea context:

- management and CM process: power derogation, institutional context, legislative context, property rights, tenure rights, knowledge base needs for fisheries management, MCS and their implementation;
- fishery resources and ecology: fish biology and ecology, impact of fishing, indicators to assess stock status, fishing practices and strategies;
- fisher behaviour: fishing community values and conflicts, tenure rights and historical habits, role played by different stakeholders and drivers (including market);

- participatory work: group dynamics, decision making, democracy and rights, methods to collect and integrate knowledge.

The tools to be used to achieve capacity-building should be tailored and defined according to local conditions; however, it is possible to identify, among others, different complementary approaches:

- promote the principles, tools and approaches for stakeholder engagement in CM schemes at the regional level by compiling and disseminating documentation (using, for instance, IT, reports, videos) based on current successful experiences;
- carry out training courses tailored to specific capacity-building needs and the target audience;
- compile a reference good practice guide and handbook to facilitate the capacity-building of stakeholders and CM committee participants;
- train facilitators that could support the development of CM implementation and provide the support needed at the local level for capacity-building;
- establish the conditions to foster the exchange of experiences and spill-over from ongoing CM experiences to those that are facing their early stage of development.

The responsibility for the development and implementation of such tools could be shared between various institutions and entities, including the GFCM and its partners, the Fishery Department of the FAO, local administrations, NGOs, etc., provided that coherence and adequate financial support is ensured.

5. CONCLUSIONS – PROMOTING STAKEHOLDERS PARTICIPATION IN SMALLSCALE FISHERIES MANAGEMENT TO ACHIEVE SUSTAINABILITY IN THE MEDITERRANEAN AND THE BLACK SEA: A ROADMAP

Recent institutional and legislative innovations fostered the development of a coordinated approach to support SSF and the strengthening of the role of fishers in fisheries management (i.e. co-management) in the Mediterranean and the Black Sea. These new acts and agreements include the SSF Guidelines (FAO, 2015), the recently amended GFCM Agreement (GFCM, 2015) and the CFP reform (Reg. 1380/2013), and they represent a major opportunity to achieve sustainable fisheries in the near future.

During this session, we identified key actions that could be put forward by the GFCM to contracting parties and cooperating non-contracting parties, in collaboration with FAO and other regional stakeholders (including NGOs) to create the enabling conditions to institutionalize stakeholder engagement in fisheries management through the adoption of co-management schemes.

1. It is strongly suggested that this framework takes into account the SSF Guidelines: a coordinated action at the GFCM level could represent a tangible implementation of SSF Guideline principles at the RFMO level, putting the GFCM in the forefront of the regional bodies supporting the adoption of these voluntary guidelines.
2. Establish the institutional context: general rules (and needs) should be defined for the engagement of fisher stakeholders in CM schemes and compliance, which define the range of measures (e.g. community-based rights) and minimum institutional requirements. This requires an analysis of national and international legal frameworks considering, in each GFCM member, the circumstances that allow for the establishment of CM schemes and stakeholder involvement and overcome potential challenges.
3. Develop and adopt a good practice guide for enforcing CM schemes for SSF in the Mediterranean and the Black Sea. This guide should encompass a series of steps that could include the institutional and legislative context, the implementation of the participatory process, the CM setting and tools, approaches for MCS schemes, indicators to monitor the effectiveness of management measures, approaches for participatory work, etc. The guide should be based on interdisciplinary

contributions (including legal, administrative, ecological, economic and social aspects) that could be found both within the GFCM and the FAO Fishery and Aquaculture Department, establishing a direct link with SSF Guidelines. Moreover, this guide should build and benefit from existing experiences on the development of CM in the Mediterranean and the Black Sea, involving NGOs and fisheries stakeholders (i.e. MedArtNet).

4. Establish a capacity-building programme devoted to supporting stakeholder roles in CM, which is tailored to various targets (institutional, Marine Protected Area administration, local administrations, resource users, natural and social scientists). This programme could be based on the "good practice guide" and the adoption of a range of tools that could allow awareness to be raised, both in the fishery sector and in its institutional context, on the opportunities that the CM approach and stakeholder involvement represent, providing the skills needed for effective participation and implementation. Various means of communication and outreach should be used, according to the target groups and national specificities (see also Par. 4.2).
5. Provide support to existing co-management schemes and create a commitment to multiply them across the region. There are several ongoing CM schemes in the Mediterranean which could benefit from further institutional support and commitment, funding and networking. These CM schemes are often isolated from a true regional approach, and to this end MedArtNet has played an important role in networking fishers and their experiences. A regional program based on a solid institutional framework, which the GFCM can provide, and commitment needs to be established, building on existing experiences and partners but with a longer term vision on how CM can benefit SSF at the regional scale.

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APPENDIX 1. Structure of the questionnaire adopted for case-studies survey

Only the list of questions are reported.

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1. GENERAL INFORMATION

1.1. Case study name
1.2. Case study area: which is the location and surface (Km^2) where the CM is applied?
1.3. Why this area was selected for the enforcement of the Co-management? SSF directly involved in the case study:
1.4. Is there a conflict for spatial/resource use between the SSF working in the CM and other SSF or Industrial fisheries? Due to spatial overlap and/or for the exploitation of the same resources? (please specify: low- medium –high)

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2. GENERAL INFORMATION ON THE CM PLAN/ACTIVITIES

2.1. What type of Co-management is (will be) enforced?
2.2. In which phase is now the Co-management process?
2.3. Could you describe the CM activities (plans)?
2.4. Which rules/activities have been (will be) implemented (please provide specifications)?
2.5. How the rules/activities were defined?
2.6. How the rules/activities were/are/will be implemented (please provide references to law/bylaw if available)?
2.7. The derogation of power from the central state to the CM was difficult?
2.8. And how was it achieved?
2.9. Did international legislation (e.g. CFP) and institutions (e.g. GFCM) facilitate or limit this process of power derogation? Which were the problems and/or opportunities? (please provide specific info if available)

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3. INFORMATION ON THE PROCESS

3.1. When the CM process started (i.e. the process of constructing the plan)?
3.2. When the CM plan was (will be) enforced?
3.3. Who started the process playing an active role and who is now actively/passively involved? (multiple options possible, please specify institutions or relevant stakeholders) (better to see if there are different opinion among CM Authority, Fisher organization, Scientists and Stakeholders)
3.4. Why the process started (this analysis question should be addressed by the different stakeholders who initiated the process)
3.5. Was there a consensus on the interpretation of the current problems or were there different interpretations of the status quo?
3.6. Which were the expectations from the initiating the CM process and which are the current outcomes and prospectus (this analysis question should be addressed by the different stakeholders who initiated the process)
3.7. How the process started
3.8. How the process is now enforced
3.9. How consensus is reached to take decisions

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4. ROLE OF KNOWLEDGE

4.1. Which knowledge-base was used for fisheries management in the area BEFORE the beginning of the CM and DURING the CM implementation?
4.2. Was "new" knowledge co-constructed through collaboration in the CM implementation? (e.g. joint revision of species' abundance, joint collection of data from fishers and scientists, etc. Please specify)

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5. ROLE OF FISHERS STAKEHOLDERS AND THEIR EMPOWERMENT

5.1. Which was the role played by fishers and fisher organizations in the definition of the CM plan?
5.2. Was there any strong leadership of fishers and/or fisher organizations? (please provide details)
5.3. Which attributes qualified the fishing community before and during the enforcement of the plan? (presence/absence)
5.4. Was the role of the fisher organization questioned by fishers before the CM process started? And during the definition/implementation of the CM plan?
5.5. Did the CM process increased the representativeness/leadership of fisher organizations
5.6. Which is the role of fishers and fisher organizations in the CM implementation
5.7. Did the participation to the CM planning and implementation empowered fishers role increasing
5.8. Are there still barriers that prevents the full involvement of fishers in the CM of the resources in the case study?
5.9. If answered yes, how it could be possible to overcome them?

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6. CONDITIONS AND NEEDS TO STRENGTHEN FISHERS ROLE IN CO-MANAGEMENT

6.1. Could you tells us which are the conditions you believe are fundamental to strengthen the role of fishers in co-management? (essential, useful, not relevant) /(Legal framework – Process framework – Context)

6.2. Capacity-building: which skills needs to be supported to strengthen the role of fishers in co-management?

6.3. Which incentives would foster the involvement of fishers into co-management plans (Please specify)
6.4. Which conditions would impede the participation of fishers in co-management?
6.5. Is the presence of a MPA or NTZ a prerequisite for enforcing co-management? Or is it an obstacle?

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7. MESSAGES

7.1. Collect messages (positive, but also negative, if there) from different stakeholders from each case study focusing on: expectations, achievements, process.

APPENDIX 2.

Case study features, Co-management attributes (binary coding: 1 = Yes [green]; 0 = No) and Co-management outcomes (binary coding: 1 = Yes [green]; 0 = No) assessed for each case-study in the pre-implementation and implementation phase. It is worth mentioning that only Sand eel case study outcomes are assessed according to actual results of the co-management implementation, while the scores provided for the other case-studies are related to expected outcomes.

Group	Variable name	Frequency (%) (Guitierrez et al. 2011b)	Taza (Algeria)		Telascica (Croatia)		Lastovo (Croatia)		Sandeel (Spain)	
CM	Type (consultative,cooperative,delegated)	-	N.A.	Coop.	NA	Cons./Coop.	NA	Cons./Coop.	NA	Delegated
	Phase(pre-, implementation, post-)	-	Pre-impl.	Impl.	Pre-impl.	Impl.	Pre-impl.	Impl.	Pre-impl.	Impl.
	Timeframe	-	2010-2015	Future	2010-2015	Future	2010-2015	Future	2010-2012	2015
RS	HDI (low, medium, high, veryhigh)	-	High		Very High				Very High	
	Governance Index (0-100)	-	25		67				77	
	Corruption Perceptions Index (0-100)	-	36		48				60	
	Resource type(single*, multi-species)	-	Multi		Single		Single		Single	
	Ecosystem (inland, coastal, offshore)	-	Coastal		Coastal		Coastal		Coastal	
	Fishingsector (artisanal, industrial, sequential)	-	Artisanal		Artisanal		Artisanal		Artisanal	
	Co-management attributes									
	Defined geographic boundaries	52	0	1	1	1	1	1	0	1
RU	Sedentary/low mobility resources	38	1	1	1	1	1	1	1	1
GS	Central governments upport(local)	93	0	1	0	1	0	1	0	1
	Scientific advice	92	0	1	0	1	0	0	0	1
	Minimum size restrictions	76	1	1	0	1	0	1	0	1
	Long-term management policy	71	0	1	0	0	0	0	0	1
	Global catch quotas	52	0	0	0	0	0	0	0	1
	Monitoring, control and surveillance	47	0	1	0	1	0	1	0	1
	Protected areas	39	0	1	1	1	1	1	0	0
	Spatially explicit management	37	0	1	1	1	1	1	0	0
	Individual or community quotas	33	0	0	0	0	0	0	0	1
	Co-management in law (national)	32	0	1	0	1	0	1	0	0
	Seeding or restocking programs	19	0	0	0	0	0	0	0	0
	TURF	18	0	0	0	1	0	0	0	0
US	Social cohesion	78	0	1	0	1	1	0	0	1
	Self-enforcement mechanisms	71	0	1	0	1	1	0	0	1
	Leadership	62	0	1	0	1	1	0	0	1
	Tradition in self-organization	55	1	0	0	0	1	0	0	1
	Influence in local market	28	0	0	0	0	0	0	0	1
	Comanagement attributes score		3	13	4	13	8	8	1	14
	Co-management outcomes									
O	Community empowerment	85	0	1	0	1	0	1	0	1
	Fishery status (under or fully, over-exploited)	67	0	1	0	1	0	1	0	1
	Sustainable catches	62	0	1	0	1	0	1	0	1
	Increase in social welfare	61	0	1	0	1	0	1	0	1
	Increase in CPUE	54	0	1	0	1	0	1	0	1
	Add-on conservation benefits	45	0	1	0	1	0	1	0	1
	Increase in abundance	38	0	1	0	1	0	1	0	1
	Increase in unit prices	30	0	1	0	0	0	0	0	1
	Success score			8		7		7		8

PANEL 3

Improving the efficiency of marine protected areas (MPAs) as fisheries management tools and benefits from involving the small-scale fisheries sector

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PANEL 3
Improving the efficiency of marine protected areas (MPAs) as fisheries management tools and benefits from involving the small-scale fisheries sector

Toni Font and Josep Lloret

EXECUTIVE SUMMARY

This background document was developed to inform Panel 3 of the Regional Conference on ''Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea" (Algeria, 7–9 March 2016). This panel was entitled "Improving the efficiency of marine protected areas (MPAs) as fisheries management tools and benefits from involving the small-scale fisheries sector".

This document intends to:

- examine key thematic issues and challenges from the biological, social, economic and management perspectives (the cross-cutting issues of governance, communication, capacity-building and finance are inherent to all perspectives);
- provide an array of examples from the Mediterranean and worldwide to understand the challenges and replicate solutions, including three in-depth case studies: MPAs of Cap de Creus, Spain, Gökova, Turkey, and Gulf of Lion, France;
- identify priority recommendations for action to be implemented collaboratively (decisionmakers, MPA managers, fishers, scientists and private sector); and
- incorporate the views of several social and natural scientists with those of fisheries and MPA managers who were consulted prior to the conference, while reconciling marine conservation and the economic benefits small-scale fishers can yield from resources in and around MPAs.

After briefly recalling the Mediterranean context for small-scale fisheries, and acknowledging that its impact is lower than that of semi-industrial/industrial professional fisheries, this document examines the various issues and challenges from a solution-orientated perspective.

Despite the biological and ecological impacts of small-scale fisheries on marine resources (such as the pressure exerted on certain vulnerable species), issues associated with ghost fishing and the socio-economic challenges facing artisanal fisheries in Mediterranean waters (such as the decline of stocks and catches despite their importance for the local economy), coastal fisheries are not studied with the same rigor as industrial or large-scale fisheries. In that respect, they are often poorly managed or not managed at all. In order to reduce the negative impacts of artisanal fishing on marine ecosystems, and to consider the socio-economic challenges faced by these fisheries, MPAs have been implemented as part of an ecosystem-based approach to coastal management.

MPAs are an essential tool to ensure the protection of overexploited populations, threatened species and their habitats, and to implement sound management actions with a view to addressing socio-economic challenges and sustaining local livelihoods. The known benefits of MPAs for coastal resources include increase in abundance (net emigration of adults and juveniles across borders), biomass, fecundity (increased production and exportation of pelagic eggs and larvae), and biodiversity, all of which positively affect small-scale fisheries. Indeed, the contribution to the sustainability of adjacent and "in-house" fisheries is often an explicit management goal for MPAs.

A key target of the Convention on Biological Diversity (CBD 2020) is "[…] the protection of 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, [that] are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascape" (Aichi Target 11). During a forum held in 2012 in Antalya, Turkey, the Mediterranean MPA community reviewed the status of MPAs in the region and identified actions needed to reach the Aichi Targets. These were reflected in a roadmap adopted by the parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention). A general objective related to fisheries is to strengthen the commitment of local populations, particularly artisanal fishers and other stakeholders, in the management and monitoring process through different actions, including: the use of innovative institutional frameworks which reinforce the integration of fisheries and conservation governance; the establishment of institutional agreements between fisheries and MPA institutions; a better understanding and integration of sustainable socio-economic activities within MPAs, and the development of communication and awareness-raising activities.

In parallel, the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) of the Food and Agriculture Organization of the United Nations (FAO) have been developed. These guidelines represent a crucial step towards sustainable smallscale fisheries as it is the first internationally agreed instrument entirely dedicated to this highly important sector.

This background document recommends that action be taken at the local and national levels with a view to reaching international and regional agreements. Several priority recommendations are put forth in this respect, namely:

- the legal and institutional feasibility of the establishment and management of multi-use MPAs with fisheries management objectives – including the establishment of more no-take zones (NTZs) – is needed;
- the establishment of systematic buffer zones around MPAs, also involving fishers in the process, is highly desirable;
- SSF can be more effectively managed via MPAs when favouring integration at the inter- and intra-ministerial levels;
- SSF management plans in MPAs, co-managed by managers and fishers and incorporating traditional ecological knowledge (TEK), strongly contribute to effectiveness;
- models such as the *Prud'homies* and territorial use rights in fisheries (TURFs) could be adapted to many areas;
- adequate regulations that are based on ecological/biological and socio-economic monitoring, fair to all users, and take into account livelihoods (i.e. prioritising sustainable SSF with respect to recreational fishing) are needed to manage SSF in and around MPAs;
- regulations to be considered include: protecting endangered species and habitats, setting minimum and maximum landing size for target species, ensuring the "reserve effect", considering selectivity (including protecting

juveniles and avoiding fisheries that selectively target certain species/sizes), favouring the targeting of lower trophic level species, establishing seasonal bans/regulations to protect key stages of the life cycle, implementing measures to reduce loss of fishing gear, banning the most destructive gear, providing incentives and collaborating to reduce bycatch, adopting simple habits to return non-vertebrate bycatch nearby, banning the use of non-marine bait, regulating recreational fishing (controlling illegal catches and their sale);

- regulations need to be enforced, by providing financial and human resources, using an array of communication means and fostering collaboration between managers and fishers;
- there is a need to conduct monitoring in and around MPAs on the biological/ecological impacts and socio-economic and benefits of SSF (*ex ante* and *ex post*) and on the effects of regulations;
- technologies used as tools to manage threats can be helpful (for example, geographic information system [GIS] tools to track lost fishing gear, tools to plan zonation and spatial use, biodegradable gear, etc.);
- it is important to raise awareness on ecology/biology and the SSF profession among all MPA users and to use communication tools on key issues and challenges;
- the perception of the profession among MPA users and coastal inhabitants/tourists needs to be improved and the tourism season should be used to increase the value of landings;
- labels should be developed for sustainable products fished in and around the MPAs, promoting short circuits and highlighting local products (specific species) on local markets close to MPAs, via the competent authorities and the private sector;
- opportunities for fishers need to be diversified ("pescatourism", wildlife observation, etc.);
- in relation to climate change and non-indigenous species (NIS), it can be highly beneficial to conduct further research and use TEK to monitor the impacts of new arrivals in a coordinated way;
- conservation efforts, and MPAs in particular, should be considered as an investment in natural capital rather than a public expenditure; in this respect, efforts should be made to protect this investment from risks such as conflicting marine-based activities and land-based pollution; and
- collaboration should be fostered between scientists in the social, economic and biological disciplines, as well as between non-governmental organizations (NGOs), fishers and MPA managers.

RÉSUMÉ

Le présent document d'information a été élaboré dans le but d'apporter des informations au titre du panel 3 de la Conférence régionale «Construire un avenir pour une pêche artisanale durable en Méditerranée et en mer Noire» (Algérie, 7-9 mars 2016). Ce panel était intitulé «Améliorer l'efficacité des aires marines protégées (AMP) en tant qu'instruments de gestion des pêches et examiner les avantages de la participation du secteur de la pêche artisanale».

Ce document vise à:

- examiner les principales questions thématiques et les défis d'un point de vue biologique, social, économique et de gestion (les questions transversales de gouvernance, communication, renforcement des capacités et financements concernent tous ces points de vue);
- présenter une panoplie d'exemples en Méditerranée et dans le monde afin de mieux comprendre les défis et la façon dont certaines solutions peuvent être reproduites, notamment trois études de cas approfondies: les AMP du Cap de Creus en Espagne, de Gökova en Turquie et du Golfe du Lion en France;
- identifier des recommandations prioritaires quant aux mesures à prendre de manière collaborative (décideurs, gestionnaires d'AMP, pêcheurs, scientifiques et secteur privé); et
- combiner les points de vue de plusieurs chercheurs en sciences sociales et naturelles et ceux du secteur des pêches et des gestionnaires d'AMP consultés en amont de la conférence, tout en conciliant la préservation des milieux marins et les avantages économiques que les artisans pêcheurs peuvent tirer des ressources présentes à l'intérieur et autour des AMP.

Après un bref rappel du contexte de la pêche artisanale en Méditerranée, et après avoir souligné que son impact est moins important que celui de la pêche professionnelle industrielle/semiindustrielle, ce document s'intéresse aux divers défis et aux différentes questions dans une optique de recherche de solutions.

Malgré les impacts biologiques et écologiques de la pêche artisanale sur les ressources marines (par exemple la pression exercée sur certaines espèces vulnérables), les problèmes associés à la pêche fantôme et les défis socioéconomiques auxquels sont confrontés les artisans pêcheurs dans les eaux méditerranéennes (notamment le déclin des stocks et des captures malgré leur importance pour l'économie locale), les études consacrées à la pêche côtière ne sont pas aussi rigoureuses que celles portant sur la pêche industrielle ou à grande échelle. Ainsi, celle-ci est souvent gérée de manière approximative, voire non gérée. Pour réduire les effets négatifs de la pêche artisanale sur les écosystèmes marins, mais aussi prendre en compte les défis socioéconomiques auxquels cette pêche est confrontée, des AMP ont été créées dans le cadre d'une approche écosystémique de la gestion côtière.

Les AMP sont un instrument essentiel pour assurer la protection des populations surexploitées, des espèces menacées et de leurs habitats, et pour mettre en œuvre des mesures de gestion rigoureuses afin de relever les défis socioéconomiques et de contribuer aux moyens d'existence des populations locales. Parmi les avantages connus des AMP pour les ressources côtières figurent l'augmentation de l'abondance (émigration nette transfrontalière des adultes et des juvéniles), de la biomasse, de la fécondité (augmentation de la production et de l'exportation d'œufs et de larves d'espèces pélagiques) et de la biodiversité, ce qui a des effets positifs sur la pêche artisanale. Ainsi, contribuer à la durabilité des pêches «internes» et voisines est souvent un objectif de gestion explicite des AMP.

L'un des principaux objectifs de la Convention sur la diversité biologique (CDB 2020) est «[…] la protection de 10 pour cent des zones marines et côtières, y compris les zones qui sont particulièrement importantes pour la diversité biologique et les services fournis par les écosystèmes, [qui] sont conservées au moyen de réseaux écologiquement

représentatifs et bien reliés d'aires protégées gérées efficacement et équitablement et d'autres mesures de conservation efficaces par zone, et intégrées dans l'ensemble du paysage terrestre et marin» (objectif d'Aichi 11). À l'occasion d'un forum tenu en 2002 à Antalya, Turquie, la communauté des AMP de Méditerranée s'est penchée sur la situation des AMP dans la région et a identifié des mesures nécessaires pour atteindre les objectifs d'Aichi. Ceux-ci ont été repris dans une feuille de route adoptée par les parties à la Convention sur la protection du milieu marin et du littoral de la Méditerranée (Convention de Barcelone). L'un des objectifs généraux dans le domaine de la pêche est de renforcer la participation des populations locales, en particulier les artisans pêcheurs et les autres parties prenantes, au processus de gestion et de surveillance grâce à différentes actions telles que: l'utilisation de cadres institutionnels innovants renforçant l'intégration des pêches et de la gouvernance en matière de conservation; la mise en place d'accords institutionnels entre les institutions responsables en matière de pêche et d'AMP; une meilleure compréhension et intégration des activités socioéconomiques durables au sein des AMP, et le développement d'activités de communication et de sensibilisation.

En parallèle, les Directives volontaires visant à assurer la durabilité de la pêche artisanale dans le contexte de la sécurité alimentaire et de l'éradication de la pauvreté (Directives PAD) de l'Organisation des Nations Unies pour l'alimentation et l'agriculture (FAO) ont été élaborées. Ces directives constituent une étape déterminante vers une pêche artisanale durable car il s'agit du premier instrument défini au niveau international entièrement dédié à ce secteur extrêmement important.

Le présent document recommande la mise en œuvre de mesures au niveau local et national en vue de parvenir à des accords régionaux et internationaux. Il propose notamment un certain nombre de recommandations prioritaires, à savoir:

- la création et la gestion d'AMP à usages multiples avec des objectifs de gestion de la pêche, y compris la mise en place de nouvelles zones de pêche interdite, doivent être facilitées au niveau juridique et institutionnel;
- la création de zones tampons systématiques autour des AMP, en impliquant également les pêcheurs dans ce processus, est fortement souhaitable;
- la pêche artisanale peut être gérée plus efficacement au moyen des AMP si l'intégration est favorisée aux niveaux inter et intraministériel;
- les plans de gestion de la pêche artisanale dans les AMP, cogérés par les gestionnaires et les pêcheurs et intégrant le savoir écologique traditionnel, contribuent à l'efficacité de manière déterminante;
- les modèles tels que les prud'homies et les droits d'usage territoriaux dans la pêche pourraient être adaptés à de nombreuses régions;
- une réglementation adaptée, fondée sur une surveillance écologique/biologique et socioéconomique, équitable pour tous les utilisateurs et prenant en compte les moyens de subsistance (c'est-à-dire en donnant la priorité à la pêche artisanale durable par rapport à la pêche de loisir), est nécessaire pour gérer la pêche artisanale à l'intérieur et autour des AMP;
- la réglementation à envisager viserait notamment à: protéger les espèces menacées et leurs habitats, définir une taille de débarquement minimale et maximale pour les espèces cibles, assurer l'«effet de réserve», prendre en compte la sélectivité (notamment en protégeant les juvéniles et en évitant les pêches qui ciblent certaines espèces/tailles de manière sélective), favoriser le ciblage d'espèces de niveau trophique inférieur, instaurer des réglementations/interdictions saisonnières pour protéger les étapes clés du cycle de vie, mettre en œuvre des mesures permettant de limiter la perte d'engins de pêche, interdire les engins les plus destructeurs, mettre en place des incitations et des collaborations destinées à réduire les captures accidentelles, adopter des habitudes simples pour remettre à l'eau à proximité des captures accidentelles

d'invertébrés, interdire l'usage d'appâts non marins et réglementer la pêche de loisir (en contrôlant les captures illicites et leur vente);
- la réglementation doit être appliquée, grâce à l'apport de ressources humaines et financières, en utilisant divers moyens de communication et en encourageant la collaboration entre les gestionnaires et les pêcheurs;
- une surveillance des impacts biologiques/écologiques et des avantages socioéconomiques de la pêche artisanale (a priori et a posteriori) ainsi que des effets de la réglementation est nécessaire à l'intérieur et autour des AMP;
- les technologies en tant qu'outils permettant de gérer les menaces peuvent être utiles (par exemple, les systèmes d'information géographique pour localiser les engins de pêche perdus, les outils de planification du zonage et de l'utilisation de l'espace, les engins biodégradables, etc.);
- il est nécessaire de développer la sensibilisation à l'écologie/biologie et à la profession d'artisan pêcheur et d'utiliser des outils de communication afin de faire connaître les principaux défis et problèmes à l'ensemble des utilisateurs des AMP;
- il convient d'améliorer l'image de la profession auprès des usagers des AMP et des habitants/touristes des zones côtières et d'utiliser la saison touristique pour valoriser les débarquements;
- il est nécessaire de concevoir des labels pour les produits durables pêchés à l'intérieur et autour des AMP, de promouvoir les circuits courts et de mettre en valeur les produits locaux (espèces spécifiques) sur les marchés locaux à proximité des AMP, par l'intermédiaire des autorités compétentes et du secteur privé;
- les débouchés accessibles aux pêcheurs (pescatourisme, observation de la faune, etc.) doivent être diversifiés;
- en ce qui concerne le changement climatique et les espèces allochtones, il peut être extrêmement utile de mener des recherches complémentaires et d'utiliser le savoir écologique traditionnel pour surveiller de manière coordonnée les conséquences des nouvelles arrivées;
- les mesures de conservation, et les AMP en particulier, doivent être considérées comme un investissement en capital naturel plutôt qu'une dépense publique. Ainsi, on s'efforcera de protéger cet investissement contre les risques liés par exemple aux activités marines antagonistes et à la pollution terrestre; et
- Il convient d'encourager la collaboration entre les scientifiques dans les disciplines sociales, économiques et biologiques, et entre les organisations non gouvernementales (ONG), les pêcheurs et les gestionnaires d'AMP.

Background paper

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This background document intends to provide concrete solutions for improving the efficiency of MPAs as fisheries management tools while also reconciling that marine conservation can go hand in hand with economic benefits to small-scale fishers from exploiting the marine resources in and around MPAs.

A large number of examples worldwide, and also more specifically in the Mediterranean, have been inventoried and referred to. Specific case studies are also provided in Appendix 2 to illustrate the document in more details.

Based on the identification of some key challenges and problematic issues from the perspectives of biological, social, economic and management branches, the document puts forth action initiatives to be considered by decision makers, MPA managers, fishers, scientists and enterprise.

These proposals are more than often recommended as joint action to be implemented in a collaborative spirit among the different actors. The cross-cutting issues of governance, communication, capacity building and finances are inherent to all perspectives.

During the process of elaborating this report, the input from several scientists and MPA managers has been incorporated. A webinar was held with a number of experts (26–29 February 2016) in order to provide upstream insight from different disciplinary perspectives and in order to secure substance for discussion to identify priority concrete action and thus further inform the main topics of the conference panel and sections of the present report (see Appendix 1 and Acknowledgments).

INTRODUCTION

Mediterranean fisheries represent an important and vital sector in the European Union (EU) fisheries, accounting for 46 percent of total EU fishing vessels. Overall, the Mediterranean fleet lands an average of 500 000 tonnes per year, of which 48 percent are landed in Italy, 20 percent in Spain, 16 percent in Greece, 8 percent in Croatia, 6 percent in France and Slovenia, Malta and Cyprus contributing each with less than 1 percent. However, landings in the Mediterranean represent a relatively small proportion, around 12 percent of total EU landings. About 80 percent of Mediterranean boats are small-scale boats, giving the Mediterranean fleet many characteristics of artisanal fisheries (Bellido *et al.*, 2014).

Because of their variety, dispersion and social complexity, small-scale fisheries are often poorly documented, poorly regulated and many of their complex management issues remain largely unresolved. At a time when fisheries resources are increasingly depleted and climate change poses a growing threat to marine resources, failure to effectively address the issues confronting small-scale fisheries places the livelihoods of millions of people at risk (World Bank, 2010). Thus, despite the socio-economic importance and the biological and socio-economic challenges facing costal fisheries in Mediterranean marine waters, coastal fisheries are not studied with the same rigor as industrial or large-scale fisheries (trawling, purse-seining, etc.). As a consequence, they are poorly managed or not managed at all (Lloret *et al.*, 2016a).

Small-scale fisheries are often considered to have less ecological impact than large-scale fisheries and therefore have been often considered as being ecologically

more sustainable than industrial ones. They are considered as potentially sustainable solutions for the exploitation of fisheries resources and employ twenty-four times more fishers than large-scale fisheries, for an equivalent annual catch for human consumption (Jacquet and Pauly, 2008). Total annual fuel oil consumption by these fisheries is much lower and discards are also small compared with large-scale fisheries (Leleu *et al*., 2014). Raising awareness of the importance of small-scale fisheries is particularly relevant not only because these livelihoods depend on sustainable use of the natural resource base, but also because these fisheries provide vital local nutritious food and a safety net for many poor households in coastal communities in developing countries (World Bank, 2010; Naji, 2013), war-torn countries and countries in crisis. Artisanal fishing is of great cultural value, due to the social and cultural characteristics, as well as the knowledge and information that passes from generation to generation (Gómez *et al*., 2006). In spite of its relatively low volume of catches and economic importance compared with large-scale industrial fisheries, artisanal fishing is socially important and an integral part of the Mediterranean coastal zone (Di Franco *et al*., 2014).

However, artisanal fishing generates a wide range of biological, ecological and socio-economic impacts and challenges that have been often overlooked and that are briefly addressed in this report. It should be pointed out that artisanal fishing does have the potential to seriously impact fishing resources, when for example the fishing effort is considerably high (Muñoz *et al*., 2013). To reduce the negative impacts of artisanal fishing on marine ecosystems, and to consider the socio-economic challenges these fisheries face, MPAs have been implemented as part of an ecosystem-based approach to coastal management (Albouy *et al*., 2010). Thus, MPAs are an essential tool for protecting overexploited populations and threatened species (Hackradt *et al*., 2014) and their habitats as well as for implementing sound management actions to tackle socio-economic challenges. However, the impact of artisanal fisheries is only one of the many challenges tackled by MPAs, considering that there exist many other types of human impacts (such as recreational fisheries and yachting) that generate different threats and challenges for MPA managers (not only within the fisheries sector). The number of ecosystem services provided by MPAs are essential for the sustainability of the activities that take place inside the MPA, especially SSF, as well as the sustainability of the resources.

The expected benefits of MPAs for coastal resources include an increase in abundance (net emigration of adults and juveniles across borders, termed "spill over"), biomass and fecundity (the increased production and exportation of pelagic eggs and larvae), as well as potentially enhanced biodiversity – all of which have a positive impact on small-scale fisheries (Marengo *et al*., 2015). Most Mediterranean MPAs are zoned for different uses. In many cases, this includes a core zone that is "no-take", a buffer zone where harvesting is limited and activities are mostly regulated, and a peripheral area where the level of regulation is the lowest. This zoning helps manage different pressures and establish specific fisheries regulations. For this reason, MPAs should always consider developing a specific fisheries management plan and, when a fisheries management plan exists in the area around the MPA, the MPA should be an integral part of the fisheries management plan.

In recent decades, a growing number of MPAs have been created worldwide with the aim of: 1) protecting natural populations of marine species and their habitats, together with related overall biodiversity, ecosystem functions and services; 2) enhancing fishing and especially supporting more sustainable fishing practices; 3) promoting local economies and their sustainable development; and 4) preserving historical and cultural values. Moreover MPAs are used for education and research, as well as for recreation and tourism purposes. MPAs have become increasingly multi-objective tools designed to accomplish conservation objectives while also promoting sustainable development (considering social and economic aspects) (Di Franco *et al.,* 2014). Over time, the concept of MPAs has shifted from "nature

under a bell jar" to "multi-use areas" with varying regulations depending on the activities and threats faced. There do also exist, however, no-go MPAs, no-take MPAs, or MPAs with certain no-go or no-take sub-sections or zones.

Due to the complexity of the activity, very few studies have quantified effort and catch (Merino *et al.*, 2008; Maynou *et al.*, 2011), particularly in relation to the effect of protection within MPAs. Furthermore, few studies have quantified the economic benefits that may accrue to small-scale fishers within well-managed MPAs, despite the substantial anecdotal evidence to support this assertion (e.g. MedPAN; WWF). Yet, contribution to the sustainability of adjacent and "in-house" fisheries is often an explicit management goal for MPAs (Leleu *et al.*, 2014).

How to read this report: the colour indicates the nature of each issue.

- Impacts (negative)
- Benefits or potential benefits (positive)

1. BIOLOGICAL-ECOLOGICAL IMPACTS

Among ecological factors, fishing represents the activity with the greatest impact on living marine resources because it has driven most stocks to overexploitation (Quetglas *et al*., 2013). In a period of 30 years, the catches in the Mediterranean have been reduced by 60 percent. Artisanal fishing, although it does not generate the same level of impacts as industrial fisheries do, affects coastal areas that need to be well managed to reduce fishing effort and increase Catch per Unit Effort (CPUE). The decrease of CPUE has been documented in several coastal areas in the Mediterranean such as in the MPAs of Port-Cros and Cap d'Agde (in France) or Cap de Creus (in Spain), where there is evidence of a certain negative trend in global yield (Blouet *et al*., 2010) obtained by small-scale fishing gears such as trammel nets, gillnets and basket traps (Lloret, 2010; 2013). In these places, there is a particular decreasing trend in less mobile benthonic species such as *S. scrofa*, *Mullus* spp., and *P. elephas* (Lloret, 2013; Bonhomme *et al*., 2008). For this reason, the following actions should be undertaken by MPA managers: i) establishment of temporal (seasonal) closures (Bellido *et al*., 2014); ii) decrease of the fishing effort by reducing the length of the fishing sets, the number of longlines and basket traps and the daily/weekly fishing hours (Bellido *et al*., 2014); iii) establishment of permanent no-take zones. The reduction of fishing effort is best suited if partnerships with fishers are implemented (Piante, 2012) and pescatourism actions are established because when fishing boats do their outings with tourists, usually they deploy fewer nets and hooks and fish for fewer hours.

However, the decreasing abundance of fish stocks due to excess fishing effort is not the only important issue to be considered. Several other impacts from artisanal fishing should also be considered in coastal areas, especially in MPAs. The decisions related to fisheries development planning, management and conservation are made in a context of widespread uncertainty with potentially negative and possibly irreversible consequences for the resource, the environment and the people. Consequently, a precautionary approach is required with degrees of precaution proportionate to the degree of uncertainty, risk, and reversibility of the impacts (FAO, 2016a; FAO, 2016b). This approach should always be considered in management efforts to tackle the biological and ecological impacts, as well as socio-economic challenges, derived from artisanal fishing activity. Such impacts and challenges are explained in detail in the following sections. In all cases, in order to make the proposed actions effective, there will need to be an increase not only in compliance, surveillance and enforcement (an issue which goes hand in hand with the need for further funding for MPAs and the need to increase the actions of the maritime authorities with responsibility over control), but also a need to increase monitoring and research of socio-economic and the biological aspects. The exclusion of larger fishing vessels (especially trawlers and purse seiners) from MPAs is also essential.

1.1 High pressure on vulnerable species ●

Description: Certain artisanal fishing methods impact certain vulnerable species included in international, regional and European conventions or policies and directives for the protection of biodiversity such as those of the Convention on Biological Diversity and Washington Convention (CITES), the Barcelona Convention, Bern Convention, the EU Habitats Directive, or in the leading recognised IUCN Red List and also species having a high Intrinsic Vulnerability Index (IV). This index is based on the life history traits and ecological characteristics of marine fish, such as maximum body length, age at first maturity, the von Bertalanffy growth parameter K, natural mortality rate, maximum age, geographic range, annual fecundity and the strength of aggregation behaviour. The most vulnerable species are deemed to be long-living and slow-growing species with low reproductive potential and a narrow geographic range. The index values range from 1 to 100, with 100 being the most vulnerable.

Challenge to face: Reduction of the pressure on vulnerable species.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Carry out studies and monitoring focused on the impact of coastal fisheries on vulnerable species, especially in and around MPAs. Acoustic telemetry studies are of special importance for these species as they enable the understanding of their spatio-temporal dynamics (telemetry allows us to estimate the home range and to calculate the proportion of the time that individual fish spend beyond the borders of the fully protected zone(s) of the MPA when therefore exposed to fishing). Although costly, this method is worth using every three years and, beyond its application to vulnerable species, it can contribute to better understanding the location of fisheries in the MPA, thus helping to adapt management measures.

2. Consider the implementation of specific regulations for artisanal fishers in MPAs (where these regulations do not exist) to preserve the population of most endangered species under high fishing pressure (e.g. to ban the capture or to regulate the fishing effort for some key species) and namely large spawners. This could also apply to a buffer zone around the MPA in order to allow some migration. Certain gears and fishing methods should be prohibited in MPAs because they largely affect vulnerable species, such as monofilament gillnets, trammel nets directed towards spiny lobster and recreational spearfishing. This selection should however be done on a case-by-case basis and when possible, "softer" measures, such as establishment of no-fishing zones in specific sub-zones of MPAs or closed seasons to protect the spawning aggregations, could be envisioned to replace a full ban. Elaborating such management decisions, in any case, requires taking into consideration the fishers' views, knowledge and traditions.

3. Establish minimum and maximum landing sizes for the most vulnerable species as a joint venture between MPA management authorities and fisheries authorities. This must be considered as a key point that should incorporate a good diagnosis of the concerned fisheries.

4. Ensure the "reserve effect" (increased biomass as a result of the high rates of reproduction and recruitment on the one hand, and low or zero rate of extraction on the other) for vulnerable species inside the MPAs.

5. Develop a catalogue of the best known vulnerable species including those that benefit from a protection status at different levels (International and Regional conventions, as well as National laws) to clearly communicate to fishers. This action would also assist with issues of species selectivity (following section).

Examples of impacts

1. The populations of many species of the genus *Epinephelus* around the world are overfished (Molloy *et al.*, 2007), whereas *L. merula* and *L. viridis* have become very rare in other parts of the Mediterranean (Kozul *et al.*, 2011).
2. In the MPA of the Strait of Bonifacio (France), 5 species represent 60 percent of the average yields per boat: *Palinurus elephas*, *Scorpaena scrofa*, *Sciaena umbra*, *Dentex dentex* and *Maja squinado* (Piante, 2012).
3. In the MPA of Cap de Creus (Spain): trammel net catch the highest number of endangered species (Lloret & Font, 2013).

Examples of actions undertaken

1. In the MPA of Scandola (Corsica), the brown *meagre Sciaena umbra* is particularly vulnerable to fishing pressure and presents a worrying population decline. Abundance and size of this vulnerable fish species conspicuously increased with reserve protection level and the duration of protection (Harmelin, 2015).
2. Font *et al.* (2012) states that in some Mediterranean MPAs, the catch of specific vulnerable species (among others) has been prohibited and the minimum landing sizes have been established (greater than they are outside the MPA), to ensure their sustainability. Some examples are: Cinque Terre and Punta Campanella (Italy), Bonifacio (France), Cala Ratjada and Cabo de Gata-Níjar (Spain).

1.2 Selection of certain species and decline in the mean trophic level of the catch ●

Description: Many artisanal fishing methods are highly selective in terms of species. Many of the target (selected) species display a high trophic level, which expresses the position of organisms within the food web and is based on the prey items in their diet. However, it should be considered that recent advances in fishery science and ecology suggest that a selective approach may also result in undesirable impacts both to fisheries and marine ecosystems.

Challenge to face: 1) Promotion of a "balanced exploitation" approach in MPAs and beyond; 2) Avoid the reduction of the trophic level due to the excessive pressure on top predators, especially in MPAs and immediate surroundings.

Actions to undertake:

1. Consider a balanced approach (with caution): a balanced approach will allow for the distribution of a moderate mortality from fishing across the widest possible range of species, stocks, and sizes in an ecosystem. However, some experts consider that empirical evidence of balanced approach is scarce and questionable. MPAs can represent great laboratories to test this.

2. Improve selectivity in order to avoid catching endangered and sensitive species, or even better, to avoid catching anything but the target size class of the target species. One way to accomplish this would be to identify a range of targets within a community and use a wide diversity of gears to catch them. This could be done collaboratively where managers support fishers to implement such measures, while the competent authorities allocate the adequate means for surveillance and enforcement, in order to further encourage compliance.

3. Undertake management actions (together with fishers) to reduce capture of certain vulnerable species by using different gears and by promoting fishing of herbivorous and omnivorous fish (low trophic level) instead of top predators (high trophic level). Fisheries managers can promote the local consumption (restaurants, at home)

of omnivorous/herbivorous fish that are not fully appreciated gastronomically, along with the territorial authorities (including those responsible for tourism) via a number of tools including publicity and labels.

Examples of impacts

1. The most selective techniques are, respectively, basket traps for the common octopus, uncovered stationary pound nets, longlines and gillnets. Trammel nets are the most multi-specific, responsible for the capture of the greatest number of species as well as the most representative species of the Cap de Creus sea bottom (Lloret, 2010).
2. In the MPA of Cap de Creus, results show that sex and size selection by artisanal fishing can not only have an impact on the reproduction of coastal fish species but may also be exacerbating, rather than reducing, the impact of fishing on coastal resources (Lloret *et al*., 2012).

Examples of actions undertaken

1. According to Zhou (2008), selectively and intensively removing a single species from an ecosystem will reduce the production of that target species. Furthermore, selectively harvesting only the target species is not necessarily advantageous to any of the target species, the by-catch species, or the ecosystem. Selectively and intensively removing one single species from an ecosystem will alter the existing relationships in the community and alter the spectrum of biodiversity. Therefore, this needs to be specifically taken into account in order to reach the MPA conservation objectives.
2. Froese *et al.* (2015) examined the models and the empirical evidence put forth in support of balanced harvesting and found that the models used unrealistic assumptions and settings, and that conclusive empirical evidence of balanced harvesting is lacking. Instead, moderate harvesting of resilient species for human consumption, with least possible impact on stocks and ecosystems, is still the most promising approach for the sustainable use of living marine resources and for the long term efficiency of MPAs.

1.3 Selection of certain sizes and sex: decline of the reproductive potential of fish

Description: Many artisanal fishing methods are highly selective in terms of size and sex. The reproductive potential represents the ability of a fish stock to produce viable offspring that may recruit to the adult population or fishery. Unlike industrial fishing systems, such as trawling, artisanal fishing generally only catches individuals that surpass the minimum landing size and size at sexual maturity for the species in question. This fact is important – in the sense that individuals can achieve adulthood and the ability to reproduce. Thus, age and size at sexual maturity are fundamental variables that influence the reproductive potential of a fish stock: i) The selection of large sizes of some species could have an impact on the reproductive potential of the species because the big individuals are high quality spawners that produce not only more eggs, but also eggs of better quality with higher chances of survival (one of the strongest, direct effects of fishing is to reduce the mean size and age of the species that are caught, and hence, in most cases, their mean length; ii) Size-selective fishing could affect hermaphrodite species, because fishing may disproportionately kill members of one or another sex, thereby skewing sex ratios leading to egg or sperm limitation; iii) Removal of breeding individuals from any population has important consequences, particularly those showing a complicated reproductive strategy. This has real implications for managing MPAs if fishing is allowed in the MPA. As such specific management measures need to take into account these variables.

Challenge to face: Avoid selective fishing of large individuals of some key species in and around MPAs (could be particularly beneficial in the case of sex-changing species).

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Avoid the excessive pressure on one sex or another, it would be interesting to apply some regulations regarding hermaphrodite species. Also, educational programs could state the need to catch individuals of different sizes, while avoiding the catch of juveniles and large sizes (large spawners).
2. Adjust minimum landing size (MLS) values so that they are larger than size at maturity (L50), especially for the most vulnerable species (such action has also been suggested in areas outside the Mediterranean) and for all coastal fish species that do not have such a limitation.
3. Consider limiting or banning the catch of certain species through seasonal closures during the spawning season. Consider also no-take zones that would contribute to protecting specific species.
4. Consider a balanced approach that distributes a moderate fishing effort among sizes above the maturity size, may alleviate the problems facing some coastal fisheries.
5. Establish maximum landing sizes to lower the fishing mortality of larger individuals.
6. Consider the ban of certain gears and fishing methods in MPAs (either in sub-zones or seasonally depending on the case) because they largely select certain fish sizes (usually the bigger ones), e.g. spearfishing.

Examples of impacts

1. In the MPA of Cap de Creus (Spain), the fact that the average landing size of the protogynous species *Epinephelus marginatus* (49,1 cm) is far below its sex-change size (80–90 cm) explains why artisanal fishing catches only females, thereby disrupting the sex structure of the population. Similarly, our study shows that in four other sex-changing species (*Sparus aurata, Diplodus cervinus, Pagellus erythrinus* and *Pagellus acarne*) artisanal fishing catches mostly individuals of one sex (Lloret *et al*., 2012).
2. In the MPA of Cap de Creus, results show that sex and size selection by artisanal fishing can not only have an impact on the reproduction of coastal fish species but may also be exacerbating, rather than reducing, the impact of fishing on coastal resources (Lloret *et al*., 2012).

1.4 Lost fishing gear (ghost fishing) ●

Description: The massive use of fixed nets (and other artisanal gears such as traps) in many small-scale Mediterranean fisheries, makes ghost fishing by abandoned or discarded gears a potentially important problem in Mediterranean waters and even more so in MPAs needy of protection for key biodiversity features. This issue, however, has attracted scant attention. Recent studies have shown that artisanal fisheries can have an impact on sessile organisms, such as gorgonians, sponges and corals, which constitute an essential habitat for many exploited fish, in several ways (e.g. during the deployment and retrieval of the gear during fishing actions). Ghost fishing affects both fish, as these gears continue to entangle and catch fish, and also sessile animals, as the lost gear causes abrasion to corals and gorgonians. Other important cause of gear loss is gear conflict/interaction. Nowadays there is so much gear in the water that it is inevitable that gears of one fisher gets entangled with gear of another. This is compounded by the fact that most fishers do not use buoys to signal the start and end of their gear for fear of theft.

Challenge to face: Reduction of the loss of fishing gear that impacts sensitive habitats and species in MPAs.

Actions to undertake in and around an MPA and in collaboration with fishers/ with the engagement of fishers and competent marine and maritime authorities:

1. Develop a GIS tool focused on lost fishing gear. Every time fishers lose their fishing gear (nets, longlines, basket traps, etc.) the coordinates could be registered in the GPS and made available to MPA managers. Thus, the managers could connect the data with the location of the different habitats and a map could be developed through the GIS tool. This will prevent future losses by warning other fishers in the area.
2. Regulate the deployment of fishing gear when the meteorology is adverse.
3. Develop biodegradable fishing gears/components, and when fishing is allowed in an MPA, implement a measure where gears used in or around the MPA have to be biodegradable.
4. Promote best fishing practices with easy, straight-forward video footage. Visually showing the scientific backgrounds to some statements (such as the occurrence of lost gears, the survival of discarded species, the status of the returned organisms in the water, etc.) will help to obtain much higher attention and a much more positive response than any technical graph report.
5. Decrease the fishing impact by reducing the number of fishing gears deployed in the same site in a season. This can be done through a marine spatial planning scheme in and around the MPA so that each type of fishery is confined to a given space, with the seasonal quotas for the frequency of gear use allocated to fishing units, and so that better surveillance and enforcement regarding illegal practices, namely trawling, can be carried out.
6. Promote the regular mending of fishing nets.
7. Promote initiatives to remove the lost fishing gear (using the data from the GIS tool mentioned above) involving all MPA users, including fishers, divers, etc. Tagging of static fishing gear would also allow better control of the amount of fishing gear being used and would be useful to keep track of lost gear as fishers are required to report lost tags.
8. Organize yearly campaigns for waste on the coasts, developing parallel information using online platforms to collect testimonies of users of the marine space. To decide an indicative date to be devoted to this action by all MPAs in the Mediterranean every year.

** Note that the above mentioned actions could be applied in a specific MPA as a pilot site, and work from there towards replications along the coast in and around other MPAs.*

Examples of impacts

1. Erzini *et al.* (1997) carried out an experimental study of gillnet and trammel net ghost fishing in shallow (15–18 m) rocky bottoms in the Atlantic waters off the coast of the Algarve in southern Portugal. The results of the study indicated that abandoned gillnets yielded more catches than trammel nets. According to Baeta et al. (2009), the catch efficiency of trammel nets in the Portuguese coast decreased in a negative exponential manner in parallel with the deterioration of the nets. The effective fishing lifetime of the nets, when catching efficiency became lower than 1 percent, was 10–11 months in the rocky bottom and 8 months in the sandy bottom.
2. In Portugal, artisanal fishers use GPS to locate their gear (instead of using buoys to signal the start and end of their gear) and a grapnel to retrieve it for hauling). This leads to fishers unknowingly setting their nets, longlines etc. on top of or across the gears of other fishers. What they often do is cut off the other person's gear in order to release theirs, thus causing gear loss in many cases.
3. In the MPA of Cap de Creus (Spain): trammel net catch the highest number of endangered species (Lloret & Font, 2013).

Examples of actions undertaken

1. In 2015 the Ecology Department and the Biodiversity Research Institute of the University of Barcelona, in cooperation with the MPA of Medes Islands, initiated a campaign to recover fishing nets from the benthos, thus avoiding the environmental impacts.
2. In the DEEPNET study of the deep water net fisheries, a number of fishery specific recommendations, addressing net loss and ghost fishing, were made.
3. Related to the marking and identification of fishing gear, the European Commission commissioned a project in 1995 on the development of methods and techniques based on acoustic technology for locating nets on the surface from nets laid on the bottom of the sea (CONTRONET, 1995). (Brown *et al.*, 2005).
4. FANTARED (2001): code of conduct of good practice to minimise gear conflict and gear loss and to agree on measures to mitigate the impact of lost gear on commercially important stocks (http://archive.nafo.int/open/sc/2001/scr01-097.pdf).
5. The initiative "Healthy Seas, a Journey from Waste to Wear" of MEDASSET (http://www.medasset.org/our-projects/healthy-seas-initiative/). The initiative aims to recover fishing nets from the seas and to regenerate them into high-quality ECONYL® yarn, which is subsequently turned into brand-new products such as socks, swimwear and carpets.
6. In Portugal, a simple and cheap GPS based system is being tested in some small-scale fisheries. It provides georeferenced data on the fishing vessels, allowing estimation and mapping of fishing effort. As sale at auction is obligatory, landings can be matched to individual fishing trips and specific fishing grounds. Integrated GPS tags are already widely used in EU fisheries (Macfadyen *et al.*, 2009).
7. A new type of completely biodegradable escape panel for crab pots has been developed from polyhydroxyalkanoates (PHAs), in which the entire escape panel degrades rather than just a cord (Bilkovic *et al.*, 2012).
8. As states Kim *et al.* (2016), a biodegradable net material, a blend of 82 percent polybutylene succinate (PBS) and 18 percent polybutylene adipate-co-terephthalate (PBAT), can contribute to reducing the duration of ghost fishing.
9. In Turkey, the Ministry of Food, Agriculture and Livestock - Directorate General for Fisheries and Aquaculture - started a national project entitled "Cleaning Seas from Abandoned Fishing gears Project".
10. In Gökova Bay (Turkey), lost fishing nets were retrieved from the habitat. An exhibition was organized to raise awareness of fishers regarding ghost fishing under the UNDP-COMDEKS Small Grant Project namely "Hunters of Ghost Nets" in 2013.

1.5 Discards: fishes, non-vertebrate species and algae

Description: Discards are species with no or low commercial value, species with sizes below MLS or damaged species and prohibited species. It is also associated to high-grading and market issues. In some cases even a portion of the valuable catch is discarded to maintain price stability if supply exceeds demand. The deployment of fishing gears on certain fragile habitats such as coralligenous assemblages and deep rocky habitats, also constitutes an indirect impact on sessile invertebrates that has been poorly studied (most studies have focused so far on the impact of trawling on the seabed).

Challenge to face: Reduce artisanal fishing discards, particularly the fragile invertebrates (e.g. gorgonians) that are often the target of key management measures in MPAs.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Ban specific gears on particular bottoms (e.g. trammel nets on coralligenous assemblages).
2. Establish spatio-temporal closures in the areas where high levels of discards or discards of especially vulnerable species have been detected.
3. Give economic advantages and/or social incentives to those fishers that promote mitigation of bycatch. When fishing is allowed in MPAs, work with the fishers for a charter of 'mitigation measures' to be adopted by fishers via regulatory management measures.
4. Improve selectivity of fishing gears.
5. Reduce the loss of fishing gear (the non-vertebrate bycatch will be also reduced).
6. Raise awareness among fishers about the implications of fishing on habitats with sensitive non-vertebrate species (corals, gorgonian, etc.), and also raise awareness of the role of such species/habitats for the resources upon which their livelihoods depend.
7. Return benthic discards (sessile invertebrates) to the water in less than 30 minutes and in the same location where the gear has been hauled, avoiding crushing to the extent possible.

Examples of impacts

1. Different studies (e.g. Tsagarakis *et al.*, 2014) show that artisanal fisheries in the Mediterranean often discard less than 15 percent of the catch, contrasting with trawl fisheries that discarded around 20-70 percent of the catch, or artisanal discards in other oceans (e.g. trammel nets off the Portuguese coast discard around 30 percent of the total catch by number and 20 percent by weight).
2. Gillnets for hake in the Ionian Sea (29.5 percent), trammel-nets for prawns in Izmir Bay and common spiny lobster (*Palinurus elephas*) in Tunisia and Spain, where discards may exceed 40 percent. According to calculations of the authors, an estimate of discards in the Mediterranean for year 2006 is 232 239 t or 18.6 percent of the total catch (Tsagarakis *et al.*, 2014).
3. In Cap de Creus (MPA, Spain), a total of 87 species were caught by all artisanal fishing gears together, of which 84 percent were retained and 16 percent discarded. Trammel net encompasses the highest number of species discarded (Lloret & Font, 2013).

Examples of actions undertaken

1. Díaz *et al.*, (2015), focused in the key engineering species, calculating their survival times onboard a fishing vessel and the health status of these species when returned at sea. Their results show that the impact over the survivorship of structural species could be minimized if returned in the same location less than 30 minutes after being captured.

1.6 The discard ban and landing obligation

Description: According to the Council of the European Union (2013), an obligation to land discards is necessary and the new Common Fisheries Policy (CFP) introduces this obligation gradually, following a schedule adapted to different areas, fisheries and species. From 1 January 2015 onwards fishers in certain parts of the EU must land all the fish they catch. By 2019, all fishers in the EU will have the same obligation (this is not relevant to the rest of the countries of the Mediterranean basin).

Challenge to face: Analyse how this ban affects artisanal fishing in each area (locally).

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Provide clearer evidence of the benefits of applying the landing obligation in this sector and develop effective enforcement and monitoring tools, as well as additional supporting measures (e.g., transferable fishing quotas), before such a measure is fully implemented in SSF.
2. Address additional challenges before such as a measure is considered: these include increased labour for handling and sorting on board, as well as processing at ports, and the lack of infrastructure to address the expected increase in landed fish.
3. MPA managers should raise awareness among fishers in order to promote fishing strategies that discard the least and that oblige fishers to land all catch.

Examples of impacts

For the EU small-scale fisheries in particular, there is still very limited evidence to support the feasibility and appropriateness of a landing obligation. The effects in the long-term are unpredictable, but available evidence suggests that a landing obligation in SSF will potentially create more negative social, economic and ecological impacts than benefits (Veiga *et al.*, 2016).

Examples of actions undertaken

Given the reasonable success of the landing obligation in some countries such as the Faroe Islands, Iceland and Norway, this policy is seen as a viable approach to tackle the long-recognized discarding problem in EU waters (Veiga *et al.*, 2016).

1.7 Bycatch of non-target species

Description: Bycatch is defined as fish which are harvested in a fishery, but which are not sold or kept for personal use (also includes economic discards and regulatory discards). Seabirds and fishing gear often co-occur in some favourable areas, and the birds may entangle and drown when diving in pursuit of fish. The impact of gillnets (and trammel nets) on some seabird species is well known from many parts of the world, including the Mediterranean. Sometimes, turtles and dolphins are also caught and killed during fishing operations.

Challenge to face: Eliminate artisanal fishing bycatch of non-target species.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Carry out further research to address bycatch implications and to investigate other techniques to mitigate net entanglement.
2. Avoid aggregation, foraging, feeding and nesting areas for seabirds and turtles with spatial/temporal measures when initiatives based on voluntarism do not function.
3. Involve fishers in the process of developing mitigation measures.

Examples of impacts

1. Individuals of *Caretta caretta*, *Larus audouinii* and *Phalacrocorax aristotelis desmarestii* have been detected as bycatch using trammel nets, gillnets and longlines (surface and bottom), between other species (Carboneras, 2009).
2. According to Carreras *et al.* (2004), most turtles were caught in lobster trammel nets or drifting longlines in Balearic Islands.

Examples of actions undertaken

In different places worldwide, proven methods for preventing bycatch in set gillnets have been implemented, such as: pingers (acoustic deterrents), reflective nets, further modifications of fishing gear and closures and gear restrictions (Koschinski & Strempel, 2012).

1.8 "Fishing the line" as an obstacle to the spillover effect ●

Description: Fishing the line is the fishing effort concentration near MPA boundaries. This phenomena can hamper the so-called "spillover effect", which is the export of biomass from inside to outside the MPAs (the increasing trend in abundance and mean fish size within a MPA is then translated into similar upward trends in the yields of the fishery immediately adjacent to this MPA). Thus, the spillover effect can be locally depleted due to fishing effort concentration near the MPA boundaries, therefore at times reducing the ability for some species to colonise nearby areas that could be pools of resources for fishers. No-take zones and the associated surrounding buffer area play a positive role to manage the "fishing the line" problem. However, Mediterranean MPAs with no-take zones only covered 0,01 percent of the basin in 2012 (Gabrié *et al.* 2012).

Challenge to face: Reduce the fishing effort near MPA boundaries, especially near the no-take zones.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Increase the surface managed by well enforced no-take zones within MPAs.
2. Establish a buffer zone (adjacent to the no-take zone) where fishing effort must be regulated to avoid effort concentration in these areas and to ensure that the spillover effect will bring benefits beyond the MPA boundaries.

Examples of impacts

1. A study investigated spillover around six MPAs in the western Mediterranean based on catch and effort data from artisanal fisheries. The selected MPAs were Cerbère-Banyuls and Carry-le-Rouet in France, and Medes, Cabrera, Tabarca, and Cabo de Palos in Spain. The hypotheses was that, in the presence of biomass export: 1) fishing effort would concentrate close to MPA boundaries, and 2) fishery production, expressed as catch per unit area (CPUA), would be highest near MPA boundaries and decrease with distance. They found evidence of effort concentration and high fishery production near fisheries closures. The spatial extent of spillover was consistent with species mobility and fisheries efficiency and extended 700 to 2500 m from fishery closure boundaries (Goñi *et al.*, 2008).
2. A study found local concentration of fishing effort around the MPA borders of Cerbère-Banyuls, Cabo de Palos, Carry-le-Rouet, Malta and Medes Islands, found that one condition indicating fisheries benefits in terms of resource spillover from a no-take zone is a resource biomass density gradient, declining from the its border toward the surrounding waters (Stelzenmüller *et al.*, 2008).
3. The increasing trends in abundance and mean fish size within the Columbretes Island MPA translated into similar upward trends in the yields of the fishery immediately adjacent to the CIMR, providing evidence of the build-up of spillover over time (Stobart *et al.*, 2009).

Examples of actions undertaken

1. As already happens, for example, in Medes Islands MPA, the buffer zone can only be "used" by local artisanal fishers with additional restrictions (more restrictive than the regulations outside the buffer zone). This would help to minimize the effects of "fishing the line", while fishers from other localities are not allowed to develop the activity in buffer zone.
2. In other areas such as Côte Bleue, Bonifacio, Banyuls-Cerbère, Cabo de Palos and Columbretes, the establishment of no take zones has provided long-term benefits for the fisheries and has fostered the engagement of fishers in the MPA (Di Franco *et al.*, 2014).

1.9 Potential effects of climate change

Description: Changes in the abundance of warm and cold-water fish species, which are linked to sea warming, may have far reaching ecosystem effects, such as trophic cascades driven by the local loss/decrease of cold-water predators or by the appearance/increase of warm-water predators. There is good evidence that the species composition of the western Mediterranean fish fauna has changed over the last decade because of the introduction of thermophilic non-native species, some of which are considered invasive alien species (IAS) because they have been able to establish in the new habitat and have become an agent of change threatening native biological diversity. Marine invasive species are regarded as one of the main causes of biodiversity loss in the Mediterranean, potentially modifying all aspects of marine and other aquatic ecosystems.

MPAs can play a role as relay observatories of change (long term series of physico-chemical parameters and check for correlations with biological/ecological parameters – find reasons for invasions and find solutions when there are some – find what measures can help the system be as resilient as possible) – well managed MPAs should also be more resilient to change (although some evidence indicates that invasive species use this resilience to be even more effective at invading).

Challenge to face: 1. Increase of awareness regarding the effects of climate change on resources and ecosystems. Increase the resilience of cold water exploited species against climate change: although climate change impacts (sea warming, ocean acidification, etc.) cannot be changed by fisheries management, the negative effects can be reduced if resilient (healthy) fish stocks are maintained through better management practices 2. Be aware (managers) and make fishers aware about the potential arrivals of IAS, thus minimizing their impacts.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Further investigate the fisheries and biology of climate-vulnerable cold-water species (that could be impacted negatively by sea warming) and warm-water species (that could be impacted positively by sea warming).
2. Decrease fishing effort on cold-water species to increase their resilience against sea warming.
3. Prevent the establishment of new invasive species. The methods for addressing invasive alien species in MPAs need to be site specific and appropriate to the particular conditions of each site and to the species concerned.
4. Establish a relationship with all the different activities performed within or in close proximity to MPAs which may act as dispersal vectors for potentially damaging species.
5. Use TEK as a useful tool to track the consequences of new arrivals in a coordinated way. TEK has recently illustrated new possibilities to retrieve historical data and the advantage of cooperation between scientists and local populations.

Examples of impacts

1. Results in the Venice Lagoon indicated a high potential vulnerability of the artisanal fishery to climate change, as the commercial catch is entirely composed of species from cold (>45° N) and temperate (between 45° and 30° N) latitudes (Pranovi *et al*., 2013).
2. In the MPA of Cap de Creus (Spain) it has been found that changes in the abundance of fish have followed a particular spatio-temporal sequence, with three different phases of colonization in the case of warm-water species (occasional occurrence, common presence and establishment), and three phases of regression (abundance reduction, range contraction and disappearance from the catch) in the case of cold-water species (Lloret *et al*., 2013).
3. A number of species introduced from the Red Sea have become well established within the eastern Mediterranean basin and have started to spread into the western basin. At the same time, some Atlantic species have passed through the Gibraltar Strait and into the western basin. Since the opening of the Suez Canal in 1869, more than 80 Lessepsian fish species (species that have spread through the canal) have been recorded in the Mediterranean. Also, a sequential spread into the western basin through the Gibraltar Strait, with alternating spreading phases spaced several decades apart. These pathways are considered natural, i.e. they are not human induced (Otero *et al*., 2013).
4. In the eastern Mediterranean, pufferfish (*Lagocephalus sceleratus*) affects the small-scale local fishery sector, because this invasive species feeds on commercial species entangled in nets, leading to significant losses of income and damage to fishing gears (Rousou *et al.*, 2014).
5. The rabbitfish in the Eastern Mediterranean has profound negative effects on algal forests, which are among the most productive and diverse communities of temperate Mediterranean coasts, providing resources such as food and habitat for a large number of exploited fish and invertebrates (Vergés *et al.*, 2014).

Examples of actions undertaken

1. Mitigation actions taken so far by the National Authorities of Cyprus to control the *L. sceleratus* population have focused on the physical removal of pufferfish. A compensation of € 1 and € 3 per pufferfish were provided to local fishers by the Department of Fisheries and Marine Research in 2010 and later on in 2012, which resulted to the removal of massive amounts of pufferfish catches that were later combusted (Rousou *et al*., 2014).
2. The Marine Science Institute of the Spanish Research Council (ICM-CSIS) in Catalonia (Spain) has initiated a campaign to build awareness among professional fishing associations and fishers about the possible introduction and arrival of species of blowfish to our waters, warning them to be aware if they catch some. They have elaborated different tools such as a brochure with the different species and the distribution map. The ICM-CSIC has also created a web tool called "Observadores del mar" ("Observers of the sea"), which is an open website to any person who has detected some possible introduction of any new species. These persons can upload pictures of the new species to the website, where the species can be validated by an expert. This can be a useful tool based on local ecological knowledge to discover and prevent the potential expansion of non-native species.

1.10 Use of non-marine baits

Description: in some places the use of pieces of terrestrial animals is used as bait in small-scale fisheries (e.g. in the basket traps for Octopus).

Challenge to face: To ban the use of these type of baits.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:
Management actions should be implemented to ban the use of these baits, promoting instead the traditional ones (e.g. salted fish).

Examples of impacts
In the MPA of Cap de Creus (Spain), currently, the bait placed inside the basket traps is either a marine species caught in the Mediterranean (basically fish with little commercial value such as bogue or horse mackerel) which are salted beforehand, or else pieces of terrestrial animals from butchers and slaughterhouses (Lloret, 2010).

Examples of actions undertaken
The new management plan of the MPA of Cap de Creus aims to ban the use of non-marine baits.

2. SOCIAL IMPACTS

2.1 Competition with recreational fishers

Description: Competition for space and resources is common among coastal fishers because they use the same fishing areas and compete for the same resources. The increase of recreational (but also subsistence) fisheries are altering the classic features of coastal fishing and increasing pressure on species, some of which are being intensively targeted by fishers such as certain vulnerable coastal species. The conflict between these two user groups is an increasing problem reported by MPA managers and artisanal fishers themselves, especially in multi-use MPAs. Professional fishers report that their operations are highly regulated and subject to a number of administrative procedures while recreational fishing is poorly regulated, accessible to all and is using increasingly high tech means. Furthermore, there are some indications that recreational fishers may sell their catches illegally (e.g. spear-fishers selling their catches to restaurants). While it is recognised that recreational fishing is an activity that benefits the tourism and recreational industry, it is also clear that safeguarding the traditions and livelihoods of local fishers, who comply with sustainable practices, is a priority.

Challenge to face: Avoid any potential conflict between recreational and artisanal fishers before it begins.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Put regulations in place to control recreational fisheries in a way that is fair for artisanal fisheries (monitor and study from the biological standpoint before and after regulation is put in place). It must be well discussed and agreed among MPA managers and scientists if priority can be given to commercial (artisanal) fishing, that is, if the conservation status of the area and species allows reasoned exploitation and how.
2. Place bans if needed.
3. Fight against these type of conflicts with surveillance and effective enforcement, thus avoiding illegal actions from both sectors.
4. Check that the fish stocks can be sustainably fished by both categories of fishers under these regulations (if this is not the case, then consider favouring

professional fishers who depend on this activity for their livelihood – once the exploitation is stable, only then allow recreational activities to start again).
5. Discuss the problems of the available stocks with both categories of fishers so they can understand each other – use these encounters for conflict resolution (with a coach or some type of mediator).
6. Educate the consumer markets (restaurants – tourists – locals) to avoid buying catches from recreational fishing (illegally).
7. Ban fishing of certain vulnerable species which are highly targeted by both small-scale and recreational fishers.

Examples of impacts

1. Bonifacio (MPA, France): Dentex dentex: estimations suggest that the recreational fishery contributes significantly to fishing mortality and that it can magnify the negative effects of artisanal fisheries (Marengo *et al*., 2015).
2. Israel: significantly, the portion of recreational catches have increased substantially over the last decade, and by 2010 (837 t/year-1) recreational catch estimates accounted for 20 percent of total catches (4,280 t/year-1) being taken by Israel in the Mediterranean (Edelist *et al.*, 2013).
3. The competition between recreational fishing and artisanal fishing has been reduced since the Port Cros MPA (France) was founded (banning of spearfishing) and now hardly occurs owing to the nearly total prohibition of recreational fishing in the MPA. The main driving force is probably the management of recreational fishing (Cadiou *et al.*, 2009).

Examples of actions undertaken

1. Scandola (MPA, Corsica): the brown meagre Sciaena umbra, is particularly vulnerable to fishing pressure and presents a worrying population decline. While not very abundant, at Scandola, the brown meagre has long been considered a prized trophy fish by spearfishers, so it was one of the fish species which responded most positively to this spearfishing ban (Harmelin *et al*., 2015).
2. In the Bonifacio Strait MPA (South Corsica), the effect of spearfishing regulation on local fisheries was demonstrated by Rocklin *et al*. (2011): the closure of 15 percent of the MPA surface area to spearfishing resulted in a 60 percent increase in catches for artisanal fisheries eight years after its implementation.
3. In Datça-Bozburun MPA (Turkey) managers organized meetings with the stakeholders, especially owners of fish restaurants, and informed them about illegal recreational fishing activities and convinced them not to buy catches from this activity. Underwater Research Society (national NGO), specialized on research and conservation of marine and coastal (natural and cultural) heritage, executed long term public awareness and lobbying activities on Responsible Fishing in last 4 years. Their studies are mainly focused on illegal and over fishing and also precautions to be taken at different levels are proposed. Strengthening land based control mechanism within responsible sales market, restaurants and responsible consumer approach, are issues handled in a short documentary film to be released by 2016.

2.2 Conflicts between artisanal fishers and other stakeholders/users ●

Description: Interaction with other fishing fleets (intra and inter fleet interactions), due to limitations on fishing grounds, and with other growing traditional and potential uses of the sea (e.g., renewable energies, dredging, tourism, and even conservation marine areas).

Challenge to face: Reduce conflicts between different MPA users.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. To implement educational programs (e.g. distribution of leaflets, information online, informational conferences, etc.) focused on the different users of a MPA to diminish the negative interactions between them and professional fishers. Awareness for MPA users should lead to best practices and codes of conduct.
2. To elaborate a Geo-tool and maps to identify the geo-localization of the *métiers* activity which is useful against other potential uses that could want to occupy the same marine area in the future. Maps also contribute to analyse the fleet dynamics and interactions of the small-scale fleet with other fleets and also with other uses of the sea.

Examples of impacts

Tourism and semi-industrial fisheries have represented a source of opportunities but also of conflicts for the artisanal fishers of Cap de Creus. Conflicts between artisanal fishers and trawlers, purse seiners, and tourists over access to marine resources and fishing grounds are common not only in Cape de Creus but also in other Mediterranean coastal zones. The large number of tourists and recreational activities (e.g., boating, diving, angling, and spear fishing) in the area drives many artisanal fishers away from their fishing grounds during the summer (Gómez *et al*., 2006).

Examples of actions undertaken

According to Muguerza *et al.* (2015), a user friendly public GIS management tool was developed for the Basque fishing fleet, where all the compiled information can be displayed, allowing stakeholders (mainly the fishing sector and administration) to analyse the interactions of the small-scale fleet with other fleets and also with other uses of the sea. The Geo-tool created under this study allows for the elaboration of different maps from the data already collected and elaborated. These maps contribute to identifying the geo-localization of the *métiers* activity which is useful against other potential uses that could want to occupy the same marine area in the future (i.e. new MPAs). Maps also contribute to the analysis of fleet dynamics and interactions of the small-scale fleet with other fleets and also with other uses of the sea.

2.3 The decline of artisanal fisheries

Description: The ageing and disappearance of the artisanal fishing community currently threaten the cultural heritage of the Mediterranean Sea. Although small-scale fishing is still important for some communities that live from it, this type of fishery is declining in many parts of the Mediterranean. The changes that have occurred over time have favoured trawlers, purse-seiners, shellfish fisheries, and tourism activities, to the detriment of artisanal fisheries. Weak renewal, aging, demographic loss, community divide and erosion of the representation of the profession, are the main drivers of this decline. This decline also leads to the loss of TEK, which takes into account the way fishers understand the ocean, the physical/biological environment in which they work and from which they make their living. The loss of TEK is not only leading to a decline of the cultural, traditional heritage of artisanal fisheries, but also to a loss of opportunities for scientists to better know the complex coastal ecosystem. With this loss, the potential use by scientists to evaluate and understand the changes in the fishery ecosystem is decreasing and leading to an increasing risk of losing the diversity of fishing gears.

Challenge to face: Ensure the long term sustainability of artisanal fisheries inside and outside MPAs. Safeguard the TEK in the MPAs as a cultural heritage and as a non-negligible knowledge about the activity.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Engage fishers in co-managing MPAs.
2. Give importance to TEK and undertake studies focused on the TEK in each area to gather as much useful information from older artisanal fishers as possible. The TEK is a cultural heritage that should be integrated into the management plan of MPAs.
3. Public awareness messages led by the MPAs should be delivered to the wider audience who visit MPAs in order to render this profession more "attractive" than it is currently perceived.
4. Young MPA staff in particular (field staff, rangers, communication people etc.) should be trained by artisanal fishers about the area they are expected to manage.
5. Make things easier for young fishers (obtaining licenses, administrative procedures, regulations, taxes, etc.).
6. Make more understandable the importance of artisanal fishing to the rest of the users (traditional knowledge as heritage) in coastal areas, through communication tools.
7. Diversify and sustain this traditional activity by promoting other complementary activities (e.g. pescatourism).
8. Value small-scale fisheries to improve revenues. The creation of a certification (e.g. labelling of SSF products from in and around the MPA when respectful of the MPA rules and regulations) of fish products caught inside and around MPAs in a sustainable way, would allow the consumer to identify the origin of fish, the sustainable way in which it was caught and provide an outlet for local fishers. This would also encourage young fishers to stay in the business with new prospects.

Examples of impacts

1. The crisis in the artisanal fisheries of the MPA of Cap de Creus continues and is patent in the fall in the number of fishers and fishing gear. In 2010, there were only a dozen artisanal fishers active in the Cap de Creus (and most of these sporadically) whereas only a few years before there were about 36 (Gómez *et al*., 2006). The number of artisanal fishing gears has also declined from around 14 in the 1960s to just 5 (trammel net, gillnet, longline, basket traps and uncovered pound nets) in the 2010s.
2. The representative from the National Park of Cabrera emphasised that the park has seen 20 percent of fishing licenses disappear in 10 years.
3. In the Cilento area (Italy) a reduction of around 25 percent for the artisanal fleet between 1995–1996 and 2001 was observed (Colloca *et al.*, 2004).
4. Five case studies (Gulf of Riga, Gulf of Patraikos, Iroise Sea, SW Irish Sea, North Coast Ireland) have seen a downward trend in the number of SSF vessels over the last ten years (Guyadera *et al.*, 2013).

Examples of actions undertaken

1. At the MPA of the Strait of Bonifacio, there is a genuine collaborative process between the surveillance teams from the MPA and the fishers to ensure that the artisanal fishers can make a decent living from their activity, i.e. sustainably drawing on their resources (Piante, 2012).
2. A multidisciplinary approach, combining qualitative (e.g. TEK) and quantitative information from different sources, provides new insight into the observed changes in fish diversity and abundance in relation to climate change in the MPA of Cap de Creus (Lloret *et al.*, 2015).
3. Descriptions of fishers' ocean-related knowledge required for decision-making on when to begin to fish and where to find the fish are more common. For example, their observation of the presence/absence of sea birds, seawater colour, current strength and direction, have been documented as important clues to line-fishing in the Caribbean Sea (Gasalla & Diegues, 2011).

2.4 Poaching

Description: poaching is the general word for illegal fishing actions such as fishing in forbidden areas, selling on the black market, using forbidden gears, using more and longer gears than allowed by regulation, retired professional fishers still commercializing their catch, etc. Moreover, two related factors make poaching in MPAs especially attractive: higher fish density inside the MPA, and reduced CPUE outside the MPA. It is probable that noncompliant harvest within MPA boundaries may have a significant effect on the success of MPAs as fishery management tools.

Challenge to face: Improve surveillance, awareness and enforcement.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Consider co-management: the more the fishers are dissatisfied with the regulations established by managers (in and outside MPAs), the lower their compliance with these regulations will be.
2. Improve control (e.g. by implementing satellite tracking devices for the artisanal fishing fleet) and surveillance (also for recreational fishers).
3. Invest in enforcement efforts. This will provide the greatest return on maintaining the benefits of the reserve to the fishery, considering that higher fish densities inside MPAs will typically entice fishers to poach.
4. Carry out studies and monitoring inside MPA boundaries because little to no data is available on the intensity of poaching within closed areas.
5. Suitably inform fishers about the location of a reserve or whether a no-take zone exists.

Examples of impacts

1. Sethi & Hilborn (2008) found that, subsidization of the open area through larval spillover from the reserve outweighs the negative effect of having a smaller fishable area when the population is fished down to suboptimal levels. With small levels of poaching, however, the win–win situation is annulled. At approximately 2.5 percent harvest rate inside the reserve, non-reserve yield falls to a level equal to the no-reserve base case (with overharvest in open areas) and CPUE is approximately 30 percent less.
2. According to Sethi & Hilborn (2008), simulations lend some evidence that MPAs can augment total reproductive output of the fishery-reserve system if poaching is non-existent or occurs at low levels. Also, as poaching increases, the reproductive performance of MPAs falls towards no-reserve management levels.
3. In Gökova Bay (Turkey), professional divers go illegal spearfishing using light sources during night time. Fishery cooperative authorities report that 2,5 tons of groupers are illegally caught in such a way per season which equates to the cooperative's legal annual catch of groupers (Ünal *et al.*, 2009).

Examples of actions undertaken

1. The Ecuadorian artisanal fishing fleet will be outfitted with satellite devices: the satellite devices will provide the Ecuadorian Vice-Ministry of Aquaculture and Fisheries with a wealth of information about the seasonal movements of the fishing fleet. Authorities will be able to police overfishing and better protect exclusionary zones, such as the waters surrounding the Galapagos Islands, one of the richest and most bio diverse ecosystems on earth.[1]
2. The project entitled "Towards community centered marine conservation in Gökova Bay, Turkey" funded by Flora Fauna International and managed by the Mediterranean Conservation Society has a powerful impact on the effective protection of NTZs. The Mediterranean Conservation Society bought two patrolling boats, trained two of the local fishers and employed them as marine rangers. Their salaries are paid with the project budget and they are guarding the NTZs on a 24/7 basis in coordination with the Coast Guard Command. This contributes to increased fish biomass, the amount of fishing catch and income (Ünal *et al.*, 2015).

[1] http://www.globalstar.com/en/index.php?cid=7010&pressId=820

2.5 Fishing-tourism ("pescatourism") ●

Description: Fishing-tourism can be defined as a set of tourism-related activities carried out by professional fishers in order to diversify their incomes, promote and valorise their profession and socio-cultural heritage, and enhance a sustainable use of marine ecosystems, by means of boarding non-crew individuals on fishing vessels. In the Mediterranean, as it happens in other places worldwide, artisanal fishers are engaged in other economic activities to complement their meagre fishing incomes. There are several advantages that fishing tourism brings to fishers: i) Economic advantage: additional financial income through a tourist activity; ii) Social advantage: recognition of a previously unknown professional activity; iii) Cultural advantage: promotion of a territory, an art of living and a culture; iv) Environmental benefit: the activity of fishing-tourism creates less pressure on the resource (fishers deploy a lower fishing effort when conducting outings with tourists).

Challenge to face: Fishing-tourism activities should be considered by MPA managers as a tool to complement the livelihoods of small-scale fishers (to guarantee a minimum income for the professional fishers).

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Promote alternative tourist activities for artisanal fishers with low incomes, such as fishing-tourism (that can be established together with a sustainability charter/ code of conduct).
2. Regulate this activity in MPAs and establish a legal framework to make the implementation easier for them (thus, allowing also a reduction of fishing effort).

Examples of impacts

1. Although fishing-tourism represents a different offer to people, some fishers interviewed complained about the strong competition of the tours of Aeolian coasts that are usually carried out by vessels without a fishing license. Moreover, the majority of fishers seemed reluctant to invest in this alternative activity because their boats need an adequate modernization and because of the low number of people they can bring on the basis of the security measures provided for the Ministerial Decree no. 293 (April 13, 1999) (Battaglia *et al*., 2010).
2. This activity occurs already in the Var, Cabrera and Corsica (Strait of Bonifacio), among other places (Piante, 2012). However, despite also being implemented in Cap de Creus, the experience in Port de la Selva finished in 2015 because the fishers did not earn enough money.

2.6 Negative perceptions about a MPA creation

Description: In the Mediterranean, on several occasions, fishers are reluctant or refuse the creation of an MPA due to the limitations that will potentially be implemented, such as the reduction of fishing effort, closed areas, shifting, etc.

Challenge to face: Convince fishers and make them more predisposed towards the creation of a MPA with no-take zones.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Involve artisanal fishers in the management of the MPA (co-management).
2. Deliver environmental education programmes focused on the benefits of MPA creation to make them more prone to accepting the existence of the MPA.

Examples of impacts

1. Artisanal fishers were in agreement with the declaration of the MPA in Cap de Creus, but claim to be taken into account as the most ancient managers of this coast, and that their own traditions should be respected (Gómez *et al.*, 2006).
2. The establishment of a MPA in the Aeolian Islands was seen as a negative event by the majority of fishers; in particular they were worried about the possible economic effects on their revenues due to the restrictions that the MPAs could create for fishing activities. The efficacy of MPAs for re-stocking exploited populations could require some years (generally 10–20 years in Mediterranean MPAs) and depends strongly on the MPA design, such as the size of no-take and buffer zones. Consequently, given the average age of fishing operators (45 years), their reluctance to accept the establishment of an MPA could be also related to the lack of immediate benefit from this management policy action (Battaglia *et al.*, 2010).
3. MPAs are not well accepted by a part of the fishing community, although younger fishers tend agree with them more. In some cases, the creation of MPAs is proposed by the fishers (Merino *et al*, 2008).

2.7 Other activities

Description: Apart from fishing, other human activities can pose a threat to fishery resources and interact from a socio-economic standpoint with fisheries. Among the traditional activities, there are yachting and scuba diving, among other activities.

Among the emerging activities there are aquaculture, offshore wind farms and offshore natural gas and oil prospections and discoveries.

Challenge to face: Improvement of the knowledge about the potential impacts of these other activities, is needed.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Evaluate the potential impact of these other human activities inside or close to the MPAs.
2. Ban/regulate these activities (if necessary).

Examples of impacts

1. Some important offshore windfarm projects are planned in the Mediterranean with only a tiny proportion of them having reached consent stage, which could have far-reaching implications for the fishery resources of the Mediterranean MPAs, as may have occurred in the North Sea, where offshore wind farms are more popular. Regarding natural gas and oil, although most of the prospections and discoveries are done in the Eastern Mediterranean region (Levant Basin), there are, however, a number of projects in the western Mediterranean where several companies are currently planning to explore for gas and oil in the Balearic and Catalan Seas and the Gulf of Lion. These activities are leading to strong opposition among fishers in these areas because they fear the impacts of exploration methods (seismicity) on fish resources.[1]
2. In 2013 the British company TGS-Nopec requested the renewal of the license to launch a campaign of seismic research close to protected areas and the Pelagos Sanctuary for marine mammals, sparking a wave of protests from environmental groups from the coastal communities.

[1] http://www.ifmer.org/assets/documents/files/documents_ifm/3--Offshore-en-Mediterranee.pdf

2.8 Food security

Description: In the developed world (e.g. Europe and US), seafood does not play such an important role in food security because people usually rely on animal protein from other sources. However, fish plays an extremely important role in the supply of protein in many developing or emerging coastal countries. It also plays a role in countries which are in crisis or are war torn (for example, Greece has seen an increase in subsistence fishing).

Challenge to face: Mitigate the negative effects of global change on seafood, and hence on human health and wellbeing in coastal Mediterranean countries that undergo difficulties and where seafood is important for the diet of local people.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers: Keep sufficient quantities of local fish to support the needs of local people that live in coastal countries that are subject to difficult times. Export catches of high market value in order to bring financial benefits to these communities, only once the community's local needs are satisfied.

Examples of impacts

1. Many coastal areas are overfished by distant water fleets and leave few fish for small-scale and artisanal fishers to generate income and subsistence, as seen in many African countries (Atta-Mills *et al.* 2004; Lloret *et al.*, 2016b).
2. In some MPAs from Thailand situated near rural communities, communities are highly dependent on coastal resources and local fishers have lost the access to fish and harvest for livelihoods and subsistence due to the implementation of some marine protected areas. This loss of rights have resulted in increased poverty, decreased well-being, and declining food security (Bennet & Dearden, 2014).

2.9 Confusing definition of the activity

Description: While the term "small-scale fisheries" is commonly used in international fisheries literature and discussions, this classification is rarely explicitly defined. A fishing boat that would be considered small-scale in one place could be considered large-scale in another. Small-scale fisheries are diverse and need to be defined within each particular context. While in the Mediterranean context, the word "métier" corresponds to a combination of gear, target species and fishing geographic zone, it could be of interest to establish a general definition of artisanal fishery/small-scale fishery in Mediterranean MPAs, considering that in these areas, artisanal fishing is more restrictive and has particular characteristics compared with the activity outside and with other areas worldwide

Challenge to face: It is necessary to define what exactly "small-scale fisheries" in each region are.
A good way to start would be to involve different stakeholders including fishers and elaborate from the description used by the Mediterranean Platform of Artisanal Fishers (MedArtNet).

What we understand artisanal fisheries / small-scale fisheries are:

- A professional commercial activity where the owner of a boat (of maximum 15 meters in length) is the one practicing the activity, along with 1 or 2 employees, sometimes family members. The fisher uses an alternation of gears (polyvalence) that are largely passive, generally doesn't trawl* and fishes in coastal waters (within 15 nautical miles) spending a maximum of a day out at sea (exceptionally 48 hours). The fisher holds solid knowledge of the field, ecosystems and of the life cycle of many species. The fisher has a strong link to this territory, including strong social roots and a strong contribution to the local coastal communities. The products are sold through short commercialisation circuits via small familytype businesses.
- Artisanal fisheries are a tradition infused with diverse cultural features.
- 80 percent of Mediterranean commercial fisheries units are artisanal ones.

The existing features that should describe artisanal fisheries and that we encourage:

- High selectivity; Passive gear; low percentage of discards; low fuel consumption; short commercial circuits; the integration of women.

**The main feature we believe we should disagree with in small-scale fisheries*

3. ECONOMIC IMPACTS

3.1 Importance for the local economy ●

Description: The fate of the production tends to differ between small-scale fisheries and larger operations, with local markets for the former and exports for latter.

Challenge to face: Maintain or improve the economic impact of artisanal fishing on local livelihoods.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Control the factors affecting price formation such as delivery conditions, day of the week, season and size of fish.
2. Work on spotlighting fishers' products (consumption markets). Raise awareness among consumers and promote fish products that come from sustainable fisheries. MedPAN and partners could encourage the development of a kind of a Mediterranean label on fisheries products that are caught inside MPAs or provide tools for MPA managers to create local sustainability labelling for products from within MPAs.
3. Reduce fishing effort in a fishery at stable levels of maximum sustainable yield. This could lead the fishery to a maximum economic yield level.

Examples of impacts

According to a study carried out in six Mediterranean MPAs, Goñi *et al.* (2008) found that revenues generally followed trends similar to CPUA. Fisheries revenues generally declined with distance to fisheries closures in a similar way to production but cannot be easily compared with the few studies available, which have reported varying results. In our study, enhanced revenue gradients were expected given the greater size (and value) of many exploited species near fishing closures.

3.2 Changing value of catches in the Mediterranean ●

Description: While fishers try to catch the most valued species and sizes, market prices of some of them rise due to the demand growth in restaurants and fresh fish markets. Thus, fishers can see their revenues improved, even though the volume of catches is not higher. Not only does seasonality affect fish values, but market variability can also devalue or push up prices depending on social trends.

Challenge to face: Increase the economic importance of the catch during the tourist season, despite very low landings, because of the high prices of the valuable species targeted.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers: Consider the value of catches at a local level, which can be improved during the tourist season (usually in summer time).

Examples of impacts

A general trend of declining catches has been observed in the last 10 years in Mediterranean coastal countries (except in Croatia). In general, both catch rates and the total amount of daily catches in the Mediterranean are low in comparison with those from other seas. However, the economic value of landings is much higher. This may be explained by the fact that most of the Mediterranean catches are sold fresh for human consumption, generating high market values (Bellido *et al.*, 2014).

3.3 Direct selling as a potential economic advantage ●

Description: In some places, it is forbidden to sell catches directly to the fishmongers or individual buyers (this is considered as black market), but in other places this strategy has been adopted by cooperatives and municipalities to make trade easier for fishers and to improve their revenues. The disparity marketing options at the national, and even local level, raises an important issue related with the economic aspects of the activity.

Challenge to face: Analyse the possibility of selling catches directly to consumers, avoiding intermediaries, but controlling the landing records.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Consider direct selling in some places and some situations, but always under strict measures to be able to record data on landings (kg and revenues).
2. Improve control and enforcement and establish appropriate management plans.

Examples of impacts

1. Between 2 percent and 5 percent of the catches in the Aeolian Islands MPA (Italy) is traded in fishmonger shops and restaurants or at the time of landing on the wharf directly by the fisher. An increase in this last activity is experienced during the summer. As a matter of fact, thanks also to the help of local cooperatives and municipalities, some fishers gained enough independence in trading catches directly to consumers, staying on boats in landing places, by adopting food safety rules in accordance with EU law on the traceability of fishery products (Battaglia *et al.*, 2010).
2. Among small-scale fish marketing strategies, selling fish as a complementary activity to normal shop operations seems to be more lucrative than using agents and middlemen (Kronen, 2004).
3. In the Aeolian Islands MPA, ex-vessel prices and retail ones showed a substantial and remarkable increase in value of large pelagic fish from the time of landing to the final sale, doubling or tripling their value at the last step of sale. Target species of trammel net, gillnet, bottom longlines and pots show the highest average ex-vessel prices (more than 10 € /kg), with valuable crustaceans such as Palinurus elephas and Scyllarides latus that reach the ex-vessel value of 40 € /kg and 50 € /kg at retail (Battaglia *et al.*, 2010).

3.4 Competition among sectors from an economic point of view ●

Description: this economic competition can be considered from two different standpoints:

1. On the one hand, while the increase of recreational and subsistence fishing is considered positive for the local economies of some areas, this is not always true across the board. Indeed, in many places, this leads instead to an increase of competition for coastal resources between recreational and artisanal fishers, because recreational fishers sometimes sell their catch (which is illegal in the Mediterranean).
2. On the other hand, sometimes, the economic value of one or more resources can be lower or higher depending on what kind of stakeholders benefits from them.

Challenge to face:

1. Avoid unfair competition between sectors
2. Optimize the economic value of resources among sectors.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Control the illegal selling of catches carried out by recreational fishers.
2. Evaluate, from an economic standpoint, how recreational fishing affects artisanal fishing revenues (for example, calculating the market value of the species caught by recreational fishers).
3. Carry out studies at local, regional or national level about, for example, the economic impact of recreational fishing in the local economies in comparison with artisanal fishing.
4. To find out what is more profitable, for example: the value gained through the catch of a grouper (*Epinephelus* spp.) by artisanal fishers, or the same living species visited repetitively by scuba divers in a MPA or captured by recreational fishers? In fact, getting scuba divers involved in protecting key locations, where for example there are groupers that divers like to see, is essential.

Examples of impacts

1. Small-scale fisheries in Majorca Island complain about recreational fishers (spearfishing) which become strong market competitors. Spearfishers sell their product to local restaurants (illegally) at a high price with no commercialization license and affect trammel net fish demand and consequently price (Merino *et al.*, 2008).
2. By selling the catch on the black market the recreational fishers are creating illegal and unfair competition in the market with professional fishers (Tunca *et al.*, 2016).
3. In two Turkish MPAs, a relevant percentage of recreational fishers (96 percent) sell their catch on the black market creating illegal and unfair competition in the market with professional fishers. In these Turkish MPAs, recreational fishing is an important activity, but from the economic perspective the authors considered it negative rather than positive because the market value of the catch was above the recreational fishing harvesting expenses (Tunca *et al.*, 2016).

4. MANAGEMENT ISSUES

4.1 Are current MPAs regulations enough for sustainability? 🔴 🟢

Description: Existing European, national, regional and local regulations are sometimes not restrictive enough, or not well implemented in some MPAs.

Challenge to face: Improve regulations in some MPAs to ensure the sustainability of resources and ecosystems.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Improve the regulations inside and outside the MPAs, in coordination with the MPA managers, to increase the expansion of the spill over effect beyond the immediate boundaries.
2. Establish management measures that take into account the life cycle of species and that protect key stages of this life cycle, including the establishment of no-take zones.
3. Implement regulations considering the following essential issues, as they have not been considered up to date in almost any Mediterranean MPA: i) Regulations affecting vulnerable species and scarce species under high fishing pressure at a local level; ii) Regulations about closed seasons, and preferably, during spawning seasons; iii) Consideration of the "balanced approach" when regulations of fishing gears are established as selective approaches may also result in undesirable impacts both to fisheries and marine ecosystems (each has its own selectivity); iv) Fishing preference for local artisanal fishers inside the MPAs.

4. Implement regulations that are adapted to the ecological and social background of each MPA.

Examples of impacts

1. In the Marine Reserve of Columbretes (Spain) it has been stated that the fishing regulations established within the boundaries have allowed the export of fish and lobsters from the no-take zone to the fished areas, and that this export has allowed fishers to compensate the loss of fishing grounds linked to the creation of the reserve.
2. See Di Franco *et al.*, 2014; a total of 26 Mediterranean MPAs have been analysed regarding existing regulations about artisanal fishing activity.

4.2 Lack of co-management

Description: The term co-management defines a partnership in which all stakeholders share equal decisional power, responsibility and authority with governmental bodies for the purpose of managing activities within an area that can pose a threat to the natural environment, including exploitation of resources. Co-management is a bottom-up management approach as opposed to more conventional top-down approaches to the management of natural features and resources. The term is sometimes wrongly used where not all stakeholders have an equitable share of decisional power yet are consulted or else engaged in decisional and management processes. Yet the management success is often related to the level of involvement of stakeholders, as has been shown for fishers.

Challenge to face: Managers must increase involvement of local communities in the decision making process and in a day to day co-management, as it has proved more effective for the success of MPAs in the majority of cases.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Implement co-management in consequent steps that can be different between young and old MPAs. The aim of young MPAs should be the protection and resilience of resources and ecosystems in the beginning, followed by the subsequent implication of fishers in the management (if biodiversity is put first, then it can be protected for the benefit of fishers). For older MPAs, where protection has had successful effects, fishers can be fully involved in the governance.
2. Incorporate the fisher knowledge and views in the design, zoning decisions, creation and development of protected area management plans. The fishers' knowledge of their environment brings light to the goal of an ecosystem based management of fisheries.
3. Include *Prud'homies*-like structures (communities of fishers who elect men from among their group to be *prud'hommes*, responsible for managing the fishing activities of their zones through regulatory, jurisdictional and disciplinary powers) in the management plans, as they are an important collective in terms of fisheries management, especially considering the adjacent areas around MPAs managed by these communities.
4. Consider partnership charters as a useful tool to engage fishers in the fisheries management (structured process for partners who want to become more knowledgeable about partnerships and avoid conflicts).
5. Implement seasonal closures and increase no-take zones both in numbers and coverage, in collaboration with fishers. Artisanal fishers can also contribute to surveillance of these no-take zones.
6. Consider the ecosystem approach (understood as "the comprehensive integrated management of human activities based on best available scientific knowledge

about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of the marine ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity") as a basis of co-management, participatory planning programs and contributions of artisanal fishers in MPAs.

7. Involve artisanal fishers in surveillance activities, not only to control themselves and their activity, but also other activities such as recreational fishing.

Examples of actions undertaken

1. In the Gulf of Roses (NE Catalonia), fishers and scientists agreed on the creation of a protected zone in open waters in front of the gulf of 70 km², closed to trawl fishing and with the aim to protect and see the evolution of hake. With this co-management and after a few years, through experimental fishing, scientists and fishers have seen how hake's biomass is 5 times higher in the protected area than outside. Both trawl fishers and scientists are happy and excited with the results and also understand that this is the best way to reach the sustainability of the resource and the activity.
2. Co-management has also arrived to Palamós with the prawn: within the last few years the activity has been regulated in diverse fishing grounds and fishers receive scientific advice. Due to this co-management between scientists, ecologists, administration and fishers, the prawn has recovered in the area. In 2014 fewer vessels went out to fish this resource and catches were reduced, but invoicing was maintained.
3. In Catalonia, co-management for the sandeel fishery (*Gymnammodytes cicerelus*) between environmental groups, scientists, the central and autonomous administration and fishers has been established. Fishers detected an important reduction in the catch of this popular and profitable species in the area and they resorted to scientists from ICM-CSIC. This co-management plan with the central administration was authorized by the European Union (in force since 2013). Thus, reduction of fishing effort (fewer boats and fewer days per week fishing this resource) was established to let the stocks rest. Scientific criteria were followed to negotiate the quota, but favouring the fishing economic activity. Benefits are already evident.
4. With the help of scientists and fishers (in Torre Guaceto), the managers have established a management plan where a partial opening of the MPA for fishing was decided on. A joint governance with the fishers was then put in place to ensure adapted and regulated co-management: the fishing effort has been determined and the fishing gear selected in order to limit the impact of fishing on juveniles, benthic communities and habitats (length of trammel nets and mesh size). A fisher from Torre Guaceto emphasised the good results of this co-management experience, which translates into good returns for his business (Piante, 2012).
5. See the Di Franco *et al*., 2014 report on the fishers engagement in Mediterranean MPAs.
6. In 1992, monitoring of the fishing effort and the artisanal fishing production was started in the former Lavezzi MPA and then scaled up to the whole MPA of the Strait of Bonifacio thanks to a partnership between the fishers and the MPA managers. This partnership is reflected by service provisions: the fishers who wish to participate in the scientific monitoring of the MPA fish stocks can be compensated for providing their boat, their fishing devices, or even full days of work exclusively dedicated to monitoring (Piante, 2012).

7 Prud'homies: (i) until 1999, in the MPA of Port-Cros (France), artisanal fishing was governed by French national regulations and by local regulations, established by the prud'homie des pêcheurs of Le Lavandou (ii) In the French Mediterranean, the Prud'homies (institutions for fishers in the French Mediterranean Sea) have often put more restrictive regulations in place than those of the European Commission (e.g. the MPAs). Thus, in France, the 34 Prud'homies of the Mediterranean are joining forces to add more weight to their actions.
8. Since 1999, the MPA of Port Cros has had its own commercial fishing regulations enshrined in a fishing charter. The charter represents an agreement between the fishers and MPA managers. To be authorized to fish inside the MPA, each fisher has to sign the charter each year and abide by its rules. In addition, fishers have to communicate details of their catches to the MPA managers via a fishing logbook. The charter is updated annually, based on scientific monitoring and in consultation with the fishers.
9. In the National Parc of Al Hoceima (Morocco), managers and AGIR (Association de Gestion Intégrée des Ressources) have implemented a broad participatory planning program according to the Ecosystem Approach, due to the lack of organization of artisanal fishers and their need to face multiple challenges. As a result, responsible fishing has moved forward within this MPA.
10. In the MPA of Gökova Bay (Turkey), conventional fisheries management and regulations were not enough to ensure the sustainability of SSF. After several meetings with artisanal fishers, no fishing zones and an improved rangers system were established to increase the efficiency of the MPA. These actions (among others) were useful to increase the catch volume, income from fishing and socio-economic benefits in general, while protecting resources.

4.3 Lack of data on artisanal fishing

Description: An accurate picture of small-scale fishing is hard to assemble because the fish caught by small-scale fishers frequently go unreported in official government statistics (unreported artisanal fishing catches in the Mediterranean is around 12 percent). This also means that the economic importance of the sector remains hidden from official view and the implications for national fisheries policy remain unclear. In the Mediterranean, economic statistical information on fisheries is particularly deficient for several reasons: i) catch operations and first sales are highly dispersed; ii) official fisheries values tend to focus on large-scale fisheries and may often underestimate small-scale fisheries; iii) the relationships between catches and economic returns are complex.

Challenge to face: 1) Invest in artisanal fishing studies at a national and regional level, but especially at a local level (MPA); 2) Encourage participation of fishers in scientific monitoring: collaborative fisheries research promotes communication and trust among fishers, scientists, and managers and can provide much-needed scientifically valid data for fisheries management.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers:

1. Implement collaboration between fishers and scientists to establish partnerships to carry out long term monitoring (including self-sampling schemes).
2. Look for funding from the local authorities and European funds. Many MPAs need this funding for their on-going studies and monitoring. Also consider philanthropy as an option for studying and managing small-scale fisheries.
3. Avoid misreporting catches.
4. Carry out economic studies that take into account economic measures such as revenues, costs, benefits, etc. The improvement of this type of knowledge is of importance to manage the activity appropriately.

Examples of actions undertaken

1. In La Restinga (MPA, Canary Islands), the key factor that has facilitated data collection has been the provision of appropriate software to the local cooperative, Pescarestinga, which has made it easier for fishers to manage catch and sales data. This way, fishers obtain a tangible benefit while also collaborating in data collection. We show how collecting this data has also facilitated the analysis of small-scale fishing unit strategies, making it possible to focus on essential fisheries. This has assisted the development of specific measures to protect relevant stocks and has contributed to fisheries governance in the area (Pascual-Fernández & Dorta-Morales, 2015).
2. Philanthropic initiatives for artisanal fisheries: i) the RARE project in the US;[1] ii) MAVA Foundation in the Mediterranean.[2]
3. In Cape Creus, an annual self-monitoring scheme has been established between scientists and fishers, funded by the MPA.

[1] http://www.rare.org/stories/bloomberg-philanthropies-invests-rare#.VpUlivnhDIW
[2] http://en.mava-foundation.org

4.4 Territorial Use Rights in Fisheries (TURFs) ●

Description: Area-based fishing rights, commonly referred to as Territorial Use Rights for Fishing programs, allocate secure, exclusive privileges to fish in a specified area to groups, or in rare cases individuals. TURFs are based on co-management approaches to common property resources; they promote the transfer or establishment of rights among key fishery stakeholders who have an interest to reduce, if not remove, the problems associated with the use of common resources under open-access regimes.

Challenge to face: Consider TURFs as a useful management tool for MPAs or specific local areas where different fisheries and fishers coexist.

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers: Establish TURFs in MPAs aimed at local artisanal fishers (if necessary).

Examples

1. Chile enacted a TURFs policy in 1991 (not implemented until 1997), which now encompasses more than 700 separate TURFs managed by local fishing associations via community-based catch-share agreements. The Chilean TURF model is seen by many as the example to follow to move small-scale coastal fisheries from the current open-access regime to a rights-based management regime. Actually, the loco (Concholepas concholepas) fishery was the driver for establishing TURFs in Chile, due to its overexploitation (Moreno & Revenga, 2014).
2. According to Di Franco et al., 2014, in 11 MPAs (52 percent of the analysed MPAs), artisanal fishers need a specific authorization issued by the MPA management bodies to duly carry out fishing operations: Kornati, Cabo de Palos, Torre Guaceto, Cabrera, Medes, Tabarca, Banyuls, Port-Cros, Scandola, Plemmirio and Tremiti. Only three MPAs have a "numerus clausus" (i.e. a maximum number of authorizations set a priori): Cabrera, Cabo de Palos and Banyuls.

TURFs initiatives

1. http://www.fishforever.org/solutions/#.Vnj3Q_nhDIW
2. https://www.rare.org/stories/punta-allen%E2%80%99s-turf-tale#.Vnj3R_nhDIX
3. http://www.nature.org/ourinitiatives/habitats/oceanscoasts/howwework/rebuilding-chilean-fisheries-through-smart-management.xml

4.5 Questions concerning legal and governance aspects

Actions to undertake in and around an MPA and in collaboration with or with the engagement of fishers, all stakeholders and relevant competent authorities:

1. Before establishing an MPA, make sure to explore the legal framework and best options for the type of designation that must be declared in order to protect and manage what it has been identified to be. Sustainable financing mechanisms should be part of this exploration, in collaboration with local businesses (first) and the private sector in general on all scales.
2. Before establishing an MPA, involve all stakeholders as much as possible.
3. Before establishing an MPA, carry out preliminary studies to identify biodiversity hotspots, features and species under threat, along with studies on the socio-economic context, pressures etc.; fishing practices should be identified along with key species targeted, TEK needs to be consulted and fishing communities need to be involved, namely regarding management options. This will optimise the design of the MPA, its zoning, setting the objectives and management plan of the MPA along with regulations and looking at how conservation can be achieved along with the enhancement of fisheries. Furthermore, this will allow stakeholders to develop a sense of ownership/responsibility in relation to the different zones (including no-fishing zones) and boost compliance.
4. The management plan of the MPA needs to have a section integrating a fisheries management plan.
5. It is essential to secure the collaboration between different management bodies at a local, regional and national level for a better management of the MPAs. This can also enhance collaborations with authorities that can be involved in surveillance and enforcement, as well as those responsible for prosecutions.
6. The ecological networks approach needs to be better developed and implemented while benefiting from support by social networks of MPA managers when involved in cooperating and sharing information within such networks.

Examples

1. Effective collaboration with different management bodies takes place in Spain, where the General Secretariat for Fisheries (GSF of the Spanish Ministry of Agriculture and Fisheries, Food and Environment manages a network of 10 marine reserves, half of them managed only by GSF, and the remaining five in collaboration with regional governments. This collaboration between bodies has been successful in, for example, in the Cala Ratjada Marine Reserve (Majorca Island).
2. Successful support to MPA managers from social networks such as MedPAN (Network of Marine Protected Areas Managers in the Mediterranean), RAMPAO (Réseau régional d'Aires Marines Protégées en Afrique de l'Ouest) and CaMPAM (Caribbean Marine Protected Area Management Network and Forum), for example.
3. Good collaborations among all the stakeholders in designing and managing; including the private sector with sustainable financing in the Jamaican Fish Sanctuaries and MPAs in 5 countries across the Caribbean (Caribbean Fish Sanctuary Partnership – Fish Sanctuaries for Sustainable communities[1] and CaribSave/Intasave.[2]

[1] http://www.c-fish.org
[2] http://www.intasave.org/Our-Projects_C--FISH.html

4. The NAMPAN: The North American Marine Protected Areas Network (NAMPAN) represents a tri-national network of resource agencies, MPA managers, and other relevant experts, and is intended to enhance and strengthen the conservation of biodiversity in critical marine habitats and help foster a comprehensive network of MPAs in North America. NAMPAN is a network of both important marine places and the institutions and people connected with those places.[3]
5. California's Marine Protected Areas Network shows effective design based on ecological and biological data while authorities provide the adequate means for research, establishment and management. It also integrates stakeholders via a regional stakeholder group and a state-wide interests group.[4] They collect data on both recreational and professional fisheries and the different types of designations include no-take zones for both fisheries for conservation and fisheries enhancement purposes. A specific MPA designation clearly regulates both fisheries allowing recreational and/or commercial fisheries on a case by case basis based on ecological/biological data.

[3] http://www2.cec.org/nampan/
[4] https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Network

5. ARTISANAL FISHING INITIATIVES WORLDWIDE

Some initiatives worldwide have focused some or all of their efforts and attention on the sustainability of artisanal fisheries. Considering the scarce number of these types of actions in the Mediterranean, these initiatives from other parts of the word can be an effective tool to consider for fishery managers.

Small-scale and Artisanal Fisheries Research Network (SAFRN)

http://artisanalfisheries.ucsd.edu/

SAFRN is a San Diego-based group of students, researchers, and faculty who study artisanal fisheries around the world; they are a Research Focus Area at the Center for Marine Biodiversity and Conservation. Network members represent a broad range of academic disciplines. SAFRN's mission is to address calls for greater coherence among research projects in this field, and serve as a model for enhancing collaboration and promoting research that can be applied to sustainable management of artisanal fisheries.

Too Big To Ignore (TBTI)

http://toobigtoignore.net/

Too Big To Ignore is a research network and knowledge mobilization partnership established to elevate the profile of SSF, to argue against their marginalization in national and international policies, and to develop research and governance capacity to address global fisheries challenges.

The Fish Project

http://thefishproject.weebly.com/artisanal-fisheries.html

The Fish Project is a project started in the Marine Environmental Issues course at the Oregon Institute of Marine Biology in the fall of 2011. Students in the class will be collecting and organizing information about 16 different fisheries topics. A page will be dedicated to each fisheries topic.

Mediterranean Platform of Artisanal Fishers (MedArtNet)

http://www.medartnet.org/ES/

They are the artisanal fishers of the Mediterranean. Together they defend the artisanal fishing as a dignified livelihood with prospects of future. They aspire to be guardians or custodians of a more sustainable sea.

Ecosystem conservation and sustainable artisanal fisheries in the Mediterranean basin (ECOSAFIMED)

http://ecosafimed.eu/reports

The project aims to contribute to the Action plan (2008/56/EC) for an integrated maritime policy in the Mediterranean by promoting sustainable fishing practices over the benthic communities and promoting the information exchange about good practices between stakeholders in order to achieve the conservation of habitats.

RARE

http://www.rare.org/

Rather than studying environmental problems, Rare focuses on bright spots in conservation — successful efforts worth emulating. Over the past few decades, Rare has demonstrated a methodology to take locally-led solutions, bright spots, and repeat them in communities around the world. See: http://www.rare.org/sites/default/files/blog/Bloomberg%20Vibrant%20Oceans%20Factsheet.pdf

The Bloomberg Philanthropies Vibrant Oceans Initiative

http://www.bloomberg.org/program/environment/vibrant-oceans/

The Bloomberg Philanthropies Vibrant Oceans Initiative supports a ground breaking approach to reform both local and industrial fishing simultaneously. Their approach integrates financial strategies to ease the transition to more sustainable fishing.

Slow Fish

http://www.slowfish2016.com/

Slow Fish is Slow Food event that is an international gathering of fishers, scientists, chefs, students and food artisans to address the many environmental, ecological, economic and political challenges that impact fisheries, habitats, oceans, sustainable fishers and cultural seafood systems.

Marine Stewardship Council (MSC)

https://www.msc.org/?set_language=en

The Marine Stewardship Council is an international non-profit organization established to address the problem of unsustainable fishing and safeguard seafood supplies for the future. A sustainable seafood market is crucial to making this vision a reality. They use their blue MSC label and fishery certification program to contribute to the health of the world's oceans.

6. CONCLUDING REMARKS

To improve the efficiency of MPAs as fisheries management tools, the needed importance of the involvement of the small-scale fisheries sector was highlighted together with the socio-economic and ecological benefits that joint action can bring to both the small-scale fisheries stakeholders and MPA managers.

A number of key solution orientated actions have been identified throughout the document and could be considered for collaborative implementation, in and around MPAs, by decision makers, MPA managers, fishers, scientists and the private sector.

Around the Mediterranean and worldwide, there exists suitable proof of the socio-economic benefits brought to small-scale fishers by well managed MPAs that include NTZs associated with regulated buffer zones with prohibited use of some gear/techniques and that involve fishers in the management decisions and processes.

- This type of MPA needs to be replicated around the Mediterranean basin to ensure the safeguard of the wild resources in order to sustain the economic, social and cultural aspects of the SSF profession and thus requires the adequate legal framework and financial and human means to be implemented.

Some fruitful collaborative examples at the inter- and intra-ministerial level demonstrate the successful management of SSF in and around MPAs when working 'hand in hand'.

- Such integrative models could encourage top-down and bottom-up processes in other Mediterranean countries in order to secure the future and sustainability of the profession while also infusing international technical guidance and requirements.

The management of MPAs, and namely multiple use MPAs that regulate a number of activities otherwise compromising natural features and the long lasting exploitation of resources, requires being scientifically informed, being adaptive and involving users/stakeholders including the TEK of fishers.

- Long-term comparative monitoring of biological features, ecological effects of small-scale fisheries and socio-economic benefits in and outside MPAs are prerequisites to tailored good management.
- As such, management plans specific to SSF in and around MPAs that are based on biological and socio-economic monitoring data (often jointly led with stakeholders such as fishers) could be required to be co-designed by MPA practitioners and fishers, jointly implemented, and revised regularly for adaptive management.
- When conflicting uses occur that can compromise the sustainability of the SSF profession, regulations should be adopted fairly for all other users based on the principles upon which conservation objectives rest and those pertinent to ensuring sustainable livelihoods. When conflict occurs specifically between small-scale fisheries and recreational fishing, priority should be given to income-earning activity when practised sustainably.

Consider conservation efforts, and MPAs in particular, as an investment in natural capital rather than as a public expenditure. As such, efforts should be made to protect this investment from risks, such as conflicting marine-based activities and land-based pollution.

Safeguard the small-scale fisheries sector in and around MPAs, including by setting up cooperatives, through strategies that are integrated in development plans devised by local authorities and that provide a market edge in favour of responsible and sustainable fisheries practices.

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APPENDIX 1. Webinar

Cover of the document used for the webinar where the following key points were gathered and discussed: vulnerable species, selectivity, ghost fishing, competition between artisanal and recreational fishers, the decline of artisanal fisheries and lack of co-management.

WEBINAR

Improve the efficiency potential of MPAs as fisheries management tools and highlight the benefits of involving the artisanal fisheries in MPAs

The webinar will be co-moderated by Josep Lloret and Toni Font (University of Girona) and Chloë Webster (MedPAN)

Introduction

This webinar aims to provide an early discussion to support the topics that will be considered in panel 3 (improve the efficiency potential of MPAs as fisheries management tools and benefits of the involvement of the artisanal fishing) of the Regional Conference on Small Scale Fisheries to be held in March 2016 in Algeria and organized by the General Fisheries Commission for the Mediterranean (GFCM) and Agriculture Organization of the United Nations (FAO), in partnership with CIHEAM-IAM Bari, MedPAN, WWF and in collaboration with the Government of Algeria (http://www.fao.org/gfcm/meetings/ssfconference2016/en/).

- This webinar will discuss the following **Key Points** from different disciplinary perspectives in order to evaluate potential management actions to be undertaken to face these challenges.
- The results of the webinar will feed back in a background document to be delivered during the Regional Conference and circulated to the wider community through the proceedings of the Conference.
- Key concrete actions points resulting from the webinar will be discussed during the panel sessions in order to bring concrete solutions to be implemented after the Conference.

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APPENDIX 2. Case studies

CAP DE CREUS NATURE PARK, SPAIN

Costa Brava, North-Eastern Catalonia, Spain (North-Western Mediterranean)

http://parcsnaturals.gencat.cat/es/cap-creus

- Nature Park declared in 1998 (with a no-take zone covering 210 ha of the total 3 056ha).
- Declared a Specially Protected Area of Mediterranean Importance (Barcelona Convention) in 2001 over the same perimeter.
- Declared a Natura 2000 site - SPA & SCI under the Bird and Habitats Directives of the European Union –in 2005 over the same perimeter.

1. Environmental and socio-economic characteristics of the study area

The MPA of Cap de Creus, created in 1998 and managed by the Department of Environment of the Autonomous Government of Catalonia, is located in the north-western Mediterranean Sea. The Nature Park, which comprises part of the rocky coast of the eastern Pyrenees in the region of Catalonia (Spain), covers 3056 ha of sea and about 15 km of coastline. The shore is characterized by the presence of rocky cliffs, capes and creeks. The climate is characterized by the presence of a north-westerly, dry and cold wind which often induces rough sea conditions, particularly in the northern parts of Cape Creus. Recreational fishing, scuba diving, recreational boating and small cruising are the main leisure activities in the MPA, while red coral extraction and artisanal fisheries are the only commercial fisheries allowed (trawl and purse seining are prohibited). The MPA is divided into different zones with different levels of protection: partial reserve (798 ha), integral reserve (21 ha) and park zone (2 237 ha). Recreational and small-scale commercial (artisanal) fisheries are allowed in the park and partial reserve zones, although spear fishing and shellfish collection are not allowed in the partial reserve zones. In the integral reserve, all fishing methods are forbidden.

2. Data availability and stakeholders implication for data gathering

Surveys on artisanal fishing have been carried out regularly in the MPA of Cap de Creus since 2008 in spring-autumn by scientists of the University of Girona, and the catches of different fishers from Roses, Cadaqués and Port de la Selva have been analysed and the fishing effort evaluated. The surveys were carried out mostly on board artisanal fishing vessels. In Roses and Port de la Selva, two fishers were paid a fee for their collaboration which consisted of providing data on the individuals captured and on the fishing effort by gear. In Cadaques, scientists benefited from the collaboration of a marine biologist, who was also paid a fee. Although this method of sampling has some advantages over other methods, the main drawback is the bias resulting from the fact that the samples are not taken completely at random but from wherever the fishers decide to cast, which is basically where they can obtain better catches or capture more of one species than another. Five fishing techniques were mainly surveyed: trammel nets, gillnets, longlines, basket traps for octopus and the bolitxa (stationary uncovered pound nets). Recently, sampling has been directed only to these gears such as trammel net and longline because they are responsible for the capture of the greatest number of species that are the most representative species of the Cap de Creus grounds (e.g. forkbeard, scorpion fish, spiny lobster, European lobster, etc.). They are also the most traditionally used by Cap de Creus fishers, especially during the summer months. Overall, more than 500 sampling trips were carried out.

During 2011 and 2013, due to budget constraints, the surveys were only carried out during summer and autumn months and only trammel net were sampled. Trammel nets were chosen among the others to be analysed.

3. Basic information regarding ongoing projects on small-scale fisheries (if available)

i. Monitoring of artisanal fisheries (financed by the MPA of Cap de Creus)
ii. SAFENET (recently started, financed by the DG Mare): The project aims to identify coherent network(s) of MPAs and other area-based fisheries management rules (e.g. temporary closures) whose emergent properties (namely the interactive effect of scaling-up MPAs) can help achieve fisheries maximum sustainable yield (MSY) and maximize over the long-term socio-economic benefits for the stakeholders in the north-western Mediterranean Sea.
iii. ECOSAFIMED (http://ecosafimed.eu; financed by ENPI-EU): The "Ecosystem conservation and sustainable artisanal fisheries in the Mediterranean basin (ECOSAFIMED)" project is part of the European Programme ENPI Mediterranean Basin (2007-2013) and its aim is to contribute to establish management guidelines based on sound scientific evidences to sustain an artisanal fishing industry in areas preserved from the trawling pressure ensuring the maintenance of acceptable practices compatible with the good environmental status of the benthic communities in the Mediterranean basin. The Ministry of Agriculture, Food and Environment of Spain, through the Biodiversity Foundation is coordinating the initiative.
iv. A small project financed by the MPA of Cap de Creus on the sociocultural characteristics of artisanal fisheries is being developed (social anthropology).

4. Description of small-scale fisheries and other fisheries in the area (management plan if any, etc.)

Currently, artisanal fishing is the only method of professional fishing permitted in the waters of the Cap de Creus Natural Park, along with the extraction of red coral. This type of fishing is carried out in small boats (usually less than 8 metres in length) typically manned by a single fisher, and has been studied from a socio-economic standpoint by Gomez et al (2006). Such fishing has gone on for centuries in the Cap de Creus and is a clear example of the complex relationship established between man and nature. Most of fishers who fish in the waters of the Park live in one of the Park's four coastal towns (Roses, Cadaqués, Port de la Selva and Llançà), although occasionally there are fishers from other ports in the province of Girona. Artisanal fishing in these small boats is carried out near the coast.

One of the most important features of artisanal fishing in the Cap de Creus is its sheer diversity: there are different types of fishing gear, fishers, fishing sites, species caught and fishing seasons. This is because the Cap de Creus is a highly complex area from the biological and environmental point of view, with various communities, depths and oceanographic and climatic situations. The Cap de Creus fishers use up to 14 different types of fishing gear. The commonest fishing methods are soltes (gillnets) the tresmalls (trammel nets), the palangres (longlines with multiple hooks), nanses (basket traps) for the common octopus and the solta bonitolera or bolitxa (stationary uncovered pound nets targeting bonito, Sarda sarda). This equipment makes up the greater part of the fishing gear used by the fishers that we have surveyed in the Cap de Creus. Other equipment, such as the potera (grapnel or multiple hooks) for squid (Loligo vulgaris), are used by a small number of fishers in certain places and at certain times of the year.

The complexity of habitats in the area has forced the fishers in each village or town to adapt to the specific conditions of each site. These skills have been passed on from father to son for generations, leading to their own particular "fishing culture" (Gomez *et al.*, 2006).

Another important feature of artisanal fishing in the Cap de Creus is how it has developed in recent decades with a sizable reduction in the number of fishers there.

Currently, there is an aging population of fishers (many fishers are over 50 years old) with few younger fishers being recruited. In 2010, there were only 12 boats registered in the fishers's guilds of the area's four coastal towns that actually go fishing - regularly or occasionally - in the waters of the Park (other registered boats belong to retired fishers). Nowadays, a number of fishers combine fishing with tourist activities or combine fishing within the Park's limits with fishing in other areas. The decline of artisanal fishing in Cape Creus is affecting the diversity of fishing gears being used, which has decreased therefore breaking the traditional "balanced approach" and shifting the fisheries towards a more selective pattern in terms of species, which is not always good for the MPA (these "selected" species become overfished).

The decline in artisanal fishing is explained not only by social and economic changes (Gomez et al, 2006) but also by the reduced catches currently obtained as a result of overfishing (both professional and recreational) and the degradation of habitats essential for coastal species. However, up to now, no specific study has been carried out into the impact of artisanal fishing on commercial fishing species or on the development of the Park's marine resources.

Despite most of the fishers remaining in the area can be considered as deploying a moderate fishing effort, some few of them deploy a large number of gears (they probably should not be considered "traditional fisheries"). A new management plan will be soon implemented.

5. Value chain profile and existing examples of diversification (if any)

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6. Description of fisheries co-management regimes in place, planned or about to be established

No co-management regimes have been put in place until date.

However, a self-sampling exists with the monitoring of the activity since 2008, were some fishers get a fee for their collaboration which consisted in providing data on the individuals captured and the fishing effort deployed.

The fishers in the MPA of Cap de Creus would like to participate in the management of the reserve and fishing, which would enable a reduction in costs and to provide additional funding for artisanal fishers. (Piante, 2012)

7. Existing marine protected area in the study area (if any)

Natural Park of Cap de Creus.

8. Interactions between small-scale fisheries and other activities in the study area (aquaculture, fisheries, tourism, etc.)

Tourism and semi-industrial fisheries have represented a source of opportunities but also of conflicts for the artisanal fishers of Cape Creus. Conflicts between artisanal fishers and trawlers, purse seiners, and tourists over access to marine resources and fishing grounds are common in Cape Creus. The large number of tourists and recreational activities (e.g., boating, diving, angling, and spear fishing) in the area drives many artisanal fishers away during summer from their fishing grounds. Spear fishing is seen by the artisanal fishers as the most harmful activity because many recreational fishers target ecologically and economically important fish species such as dusky grouper (*Epinephelus marginatus*). Although trawling and purse seining in Cape Creus is prohibited, incursions of trawlers and purse seiners inside the protected bottoms occur occasionally and originate many disputes between both fishers collectives (Gómez *et al.*, 2006).

Competition between recreational and artisanal fishers for the natural resources in Cap de Creus is important as 51 species were caught by both types of fishers.

This represents 52 percent of the total number of species (98) caught by artisanal and recreational fishers with all gears. Three species were caught by all recreational and artisanal fishing gears: *Dentex dentex* (L.), *Diplodus sargus sargus* (L.) and *Scorpaena scrofa* (L.). Furthermore, within the most important species in terms of abundance (i.e. those representing > 5 percent of the total catch in number), four species, i.e. *Phycis phycis* (L.), *Mullus surmuletus* (L.), *Coris julis* (L.) and *C. conger* (L.), were caught by both recreational and artisanal fisheries. In particular, the overlap of species captured by spear and small-scale fishing is important as three (of five) of the most important species in the spear fishing catch in terms of abundance, i.e. *D. sargus sargus*, *M. surmuletus* and *P. phycis,* were also caught by artisanal fishing.

Moreover, boat fishing, shore fishing and spear fishing altogether take around 42 tons annually (20 tons in boat catches, 3 tons in shore catches and 19 tons in spear fishing), so in Cap de Creus there is direct competition as regards the total amount caught by recreational fishing represents nearly 50 percent of the amount caught from artisanal fishing (c. 50 tons). Thus, the proportion of the harvest attributed to recreational fishing (c.50 percent) seems much higher in Cape Creus than the world average (12 percent according to Cooke and Cowx, 2004).

9. Examples of best practices concerning governance and management measures in the study area

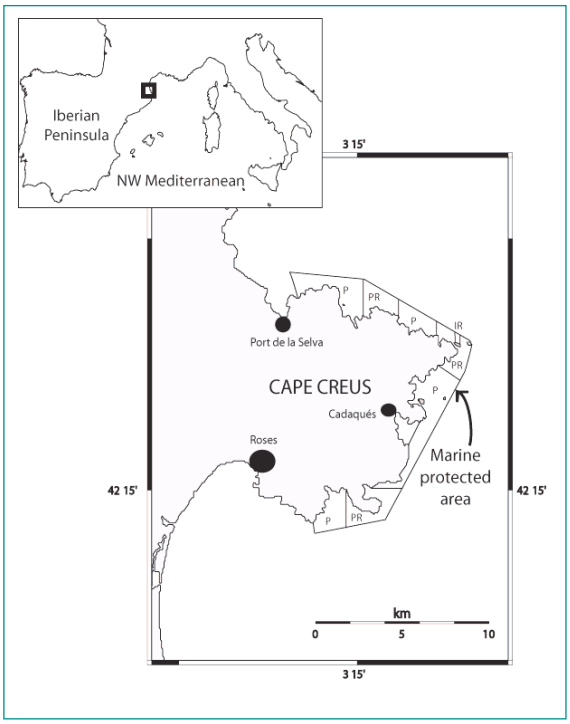
Scientists from the UdG have elaborated T-shirts with messages directed towards the sustainability of fisheries, which have been distributed to fishers.

A poster on the artisanal fisheries' characteristics has been elaborated by the MPA of Cap de Creus, which has been distributed to the local prud'homies. These posters have disseminated not only the impacts of artisanal fisheries but also the sociocultural value attached to them, which is important for the park.

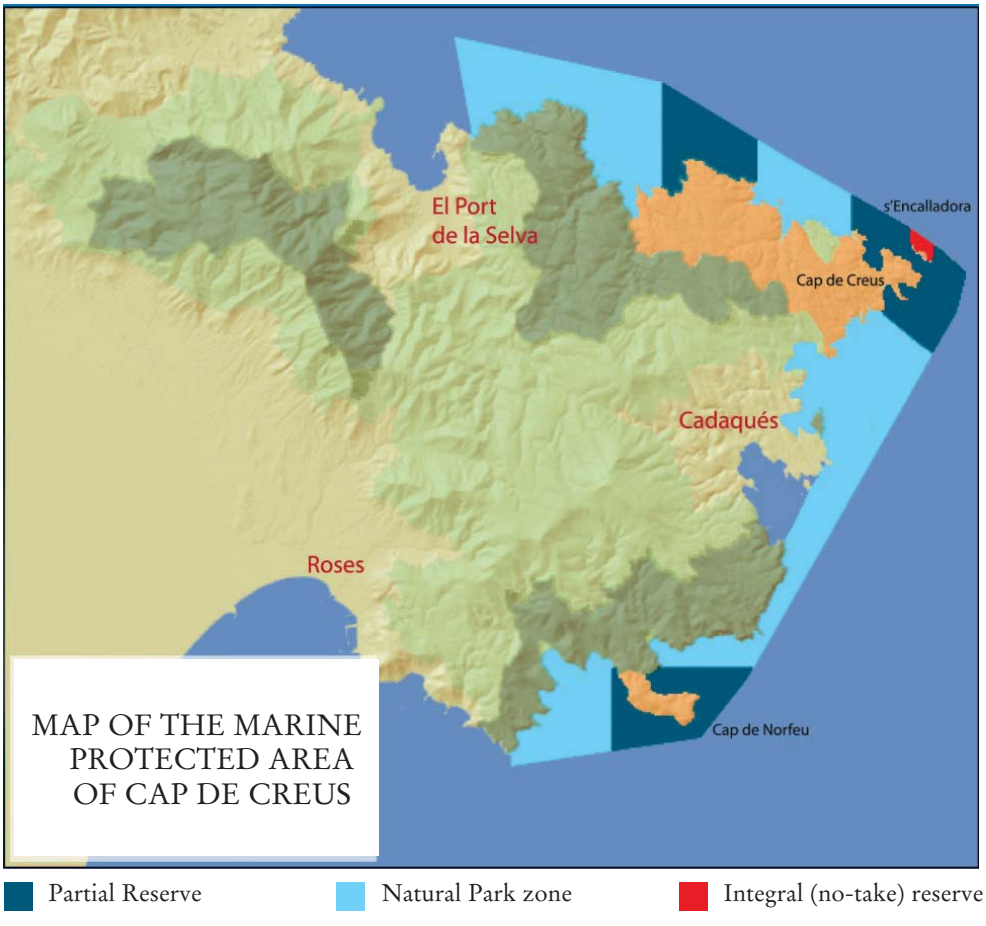
Several local conferences (towards inhabitants of the MPA villages) have addressed the biological and socio-economic challenges of artisanal fisheries in the MPA of Cap de Creus.

In the nearby marine protected area of Medes-Montgrí, an action to eradicate lost fishing nets was established in 2012 in collaboration with scuba divers.

10. Pictures and maps of the study area



Map of the marine protected area (MPA) of Cap de Creus.
Source: Natural Park of Cap de Creus.
P: Natural Park zone; PR: Partial Reserve Zone ; IR : Integral reserve



Map of the study area showing the boundaries of the marine protected area of Cape Creus and the different levels of protection. *Source:* Natural Park of Cap de Creus.

11. Any other relevant information

Fishing-tourism: in Cap de Creus, the regulations prohibit tourists from boarding fishing vessels. So the fishers have come up with an alternative and created another tourist product: when the fishers go out to sea, the tourists board another boat and observe the fishing activity by following the fishing boat. When the fishing vessel is at a standstill and secures its parts, the tourists can then board the fishing vessel for a moment. On-board their boat, the fishers explain their business, their gear, the territory where they work in. As soon as the fishing boat returns to port the tourists are transferred to the other vessel. Tourists are offered two packages. The half-day trip takes place from 6:30 am to 10:30 am from Port de la Selva and Llança. Another one-day package is available in which tourists have lunch with the fishers at sea. Ultimately, the fishers from Cap de Creus appreciate not having tourists permanently on their fishing vessel. Unfortunately, the experience from Port de la Selva finished in 2015 because the fishers did not earn enough money from this activity.

GÖKOVA SPECIAL ENVIRONMENTAL PROTECTION AREA (SEPA), TURKEY

Gökova Bay, Muğla, Turkey (Eastern Mediterranean)

- Part of the Gökova Bay including both marine and land areas was determined and declared as a Special Environmental Protection Area (SEPA) by Decree no. 88/13019 of the Cabinet of Ministers (dated 12 June 1988).
- It includes six NTZs that cover 2 400 ha of the 82 700 ha marine part of the MPA.

1. Environmental and socio-economic characteristics of the study area

Gökova Bay is one of the eight special MPAs in Turkey with a land area of 270 km^2 and a marine area of 827 km^2. Gökova MPA is abundant with eggs and larvae, reaching 667 eggs per m^2 in patches. Diversity of species is also relatively higher. Researchers have identified 723 macroscopic species belonging in 19 systematic groups within Gökova MPA area. 34 of these species are protected under national and international treaties (Okuş *et al*., 2007). 26 species have moved to the Mediterranean through various routes and some have even become dominant over the local species in time.

Three are three main settlements in the Gökova MPA namely Akyaka, Akçapınar and Sarnıç also have their own fishery cooperatives. The economy of the region depends on tourism, agriculture and fishing.

2. Data availability and stakeholders implication for data gathering

There are three fishery cooperatives in the area. Only one of them Akyaka Fishery Cooperative records data on species and price basis. In an ongoing project funded by Mediterranean Protected Areas Network, we supplied a laptop computer and related software to Akyaka Fishery Cooperative for daily recordings of catch and prices in detail. They share the data with us and other institutions on request.

3. Basic information regarding ongoing projects on small-scale fisheries

There are two major projects going on in the area:

Community Conservation Marine Rangers: In July 2010, six no-fishing zones (NFZs) covering 24 km^2 officially declared in Gökova Bay Turkey to protect biodiversity and restore heavily depleted fish stocks. Due to the geographic location and extent of the NFZs, the enforcement effort by Coast Guard was not sufficient to mitigate illegal fishing activity threats. While law abiding local fishers agreed to give up these fishing grounds for protection illegal fishing activities were evident. The Mediterranean Conservation Society established "Local Marine Ranger" system training and employing local fishers as marine rangers in two marine ranger stations with speed boats. Four local rangers have been working in close cooperation with Coast Guard since January 2013. The enforcement implemented by marine rangers

had big positive impact and in 2014 Akyaka Fishery Cooperative declared 53 percent increase in their fisheries related incomes. The continuing monitoring of fish biomass within and outside the protected areas reveal up to 7 folds increase in fish biomass in NFZs.

The project had been funded by Fauna Flora International and won Whitley Fund for Nature Award in 2013[1] and the 2014 UNDP Equator Initiative Award.[2] The project well appreciated in promoting local sustainable development solutions for people, nature and the resilient communities. Gökova Marine Ranger Project is the first of a kind incentive given to the local coastal communities in Turkey for managing their resources and conserving the biological diversity. It is a unique example of co-management of MPA and fisheries in Mediterranean. The clear benefits of enforcement and marine ranger employment are well appreciated by local fishing community.

Sustainable Fishing Activities in Gökova Bay: Fishing is one of the major livelihoods in Gökova Bay MPA and following the collapse of important target species, six No Fishing Zones declared in 2010 where Mediterranean Conservation Society implement the enforcement and monitoring. The fishery in the bay is very dynamic and today four Lessepsian invasive species, Randall's threadfin bream (*Nemipterus randalli)*, Brushtooth lizardfish (*Saurida undosquamis)*, Marbled spinefoot (*Siganus rivulatus)* and Goldband goatfish (*Upeneus moluccensis)*, held important percentage among the catches of the cooperative members. As the public doesn't know the species well enough there is very limited demand on those species resulting low rates, loss of potential income, in certain times cooperative even treats them as discard when there is no demand at all. On the other hand, those species are quite delicious especially *Siganus rivulatus* is one of the most delicious species as long as cooked properly. In Greece, its market price is at least five times higher than Turkey.

The project aims to increase the value of those species by advertising them to local public with proper recipes. In addition, developing a reporting systems on commercial fish landing by the cooperative and launching first pescaturismo project in Turkey are other objectives to support sustainable fisheries within the Gökova MPA. The project is funded by MedPAN.

4. Description of small-scale fisheries and other fisheries in the area (management plan if any, etc.)

Fishing in the region has developed as small-scale due to the conditions of the coastal line, the geography and productivity of the bay as well as the status of the area pertaining to conservation.

There are a total of 100 vessels localized around the Gökova MPA. Around 15 vessels more arrive occasionally from neighbouring areas. Gillnet and longline fisheries dominate the small-scale fishery in the bay. Species that belong to Sparidae and Epinephelinae are the target species in this region.

Although small-scale fishing dominates the fishing activity with about 115 fishing boats presently operating, there are two local purse seiners localized in the bay. Small-scale fishing boats are 6–12 meters in length, locally built and of wood. Usually each boat is operated by one or two fishers. They use gill nets, trammel nets and long-lines. Additionally, the small-scale fishery provides more employments (approx. 200 fishers) than large-scale fishery all around the Gökova MPA.

Around 100 small-scale fishers are organized under three fishery cooperatives in Gökova. In all three fishery cooperatives, groups are small enough to retain the

[1] http://whitleyaward.org/2013/05/whitley-award-donated-by-the-william-brake-charitable-trust-winner-zafer-kizilkaya-turkey/

[2] http://www.tr.undp.org/content/turkey/en/home/presscenter/articles/2014/06/10/equator-prize-goes-to-mediterranean-conservation-society-for-its-community-based-marine-biodiversity-conservation-studies.html

interest of fishers; additionally, there is no evidence of corruption, larceny or other dishonest activities in any of the cooperatives. All had been formed on the basis of local initiatives, in response to the fishers themselves. All three cooperatives have managers. Two of these also offer marketing services.

There is no fisheries management plan in practice in the area yet. However, a draft fisheries management plan (or better to say discussion paper) was prepared in the past but has never been considered by the responsible fisheries management authority yet. Recently, FAO EastMed funded a pilot project in the area to a develop fisheries management plan based on the ecosystem approach to fisheries.

5. Value chain profile and existing examples of diversification (if any)

- n/a -

6. Description of fisheries co-management regimes in place, planned or about to be established

We are implementing the first co-management model for conservation of biodiversity and sustainable fisheries management in Turkey. Bringing more government institution having authority and responsibility into co-management needs time and patience. In our project we are practicing the most important role of fisheries management, enforcement on the sea. The Fisheries and Aquaculture General Directorate is very close collaboration with our project and we have been discussing co-management issue of enforcement. NGO-Government, fisheries cooperative model we are imposing seems the most efficient one marine resources management and marine conservation. As we have demonstrated the success of the project both in biological and socio-economic way we have more power to negotiate and invite more government bodies to join co-management. It is a delicate balance as different government departments generally do not like to work on areas with overlapping jurisdiction. We are carefully approach each institution and explain their participatory role.

Another issue we have been put on the table with the government is site specific fisheries management especially for marine part of SEPA. We plan to integrate EU Fisheries Regulations (1967/2006) as a pilot project in Gokova Bay. We keep close contact with General Directorate of Fisheries and Aquaculture to open a way for this approach.

Enforcement on the sea is a very challenging job. From technical problems to legitimacy there are many components. While the Mediterranean Conservation Society shoulder the enforcement responsibility, the community rangers have no authority to assign fines. As a solution, our rangers are in communication with Coast Guard staff all the time and by documenting the case, Coast Guard assigns the fines later. Coast Guard has initiated a faster way of assigning fines or taking the case into court by just asking from our rangers to pass the national identity number of the alleged suspects. This speeds up the process of assigning fines and saves time as well. We had three meetings in 2014 with Coast Guard, Gendarme Forces and Fisheries and Aquaculture local department how to prevent gaps for better enforcement and cooperation among partners.

7. Existing marine protected area in the study area (if any)

Gökova MPA has 827 km² marine area and 270 km² of land area. Within the MPA there are six No Fishing Zones altogether cover 24 km². There are also two designated areas restricted for purse seine and trawling.

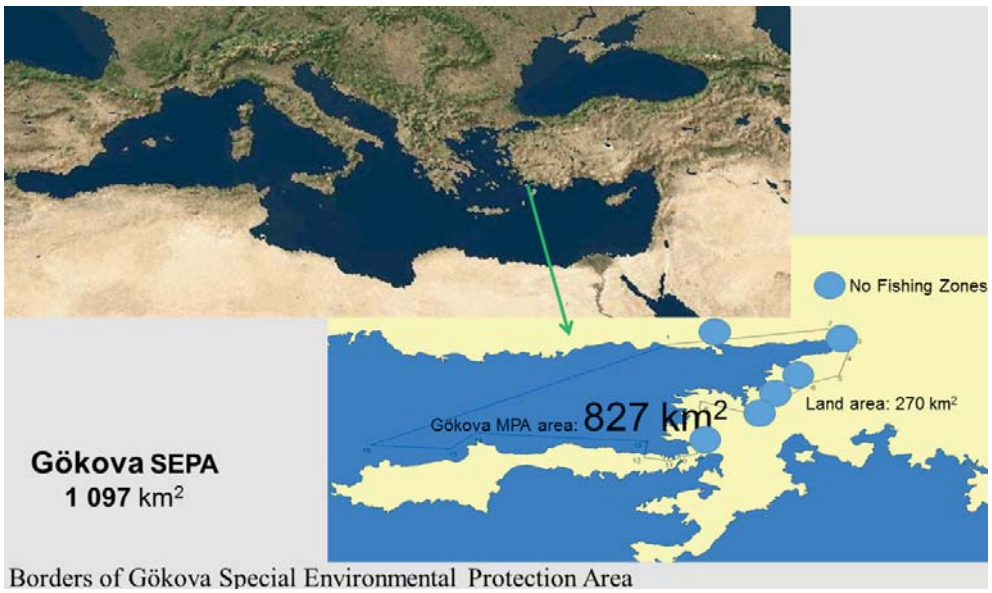
8. Interactions between small-scale fisheries and other activities in the study area (aquaculture, fisheries, tourism, etc.)

Small-scale fisheries interact with other type of fisheries rather than other sectors. There is a serious conflict with purse seiners and recreational fishers especially with those using spearfishing -especially practiced during night time using light and scuba-diving equipment illegally.

9. Examples of best practices concerning governance and management measures in the study area

Gokova Bay NFZs are the only community conserved and well enforced marine reserves in Eastern Mediterranean. Establishment of the NFZs with full consensus of the local fishing community and new rules and regulations brought were one of the best practices in terms of sustainable fishery management and conservation of biological diversity. This example would easily be replicated in the rest of Eastern Mediterranean. The community rangers and enforcement they implement have already proved itself by not only increased the fish biomass almost seven folds in the protected areas but also gave rise to 53 percent increase in local fishing community revenues since the start. It is evident that spillover effect of No Fishing Zones in very sensitive areas like Gökova Bay starts in early days of MPA as long as proper enforcement sustained. In addition, restricting large-scale fishing within the inner bay is another solid step for sustainable future for small-scale fishery. The Mediterranean Conservation Society currently supports the local fishery cooperatives for marketing increasing commercial invasive species and very closely monitor species composition coming to the cooperatives. The NFZs are still young and they need 5 to 10 years period of time to get mature and function well. We need to keep ranger system working for some longer time to prove the positive effect of properly managed NFZs is not a coincidence.

10. Pictures and maps of the proposed study area if available



Borders of Gökova Special Environmental Protection Area

Aerial view of Boncuk Cove No Fishing Zone. ©Z. Kızılkaya

11. Any other relevant information

The NFZs are still young and they need 5 to 10 years period of time to get mature and function well. We need to keep ranger system working for some longer time to prove the positive effect of properly managed NFZs is not a coincidence. This approach could easily be enhanced with other new site specific fishery and monitoring management tools especially considering climate change effect.

Negotiations with government officials are still going on for sustainable financing of the project by the local government. Fisheries and Aquaculture General Directorate would like to see 5 year span results. Two more years of proper enforcement in No Fishing Zones will reach to a turning point to prove the success of co-management in protection of MPAs and to have chance to replicate it in other areas of Turkey. The success project proved so far will have a great opportunity bringing long term financial solutions with the key for protecting biodiversity and sensitive habitats as well as successful example for fisheries management.

One of the project objectives will focus on developing community based sustainable income opportunities. In the long-term we anticipate that part of the income generated through these activities will be donated to the local conservation fund which will be set up to support enforcement and monitoring in the network of FCAs in Gökova Bay. "The Underwater Trail Project" we started in 2015 in one of the NFZs will benefit to the project. There is also an initiative of opening a dive center in English Bay NFZ. We are planning to coordinate Underwater Trail Project with dive center activities.

The financial support provided by WFN has been invaluable in setting this project underway. We inevitably seen some areas of the project succeed more quickly than others, offering an opportunity to demonstrate impact and obtain additional support to make the overall project stronger in future years.

We still believe that project results will produce catalytic effect and other initiatives will be launched such as national community guard certification scheme or set the basis for more ambitious goals such as Ecosystem Based Fisheries Management in the entire Gökova Bay.

English Bay No Fishing Zone ranger boat and rangers. ©Z. Kızılkaya

Community fishers meeting with rangers and government stakeholders, Akyaka Mugla, Turkey. ©Z. Kızılkaya

Small-scale fishing boats in front of the Akyaka Fishery Cooperative, Mugla. ©V. Ünal

Fisherwomen Akyaka Mugla Turkey. ©Z. Kızılkaya

GULF OF LION MARINE NATURAL PARK (FRANCE)

Gulf of Lion Marine Natural Park, France (North-Western Mediterranean)

http://www.parc-marin-golfe-lion.fr/accueil.html

1. Environmental and socio-economic characteristics of the study area

The Gulf of Lion Marine Natural Park was created in 2011 and covers an area of 4 000 km², it covers 100 km of coastline and extends over 60 km wide. The Park governance, inscribed in the legislative framework, includes all relevant stakeholders in a management board. The French government delegates parts of its responsibilities to the management board to manage this territory. It is a participatory and inclusive mechanism concerning marine areas which offers local actors the opportunity to be at the centre of decisions. The Marine Natural Park has a management board which has over 60 members. The Marine Protected Areas Agency (public institution under the Ministry of Ecology, created in 2006 as a tool for the sustainable protection of large marine natural areas) provides support to local decision-makers in order to manage the marine protected area.

The Gulf of Lion Marine Natural Park is located off the eastern Pyrénées and the Aude department in the southwest of France. It borders with Spain, which explains that the management process must respect the historic fishing agreements between France and Spain. Spaniards have the right to fish between 6 and 12 nautical miles in the park. The marine park area encompasses all the natural habitats of the Mediterranean, including Posidonia meadows, the coralligenous reefs and underwater canyons. It houses more than 1,200 animals and 500 plant species and hosts 7 of the 9 protected marine species in France (dusky grouper, sea urchin, loggerhead turtle, posidonia, etc.) There are more than 20 species of cetaceans like the bottlenose dolphin and the finback whales, etc. This marine area also provides a historical setting of a particularly rich maritime culture, especially of fishing and of processing anchovies and sardines. Port-Vendres is a port town for boating and fishing, and Collioure, formerly a place of unloading and processing anchovies and sardines, maintain the historical and cultural atmosphere of the area. If the fishing economy is still based on a fleet of a hundred boats, marine tourism has grown considerably in recent decades. The population of the 12 coastal municipalities of the Park benefit also from the strong points of the terrestrial part of their territory for their economic and social development.

In the early 1970s, the demersal resources of the Gulf of Lion were still considered underexploited. First diagnosis of overexploitation in this area occurred after the rapid development of the bottom trawling fleet in the mid-seventies.

In the Gulf of Lion, there are several commercially important populations of demersal species of fishes, crustaceans and molluscs. A number of these species are clearly coastal, i.e. grey mullets (Mugilidae), sea breams (*Sparus aurata*), sea bass (*Dicentrarchus labrax*), some shrimps and many molluscs. The upper zones of the continental shelf are inhabited by species like red mullets (*Mullus barbatus, Mullus surmuletus*), sole (*Solea solea*), gurnards (Trigla sp.), poor cod (*Trisopterus minutus capelanus*), Black Sea whiting (*Merlangius merlangus*), and some shrimps. On the continental slope there are many fish species of great economic interest. Thus in the upper part of the slope (200 and 400m) there are hake (*Merluccius merluccius*), Norway lobsters (*Nephrops norvegicus*) and various shrimps (e.g. *Peneus longirostris*). In deeper waters, from 400 to 600m, the dominant species are the greater forkbread (*Phycis blennoides*), the blue whiting (*Micromesistius poutassou*) and the red shrimps (*Aristeus antennatus, Aristaemorpha foliacea*).

Today, 15 local small-scale fishing units are allowed to work in the MPA.

2. Data availability and stakeholders implication for data gathering

The Park Management Plan includes baseline studies for the different chapters that makes it: natural heritage, water quality, natural resources, cultural heritage and

governance. These baseline studies were built using multiple sources of data: from expert opinion to more complex data measurements.

One of the vocations of the marine park as a tool is to make territories involved "reference areas" in terms of knowledge concerning ecological and socio-economic systems. Advancing knowledge is an end in itself but it also allows to measure the achievement of goals outlined in the management plan and the effectiveness of management measures that are implemented.

Regarding fishing and fisheries resources, several official datasets on professional fisheries are currently available in France via the Fisheries Information System managed by Ifremer. However, these national systems have limitations for use by an MPA manager: the scale is not suitable (e.g. Mediterranean Sea at large), poor quality of some data (e.g. catch reports) or data can be rather difficult to access.

As such, to establish the initial inventory of artisanal fishing, a fine-scale study and monitoring initiative of landings occurring within the park was conducted by the University of Perpignan in collaboration with the Park (2008-2012). Undertaken using a questionnaire, it contains a precise description of the species caught (171 species inventoried, including 22 target species), *métiers* (more than 32 *métiers* for ten different gears), georeferenced CPUE for the five main businesses (by square 1 km²).

Important information gaps on fishing activities persist over the area for several reasons:

- The sole auction based within the park closed in 2014 and it is therefore not possible to get their feedback today, including on blue fish catches.
- Small businesses in the area tend not to contribute socio-economic data on their activities to management centers, which then makes it difficult to obtain that data.
- They are not affiliated with producer organizations.

This difficulty with systematically collecting data requires state services and managers to adapt the data collection protocols, including lengthy and costly field surveys.

The Prud'homies (ancestral structures of fishers specific to the Mediterranean) and fishers committees are two of the close links from which to rely for data collection, even if they do not always have the means to gather long-time series of data. The CRPMEM is also the intermediate link between local management and Mediterranean level management. It is one of the stakeholders in the establishment of management plans for different gear used in the Mediterranean (trawlers, dredges, gangui, beach seines, etc.) and concerning certain stocks of widely distributed fish (sardines, anchovies, hake, etc.).

3. Basic information regarding ongoing projects on small-scale fisheries (if available)

Economic business profitability: Pursuant to French law, the Gulf of Lion Natural Park may award grants via call for proposals. The first call for projects focuses on strengthening marketing methods using short circuits and / or promoting new products from the local fisheries to enhance the economic viability of business: market research, equipment, development of tools to enhance short-circuit commercialisation and innovative marketing channels, upgrade professional skills, etc.

This project is developed to help achieve the aim described in the purpose and sub-purpose which were identified during the consultation phase related to the development of the management plan:

Goal: The maritime activities are valued and sustained, under the condition that they engage in the conservation objectives of the marine natural environment.

Sub-goal: A small-scale fisheries supported and socio-economically viable when professionals commit to the conservation objectives aimed at preserving the marine natural environment park, in line with the available biomass.

Integrated Fisheries Management: The park provides assistance to CRPMEM Languedoc-Roussillon to structure a project on the integrated management of artisanal fisheries. The general idea is to work for the establishment of a "green corridor" for the fishery resources in the coastal strip: catches of juveniles at sea, aquaculture hatchlings, release back in the water in coastal lagoons, protection seabed in shallow waters, artificial reefs, fisheries "cantonment" (reserves), work on fishing gear, management measures, etc. are part of the array of tools that could be developed within this project. Currently, it is laying the foundations and brainstorming so to present Europe a list of options to choose from. Then, if validated, the project objectives will be finalised to secure funding.

4. Description of small-scale fisheries and other fisheries in the area (management plan if any, etc.)

The boats exploiting the marine resources of the Gulf of Lion are mainly based in the French ports of Sète and Le Grau du Roi which group more than 60 percent of the boats and insure about 70 percent of the halieutic production of the Gulf of Lion and in the Spanish ports of Roses and Port de la Selva. In 2010, 220 boats were involved in the demersal fishery:

111 French bottom trawlers, 67 French gillnetters, 27 Spanish bottom trawlers and 15 Spanish long-liners, while 14 French purse seiners and 6 Spanish ones where fishing small pelagics in 2007-2008.

However, in 2016, only one trawler is left within one of the ports along the coast of the Park. A dozen French trawlers based in ports further up north are more or less regularly frequent in the waters of the park along with a couple of Spanish trawlers.

French trawlers are the main component of the fleet exploiting the marine resources of the Gulf of Lion. In 1998 the French fleet was composed of 140 trawlers. During the last decade the number of French trawlers decreased until 90 units in 2010. In 2010 eleven small French purse seine boats where still using the "lampara" technique (light attraction) to fish the anchovy and the sardine. The increasing scarcity of anchovy and sardine results in a virtual disappearance of "lampara" within the Park since 2015. The fish auction market in Port-Vendres closed in 2014 because of its dependence on blue fish.

The part of the fleet devoted to small-scale fisheries is defined by default as all fishing vessels except licensed trawlers and tuna and sardine vessels licensed to catch pelagic fish. Vessels that can catch pelagic fish with lampara nets are also excluded when they use those nets but are included when they pursue a different *métier*. The small-scale boats operating in the Gulf of Lion are essentially French ones. The fleet is very diversified and composed from boats of 3-4 m until units from 10 to 16 m. There are almost 50 different "métiers", among which most are very specific in certain sectors. The gillnets and the trammel nets are the most used gears, along with trolling lines, longlines and many other gears. About 60 percent of the activities of the small-scale boats are operating in the shallow waters of the coastal zone, between 0 and 50 m depth. Some of the biggest boats also fish at depths of more than 100 m and even in the canyons of the continental slope, in particular the gillnetters targeting the hake. In general the small-scale fleet of the Gulf of Lion is declining as it decreased about two thirds during the last decades. However this activity is still much to the fore, with 769 registered active entities and 81 percent of total manpower in 2008. A total of 171 boats where registered in Port- Vendres, 222 in Sète, 175 in Martigues and 201 in Marseille. In 2010 the small-scale fleet of the Languedoc-Rousillon was composed of 897 boats.

Recreational fishing: Another important extractive activity of fishing resources which also exists within the Park is recreational fishing. It bears several components (shore fishing, Boat fishing and spear fishing), and it remains difficult to quantify this activity. Three fishers federations account for about 650 fishing ships belonging

to various recreational fishing clubs. However, the coast of Languedoc-Roussillon is extremely touristy, especially in summer. Thus, thousands of summer recreational fishers also practice recreational fishing activities without necessarily belonging to a club or organized associations. Several research studies using questionnaires have led to gaining a tentative idea of the importance of these activities, particularly on the rocky coast of the Park. However, similar surveys should be conducted on the sandy part of the perimeter, coupled with an extrapolation linked to the number of users in the Park.

In the park management plan, both the extraction (professional fishing and recreational fishing) are treated at the same level as regards the management of fishery resources. Thus the objectives of the management plan to achieve sustainable management of fisheries resources highlight the necessity for joint management, combining the two types of activities (cumulative catch, involvement of the actors).

5. Value chain profile and existing examples of diversification (if any)

The Small *métiers* use a wide variety of different *métiers* (combination of gear and a species): 171 species inventoried, including 22 target species, 32 *métiers* for ten different gears. This versatility is a hallmark of the Park flotilla. Small *métiers* therefore use on average between three and five different *métiers* (depending on sources).

This versatility (diversification used *métiers*) ensures that their revenue spans over the whole year rather than having to depend on one or two target species. Keeping it this way is one of the management plan objectives.

A few trials at developing fishing tourism were initiated within the Park but administrative constraints have significantly hindered their establishment.

The bulk of sales of small *métiers* goes via a short circuit marketing chain: direct sales from fisher's stall or sales to restaurants. Some wholesalers provide a first purchase. Since the closure of the only Park auction in 2014, a buying-circuit with a truck has been established by a neighboring auction market from Port la Nouvelle town. However, this system is precarious due to the small volumes, and sometimes quite irregular, that small *métiers* can provide.

Income diversification can go through the diversification of marketing methods including the development of short circuits (which is the subject of a call for projects from the Park): basket of fish, a first processing stage, small catering unit, etc.

6. Description of fisheries co-management regimes in place, planned or about to be established

Sea urchins: Following a professional fishers demand of exemption to be allowed to fish sea urchins using scuba-diving in the waters of the Park, a monitoring scheme was set up to follow populations. Following the monitoring, the management committee allowed for this practice and a working group was set up to follow the management of this resource. Comprising all stakeholders (professional and recreational fishers, fisheries control service, scientists and managers), the working group reviewed various management scenarios for a balance between resource conservation and socio-economic stability of businesses. The board of management, based on the conclusions of the Working Group, proposed to the state departments to set up specific regulations on the region for both commercial fishing and recreational fishing (seasonal date maximum daily amount, number of season per fishing day) and for the CRPMEM Languedoc-Roussillon to create a fishing license for sea urchin with a maximum total of seven professional fishers allowed in the Park.

During the development phase of the management plan, other species or families of species were classified a priority for setting management measures: sea bream, octopus, red mullet. This is to ensure sustainable management of the perimeter of the park, with shared objectives of achieving MSY. A joint work between managers and professional fishers and their representative structures (prud'homies, fisheries

committees), including concerning recreational fishing are to be conducted on the same model as that of the sea urchin.

Prud'homies, have an ancestral role in conflict management within the profession and also one in resource management (resource access and protection). Having some trouble finding their place in the management system related to the European fisheries organization, they can however implement protection of a particular resource system. For example, octopus fishing with pots are initiatives gaining success in the area. Consequently, several *prud'homies* have set up a management framework system (number of pots, season, etc.). Measuring the effect of that framework and assessing in situ populations could become subject of a co-management scheme with the MPA managers of the area.

7. Existing marine protected area in the study area (if any)

The Gulf of Lion Marine Natural Park includes several other MPAs of different categories and thus different levels of responsibilities:

- Réserve naturelle marine de Cerbère-Banyuls, established on 26/02/1974.
- Natura 2000 sites (EU Habitats Directive):
  - Posidonies de la côte des Albères - FR9101482.
  - Embouchure du Tech et grau de la Massane - FR9101493.
  - Prolongement en mer des caps et étangs de Leucate - FR9102012.
  - Côtes sableuses de l'infralittoral languedocien – FR 9102013.
- Natura 2000 sites (EU Birds Directive):
  - Cap Béar - Cap Cerbère - FR9112034.
  - Côte languedocienne – FR9112035.

8. Interactions between small-scale fisheries and other activities in the study area (aquaculture, fisheries, tourism, etc.)

Commercial fishing coexists with many other uses in the Park: maritime transport, passenger transport, leisure boating and other tourist activities, recreational fishing, etc. New uses could also arise in the coming years such as renewables energies including wind farms. Since the mid-1970s the development of tourism, essentially coastal, is targeted by the objectives of the Languedoc-Roussillon Region. Tourism has become the dominant use of the Park. Today, the place the small *métiers*, ancient, nurturing, and structuring the life of harbours, tends to often be difficult to maintain in ports of coastal towns. User conflicts may also appear in some areas. One objective of the Park is to ensure a balance between uses and harmonious sharing of space within the limits of ecosystems carrying capacities.

9. Examples of best practices concerning governance and management measures in the study area

All the local structures of professional fishers are represented in the Park Management Board. Alongside all the actors of the park, they are directly associated with all decisions made by the Management Board.

While there is no specific professional fishing committee in the structure of the Park (and there are none dedicated to one single activity), thematic working groups are created as and when required. The first working group was created to study a call for interest by the Ministry of Ecology for the creation of a pilot floating wind farm in the Mediterranean. A working group, whose mandate is specifically prepared by the management committee, delivers its findings to that body to inform its decisions.

This working group chaired by a representative of the professional fishing was mandated to participate in the consultation regarding the establishment of areas with more flexible regulations within the Park (reflecting the management plan objectives) as well as the development of recommendations to the Ministry for integration to the call for interest.

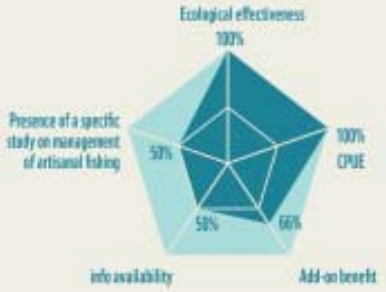
10. Pictures and maps of the proposed study area if available

CERBÈRE-BANYULS MARINE NATURE RESERVE (FRANCE)

ARTISANAL FISHING ALLOWED YES ☑ NO ☐

MANAGEMENT PLAN FOR ARTISANAL FISHING YES ☑ NO ☐

FISHERMEN ENGAGEMENT IN MANAGEMENT 0 1 2 3 4



MPA PASSPORT

DATE OF CREATION:
1974 (1978 for Integral reserve (IR))

ESTABLISHMENT OF THE MANAGEMENT BODY:
1974

MANAGEMENT BODY:
Cerbère-Banyuls Marine Nature Reserve

TOTAL AREA:
6.50 km²

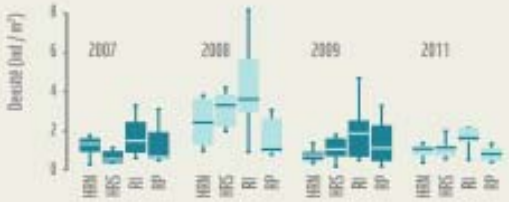
ZONING:
5.85 km² buffer zone (BF) and 0.65 km² integral reserve (IR). Artisanal fishing is allowed in the BF. Recreational fishing is permitted only during the day and under specific regulation.

DOES THE MPA WORK ?
ECOLOGICAL EFFECTS FOLLOWING PROTECTION AND MANAGEMENT

- Reserve effect in term of fish biomass [5]
- Higher fish biomass within the IR.
- Biomass rapidly declining from IR outward.
- Evidence of fish spillover from IR outward [2,3,5].

Figure 1: Total density according to protection level (ORN : Outside Reserve North, ORS : Outside Reserve South, IR : Integral Reserve, BF : Buffer Zone) and year (2007,2008, 2009, 2011) at a 10-meter depth

Source: RNCB



ARTISANAL FISHING AT CERBÈRE-BANYULS RESERVE TODAY

Authorization required for fishing within the reserve. It is issued by the Departmental Directorate of Maritime Affairs after approval by a committee comprising the Reserve management body, *Prud'homie* and Maritime Affairs.

Number of vessels authorized to fish in the MPA: 15 boats maximum (local fishermen have priority).

Length of vessel: up to 8.5 m.

Authorized gears: 3 patches of fishing net 750 meters long or 1 or more fishing lines for a maximum of 500 hooks, deployed for 24 hrs. Nets shall be marked with flags bearing the number of the authorization. Three "bonitières" (fishing net to catch fishes belonging to the Scombridae family) fixed, each 250 meters long.

Traps prohibited.

CPUE (CATCH PER UNIT EFFORT) AS AN INDEX OF PRODUCTIVITY AND SUSTAINABILITY

- Highest CPUE: near the boundaries of IR (Fig.1).
- Decrease in CPUE as distance increases from the IR [3].
- Similar trends in fishermen income [3]

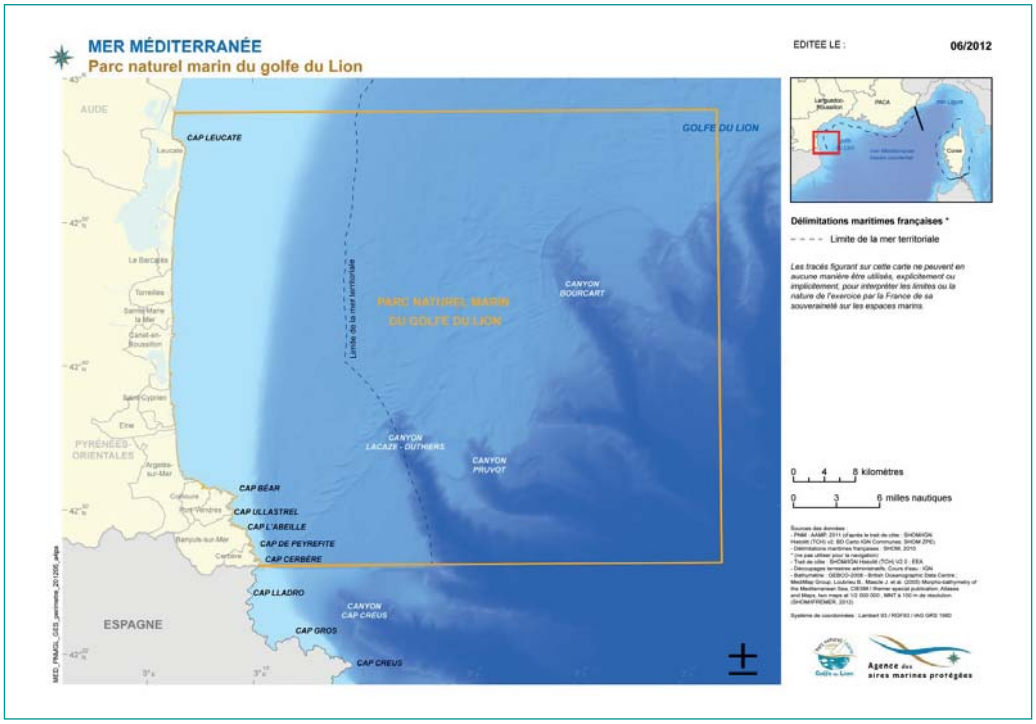
THE PROCESS OF FISHERMEN ENGAGEMENT

- 1974: establishment of the reserve. Consultative meetings took place before the reserve was established.
- 1978: The implementation of the IR was difficult.
- Today:
  - More frequent participation of fishermen in meetings.
  - No Fishing logbook to complete. Fishermen prefer that managers board fishing vessels.
  - No participation of fishermen in scientific monitoring.

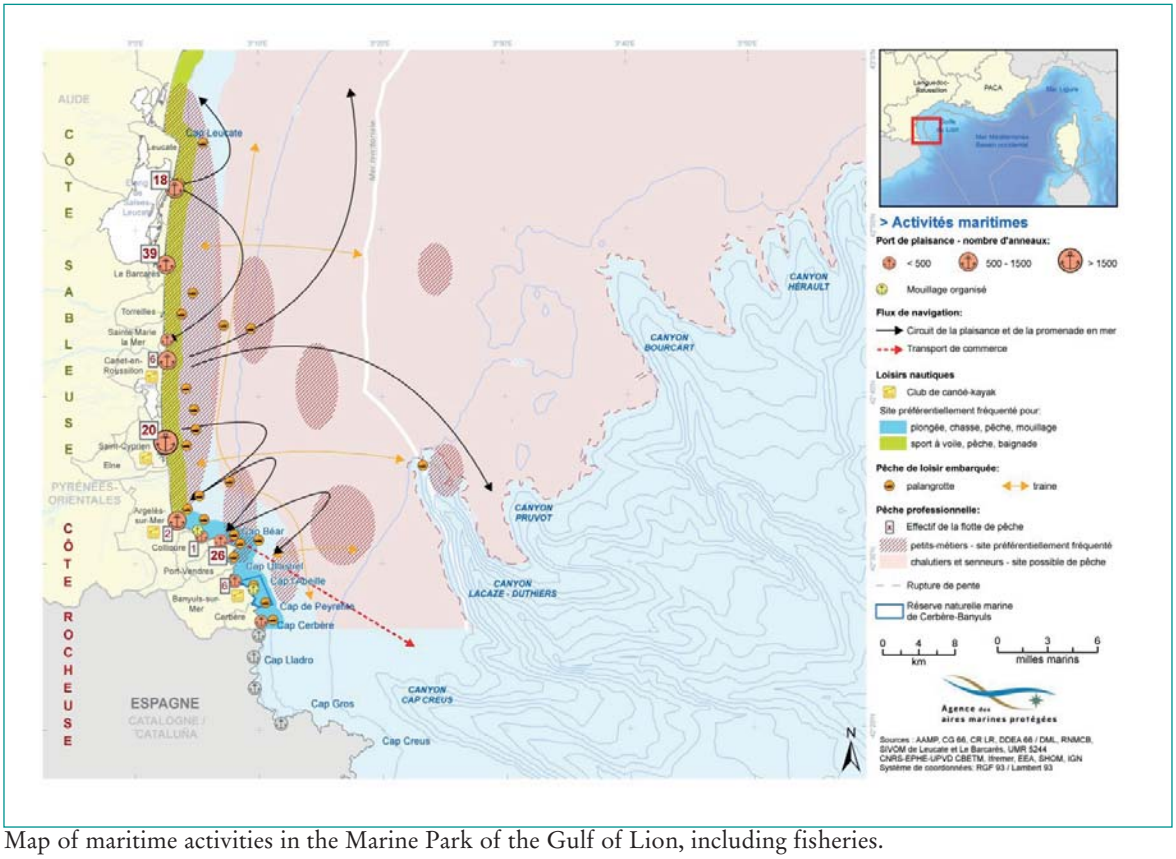
LESSONS LEARNT

- Involve artisanal fishermen in the consultation process and in the establishment of the MPA if possible, or in the early management measures.
- Implement measures to manage commercial fisheries that integrate fishermen: sustainable fisheries, pescatourism (including training), return fishing data, possibility of collecting fishing data directly on board and / or at dock .
- Include fishermen in the annual reviews to make them feel included in the MPA management.
- Manage other activities permitted within the Reserve taking into account the long-standing activity of fishermen (e.g. traditional fishing area) such as in the case of managing dive sites which overlap with fishing sites.

Focus on the marine natural reserve of Cerbère Banyuls



Map of the limits of the Marine Park of the Gulf of Lion.



Map of maritime activities in the Marine Park of the Gulf of Lion, including fisheries.

11. Any other relevant information

-n/a-

Staff of the marine reserve of Cerbère Banyuls onboard an artisanal fisheries boat. ©J. F. Planque

PANEL 4

Enhancing small-scale fisheries value chains

PANEL 4
Enhancing small-scale fisheries value chains

Giulio Malorgio, Luca Mulazzani, Massimo Zuccaro, Rabea Zerrouky, Enrico Azzone, Daniele Galli, Stefano Lelli, Mario Michelini, Massimo Toma and Roberto Ugolini

EXECUTIVE SUMMARY

The conference panel "Enhancing small-scale fisheries value chains" identified four relevant areas of intervention: sustainability aspects (including governance and marine protected areas [MPAs]), marketing strategies (quality aspects and chain organization), intersectorial integration, and provision of infrastructures and services (in particular wholesale markets and credit).

Value chain analysis, in the narrow meaning, focuses on a single firm and includes the conception and design stage, the acquisition of inputs, production, marketing and distribution activities, and the performance of after-sale services. On the other hand, the broad approach to value chains looks across enterprises at the range of activities implemented by various actors to bring a raw material to the final product. In this sense, "value chain" is often used as a synonym of "supply chain", which is a network of retailers, distributors, transporters, processors, storage facilities and suppliers that participate in the production, processing, delivery and sale of a product to the consumer. Small-scale fisheries value chains are enhanced by a favourable environment where fishers are strongly connected with other local actors, including public and private institutions and consumers: this competitive economic cluster can foster the development of the coastal community.

Policy-makers must identify and implement support actions addressing taxation, market regulation, piloting of specific products and strengthening of skills in organizational development, financial management and pre-harvest handling. Public institutions should provide basic infrastructures and services to foster the value chain and to prevent market failure. Infrastructure facilities and financial products can be developed in partnership with rural banks and public authorities for medium to long-term investment. In addition, formal chain financing schemes (production contracts, storage receipts) can be applied with the participation of fishers, traders and public authority.

A critical aspect to be improved is communication to final consumers and information transmission along the supply chain. This can be attained by means of joint promotional campaigns in the media and special events with the participation of all stakeholders. Moreover, small-scale fishers are often on the losing end of market asymmetries where traders and processors use the market information they exclusively possess as a leverage in setting prices. Market-oriented research and product innovation as well as the development of applicable fisheries product standards and certification systems, can lead to greater added value and to an increase in market access for products from small-scale fisheries. It is important to identify relevant cases of good practices and to evaluate if the determinants of success can be reproduced in different geographical contexts. This evidence should be used to improve human capital within fishing communities, for example, by providing courses on different aspects, ranging from technical and marketing issues to administrative steps, for the creation of

cooperatives or for the preparation of projects and management plans. Relationships between members are first of all characterized by transactions through which a product/service is transferred from one member to another in return of payment. Secondly, relationships in value chains are also characterized by a vast exchange of information, knowledge, skills and various embedded services (e.g. loans provided by input suppliers to small producers, training sessions conducted by lead firms, quality control mechanisms, leasing arrangements, provision of equipment and manuals, marketing support, etc.).

Coasts and seas are drivers for the economy and have a great potential for innovation and growth. Creating synergies between economic activities and addressing tensions clearly helps in realizing Blue Growth potential. Synergies are expected to benefit maritime economic activities, especially those in the development stage and when there is a lack of critical mass (which is a necessity for industrial clusters). These benefits can take the form of additional income sources, sharing of costs, sharing of services and infrastructure.

RÉSUMÉ

Le groupe de discussion «Améliorer les chaînes de valeur de la pêche artisanale» a identifié quatre grands domaines d'intervention: les aspects relatifs à la durabilité (y compris la gouvernance et les aires marines protégées [AMP]), les stratégies de commercialisation (aspects relatifs à la qualité et organisation de la filière), l'intégration intersectorielle et, enfin, la fourniture d'infrastructures et de services (en particulier les marchés de gros et le crédit).

Au sens strict, l'analyse des chaînes de valeur porte sur une seule entreprise et englobe la phase de conception, l'acquisition des intrants, la production, les activités de commercialisation et de distribution, ainsi que l'exécution des services après-vente. D'un autre côté, l'approche globale des chaînes de valeur s'intéresse, par-delà les entreprises, à l'éventail d'activités mises en œuvre par différents acteurs pour passer d'une matière première au produit final. En ce sens, le terme «chaîne de valeur» (ou filière) désigne souvent la chaîne d'approvisionnement, qui se compose d'un réseau de détaillants, de distributeurs, de transporteurs, de transformateurs, d'installations de stockage et de fournisseurs qui contribuent à la production, à la transformation, à la livraison et à la vente d'un produit aux consommateurs. Les chaînes de valeur de la pêche artisanale sont améliorées par un environnement favorable dans lequel les pêcheurs établissent des liens solides avec les autres acteurs locaux, notamment les institutions publiques et privées et les consommateurs. Un pôle économique compétitif de ce type peut favoriser le développement de la communauté côtière.

Les décideurs politiques doivent identifier et mettre en œuvre des actions de soutien portant sur l'imposition, la réglementation du marché, le pilotage de produits spécifiques et le renforcement des compétences dans les domaines du développement organisationnel, de la gestion financière et des manipulations en amont de la capture. Les institutions publiques doivent fournir les infrastructures et les services de base nécessaires pour renforcer la chaîne de valeur et éviter les échecs commerciaux. Des mécanismes de financement des infrastructures et des produits financiers peuvent être développés en partenariat avec les banques rurales et les pouvoirs publics pour les investissements de moyen à long terme. Par ailleurs, des dispositifs formels de financement de la filière (contrats de production, récépissés d'entrepôt) peuvent être mis en place avec la participation des pêcheurs, des mareyeurs et des pouvoirs publics.

La communication avec les consommateurs finaux et la transmission de l'information tout au long de la chaîne d'approvisionnement sont des aspects critiques qu'il convient d'améliorer. Pour ce faire, des campagnes de promotion communes dans les médias et des manifestations spécifiques avec la participation de toutes les parties prenantes peuvent être organisées. De plus, les artisans pêcheurs sont souvent pénalisés par les asymétries du marché, alors que les mareyeurs et les transformateurs utilisent les informations de marché dont ils disposent en exclusivité comme un levier lors de la fixation des prix. Une recherche et une innovation produit axées sur le marché, ainsi que la mise en place d'un système de certification et de normes pour les produits de la pêche, peuvent améliorer la valeur ajoutée ainsi que l'accès au marché des produits de la pêche artisanale. Il est important d'identifier les cas de bonnes pratiques intéressants et de déterminer si les facteurs de réussite peuvent être reproduits dans d'autres contextes géographiques. On utilisera ces éléments pour améliorer le capital humain au sein des communautés de pêcheurs, par exemple en proposant des formations sur différents thèmes, des problématiques techniques et commerciales aux étapes administratives de création d'une coopérative, ou encore à la préparation des projets et des plans de gestion. Les relations entre les membres se caractérisent avant tout par les transactions au travers desquelles un produit/service est transféré d'un membre vers un autre en échange d'un paiement. Par ailleurs, les relations au sein des chaînes de valeur se caractérisent aussi par de vastes échanges d'informations, de connaissances, de compétences et de divers services intégrés (par exemple les prêts consentis par les

fournisseurs d'intrants aux petits producteurs, les formations assurées par les grandes entreprises, les mécanismes de contrôle de la qualité, les dispositifs de crédit-bail, la fourniture d'équipements et de manuels, les supports de commercialisation, etc.).

Les côtes et les mers sont des moteurs économiques et offrent un vaste potentiel d'innovation et de croissance. Il est évident que la création de synergies entre les activités économiques ainsi que la gestion des tensions faciliteront la réalisation du potentiel de la croissance bleue. Les synergies devraient se révéler positives pour les activités économiques maritimes, en particulier pour les activités en cours de développement ou qui manquent de masse critique (une nécessité pour les pôles industriels). Ces bénéfices peuvent se présenter sous la forme de sources de revenus supplémentaires, d'un partage des coûts ou d'un partage de services et d'infrastructures.

Background paper

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1. INTRODUCTION

Small-scale fisheries (SSF) can make an important contribution to poverty alleviation and food security, offering work and income opportunities for coastal communities (Food and Agriculture Organization of the United Nations [FAO] and WorldFish Center [WFC], 2010; World Bank, 2010). Fisheries also create upstream and downstream employment and economic activity in other sectors such as boat building, gear manufacturing, port services, processing, retailing and restaurants.

Furthermore, the social and cultural role of SSF is often highlighted by policy-makers, reflecting the historic links to adjacent fishery resources, traditions and values, and supporting local cohesion. Around the world, about half (47 percent) of people involved in SSF value chains are women, mainly engaged in post-harvest activities, handling the fish after it is caught and ensuring that this important source of nutrition reaches more than 1 billion consumers for whom fish is a key component of their diets (World Bank, 2010). In particular, it is important to give specific emphasis to those remote areas where alternative economic activities to fishing are not easily identifiable, and where small-scale fishing still represents the main, or even the only, work opportunity.

Economic literature highlights that the competitive environment for small-scale agro-food businesses has been dramatically altered in recent years. The new environment is characterized by globalization, liberalization and extensive organizational, institutional and technological change. This is equally true for SSF, where we also have to consider changes and problems related to the sustainability of fish stocks and, more generally, to the provision of ecosystem services. In this context, SSF have specific characteristics that make them less competitive but, at the same time, provide elements of higher flexibility and resilience. SSF, in particular, compete and conflict with industrial fisheries. Negative features of SSF are the scarcity of economic resources, the low investments, the lack of innovation, the small size of the enterprises, the weak market position, the fragmentation of production, the difficulty to comply with sanitary and safety standards, the low education and the individualism of fishers. On the other hand, some of the relative advantages of SSF (Naji, 2015), under certain conditions, are:

- Lower running costs and fuel consumption.
- Lower ecological impact (thus, higher sustainability) because SSF fishers employ mainly passive gears.
- Higher employment opportunities (being more labour-intensive).
- Higher versatility (small-scale fishing boats can operate from small ports and landing sites relatively close to the fished resource).
- Lower construction costs.
- Less expensive technology (artisanal fisheries require relatively low investment in technology and equipment and are consequentially more competitive in most developing regions where labour is cheaper than equipment).

In other words, quite often, the same reasons that seem to make SSF uncompetitive also can make them resilient. In this framework, it is necessary to find development approaches that could solve the points of weakness without compromising the strengths of SSF. Even more complex is the concept of "enhancing SSF value chains", where different economic actors are involved at the same time with conflictual purposes.

This paper is structured as follows. Section two focuses on the theoretic concept of the value chain and how this can help us to elaborate strategies for SSF. Section three further elaborates the value chain concept, presenting other approaches to (coastal) local development and highlighting the importance of elements such as the sustainable use of ecosystem services, the provision of services and infrastructures, the relationships with other economic sectors and the empowerment of communities. In section four, starting from these theoretical considerations and from the results of the five case studies selected in the conference, four pillars for enhancing SSF value chains are discussed. Section five discusses another case study where an integrated approach for the development of coastal communities is used, linking the situation of SSF with that of other economic activities and with the state of ecosystem services. Section six concludes the paper.

2. VALUE CHAIN

Value chain analysis seeks to characterize how chain activities are performed and to understand how value is created and shared among chain participants (Kaplinsky and Morris, 2002).

Small-scale fisher organizations are often not sufficiently familiar with the tools needed to perform a value chain analysis and to not have access to the information needed to make an accurate analysis.

Value chain analysis can be viewed from a narrow or broad sense. In the narrow meaning, a value chain focuses on a single firm and includes the conception and design stage, the acquisition of inputs, production, marketing and distribution activities, and the performance of after sale services. The broad approach to value chains, which is preferred in this document, looks across enterprises at the range of activities implemented by various actors to bring a raw material to the final product. In this sense, value chain is often used as a synonym of supply chain, which is a network of retailers, distributors, transporters, processors, storage facilities and suppliers that participate in the production, processing, delivery and sale of a product to the consumer. In this sense, relationships between members are not only characterized by transactions through which a product/service is transferred from one member to another in return for payment. Instead, relationships in value chains are also characterized by a vast exchange of information, knowledge, skills and various embedded services (e.g. loans provided by input suppliers to small producers, training sessions conducted by lead firms, quality control mechanisms, leasing arrangements, provision of equipment and manuals, marketing support, etc.) (Naji, 2015).

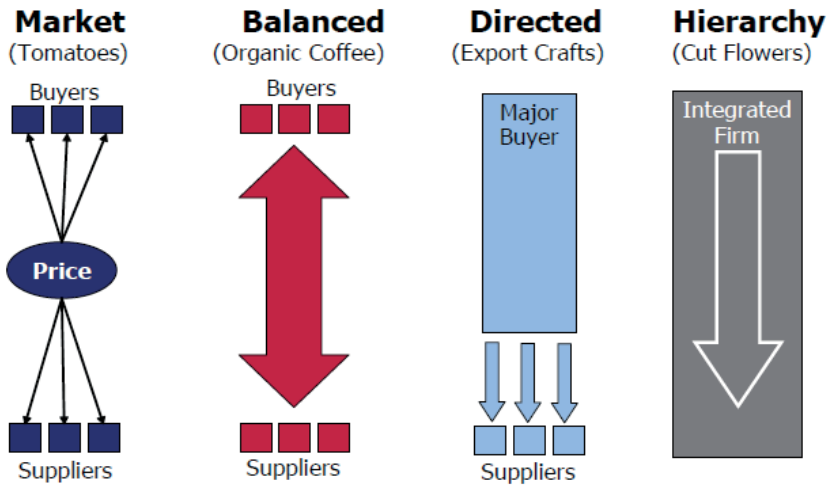
Several structures of leadership can be identified in a value chain (Naji, 2015; Humphrey and Schmitz, 2002). In Figure 4.1, several examples are indicated.

- The first case (on the left), describes market-based relationships, which are characterized by transactions in which there is little power difference between buyers and sellers. Exchange of goods and services are negotiated daily based on the market price. There is little information exchange and learning from the interaction. There is little or no formal cooperation among participants. This is a classic situation of perfect market. It could be considered as a benchmark situation, from which different less conventional cases can evolve.
- The second case describes a balanced governance in which decision-making is fairly equal among the participants. The relationships usually create mutual dependence. There is cooperation among buyers and sellers and no one

dominates over the other. Theoretically, both buyers and sellers of the value chain should benefit (win-win situation) from this situation, to the detriment of other buyers and sellers who are members of a value chain as described in the first case.

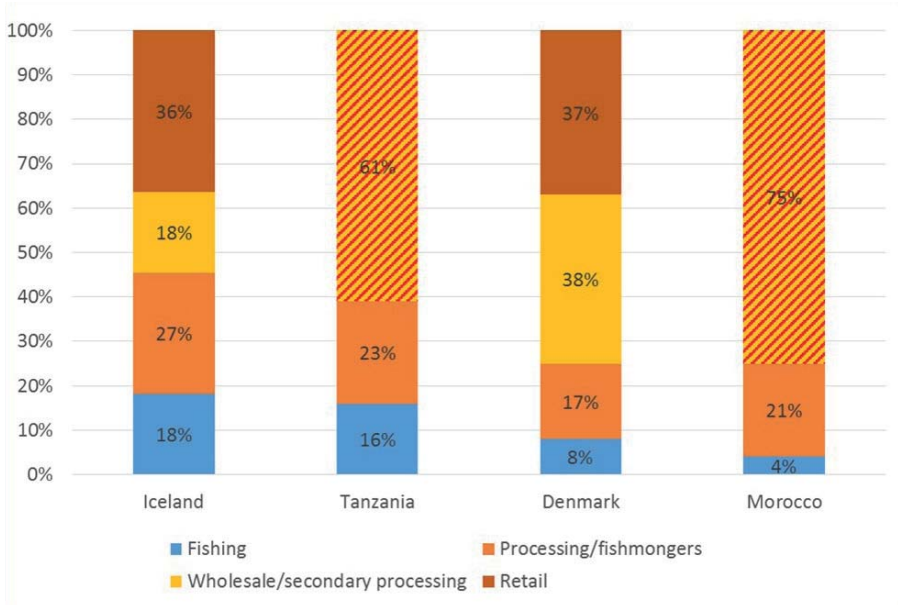
– Case three is a typical situation where small suppliers are transactional-dependent on much larger buyers. The supplier is controlled by one or several lead firms who determine product specifications and trade rules. Buyer-driven chains, in fact, refer to those industries in which large retailers, marketers, and branded manufacturers play the pivotal role in setting up decentralized production networks. However, we can have cases of producer-driven chains, where key producers in the chain, generally commanding vital technologies, play the role of coordinating the various links. In both situations, lead firms are able to drive the chain in different ways and to a different degree. For example, they can be driven through a hands-on approach (vertical integration, long-term contracts, explicit control of suppliers, regular engagement with suppliers or buyers), a hands-off approach (use of specifications that can be transmitted in codified, objective and measurable or auditable ways; ability to set standards that are then followed along the chain; ability to transmit information that cannot is easily codified in other ways), or a combination of the two (Ponte, 2008; Ponte and Gibbon, 2005).
– In the last case (on the right), we have a situation where the value chain has a dominant player (a vertically integrated enterprise) that sets or controls various functions along the chain (Humphrey and Schmitz, 2002).

FIGURE 4.1
Examples of value chain organizations (Naji, 2015)



Essentially, the largest returns accrue to those parties (i.e. lead firms) who are able to protect themselves from competition. This ability to insulate activities can be encapsulated by the concept of rent, which arises from the possession of scarce attributes and involves barriers to entry (Kaplinsky and Morris, 2001). In Figure 4.2, it is shown how value is distributed through four seafood value chains (Gudmundsson *et al.*, 2006). It should not be a surprise that fishers always get the smallest share.

FIGURE 4.2
Comparison of value distribution in four value chain case studies (Gudmundsson *et al.*, 2006)



A value chain perspective of the small-scale fisheries sector can reveal response strategies that enhance the sustainability and competitiveness of the entire value chain and the economic agents that comprise it. The issues have implications for both the public and private sector.

Several strategies can be considered by a value chain participant (e.g. the fisher) in order to improve their position inside the chain. Humphrey and Schmitz (2002) have considered the following three typologies of upgrading:

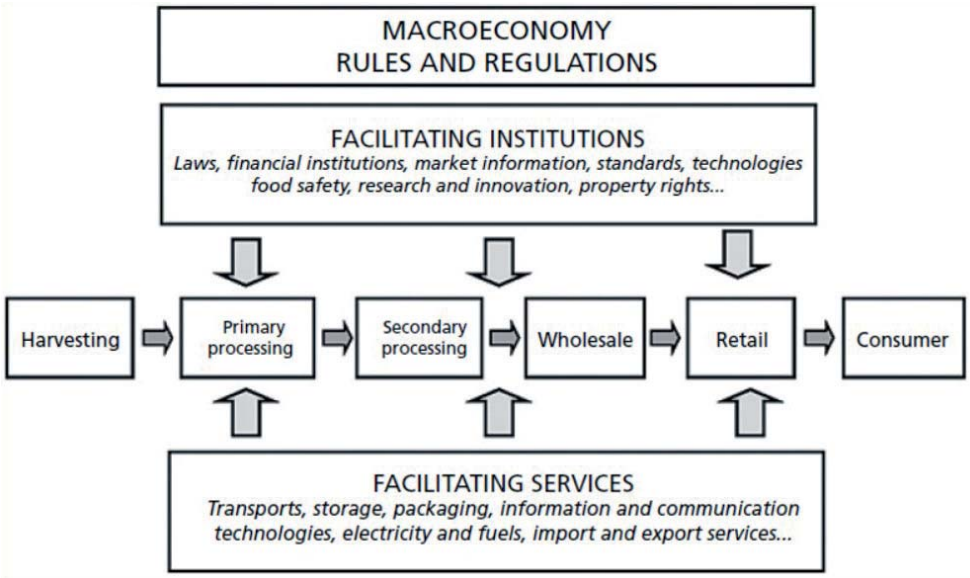
- Process upgrading: achieving a more efficient transformation of inputs into outputs through the reorganization of productive activities.
- Product upgrading: introducing new products or improving old products faster than competitors. This implies changing new product development processes both within individual links in the value chain and in the relationship between different chain links.
- Functional upgrading: increasing value added by changing the mix of activities conducted within the firm or moving the activities location to different links in the value chain.

Functional upgrading continues to be regarded by global value chain analysts as the optimal form that developing country firms can achieve, although this entails several practical difficulties (Naji, 2015). Sometimes, functional downgrading, combined with economies of scale and process upgrading, can also be successfully employed to maximize returns or to remain in an increasingly demanding value chain (Ponte, 2008), but this seems to be a rather difficult strategy in the case of SSF, where production potential is bound by biological parameters. On the other hand, cooperation and horizontal integration can be seen as an alternative approach to achieve economies of scale.

As we have said, value chain analysis mainly focuses on the network of retailers, distributors, processors and suppliers that participate in the production, processing, delivery and sale of a product. Value is created by the activities and strategies of these participants, through isolated or coordinated (horizontally/vertically) initiatives. On the other hand, there are good reasons to extend the point of observation beyond the value/supply chain perspective. In fact, many other public and private actors can affect, directly or indirectly, positively or negatively, the competiveness of the supply chain

(Figure 4.3). For this reason, in the following chapter, we are going to illustrate some methodological frameworks that support a more integrated vision of the value chain (in particular fisheries value chains) inside a territorial system, including its ecological, economic, social and governance features.

FIGURE 4.3
Value chain and facilitating services and institutions (adapted from United Nations Industrial Development Organization, [2009])



Finally, the concept of the value chain encompasses the issues of organization and coordination, the strategies and the power relationship of the different economic agents in the chain.

The value chain framework can also be used to understand social ties and traditional norms, which can be used to draw conclusions on the participation of the poor and the potential impact of value chain development on poverty reduction and food security.

Therefore, the tool of value chain analysis provides information which allows insight into the structure and efficiency of the market and policy framework in a given period, as well as:

1. It systematically maps the economic agents participating in the production, distribution, marketing and sales of a particular product: cost structures, size and employment characteristics, flow of goods, destination and volumes
2. It can play a key role in identifying the distribution of benefits of economic agents in the chain, identifying in particular the vulnerability of small and poor producers.
3. It can be used to examine the role of upgrading within the chain. Upgrading can involve improvements in quality and product design that enable producers to gain enhanced value or diversify the product line services. Governance issues play a key role in defining how such upgrading occurs.
4. It can highlight the role of governance in the value chain. Governance in a value chain refers to the structure of relationships and coordination mechanisms that exist between economic agents in the value chain. Governance is important for policy perspectives, identifying the institutional arrangements that may need to be targeted, improving capabilities in the value chain, remedying distributional distortion and increasing value added in the sector (Jacinto *et al.*, 2011).

3. BEYOND THE VALUE CHAIN

Value chain analysis alone is not enough to highlight the complexity of the fishery sector and the drivers that could lead to enhanced competition and sustainability of small-scale fishery value chains.

In this chapter, we will introduce new frameworks and approaches, which broaden the discussion on value chains, stressing the importance of other elements for the development of local communities. Industry clusters, in particular, focus on the strong relationship between value chains and all the other sectors and institutions of a geographical area.

Ecosystems service approaches stress the interactions between economic activities through the mediation of the environment. Blue Growth and marine spatial planning are concepts highlighting the importance of coordination for the development of coastal areas. Multi-functionality stresses the non-market benefits generated by fisheries to the advantage of other (productive or non-productive) sectors. Finally, empowerment approaches teach us that local development cannot be successful without an endogenous growth of self-sufficiency.

3.1 Industry clusters

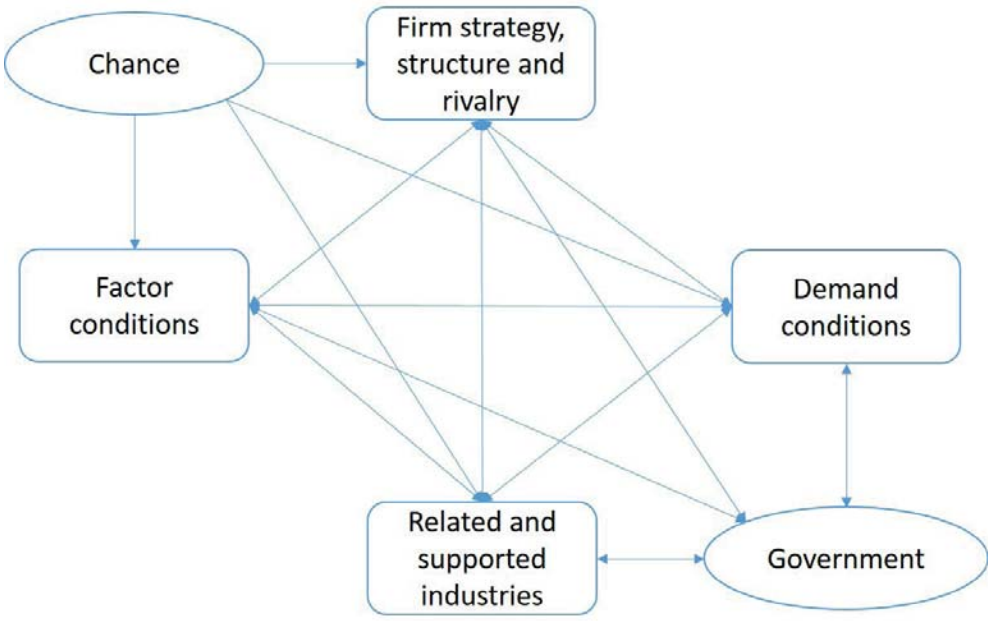
In the face of the challenges of modern economy (i.e. globalization, liberalization and extensive organizational, institutional and technological change), one organizational strategy that appears to warrant optimism for small and medium sized enterprises is clustering (Neven and Droge, 2001). The term industry cluster was introduced and popularized by the economist Michael Porter (1990), although the underlying concept, which economists have referred to as agglomeration economies, dates back to 1890 and the work of Alfred Marshall.

An industry cluster is a geographical location where enough resources and competencies are amassed in order to reach a critical threshold, giving it a key position in a given economic branch of activity. Clusters have the potential to affect competition by increasing the productivity of the companies in the cluster, by driving innovation in the field, and by stimulating new businesses in the field. Porter argues that economic activities are embedded in social activities and are enhanced by inter-personal networks. Depending on the structure and composition of the cluster, we can classify it as geographical or sectorial (e.g. marine/maritime clusters) and horizontal or vertical (i.e. a supply chain cluster).

The question now becomes "why do these determinants arise in certain specific environment?" (Neven and Droge, 2001). This is not a random process. Local factors are determinant and Porter classifies them according to the so called "diamond model" (Figure 4.4), which is composed of factor conditions (human resources, physical resources, knowledge resources, capital resources and infrastructures), demand conditions, firm strategy, structure and rivalry. Furthermore, "government" and "chance" are second-level factors that can influence all other determinants, enhancing local development. Depending on the reasons of comparative advantage that lead a cluster to have success over others, we can recognize: historic-know-how clusters, factor endowment clusters or low-cost factor clusters.

In this framework, SSF and their value chains can represent important elements of marine/coastal clusters. Synergies between private and institutional actors are necessary in order to foster this development in a win-win approach, generating benefits for all actors of the supply chain and of the related and supporting industries. Fisheries value chains may constitute the backbone of the coastal economy in isolated areas or may be part of more integrated development strategies (including tourism, for example), environmental and structural characteristics permitting.

FIGURE 4.4
Porter's Diamond Model



3.2. Ecosystem services

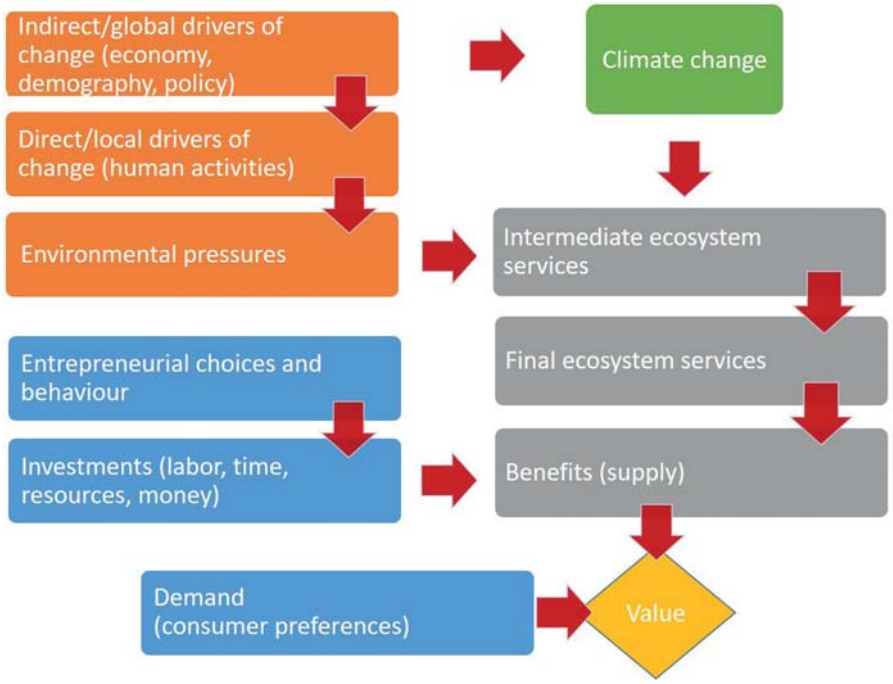
Ecosystem services are components of nature enjoyed, consumed or used to yield well-being (Boyd and Banzhaf, 2007). The ecosystem service approach may play an important role in demonstrating the connection between costal/maritime human activities and the environment. Most coastal and maritime activities are, in fact, supported by a flow of ecosystem services.

On the other hand, climate change, feedbacks from coastal and maritime activities, and exogenous outputs from other human activities can affect the stock of natural capital and the flow of ecosystem services (including their value), with consequences on related economic activities. This, in the long-run, can lead to different behaviours of stakeholders (e.g. fishers), including economic diversification (Mulazzani *et al*., 2015).

Under these assumptions it is possible to build a framework like that shown in Figure 4.5 (Mulazzani *et al*., 2015; International Centre for Advanced Mediterranean Agronomic Studies – Mediterranean Agronomic Institute of Bari [CIHEAM-MAIB], 2015). The United Nations Environment Programme (UNEP) (2006) identified the direct and indirect drivers of change of marine and coastal ecosystems. Indirect drivers mainly refer to large scale (national/regional/global) trends at socio-political, demographic, economic, scientific and technological levels. The direct drivers are, on the contrary, the (local) human activities causing specific modifications on the structure or flow of ecosystem services in the area under analysis. Benefits (e.g. catches) are the result of a human activity (e.g. fisheries) where both ecosystem services (e.g. fish stocks) and other traditional goods and services (such as labour, time, technology, resources or money) are used as inputs. Benefits are still physical flows, to which an economic value can be attributed. The social value of benefits depends both on the level of supply and on the level of demand (social value includes both consumer and producer surplus). On the other hand, entrepreneurial choices are clearly directed to the maximization of their (private) utility.

Maximization of (social) benefits linked to ecosystem services represents the natural strategy for the development of coastal areas. Communities must recognize this potential and build sustainable strategies. It is important to remember that private benefits represent only a part of social benefits. Clearly, without careful planning,

FIGURE 4.5
Framework for the interaction between ecosystem services and human activities (Mulazzani *et al.*, 2015)



the nature of common goods of many ecosystem services may cause a proliferation of private initiatives with counterproductive effects. In fact, negative externalities are often the result of negative trade-offs between benefits generated by marketed goods (and services) and benefits generated by non-marketed goods (and services).

Under these assumptions, SSF are important and (in some circumstances) fragile links of the ecosystem service chain. They are important because they (normally) use sustainable techniques. On the other hand, they can be affected by the consequences of external drivers of changes, such as pollution or industrial fisheries, which damage the state of the environmental resources.

3.3. Blue Growth and maritime spatial planning

Blue Growth is the (European) long-term strategy to support sustainable growth in the marine and maritime sectors as a whole. Coasts and seas are drivers of the economy and have great potential for innovation and growth. Creating synergies between economic activities and addressing tensions clearly helps in realizing the Blue Growth potential.

The market failure resides in the fact that these externalities are not fully exploited without policy intervention. Synergy is a much-used term. Here we refer to synergy in situations where several maritime economic activities combined are likely to produce more growth and jobs than the sum of their parts. It implies a form of orchestrated or spontaneous behaviour between key actors rather than fragmented behaviour. Synergies are expected to benefit maritime economic activities, especially those in the development stage and in case of a lack of critical mass (which is a necessity for industrial clusters).

These benefits can occur in the form of additional income sources, sharing of costs, sharing of services and infrastructure, etc. (Ecorys *et al.*, 2012).

Synergies can be triggered through various mechanisms. Some examples of relevance for the development of SSF include:

- Shared suppliers. This is the case of activities that use similar inputs, like the construction/reparation of boats for both fishing and touristic purposes.
- Enabling activities. This is linked to economic activities which provide conditions, in particular technology or credit, for the development of other economic activities.
- Common use of infrastructures. Ports or interventions of coastal protections can benefit several maritime activities. Markets also enter in this group.
- Shared input factors. This is especially the case of notably specialized workers such as sailors or maritime engineers, often locally trained.

With a wide range of activities being developed, there are likely to emerge a range of tensions, which will be mostly of a spatial nature. Hence, a strong link exists with maritime spatial planning to address these tensions. Tensions may occur between economic activities (activities that do not combine well), but can also relate to the activity and the marine environment (Ecorys *et al*., 2012). SSF, as already seen in the ecosystem service framework, can be easily affected by these external effects. For instance, aquaculture could have a negative impact on water quality in the surrounding environment. Litter from ships can cause damage to food, nutrition, health and ecosystem services. Coastal tourism and related infrastructure development can lead to pollution and adverse impacts on natural and living environment. Leakage or spilling of oil can be by accident or on purpose. Monitoring data indicate that spills are found mainly along the shipping routes (Ecorys *et al*., 2012).

3.4. Multifunctionality

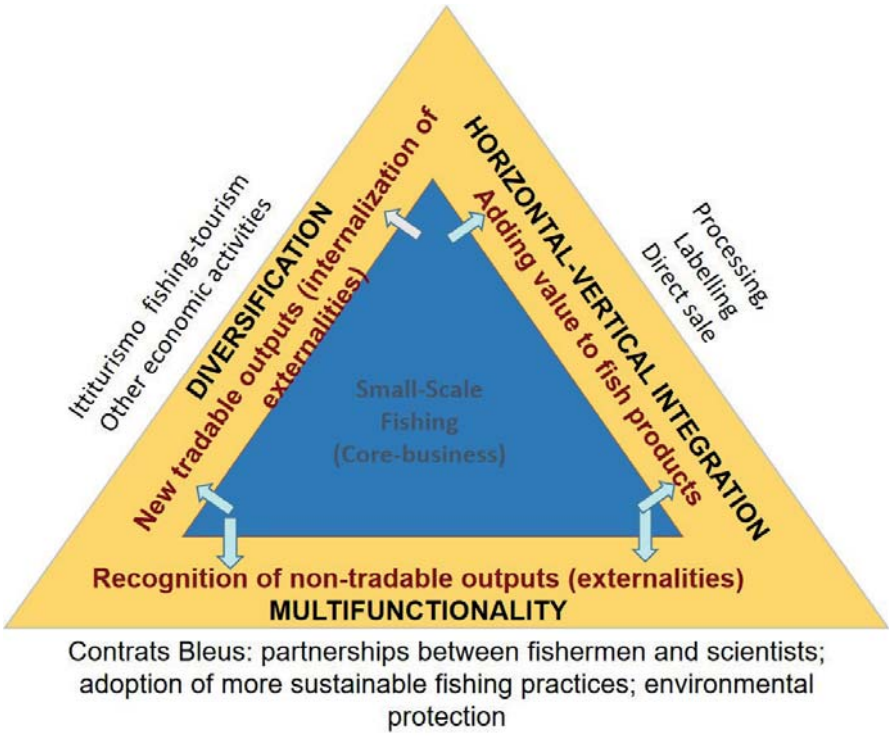
The First Regional Symposium on SSF in the Mediterranean and the Black Sea (Malta, 2013) stressed that multi-functionality of fishing activity should be recognized. Multi-functionality is a new concept in fisheries. Actually, it is related to the existence of non-trade benefits of fisheries (especially SSF), that is, benefits other than commerce and food production which have the characteristics of public goods. The correct evaluation of these environmental, territorial and social functions is essential to assess the total relevance of SSF (Malorgio *et al*., 2015).

In the case this concept were considered valid for the fishing sector as it is (in many countries and conditions) for agriculture, a policy issue would arise in governments to ensure that the non-tradable outputs correspond in quantity, composition and quality to those demanded by society. Thus, the question is: are there non-tradable benefits directly linked to SSF? A preliminary list of these functions could include: employment (strictly linked to other social issues such as migration and security), food security, environmental functions (selectivity, sustainability), social and territorial functions (maintenance of traditions, attraction for tourists) (Malorgio *et al*., 2015).

Diversification, that is the decision of fishers to change something in their economic activity as far as undertaking new work outside the fisheries sector, can be seen as a strategy for the internalization of some externalities (Figure 4.6). Actually, diversification in the context of SSF can be understood in many different ways. From a more restricted to a broader level we can understand diversification as (Farnet, 2011a):

- diversification of primary production activities;
- diversification of activities within the fish value chain (often into those that add value to fish products: direct sales, marketing, etc.);
- multi-activity, whereby fishers and their families continue to obtain some income from fishing but also carry out complementary activities, such as tourism or catering; and
- broader diversification of the fisheries area into sectors unrelated to fishing, such as social services, renewable energies or other emerging sectors.

FIGURE 4.6
New roles and strategies for fishers (Malorgio *et al.*, 2015)



3.5. Community empowerment

Community empowerment entails encouraging and developing the skills for self-sufficiency, with a focus on eliminating the future need for external aid for the individuals of a group. While some specific objectives regarding the quality of life (e.g. the physical and institutional structure of a new fish market) can be obtained through external interventions (top-down approaches), the deep purpose community empowerment, in contrast, is to provide the education, information and know-how needed to understand that an improvement is needed (e.g. the market) and the capacity to realize it. Intermediate forms of external aid and community empowerment are possible; in other cases, infrastructures and services can be realized exclusively by the public authorities (e.g. schools, hospitals) but empowerment can be important in order to encourage people to claim their rights. One typical empowerment strategy consists of assisting marginalized people to create their own organization, using the rationale that only the marginalized people, themselves, are able to define what their own people need most.

4. THE FOUR PILLARS FOR ENHANCING SSF VALUE CHAINS

Following the theoretical approaches before mentioned, five Mediterranean case studies have been selected and analysed, for drawing a picture related to the value chain of SSF. These case studies offer good examples of the sector and at the same time can be used for suggesting guidelines oriented to consolidate the income and the quality of life of fishers.

The analysis has permitted the identification of four broad determinants that can be considered at the base of local competitiveness and value chains, but that at the same time can be seen as bottlenecks of development. These four determinants are:

- Sustainability dimension
- Marketing strategies
- Inter-sectorial integration
- Infrastructure and credit services

These four broad determinants (or sets of determinants) can by no means be considered as isolated or independent strategies for development; on the contrary, as we will see, there is strong complementarity between them.

4.1. Sustainability dimension

Trivially, the income of fishers can increase by three ways: decreasing costs, increasing catches or increasing sale prices. For most of human activities, production can be increased and costs can be decreased thanks to innovation. Innovation is clearly a necessity for SSF. On the one hand, the low investment of small enterprises is probably a characteristic allowing for higher adaptability and resilience of fishing communities because economic risks are reduced and there are fewer restraints in work mobility. On the other hand, however, production cannot be arbitrarily increased without compromising sustainability. In other words, innovation may cause the overexploitation of the resources or (in order to avoid overexploitation) may entail a reduction in the number of fishers.

It is clear that sustainability cannot be neglected for any development strategy and this can be obtained only through the active participation of fisher associations and coastal communities in management decisions. Thus, competitiveness requires sustainability, and sustainability, in order to be accepted, requires stakeholder participation, cooperation and empowerment. For small-scale fishers to manage resources sustainably and at the same time enhance their household income, some kind of (individual or communal) property right is probably a necessary condition in order to internalize social and environmental costs.

Sustainability is also linked to marketing. In fact, the certification labelling of sustainable fisheries can facilitate greater appreciation of the products by consumers, allowing higher sale prices. Furthermore, sustainability can be achieved through the implementation of MPAs and through collaboration between fisher associations and public institutions. MPAs can represent an attraction for tourists, which in turn increases the demand and the price for (labelled) sustainable, local and traditional fish products.

The Bibaine Lagoon case study (Tunisia), for example, is significant in this regard. In this situation, in fact, the fisheries concession is given to a sole private stakeholder. All the fishers operating in the area have to sell their catches to the concession holder. This resource right framework should guarantee, at a theoretical level, the rational and sustainable exploitation of the resources. On the other hand, the relationship between the concession holder and all the fishers should be better understood. To this end, the national General Direction for Fisheries and Aquaculture has the objective of preparing a management plan of the area that is to be shared by all stakeholders. In the framework of the project NEMO (funded by the Italian Ministry of Foreign Affairs), the development of two labels for the certification of local production is also included. In fact, lagoon fisheries products, caught with the use of static and sustainable fishing gears, share specific characteristics that can be appreciated by consumers.

Another interesting situation is found in Porto Cesareo (Italy). The area is characterized by biophysical attractions (beaches, islands, and wetlands), an important MPA and one naturalistic museum. The local fisher cooperative has performed several projects in collaboration with researchers and institutions in order to promote sustainable practices. The MPA has specific regulations and is divided into areas where no fisheries activities are allowed and areas where only SSF, including fishing-tourism (involving two SSF vessels), are allowed. The local cooperative is involved with other six cooperatives of the same region for the preparation of a common management plan for the area.

Pollution (from industrial areas and sewage outlets), on the other hand, seems to be a severe problem in the case of Tyre (Lebanon). It is possible that this situation is typical of other urban or industrial areas.

4.2. Marketing strategies

Investment and innovation are essential for meeting market requirements, including sanitary and safety standards, in order to achieve higher prices. Generally, the size of the small-scale vessels may inhibit on-board handling and storage facilities, which may reduce the quality of the product or may simply result in a negative perception of products from SSF.

Several strategies can be considered in order to increase the value of products. In value chain analysis, upgrading is used to identify the possibilities for producers to move up the value chain, either by shifting to more rewarding functional positions, or by making products that have more value-added invested in them and that can provide better returns to producers. One strategy, as already discussed, is labelling, which can differentiate local production (Bibaine Lagoon case study). Processing is another strategy. Furthermore, seasonal overproduction can be better dealt with if storage or processing facilities are available. Fishers can also try to shorten the number of supply chain stages.

Product differentiation and quality certification strategies may provide an effective solution to hinder the competitive pressure on firms and improve their profitability, by boosting the consumption of domestically produced product and increasing consumer satisfaction.

Many examples of these strategies can be found in the agro-food sector, undertaken by both private actors and public institutions (e.g. collective brands, protected designations of origin, protected geographical indications, etc.).

Quality signs, and among these quality labels, provide a particularly interesting differentiation tool, as they emphasize the connection of a product to a specific territory or to specified quality characteristics. Moreover, quality marks are designed to ease the transmission of market information, so as to facilitate the recognition of quality attributes by consumers, and therefore, to increase their appreciation of the product.

Product certification schemes provide a useful tool to ensure a certain quality standard and to effectively communicate to consumers that fisheries products from specific value chains have adhered to production and processing criteria that assure food safety, environmental sustainability and social responsibility.

Product quality is attained in compliance with a predefined production method, either thanks to a common local heritage in the area considered or thanks to natural or cultural conditions. Both elements – production method and product origin – contribute to the creation of a collective reputation and strengthen consumer appreciation and confidence. In this way fishers are able to create a new market segment where consumers are willing to pay a premium price for the branded product.

A major threat for the success of a collective brand is due to the opportunistic conduct of single actors, who attempt to take advantage of information asymmetries on the demand side. In fact, in the case of combined production by many agents, without adequate incentives and monitoring systems, free riding behaviours will arise (Holmström, 1982).

Given the fragmentation of the upstream sector and the imbalance of bargaining power between large marketing firms and fisheries operators, the role of cooperatives and fisher associations assumes a greater importance. Not only do they provide a way of concentrating supply, but also they serve as an institution that can support individual producers in the process of adaptation, in the promotion of fishery products and in the provision of mechanisms to coordinate the supply chain, quality control systems and labelling. Horizontal linkages among producers also reduce the transaction costs of working with many small suppliers. Linkages help small firms to generate economies, for example, by buying in bulk or by filling large orders, which can contribute to competitiveness and increase their bargaining power.

On the other hand, in a broader sense, value chain development should be a multiple and participatory process that leads to coordinated interventions of many stakeholders

from different production stages and sectors, to creating a productive and innovative dialogue and to drawing attention to "collective competitiveness" (CYE Consult, 2009). Compared with an integration strategy, vertical cooperation does not require any capital investments and permits easy exit options. Fishers, however, can be trapped in a dependency relationship if they are associated to a strong partner.

The cooperative of small-scale fishers of Porto Cesareo (Italy) has implemented an interesting project of direct sale, where vessels communicate their catches to the consumers through SMS. Prices through this short supply chain are 30–50 percent higher compared with those that fishers receive from wholesalers. At the same time, consumers pay 15–25 percent less than what they would pay to fishmongers.

4.3. Intersectorial integration

We have already highlighted the importance of horizontal cooperation for both the management of the resources and the marketing of the products (Bibaine Lagoon case study). Such cooperation also entails good relationships with institutions and research centres. As previously said, economic literature stresses that the competitiveness of small enterprises is enhanced by strong clustering, which also entails further vertical cooperation inside the supply chain (cooperation between fishers, wholesalers, retailers, restaurants and processors) and includes strong relationships with all public and private actors of the local environment.

Small-scale fisheries, for example, have important and often neglected connections with pre-harvest activities, including building and repairing of boats and gear, port services, and ice production. The poor development of such sectors is clearly a problem for the modernizations of fisheries. We have also seen that tourism services are directly and indirectly linked to small-scale fisheries; traditional fisheries are often an attraction for visitors, while at the same time tourism infrastructure increase opportunities for the sale of local products. Thus, small-scale fisheries may represent a key node for the creation of new economic activities and added value in coastal areas and the same fishers can take advantage of a larger share of this value chain through diversification (e.g. fishing-tourism), transformation and direct sale.

Coastal community development requires a constant coordination of all private and public actors involved in the area enhancing all possible synergies between economic activities. An empowering strategy is necessary to develop the propositional potential of local stakeholders in economic and social themes.

The Marsa Matrouh case study (Egypt) provides an interesting perspective from this point of view. Matrouh is, in fact, a major Egyptian tourist resort for both Europeans and locals. The bay has soft sands and calm transparent waters, and a major tourist attraction, the ruins of a temple of Ramses II, can also be found there. In other words, there are many possibilities for SSF to benefit from tourism development. However, despite local SSF selling primarily on the local market (managed by the fisher cooperative) directly to consumers – whereas the landings from local industrial vessels are mainly sold to wholesalers in Alexandria through private negotiations (with a part of the production then exported) – restaurants and hotels in Matrouh prefer to buy fishery products from the wholesalers of Alexandria, because they can offer the needed quality and the quantity. Thus, it seems that relationships between SSF and tourism activities are very poor and local fishers are not able to benefit from this opportunity.

Tyre (Lebanon) and Algiers (Algeria) are large cities with several touristic activities. Yet also in these cases, integration between the different sectors seems to be very poor.

In Bibaine Lagoon (Tunisia), the concession owner is focusing on the realization of ecotourism activities, the success of which will have to be evaluated, considering the remote location of the site and the vicinity with the Libyan border.

4.4. Infrastructure and credit services

The active involvement of local stakeholders in participative development is essential but can be futile if public institutions are not able to provide basic infrastructures and services that go beyond the possibilities of private citizens and civil society. For example, the absence of appropriate infrastructure in the fishing ports may have the same results of low private investments, determining a first weak point in the value chain.

Specific inland infrastructure facilitating working conditions of fishers and value creation include the state of moorings, markets, and warehousing services. States should also support the development of other services that are appropriate for small-scale fishing communities such as savings, credit and insurance schemes, with special emphasis on ensuring women's access to such services.

Economic issues are just one part of a fisher's well-being. As attested by FAO, where poverty exists in small-scale fishing communities, it is of a multidimensional nature and is not only caused by low incomes but also due to factors that impede full enjoyment of human rights including civil, political, economic, social and cultural rights. The scale and the priorities of State intervention may clearly change considerably depending on location (i.e. northern vs. southern coast of Mediterranean, urban vs. marginalized areas), but public institutions should ensure that small-scale fishing communities have access to essential public services, starting from decent housing, sanitation, potable water and electricity.

Furthermore, it should be guaranteed that small-scale fishers and fish workers are covered by unemployment insurance and social security schemes with benefits equal to other professional groups in the country. In this case, the external intervention of the State is essential, but empowered fisher organizations can also lobby for their rights.

Lack of finance capital is one of the major constraints faced by small-scale fishers. They are generally considered as a credit risk because of the unpredictability of fish catches due to resource variability, the seasonality of fishing as source of income, the perishability of fishery products and the price volatility resulting from the combination of these factors.

Because of the uncertainties of fishing, small-scale fishers often find it difficult to get financing for day-to-day fishing operations. Their needs are not met by either micro-finance schemes that cater mainly to micro-enterprises or by banks that are geared towards providing services to medium or large-scale enterprises (Jacinto *et al.*, 2011).

Access to formal finance is a crucial concern. This includes both access to formal credit for capital expenses and financing for fishing operations.

From the analysis of the case studies, it emerged that there are situations where credit is a limiting factor of development. This is the case of Tyre SSF (Lebanon). Here, at the beginning of each year, fishers decide whether to request and accept a loan from one of the local wholesalers. In case the fishers take the loan, they have to reimburse it with a provision of daily catches. Unfortunately, the price calculated for the repayment is lower than the normal price by an average of 20 percent. This also determines a situation of non-competition on the supply side that contributes to lowering the market prices. An alternative available source of credit is a micro-credit program executed by the Lebanese Association for the Development of Rural Capacities.

The Algiers port case study (Algeria) shows a successful situation where infrastructure and a number of modern services are provided to fishers, including ice and fuel provision, gear workshops, medical assistance, insurance offices, etc. From a touristic point of view, the port provides several attractions, including cultural animations, restaurants, water sports and one museum. The port is also the main site dedicated to fish sale. Public institutions, however, see the establishment of a more formally structured wholesale (or possibly auction) market as a necessary development in order to have better control over sales and trade circuits (traceability), to stabilize prices and to reduce the gap between ex-vessel and retail prices.

In the case of Porto Cesareo (Italy), the wholesale market is also missing. The local cooperative is aware of the importance of this structure and has repeatedly requested, so far without success, that local institution provide a solution to this problem.

5. AN EXAMPLE OF INTEGRATED ANALYSIS IN SALENTO (ITALY)

In the framework of the European territorial cooperation program Greece–Italy 2007–2013, the CIHEAM-MAIB, has realized a study called "Improving governance, management and sustainability of rural and coastal protected areas and contributing to the implementation of the Natura 2000 provisions in Italy and Greece" (CIHEAM-MAIB, 2015; Mulazzani *et al*., 2015). In this study, an integrated analysis of coastal and marine activities has been performed, including the relationships between economic activities and environment.

In a more specific way, in the Salento region, the study focused on the environmental changes caused by human activities and how these environmental changes, in turn, affected the outcome and the behaviour of other stakeholders, in particular fishers. Given the specific characteristics of this area, the study explicitly focused on the behaviour of artisanal fishers and on the possibilities of economic diversification provided by tourism development. With this approach, the analysis links the discussion about ecosystem services (their use, benefits and value), with the discussion about strategies for the improvement of the well-being of fisher communities, which normally include solutions like diversification and direct sales. Relationships between variables were evaluated thorough questionnaires in order to enhance the participation of local stakeholders.

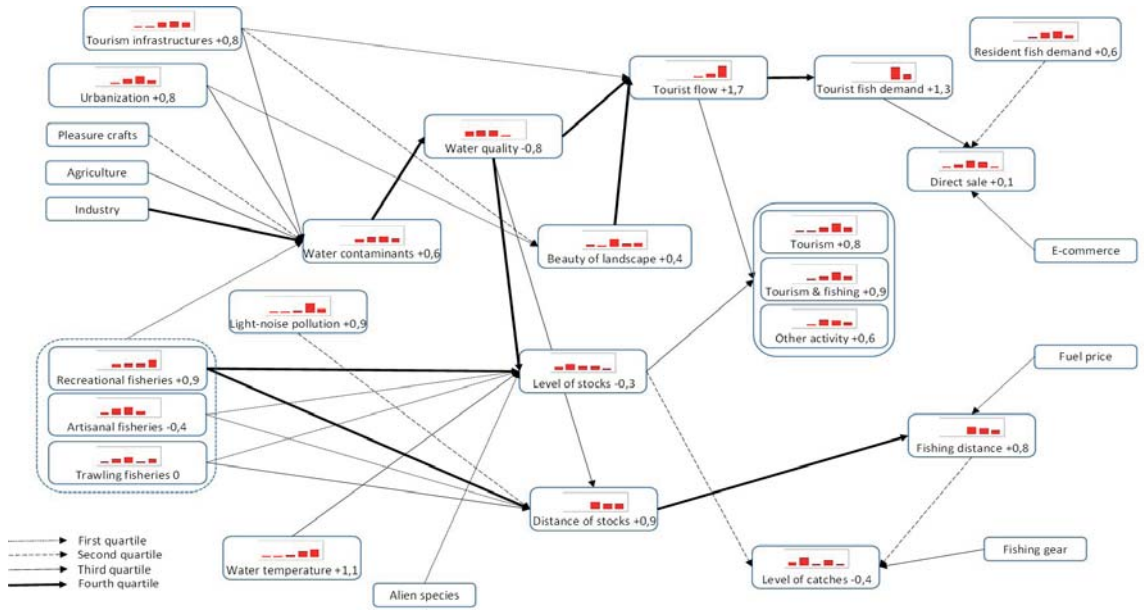
Based on the information collected from stakeholders, a cause-effect diagram has been built, including drivers of changes, human activities, ecosystem services and fisher behaviour (Figure 4.7). The diagram shows the most significant relationships and can be used to simulate (using Bayesian techniques) the theoretical consequences of any change in the current situation. In this specific context, the most relevant drivers of change seem to be water pollution and the activity of recreational fisheries. Water pollution, in particular, can affect both SSF and tourism flows, conditioning the future development of the area.

The results of this preliminary work represent only a first step for a deep integrated knowledge of the ecological-socio-economic system of the Salento coastal areas. New analyses can deal with more scientific data collection (of both biological and socio-economic data) about relationships already mentioned and/or with an extension of the cause-effect network to new kinds of phenomena, relations and problems. Problems and relations in this first assessment are mainly related to the condition of fishers and to activities (especially tourism activities) where fishers can find diversification opportunities of work. Thus, the framework can be expanded including the priorities of other social groups living in coastal areas, in particular farmers and aquaculture operators, but also tourism operators strongly linked to the quality of the environment and the landscape.

The qualitative framework, such as it is in its current state, can already be considered a useful tool for planning at several geographical and institutional levels. Public authorities can consult it in order to evaluate possible consequences of new policies. The framework, in particular, can be seen as an integrative instrument to connect strategies related to Marine Spatial Planning with strategies related to Integrated Coastal Management. Blue Growth issues are also perfectly framed by this tool.

Economic and civil society groups can consider the framework in order to address their priorities and actions. Fisheries Local Action Groups (FLAGs), and other Local Action Groups, in particular, can use this tool for planning their activities and for the selection of projects. This tool can also support Community-Led Local Development (CLLD) in proposing and testing new solutions.

FIGURE 4.7
Example of interaction between ecosystem services, human activities and fishers behaviour (CIHEAM-MAIB, 2015)



6. CONCLUSIONS

Small-scale fisheries value chains are enhanced by a favourable environment where fishers are strongly connected with other local actors, including public and private institutions and even consumers. This permits the creation of a competitive economic cluster, which can foster the development of the coastal community. The economic objectives of industrial clusters and Blue Growth approaches cannot be pursued without consideration of sustainability (ecosystem approach) and empowerment.

Clustering should be encouraged eliminating all possible bottlenecks. In the case of the SSF in the Mediterranean and Black Sea, four relevant areas of intervention have been identified: sustainability aspects (including governance and MPAs), marketing strategies (quality aspects and chain organization), inter-sectorial integration, and provision of infrastructure and services (in particular wholesale markets and credit).

Thus, from this and previous studies on SSF in the Mediterranean and Black Sea, some key lessons that can be learned are as follows (Naji, 2015; Sauzade and Rousset, 2013):

- Reducing poverty, in the long run, can only be achieved by increasing the value of the catches, rather than their quantity.
- Efforts cannot be applied to the targeted stocks alone, but rather an ecosystem approach is called for, which also takes into account key and related ecosystems.
- Intervention should occur at all stages: when the resources are still in the water, when they are landed, and as they enter the transformation and marketing cycle.
- Small-scale fishers are almost always better off when they organize and form cooperatives. These cooperatives in turn must be supported by local, regional and national authorities, and be provided with significant capacity-building (empowerment).

The idea of value chain is associated with the concept of governance, which is of key importance for fisheries because fisheries value chains crucially depend on the utilization of natural and environmental resources.

Fostering an enabling policy environment for market development for small-scale fishers can be implemented by bringing together public and private stakeholders.

The policy environment would not only encompass the body of laws governing the fisher sector but also policies of support interventions such as taxation, market regulation piloting of specific products and strengthening of skills in organizational development, financial management and pre-harvest handling.

Issues related both to credit and banking system support must be better studied and analysed. Public institutions should provide basic infrastructures and services to foster value chains and prevent market failure. Infrastructure facilities and financial products can be developed in partnership with rural banks and public authorities for medium to long-term investment; formal chain financing schemes (production contracts, storage receipts) can be applied with the participation of fishers, traders and the public authority.

A critical aspect to be improved is communication to final consumers and information transmission along the supply chain, which can be attained by means of joint promotional campaigns in the media and special events with the participation of all stakeholders.

Small-scale fishers are often on the losing end of market asymmetries wherein traders and processors use market information that they exclusively possess as leverage in setting prices. Therefore, conducting market-oriented research and developing product innovation, as well as developing applicable fishery product standards and certification systems, can lead to greater added value and to increased market access for products from small-scale fisheries.

It is important to identify relevant cases of good practices and to evaluate if the determinants of success can be reproduced in different geographical situations. Evidence collected should be disseminated. Furthermore, such evidence should be used to improve human capital within fishing communities, by providing courses on many different aspects – from technical and marketing issues to administrative steps for the creation of a cooperative – or by preparing projects and management plans.

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APPENDIX 1. **Algeria - synthèse exécutive de l'étude de cas**

LA PETITE PÊCHE AU PORT D'ALGER

Depuis le début des années 2000, le Gouvernement algérien a engagé une politique de réhabilitions et de restructuration du secteur de la pêche (et de l'aquaculture) pour la diversification économique et pour répondre aux besoins alimentaires de base de la population.

La programmation quinquennale du Gouvernement 2015-2019 a élaboré le «Plan Aquapêche 2020». L'objectif global est de contribuer à renforcer la sécurité alimentaire durable et le développement des systèmes productifs locaux

Les objectifs spécifiques du plan Aquapêche 2020 se résument ainsi: améliorer la disponibilité des produits de la pêche et de l'aquaculture d'importance pour la consommation alimentaire; consolider et préserver les emplois et améliorer les dispositifs de protection sociale pour les professionnels; développer les moyens et les instruments de gestion durable et partager les ressources halieutiques.

Le port de pêche d'Alger est cogéré par l'Entreprise de Gestion des Ports et Abris de Pêche de la Wilaya d'Alger.

D'autres activités de pêche viennent s'ajouter à la pêche artisanale, telles que la pêche des sardiniers et des chalutiers. L'activité des sardiniers et chalutiers est plus importante au niveau du port.

La pêche artisanale dans le site du Port d'Alger est représentée par près de 101 embarcations dont la majorité sont d'une longueur de 4/5m, en polyester (plastique), avec motorisation hors-bord. La majorité de ces embarcations exercent leur activité sur les plages d'échouage limitrophes au port. Les principaux engins utilisés par les petits métiers sont: trémail, embostade, palangre et ligne à main.

Un projet de plan d'aménagement des zones de pêche est en cours d'élaboration au niveau national qui permettrait notamment de définir et de délimiter les différentes zones de pêche par activité. Actuellement, l'Administration de Pêche dans le cadre de la révision de la loi N°01-11 du 3 juillet 2001 relative à la pêche et à l'aquaculture, a intégré un ancrage sur le développement de la pêche artisanale par la mise en place d'un ancrage juridique pour la création et la gestion des sites d'échouages et la création et la détermination des zones de pêche.

La poissonnerie du port de pêche d'Alger reste le seul lieu de débarquement réglementé de produits de la mer enregistré dans la wilaya d'Alger. Elle a été mise en service en 1939, sa superficie est de 3 260 m^2 avec une capacité annuelle de 3 168 tonnes. Elle dispose de 11 carreaux, exploités par 13 mandataires privés. La poissonnerie a été réhabilitée, équipée en 2014.

Sur le plan économique, le port de pêche d'Alger est un pôle attractif de tous les commerces des produits de la pêche et les produits commercialisés proviennent des treize wilayas côtières.

L'approche et la démarche entreprise à ce jour par l'administration des pêches et de l'aquaculture s'inscrivent dans le cadre du développement participatif. L'objectif principal est la promotion de tels projets au niveau de sites propices afin de contribuer à la réorganisation de la pêche artisanale.

Les démarches de développement du Port de pêche d'Alger a connu l'implication des autorités locales et la population et ce dans le cadre de l'élaboration de la stratégie de pêche et d'aquaculture «Plan Aquapêche bleue 2020», un projet de charte d'adhésion volontaire pour un développement responsable et durable de la pêche et de l'aquaculture, concluant un partenariat entre l'administration publique et l'ensemble des acteurs professionnels activant dans les filières de la pêche et de l'aquaculture.

Cette charte inclut également les principes inscrits dans le Code de bonne conduite pour une pêche responsable de la FAO. C'est une première initiative concrète dans l'engagement vers l'application des directives volontaires visant à assurer la durabilité de la pêche artisanale dans le contexte de la sécurité alimentaire et de l'éradication de la pauvreté.

Les acheteurs viennent de différentes wilayas pour l'achat des produits halieutiques en gros. L'achat en gros des produits halieutiques se fait très tôt le matin à partir de 2 heures par les grossistes, les revendeurs au détail, les fournisseurs des restaurants des collectivités locales (casernes, base de Sonatrach, hôpitaux) et sont preneurs quel que soit le prix.

TABLEAU A1.1
Segment de pêche

Segment % distribution et marché	Petit Métier	Sardinier	Chalutier
Grossiste	60	98	98
Restaurant/ hôtels	20	/	/
Vente directe aux consommateurs	18	/	/
Consommation par pécheur /famille	2	2	2

Actuellement, le circuit de distribution des produits de la pêche échappe à tout contrôle, ce qui explique l'écart important entre le prix de gros et celui de détail, ainsi que l'anarchie qui règne pendant les opérations de vente. Un constat amer qui a des répercussions négatives sur le consommateur. Ce marché de poisson n'est soumis à aucune loi ni corrélation entre l'offre et la demande.

Afin d'éradiquer cette vente illicite en face de la poissonnerie et d'améliorer la disponibilité de produits sains aux ménages, il est impératif de mettre en place un marché de gros des produits halieutiques et aquacoles qui permettra de renforcer le circuit de commercialisation et d'assurer la traçabilité des produits.

Les opérateurs des marchés de gros sont ceux qui vendent des produits halieutiques et aquacoles sur les marchés. Ils sont très variés: les grossistes de tous produits de pêche et d'aquaculture, les courtiers de ces mêmes produits, les producteurs, les importateurs et exportateurs, les petits transformateurs (produits salés, fumés, etc.).

Les prestataires de services tels que les hôpitaux, les établissements scolaires, restaurants.

Au niveau de la poissonnerie d'Alger, les produits de la pêche sont entreposés dans des caisses en plastiques qui répondent aux normes internationales. En effet, ces caisses sont fabriquées à base de polypropylène et de polystyrène expansé, ce qui protège le produit tout au long de la chaîne de distribution. Ces caisses sont nettoyées, lavées, séchées et entreposées dans un local séparé de l'aire de vente après chaque utilisation.

Au port d'Alger, il existe trois fabriques de glace, ce qui facilite aux mandataires la tâche de garder leur produit dans un état frais.

La production halieutique débarquée au port de pêche d'Alger est constituée principalement de poisson bleu à 90 pour cent. La poissonnerie d'Alger est la plaque tournante des produits de la pêche nationale, par laquelle la plupart de la production et des importations transitent pour desservir le reste du pays. On constate une diversification des produits halieutiques en provenance des autres wilayas littorales, tels que le poisson blanc et les grandes espèces comme l'espadon. S'ajoute à cela, la production des petits métiers et plaisanciers qui débarquent d'autres variétés d'espèces (environs 47 espèces).

Plusieurs structures d'accompagnement ont été réalisées dans ce port permettant ainsi l'amélioration des conditions socioéconomiques des professionnels: centre de médecine, bureau CNAS (Caisse Nationale d'Assurances), station d'avitaillement en carburant et lubrifiants de 315 m², atelier de vente de matériel de pêche et de petites réparation (société Sarl REPNAV), fabrique de glace, foyer des pêcheurs, cases de pêcheurs, commercialisation, réalisation de quatre sanitaires publics dans

le port, revêtement des terre-pleins au port d'Alger, réalisation des amenées/ distribution d'alimentation en eau et en énergie électrique, réalisation des réseaux AEP/ assainissement/incendie, acquisition des moyens de récupération des huiles de vidange usées, moyens navals de récupération des déchets solides, camions pour récupération des déchets solides, et citernes tractables.

Sur le plan touristique, les travaux d'aménagement et d'embellissement effectués par la Wilaya d'Alger ont permis d'ouvrir le port de pêche à la population ,aux touristes et aux visiteurs, à travers: des animations culturelles grâce à l'aménagement d'une terrasse équipée; plusieurs restaurants donnés en concession à des chaînes de grands hôtels; sports nautiques; construction d'une station-musée de la place des martyrs.

Forts de la dynamique créée, il y a la nécessité en Algérie de prendre des mesures concrètes en vue d'assurer un avenir durable au secteur de la petite pêche en considérant le rôle social et économique en Algérie.

Il est crucial de consolider la filière de la petite pêche avec l'amélioration de l'approvisionnement du marché domestique avec des produits diversifiés, de meilleure qualité et plus accessibles pour le consommateur.

La mise en place de dispositifs d'appui et de soutien adaptés au développement des filières de la petite pêche est aussi importante, avec le renforcement de la gestion participative et l'intégration du secteur au développement des capacités de croissance de l'économie productive nationale.

Le renforcement des capacités d'encadrement et de gestion des institutions publiques au niveau central et le renforcement des capacités techniques et organisationnelles des opérateurs privés sont essentiels pour le développement rationnel et durable du secteur.

En ce qui concerne les marchés et les produits de la pêche, les opérateurs privés nécessitent un appui important comme la formation technique pour accompagner les investissements productifs et pour l'amélioration des connaissances sur la qualité et les normes sanitaires des produits.

Résoudre les problèmes suivants du secteur de la petite pêche Algérienne:

- Capacités d'encadrement et de gestion des institutions publics et renforcement des capacités techniques et organisationnelles;
- Clarification des rôles et responsabilités entre le secteur privé et public;
- Renforcement des capacités techniques et organisationnelles des opérateurs privés de la petite pêche;
- Renforcement des capacités techniques des opérateurs publics et privés en relation avec la qualité et les normes sanitaires des produits.

Le Gouvernement d'Algérie accorde une attention particulière à la pêche artisanale. Un projet a été initié avec le Programme des Nations Unies Pour le Développement (PNUD) et avec le concours de la FAO pour les aspects techniques (octobre 2013, décembre 2014). Ce projet a permis de disposer d'une stratégie nationale de développement de la pêche et de l'aquaculture en se penchant plus particulièrement sur le développent de la pêche artisanale et la consolidation du plan Aquapêche Algérie.

Un projet de texte réglementaire a été élaboré confiant la gestion des sites d'échouage aux professionnels eux même, à travers les chambres des pêches et de l'aquaculture des wilayas (départements). Actuellement, le port de pêche d'Alger est cogéré par l'entreprise de gestion des ports et abris de pêche et la wilaya d'Alger.

La wilaya Alger est peuplée et a une forte urbanisation; elle ne dispose actuellement d'aucune aire marine protégée. Cependant, un projet de classement de la zone marine lac Reghaia - île Bounetah en aire marine protégée est en cours d'élaboration.

C'est un projet inscrit dans le cadre de la stratégie nationale GIZC initiée par le Gouvernement algérien en collaboration avec le Plan d'Action pour la Méditerranée du Programme des Nations Unies pour l'environnement (PNUE-PAM). C'est un appui à la stratégie nationale en matière de protection et de valorisation du littoral basé sur une méthodologie commune aux pays méditerranéens.

Cette zone est située à l'extrême est de la wilaya d'Alger. C'est un site d'importance écologique très importante car il est caractérisé par une riche biodiversité et des paysages remarquables d'une importance économique et écologique.

TABLEAU A1.2

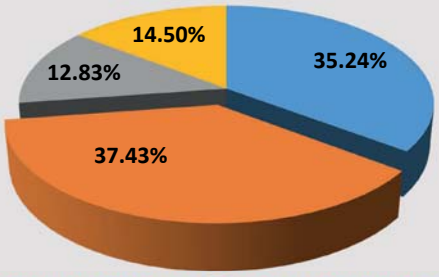
Segment de pêche – Valeur de la chaîne DZD (EUR 1 = DZD 116,8)

Segment	Petits métiers	Sardiniers	Chalutiers
Description	**Longueur entre 4.80 m et 9 m**	**Longueur entre 9 m et 16 m**	**Longueur entre 17 m et 22 m**
Filets	Trémail, embostade, palangre et ligne à main + FMD	Senne coulissante	Chalut de fond Chalut pélagique et semi-pélagique
Bateaux de pêche	101	57	18
Jauge brute	3,72	19,87	47,4
Moteurs	72,54	237,2	433
Jours de pêche par année	5 151	6 868	1 638
Pêcheurs plein temps	301	1 140	360
Pêcheurs mi-temps	0	0	0
Âge des pêcheurs (en moyenne)	40 ans	33 ans	36 ans
Travaux des femmes	/	/	/
Espèces principales	Rouget de roche, pageot acarné, pageot commun, rascasse, merlu, sépia, poulpe	Allache, sardine, saurel, anchois	Rouget de vase, pageot commun, merlu, mustelle, crevette, poulpe, sépia, calamar
Production totale par année	244 672 kg	3 420 513 kg	360 360 kg
Quantité % marché			
Grossiste	60	98	98
Restaurants/hôtels	20	/	/
Vente directe aux consommateurs	18	/	/
Consommation par pêcheur /famille	2	2	2

Catégorie du bateau (segment)	101 Petits métiers	57 Sardiniers	18 Chalutiers
Revenu total de la région	224 284 928	954 450 749	366 219 900
Coût variable total	80 673 750	185 133 563	153 022 500
Salaire total	55 550 000	206 625 000	65 250 000
Profit total	88 061 178	562 692 189	147 947 400

Catégorie du bateau (segment)	101 Petits métiers	57 Sardiniers	18 Chalutiers	Total	%
Valeur de la chaîne avec la commercialisation	336 427 392	1 240 785 975	549 329 850	2 126 588 217	100
Valeur de la commercialisation	112 142 464	286 335.225	183 109 950	581 587 639	27.33
Coût production pêcheurs	139 056 655	391 758 563	218 272 500	749 087 718	35.24
Profit total pêcheurs	85 228 273	562 692 186	147 947 400	795 867 859	37.43
Coût de commercialisation	44 140 000	135 330 000	93 109 950	272 579 950	12.83
Profit de la commercialisation	67 002 464	151 005 225	90 000 000	308 007 689	14.50

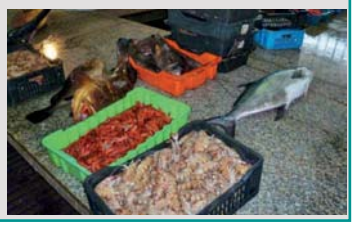
ALGIERS FISHING PORT



- 101 fishing boat SSF for 301 fishermen
- 57 purse seine for 1 140 fishermen,
- 18 trawling vessels for 360 fishermen
- Strong Institutional support
- Sector development plan/AQUAPECHE
- Social inclusion and integration with Algiers

MEAN ADDED VALUE % SALES PRICES

- Fishermen cost of production
- Profit for fishermen
- Marketing cost
- Marketing profit



APPENDIX 2. Tunisie – synthèse exécutive de l'étude de cas

LA GOUVERNANCE ET LA CHAÎNE DE VALEUR DANS LA GESTION DE LA LAGUNE DE BIBAINE

La pêche en Tunisie est considérée comme un secteur économiquement stratégique représentant une ressource alimentaire non négligeable. Durant ces derniers quinquennats, l'État s'est investi en la mise en place d'une importante infrastructure de base notamment en ports et marchés de gros et le lancement de processus de désengagement de l'État au profit d'une privatisation des services publics.

Les exportations des produits de la pêche viennent en deuxième position après l'huile d'olive dans la valeur globale des exportations agricoles tunisiennes. En effet, la pêche contribue à raison de presque 9 pour cent de la valeur de l'agriculture, soit environ 1.4 pour cent au PNB. De par sa contribution à la croissance du pays le secteur procure directement 54 000 postes d'emplois et une source de revenu à 45 000 autres chefs de familles.

Avec une infrastructure maritime dense constituée de 41 ports de pêche bien répartie sur les 1 300 km de littoral et une flottille bien développée de plus 11 500 bateaux de pêche, la production moyenne annuelle est de près 100 000 tonnes pour une valeur de l'ordre de 330 millions de dinars. La production est constituée de 52 pour cent des produits benthiques (pêche côtière et chalutage) et 48 pour cent des produits pélagiques (chalutage pélagique, sardinier et thonier).

La production de pêche et de l'aquaculture à fin mai 2015 a été de 44 000 tonnes pour une valeur de 216 MD contre 49 000 tonnes d'une valeur de 234 MD au cours de la même période de 2014, soit une baisse de -10,2 pour cent en quantité et de -7,7 pour cent en valeur. La baisse de la production a concerné essentiellement l'aquaculture (-23,8 pour cent), la pêche au chalut benthique (-13 pour cent) et la pêche au poisson bleu (-8 pour cent). Par région la production a baissé au Nord (-14 pour cent), au Centre (-7 pour cent) et au Sud (-12 pour cent).

Les exportations ont atteint 8.1 mille tonnes (valeur 118.2 MD) contre respectivement 9.4 mille tonnes (126.3 MD) soit des baisses respectivement de -13 pour cent et de -6.4 pour cent.

Les importations on atteint 10.2 mille tonnes pour une valeur de 44.1 MD contre 12.5 mille tonnes et une valeur de 41,7 MD au terme des cinq premiers mois de 2014, soit des variations respectivement de -18.4 pour cent et +5.8 pour cent.

Le solde des échanges extérieurs des produits de la pêche a été positif avec +74.1 MD en 2015 contre +84.6 MD enregistré à la même période de l'année précédente, soit 12.4 pour cent de moins.

Les zones humides côtières (vallées, lagunes, étangs, estuaires et des deltas) sont très productives et riche en termes de biodiversité. La pêche lagunaire est une gestion extensive traditionnelle, avec des productions comprises entre 50 et 150 kg/ha/an, bien que dans certains environnements très productifs elle atteindra 500 kg/ha/an. Les lagunes côtières en Tunisie sont contrôlées par les autorités publiques, mais des exemples de gestion meilleurs sont ceux dans lesquels la production des composants est confiée à des particuliers.

La lagune d'El Bibane se situe au sud de la Tunisie dans le gouvernorat de Médenine, près de la frontière libyenne. Nommée plus exactement Bahiret El Bibane (les portes), cette lagune est la plus méridionale de toutes les lagunes tunisiennes. Située au sud-est de la ville de Zarzis et au nord de Ben Gardene, dans un environnement aride, elle reste plus ou moins épargnée des effets anthropiques. De même, l'exploitation des

ressources halieutiques y revêt toujours un caractère traditionnel: bordigues et équipes de pêcheurs.

La lagune El Bibane est la seconde lagune tunisienne. Sa superficie est de 23 000 hectares, qui peuvent être portés à 30 000,si on inclut au plan d'eau la sebkha Bou Jmel qui la jouxte dans sa partie nord et à laquelle elle est reliée par un petit chenal, El Mekkhada, laissant transiter des eaux de très forte salinité. La profondeur moyenne de la lagune est de l'ordre de 5 m, offrant un contraste net avec celle de la mer voisine où l'isobathe des 5 m est situé à 20 km de la côte (plateau continental du Golfe de Gabès).

La lagune est dotée d'une très grande diversité biologique, la végétation immergée est caractérisée par un herbier particulièrement riche en *Cymodocea nodosa* et en phanérogame *Posidonia oceanica*. Aux abords de la lagune, on trouve une végétation halophile typique des zones côtières et des zones peu profondes de la Méditerranée comme *Rhanterium suaveolens* et *Stipa lagascae*. Les lits marins subtidaux, en pleine mer, sont d'une grande importance pour les poissons dont *Sparus aurata* et *Mugil cephalus*.

La principale activité à l'intérieur de la lagune est la pêche. Sur l'îlot de Sidi Ahmed Chaouch a été installé l'équipement de pêche, y compris une usine de glace, une administration, des dépôts des filets, etc. Les captures à l'intérieur de la lagune (zone contrôlée par la Direction Générale de la Pêche et de l'Aquaculture) étaient de 203 tonnes en 2000 et plus de 280 tonnes en 2001 et 2003.

Au marabout (lieu saint) de Sidi Ali Chaouch sur l'îlot d'El Bibane, il y a une tradition de visites au lieu d'enterrement d'un homme vénéré, dont les origines sont perdues dans la nuit des temps. Il s'agit d'un phénomène d'intérêt local, pratiqué à petite échelle, environ cent personnes visitent ce lieu par semaine (Ramsar, 2007).

En février 2016, le Ministère des Affaires Étrangères et de la Coopération Internationale italien – Direction Générale de la Coopération au Développement a financé un projet de coopération au développement intitulé «Développement durable des communautés côtières du gouvernorat de Médenine – NEMO II». Ce projet est exécuté en Tunisie par le CIHEAM-MAIB, en partenariat avec la Direction Générale de la Pêche et de l'Aquaculture auprès du Ministère de l'Agriculture, des Ressources Hydrauliques et de la Pêche.

L'initiative veut encourager le développement de la communauté côtière dans la région tunisienne de Médenine, à travers le renforcement des compétences à niveau institutionnel (gouvernorat et CRDA) ainsi que le développement des secteurs privés stratégiques (pêche/agriculture) et des filières concernées.

Le projet prévoit aussi d'entamer et renforcer le modèle de développement local déjà entamé par le projet NEMO à travers des initiatives et des activités de formation pour l'appui aux activités de pêche qui visent à l'amélioration des situation socioéconomiques locales.

Les activités qui seront lancées concerneront la formation, les rencontres institutionnelles au niveau local et en Italie, le plan pour la gestion de la lagune de Bibaine, l'introduction du microcrédit pour l'appui financier à des petits projets d'investissement dans le secteur, la participation à des rencontres de promotion nationales et internationales et la mise en place de formes d'associations de producteurs à un niveau pilote.

Dans la lagune, le projet prévoit une analyse du contexte environnemental et institutionnel de la lagune afin de développer un modèle de gestion public-privé dans lequel ont atteint des niveaux élevés d'efficacité, sur la base des trois dimensions du développement durable: économie, écologie et aspects sociaux.

En outre, le projet prévoit de réaliser deux labels, un destiné à la pêche des poissons dans la lagune et l'autre destiné à la récolte des palourdes. Ceux deux labels identifient l'origine du produit, en donnant aux consommateurs une valeur ajoutée en termes de garantie sur l'origine des produits. Normalement, les lagunes côtières méditerranéennes sont extrêmement productives et, grâce à leurs caractéristiques biologiques, les produits

piscicoles sont caractérisés par une haute valeur nutritionnelle. Loup de mer, dorade, rouget et anguille sont capturés avec des engins statiques, pièges fixes (barrages) et par la pêche à la ligne.

L'activité de la concession est basée sur trois types de pêche:

- La pêcherie fixe, ou bordigue, qui s'étend sur 3 km, et permet de capturer dorades royales (*Sparus aurata*) et loup (*Dicentrarchus labrax*) ayant grossi dans la lagune, principalement en automne. Un repos biologique est assuré en période de recrutement (février-mars). La pêcherie fixe d'El Bibane est ancienne (1899) et fonctionnait à l'origine en utilisant le marnage pour capturer les poissons grâce à des pièges et/ou pêcheries fixes confectionnés initialement à partir de palmes, puis progressivement modernisées. Depuis 1999, l'activité de pêche est concédée à un concessionnaire, qui gère la pêcherie fixe, rachète le poisson aux pêcheurs autorisés sur la lagune et doit assurer des missions complémentaires pour le village de Jderia (alimentation en eau, transport maritime vers le marabout).
- La pêche à la ligne traînante dans le chenal principal, organisée par le concessionnaire, qui cible particulièrement les espèces de haute valeur commerciale (loup, daurade, liche et serre).
- La pêche au filet, pratiquée par 92 pêcheurs autorisés par la Direction Générale de la Pêche et de l'Aquaculture, qui doivent vendre la totalité des produits de la pêche au concessionnaire sur la base d'un prix convenu. Les espèces capturées sont la saupe, la daurade et les mugilidés.

L'évolution de la production annuelle de la lagune baisse régulièrement depuis les années 80, avec un rendement actuel moyen de 10 kg/ha, ce qui est faible comparé à la moyenne enregistrée dans les lagunes tunisiennes. L'évolution de la production halieutique de la bordigue est très fluctuante et varie entre 100 et 200 tonnes au cours des dernières années.

La production maximale a été enregistrée en 1978 (524 tonnes) alors que la minimale a été observée en 1995 (94 tonnes). L'exercice de la pêche tel que précisé dans le cahier des charges de la concession permettrait une exploitation durable des ressources de la lagune (bordigue, ligne, filets droits). Cependant, certaines pratiques vont à l'encontre de cet objectif et font peser une menace sur la durabilité de l'exploitation halieutique de la lagune:

- La pêche illicite avec des sennes de plage voire des kiss, qui se développe par manque de capacité de surveillance des débarquements, tant de la part du concessionnaire que des autorités de police, et peut être assimilée à du vol de poisson;
- Le non-respect de la période de repos biologique et des irrégularités dans le respect des tailles commerciales;
- L'intensification de l'effort de pêche par manque d'emplois alternatifs pour la population de Jderia, avec intensification de l'usage des lignes et des filets encerclants et généralisation de l'usage des filets maillants de type mono-filament ;
- L'exploitation irraisonnée de nouvelles espèces (ascidies, anémones ou autres).

La Direction Générale de la Pêche et de l'Aquaculture travaille actuellement sur le cahier des charges d'exploitation de la pêcherie. L'objectif est de construire en commun un plan de gestion. L'avenir de la lagune dépend d'un effort collectif de la part de l'ensemble de ceux qui l'utilisent. Il est par conséquent important d'associer tous les acteurs.

L'ilot Borj, d'une superficie de 4.5 ha environ, est aujourd'hui occupé, en partie par des constructions touristiques récentes établies par d'anciens concessionnaires.

Du côté de la délégation de Zarzis, le seul noyau urbain donnant directement sur la lagune est celui de Jdaria, situé à la pointe du Slob El Gharbi. Environ 150 logements y sont actuellement recensés. Ce noyau est aujourd'hui équipé d'un centre de soins de base (dispensaire), d'une école primaire d'un bureau de poste, d'un poste de garde nationale ainsi que d'un bureau de OMDA.

Le village de Jderia a été créé au début des années 60 avec la construction par le gouvernorat de 60 logements ruraux pour abriter les pêcheurs, installés jusqu'alors sur l'ilot principal. En 1974, dix grands logements ruraux sont retransformés par les pêcheurs en 30 logements, pour répondre aux besoins d'accroissement de la population. Durant ces dernières dizaines d'années, 60 maisons ont été ajoutées au village par la population. Aujourd'hui les problématiques principales à Jderia sont :

- l'absence de transport en commun public;
- l'absence d'éclairage public;
- une alimentation en eau potable uniquement à partir des réservoirs remplis par camions citernes (CRDA);
- l'absence d'enseignement au-delà de l'école primaire;
- des puits perdus pour les eaux usée, ou rejets directs;
- l'absence de ramassage des ordures: pollution par déchets solides ou incinération.

Selon le cahier des charges de gestion de la lagune, les pêcheurs qui opèrent dans ce site doivent vendre leur production à la concession privée de la lagune. Successivement, le concessionnaire sera chargé de la recherche du meilleur écoulement du marché, généralement à travers les grossistes pour le marché local (90 pour cent de la production), le reste étant destiné à l'exportation.

Actuellement il n'y a aucun label de qualité qui puisse donner une valeur ajoutée à la production de la lagune.

La préservation de la lagune pourra permettre le développement d'un tourisme durable de qualité et de l'écotourisme. Actuellement, malgré l'effort du Ministère de l'agriculture tunisienne afin d'élaborer des procédures et règles pour développer des activités de pescatourisme, il est possible dans la lagune de Biben de faire des activités de pêche.

L'actuel concessionnaire est concentré sur la réalisation d'activités d'écotourisme basées sur la mise en valeur de caractère naturel et traditionnel de la lagune et exploite les bungalows et le restaurant construits par la précédente gestion. Cette nouvelle activité pourra fournir un revenu de remplacement pour les personnes locales et réduire la pression sur l'exploitation des ressources naturelles de la lagune.

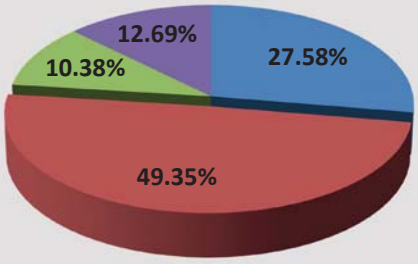
TABLEAU A2.1
Segment de pêche – Valeur de la chaîne TND (EUR 1 = TND 2.22)

Segment	Petits métiers	Pêcherie fixe ou bordigue
Description du segment de pêche	Navires ayant une longueur moyenne de 3 m	
Engin de pêche	Ligne à main armée d'hameçons à palette	
Bateaux de pêche	70	
Jauge brute des bateaux		
Moteurs	No	
Jours de pêche par année	200	200
Pêcheurs plein temps	80	
Pêcheurs mi-temps	20	
Âge des pêcheurs (en moyenne)	43	43
Travaux des femmes	No	
Espèces principales	Daurade, Loup, Soie, Saupe, Spare	
Production totale par année	100.073 T	130 T
Quantités % marché		
Concessionnaire	100	100
Grossiste	0	0
Restaurants/hôtels	0	0
Vente directe aux consommateurs	0	0
Consommation par pêcheur/famille	0	0

catégorie du bateau (segment)	Petits métiers	Bordigue
Revenue total de la région	1 701 241	2 210 000
Coût variable total	202 160	880 000
Salaire total	0	320 000
Profit total	1 499 081	1 010 000
Commercialisation	510 372	663 500
Valeur avec la commercialisation	2 211 613	2 873 500

Catégorie du bateau (segment)	Petits métiers	Bordigue	Total	%
Coût production pêcheurs	202 160	1 200 000	1 402 160	27.58
Profit total pêcheurs	1 499 081	1 010 000	2 509.081	49.35
Coût commercialisation	229 667	298 575	528 242	10.38
Profit commercialisation	280 705	364 925	645 630	12 69
TOTAL	2 211 613	2 873 500		100.00

EL BIBAINE LAGOON



- 23.000 Hectares
- 70 vessels (3 m) and 100 fishermen;
- Environment quality and preservation of lagoon linked to products quality (Label?)
- Common and shared management plan (fishing period and gears)
- Marketing and offer concentration for product selling
- Development of the tourist sector and integration

MEAN ADDED VALUE % SALES PRICES

- Fishermen cost of production
- Profit for fishermen
- Marketing cost
- Marketing profit

APPENDIX 3. **Egypt – case study summary**

MARSA MATROUH FISHING PORT

The main fishing ports along the Egyptian Mediterranean coast are Matrouh, Alexandria (Anfoshi), Alexandria (Abu Qir), Madaaia, Rashid, Motobas (Burullus), Baltim, Damietta (Izbet El-Borg), Port Said and Arish.

In 2012, the Egyptian fishing fleet consisted of 4 909 motorised vessels, most of these (3 046 vessels, 62 percent) fishing in the Mediterranean Sea.

In the Mediterranean, the fleet of sail boats consisted of 1418 small boats of which 929 boats were 4–6 m in length, 465 boats 6–8 m in length, and 24 boats longer than 8 m.

There were many small sailing boats (24 324) used in inland fisheries (Nile and lake fisheries) (General Authority for Fish Resources Development, 2012). As these boats do not travel far, there are also many landing sites. Along the Nile river, there are 695 registered landing sites as well as countless unregistered sites. The distribution of these boats may thus be a reasonable indicator of the spatial allocation of fishing effort. Accordingly, the highest number of sailing boats was registered in Kafr El-Sheikh province, with almost 25 percent of the total sailing boats in Egypt.

Sardines *Sardinella aurita* and *Sardina pilchardus* are the most landed species (15.34 percent) in the Mediterranean, followed by shrimps *Penaeus japonicus*, *Metapenaeus stebingi*, *Penaeus semisulcatus* and *Trachypenaeus curvirostris* (9.57 percent), molluscs (5.78 percent), bogue *Boops boops* (5.23 percent), grey mullets *Mugil cephalus*, *Liza aurata* and *Liza ramada* (5.22 percent) and anchovy *Engraulis encrasicolus* (4.19 percent).

Domestic supplies are boosted by substantial imports (about 335 000 tonnes in 2012) of frozen, salted and smoked fish products.

The Law 124 of 1983 is the legal instrument providing the General Authority for Fish Resources Development with the responsibility for the development and management of fishery resources, including aquaculture. It is also responsible for issuing fishing licenses, supervising fishery cooperatives and collecting statistical data on fish production, consumption and trade.

Regarding wild fisheries management, the aforementioned law entails that every vessel should have a fishing license issued by the General Authority for Fish Resources Development, which indicates the type of gear used by the vessel as well as its permitted fishing ground.

Trends show that fisheries production has significantly decreased in recent years, while aquaculture has gained considerable importance because of the high demand for aquatic food products from an increasing human population.

Therefore, the aquaculture industry is a promising sector for the economy in Egypt, while wild fisheries have more challenges to overcome. The geographical location of Egypt bestows a major advantage in supporting high biodiversity, providing plentiful marine, brackish and fresh water resources to support fisheries and aquaculture. Fisheries also provide fish protein as raw material to the farming and industrial sectors in Egypt, creating further employment opportunities.

The Egyptian government started to support fish farms financially in the late nineties.

Consequently, aquaculture production increased 475 percent in the years between 1999 and 2012. At present, Egypt is the world's eighth largest aquaculture producer and the largest producer in Africa. It is also the world's second largest tilapia producer (after China) and first in Africa. As a result, fish consumption in Egypt rose to 20.55 kg per capita per year, which is close to the average European consumption (22 kg) and higher than the global (15.3 kg) and African (10.4 kg) averages. It has averaged around 15 kg over the past decade.

The fisheries are described as labour intensive, multi-species and multi-gear, they are widely distributed along the coast and associated with high levels of community dependence. The demand for fishery resources has been gradually increasing due to the rise in population and tourism development.

In general, there is a lack of communication among the three main groups of stakeholders in adaptive management: managers, fishers and scientists.

Marsa is a Mediterranean seaport and the capital of the Matruoh Governorate in Egypt. It is 240 km (150 miles) west of Alexandria and 222 km from Sallum, on the main highway from the Nile Delta to the Libyan border.

It is a major Egyptian tourist resort and serves as a getaway resort for Europeans as well as Cairenes eager to flee the capital in the sweltering summer months. It is served by Mersa Matruh Airport.

The city is known for its white soft sands and calm transparent waters; the bay is protected from the high seas by a series of rocks forming a natural breakwater, with a small opening to allow access for light vessels.

It started as a small fishing town during Ancient Egyptian times and the reign of Alexander the Great and was named Amunia. There are ruins of a temple of Rameses II (1200 BC). Marsa Matrouh became known as Paraitonion in the Ptolemaic era. When Roman occupation came to Egypt, the town became an important harbour for trade and shipping goods and crops to Rome. It was named Paraetonium by the Romans.

The city becomes a destination for millions of Egyptians and foreign tourists.

Currently in the area only one project is on-going. It is the NEMO Project funded by the Italian Ministry of Foreign Affairs and implemented by CIHEAM-MAIB. The Project aims to consolidate the professional capacity of the local fisher association by creating a fishery market and technical equipment supply in order to facilitate improvements in the product's quality and foster economic diversification for fishermen by linking production to the tourism and restaurant sectors. The Project is also planning to supply the fishermen of the area with technical equipment.

Matrouh is the main fishing port in the Egyptian north coastal area until to Sallum; there are the following fishing segments.

TABLE A3.1
Fishing segments

Fleet segment	1	2	3
Fleet segment	Feluca boats (3-6 m)	Feluca boats with engine (3-6 m)	Big boat (16-25 m)
Main fishing gear	Trammel net	Trammel net	Line Fishing
Number of vessels	60	6	17

In Matrouh, about 80-90 percent of the fishery products of the bigger boats are sold mainly to the Alexandria wholesalers: there are private negotiations and agreements directly between the boats and the wholesalers.

On the contrary, the main market for the small boats is the local one, where fishers sell 70-90 percent of their catches.

The Alexandria wholesalers prefer to sell the Matrouh fishery products to the national market (Cairo and Alexandria) but the most high-value commercial species (grouper, sea bream, sea bass, prawns) are exported to Europe from EU authorised establishments.

The restaurants and hotels of Matruoh also prefer to buy products during the tourist season from the wholesalers of Alexandria, considering that they can consistently offer the quality and the quantity needed by the hotels and restaurants every day.

The local fisher cooperative, a member of the National Fishers Association, manages the local fish market and works to control the offer and the demand, acting as a regulator element between the fishers and the clients.

The cooperative has the right to have 1 percent of the income of the commercialisation of the local market.

Some women also work within the value chain, buying the cheaper catches/species directly from the fishers and selling this product on the local market.

There are two working areas for the fishers, both located in the protected lagoon area. The first one is dedicated to the bigger boasts as it is a military area. The second one is dedicated to the smaller boats without engines.

Fishers buy ice from a private company located near the lagoon area. Not far from the main fishing port there is a covered fish market, which is managed principally for the local marketing of products.

As already remarked, the fishery products of the bigger boats are sold mainly to the Alexandria wholesalers, whereas smaller boats primarily sell on the local market. Furthermore, local hotels and restaurants in Matrouh prefer to buy from the wholesalers in Alexandria.

In the two working areas, the products are sold fresh without undergoing processing. Ice is used for preserving the quality of the product during transport from Matrouh to Alexandria and for the auction day in the local market.

Fishing is the primary form of revenue for families and it is not integrated with other revenues. Currently the integration with the tourism sector is very low and hotels and restaurants of Matrouh prefer to buy the products for their needs from Alexandria wholesalers.

The city is a destination for millions of Egyptians and foreign tourists and linking fishing activity with tourism can potentially offer an opportunity to the local fishers. For the moment, however, there is no evidence of such benefits.

Furthermore, the local market is not in the condition to attract either Egyptian or foreign tourists.

TABLE A3.2

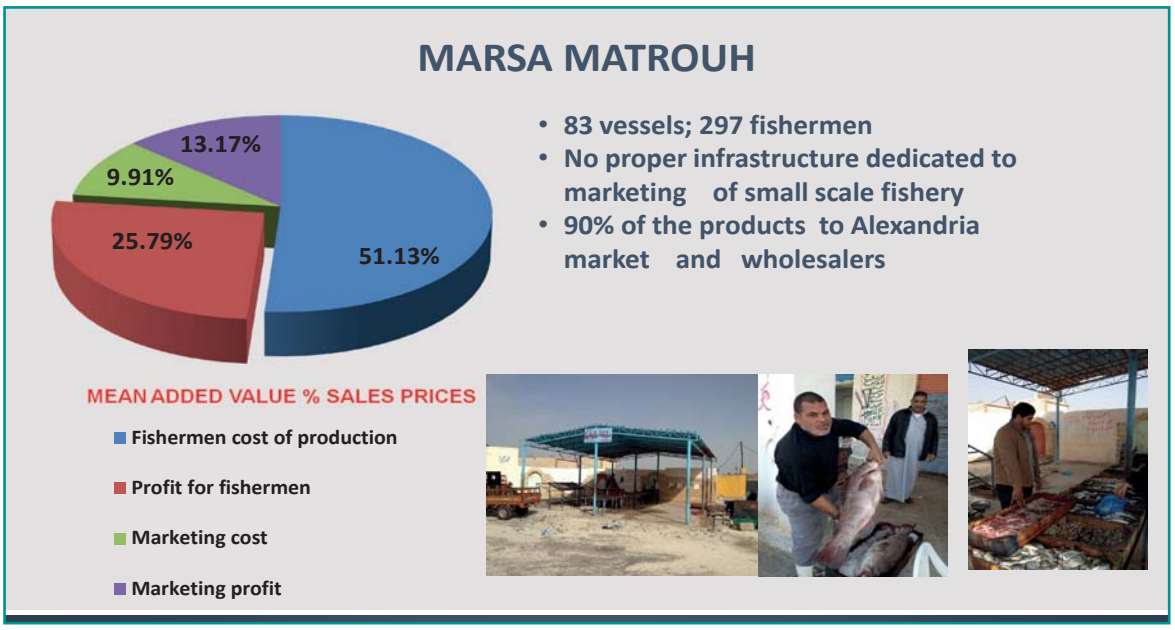
Fleet segment– Value chain EGP (1 Euro = 8.5 EGP)

Fleet segment	1	2	3
Description of the fleet segment	Feluca boats (3-6 m)	Feluca boats with engine (3-6 m)	Boat with engine (16-25 m)
Main fishing net	Trammel net	Trammel net	Line Fishing
Number of vessels	60	6	17
Mean gross tonnage of vessels			
Mean engine power	NA (Row boats)	25 HP	500 HP
Mean days at sea	108	108	140
Fishers: full time	85	15	197
Fishers: part time	NA	NA	NA
Fishers: age (mean)	40-50	40-50	40-50
Role of women			
Main species	Red mullet, mullet, crabs	Grouper, mullet, sea bream	Grouper, mullet, sea bream
Total yearly catches	12 T	20 T	60 T
Marketing	Quantity %		
Wholesalers	10	10	90
Restaurant/hotel	0	0	0
Direct to consumers	90	90	10
Direct consumption by fishers	0	0	0

Fleet segment	Boat no engine: 60 boats	Boat with engine: 6 boats	Big boats: 17 boats
Total revenue in the area	648 000	226 800	5 950 000
Total variable costs	97 200	68 040	2 082 500
Total crew salary	275 400	79 380	1 933 750
Total profit	275 400	79 380	1 933 750

Fleet segment	Boat no engine: 60 boats	Boat with engine: 6 boats	Big boats: 17 boats
Total revenue in the area	648 000	226 800	5 950 000
Marketing	197 200	64 020	1 785 000
Total value chain	845 200	290 820	7 735 000

Fleet segment	Boat no engine: 60 boats	Boat with engine: 6 boats	Big boats: 17 boats	Total	%
Total value chain	845 200	290 820	7 735 000	8 871 020	100.00
Fishers: cost of production	372 600	147 420	4 016 250	4 536 270	51,13
Fishers: Total profit	275 400	79 380	1 933 750	2 288 530	25,79
Marketing costs	97 000	30 420	750 000	877 420	9,89
Marketing profit	100 200	33 600	1 035 000	1 168 800	13,17
Marketing	197 200	79 020	1 785 000	2 061 220	23,23



APPENDIX 4. Lebanon – case study summary

TYRE, A MILLENARY PORT DEDICATED TO SMALL-SCALE FISHING

The agriculture and fisheries production sector accounts for approximately 6 percent of the gross domestic product (GDP) (World Bank) and 30 percent of the domestic food demand – figures which have been constant over the past ten years. Marine capture fisheries compromise about 0.06 percent of GDP (FAO EastMed, 2013).

Lebanon's fisheries sector is composed of a small artisanal fishing fleet of approximately 1 460 licensed vessels (in 2011) which are predominantly operated by rather aged fishers using old boats with dated equipment (Pinello & Dimech, 2013). Nowadays, the fishing sector in Lebanon employs about 6 500 people, who are organized into five syndicates and 33 cooperatives.

There are 44 harbours – most of which require infrastructural interventions, dredging and maintenance – which in total host a fleet of around 2 860 boats. The total catch ranges between 5 000 and 9 000 tonnes per year. This amount is not sufficient to cover the national fish consumption of about 35 000 tonnes, and therefore more than 74 percent of the consumed fish is imported, mainly from Turkey.

Located on the southern coast of Lebanon, 83 km south of Beirut, the ancient town of Tyre was the great Phoenician city that reigned over the seas and founded prosperous colonies such as Cadiz and Carthage and, according to legend, was the place of the discovery of purple pigment.

The southern Lebanese coast has the last partially unspoiled stretch of coastal habitat in Lebanon.

The International Union for Conservation of Nature (IUCN) Regional Office for West Asia and the Association for the Development of Rural Capacities (ADR) are implementing a project in Lebanon to assist the members of the Tyre Fishing Syndicate and their families to jointly improve their livelihoods. The three-year project "Sustainable Fisheries Management for Improved Livelihoods of the Coastal Fishing Community in Tyre Caza [province]", funded by the DROSOS Foundation, aims at poverty reduction, sustainable fisheries management, better processing/marketing and supplementary income generation.

The fleet of Tyre is made up by 250boats (mostly < 10 m length) involving 400-500 fishers. Most of the fleet uses different types of bottom standing gear, such as trammel nets, set gillnets and bottom longlines, whereas purse seines and other fishing gear (floating longlines, traps) were used less frequently. Landings are composed of a great number of species, many of which were Lessepsian migrants. In 2005, a total of 25 different Lessepsian species, representing 37 percent of the total landing, were identified.

In Tyre there is a very strong relationship between fishers and fish sellers. The nature of this relationship builds on the grant that each year the fish sellers give to some of the fishers.

At the beginning of each year, the owner of each boat decides whether or not to ask for or accept a grant from one of the local fish sellers. The grant might consist of cash or nets and the amount depends on the accountability of the fishers and their crew, on their capabilities, their equipment etc.

The only obligation that the fishers have in relation to this grant is that they deal only with the fish seller to market their product. The received amount is reimbursed to the seller by provision of daily catches until the loan is fully repaid. This relationship may foster a situation of non-competition on the supply side that contributes to lower market prices.

The Tyre Coast Nature Reserve is a nature reserve and a Ramsar-acknowledged site. Expanding over 380 ha, the reserve remains the largest sandy beach in Lebanon. Tyre Coast Nature Reserve hosts many species of plants, animals and insects. It is also a nesting site for the endangered loggerhead and green sea turtles and many other important creatures.

Tyre has tourist assets such as two internationally known monumental Roman sites, a Phoenician history, an important position within the history of Christianity, an open door to all heritage – Arab, Crusades, Roman, religious – disseminated all over south Lebanon, sandy beaches, preserved natural surroundings, a traditional picturesque port, etc.

The pollution of marine waters has to be considered as one of the major threats for artisanal fisheries in south Lebanon. Saida is bordered by the Ghazieh industrial area where several tanneries, chemical industries and slaughterhouses discharge their effluents directly into the sea. Similarly, Tyre hosts the Bourj el Chemalli industrial area, in addition to many sewage outlets. In the absence of operational wastewater treatment plants, effluents from coastal agglomerations are directly discharged into the sea while effluents from inland communities are disposed in rivers, streams, on open land or underground.

The most common credit facility serving the fishing community is the one provided by the fish sellers. In fact, besides the yearly grant that some of them give to the fishers, in kind or in cash, they are often available to lend them extra money during the year. The amount is, of course, corresponded in cash with no question on the final destination of the loan. The repayment scheme is extremely flexible and somehow customized according to the borrower needs.

Other credit facilities that are, in theory, available to the community are the banks. Few banks, however, offer small credit and none does so without any collateral. Therefore, only those owning a boat or some other valuable good can afford to ask for a loan. There is one micro-credit programme executed by the ADR in partnership with the European Commission, and with the support of one of the largest Lebanese banks (Bank Audi). It targets the whole Caza of Tyre. As no collaterals are requested to give the loans, some Tyre fishers have taken out loans from the ADR, generally negotiating the loan for the longest period possible.

The biggest constraint that the fishers seems to be facing is the loss of competitiveness deriving from the reduced bargaining power due to the cash advance provided by the sellers at the beginning of each year. This amount is, for many fishers, essential. The virtual repayment can be more costly that those made available by other micro-finance institutions operating in the area.

Still the fishing community seems to prefer the fish-seller support for different reasons, among which the apparent flexibility of the "repayment" scheme makes it more appealing. In many cases, the debts incurred beyond the yearly cash advance to face unexpected harsh conditions or simply for the daily household management, bind them to the seller, regardless of whether the initial grant/loan is provided or not. The chronic uncertainty under which the community lives push them to rely on the closest counterparts, regardless of whether or not they are the most convenient option.

This causes a direct loss of income and undercuts the chance for the fishers to find other more suitable marketing options, in this way causing further indirect loss. On the seller's side, this situation diminishes the competition between them to acquire the best fish, as their supply is more or less given. All this brings about a relative market rigidity.

Among fishers, planning and forecasting capabilities are limited, as the immediate needs are a matter of mere survival and the future perspective a luxury they cannot really afford. Plus the priority, let aside the minimum which is spent for food and few other necessary items, is given to the expenditures related to the income generating activities (in this case nets, baits, etc.). Schooling can be an arduous issue and health

a burden that only few families can afford without any external support. Therefore, many fishers integrate their incomes through different occupations that are not related to the fishing sector. Indeed, for some of them, fishing activities become secondary income generating occupations.

TABLE A4.1
Value chain US$

Fleet segment	Polyvalent 0-6 m	Polyvalent 6-12 m	Seiners
Description of the fleet segment	Small vessels	Bigger vessels	purse seines/ lampara
Main fishing gear	Trammel nets, gillnets, longlines, pots	Trammel nets, gillnets, longlines, pots	purse seines and lampara nets
Number of vessels	30	166	27
Mean engine power	16.1 hp	26.2 hp	30.3 hp
Mean days at sea	152	208	170
Fishers: full time			
Fishers: part time			
Fishers: age (average)	49.1	47.7	46.1
Total yearly catches	44 659 kg	350 863 kg	948 000 kg
Marketing %			
Wholesalers	88	90	97
Restaurant/hotel	0.5	0.5	0
Direct to consumers	0	0	0
Fishers: consumption	11.5	10	3

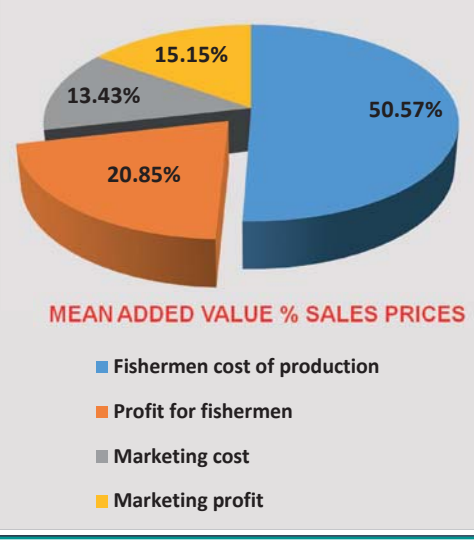
Vessel category/segment	Polyvalent 6 m	Polyvalent 6-12 m	Seiners
Total revenue in the area	393 000	3 087 600	1 328 400
Total variable costs	124 932	1 035 840	545 292
Total crew salary	141 816	1 156 688	400 248
Total profit	126 252	895 072	382 860

Vessel category segment	Polyvalent 6 m	Polyvalent 6-12 m	Seiners
Total revenue in the area	393 000	3 087 600	1 328 400
Marketing	158 000	1 235 040	531 360
Total value chain	551 000	4 322 640	1 859 760

Vessel category segment	Polyvalent 6 m	Polyvalent 6-12 m	Seiners
Total revenue in the area	393 000	3 087 600	1 328 400
Total Variable costs	124 932	1 035 840	545 292
Total Crew Salary	141 816	1 156 688	400 248
Total Profit	126 252	895 072	382 860

Vessel category	Polyvalent 6 m	Polyvalent	Seiners	TOTAL	%
Total value chain	551 000	4 322 640	1 859 760	6 733 400	100.00
Fishery cost of production	266 748	2 192 528	945 540	3 404 816	50.57
Fishers: Total Profit	126 252	895 072	382 860	1 404 184	20.85
Marketing cost	60 000	634 000	210 000	904 000	13.43
Marketing profit	98 000	601 040	321 360	1 020 400	15.15
Marketing	158 000	1 235 040	531 360	1 924 400	28.57

TIRO



- 250 vessels (mostly < 10 m length) and 500 fishermen
- Credit constrains
- Wholesalers supports fishermen by credits asking back the products
- In Tyre there is a very strong relationship between fishermen and fish sellers. The nature of this relationship builds on the grant that each year the fish sellers give to some of the fishermen.

APPENDIX 5. Italy – case study summary

SMALL-SCALE FISHERIES MANAGMENT IN PORTO CESAREO (LECCE, ITALY)

In Italy, small-scale coastal fishing is the most important fisheries segment, not only in terms of the number of vessels – which is equal to 7 386 units out of a total of 12 666 (MiPAAF, November 2014) – but also in terms of employment and social impact. Small-scale coastal fishing is practiced by vessels of up to 12 metres LFT with tonnage under 15 GT, which are allowed to fish within 12 miles from the coast and with non-towed gears, as shown in table 3 in the annex to the Regulation (EC) No 1799/2006.

The Municipality of Porto Cesareo is east of the Gulf of Taranto, north of the Ionian Sea, 28 km from Lecce, and is located at the centre of the Ionian coast between Taranto and Gallipoli.

The area is characterised by a long coastline with stretches of sand dunes covered with Mediterranean vegetation, wetlands, reefs and islets, including in particular, the Great Island (also known also as Rabbit Island) which is covered with a dense forest of Aleppo pines and acacias, and Mallow Island.

The extraordinary biological interest due to the presence of over 200 plant species has led to the establishment of the natural marine protected area of Porto Cesareo in 1997. The very rich sea bottoms (which are typical of warm seas in sub-tropical environments) host the so-called submerged seagrass (*Posidonia oceanica*) meadows in sandy areas – which are considered biologically rare and which ensure shelter and food to many marine organisms – and the multi-coloured corals in rocky areas. Marine fauna consists of crustaceans, molluscs, colourful fish and tortoises.

The main economic activities in the area of Porto Cesareo include accommodation and catering services (120 businesses and 346 employees) and retail and wholesale trade (171 businesses and 321 employees). Most of the economic activity is related to seaside tourism, which ensures over 280 000 visits and 50 000 resident tourists during summer (source: Puglia Promozione, 2014). Another important industry is that of fisheries, which have a long tradition in Porto Cesareo. Currently the area has 57 licensed fishing vessels employing a total of 115 people, which is equal to 12 percent of the employed workforce. Nearly all fishers in Porto Cesareo are members of the Pescatori dello Ionio cooperative, which promotes important experimental projects aimed at improving fishery sustainability and reducing fishing effort and which involve fishers alongside researchers and scientists. The most common catching systems are those of artisanal fisheries and the Cooperativa dello Ionio has initiated some testing activities within Porto Cesareo's marine protected area to improve selectivity and reduce bycatch and discards.

The Pescatori dello Ionio cooperative also plays a proactive role in producing scientific evidence and collecting experimental data. In collaboration with several research institutions, it has promoted many projects aimed at improving sustainability and reducing fishing effort. Some initiatives have been directed to improve the selectivity of gill nets within Porto Cesareo's marine protected area in order to reduce bycatch and discards. In this circumstance, all fishing units of the Pescatori dello Ionio cooperative have conducted a sampling campaign (including over 216 samples) involving fishers and researchers, with the purpose of assessing the impact of gillnets with a mesh size equal to 20, 22 and 24 mm, respectively, on fish. At the same time the cooperative joined the voluntary biological rest period in October 2011, 2012 and 2013 in which all (small-scale) fishing vessels in Porto Cesareo self-suspended their activity, delivering their fishing license to the harbour master's office.

Porto Cesareo's fishing fleet includes 57 vessels and 115 employees, mostly involved in small-scale fisheries. It actually has 38 vessels ranging between 6 and 10 m and 9 vessels between 10 and 12 m that use different equipment all year round, depending on the target species. However, most fishing units generally use trammel and gillnets. Other units use bottom and surface-set longlines, fish pots and other particular fishing methods. Most fishing units are typically wooden boats with an engine power of around 40 kW. Ninety percent of fishers are boat owners. Boat built between the 1980s and the 1990s are the most common (32.5 percent), whereas those built after 2010 account for only 8.7 percent.

In the area of Porto Cesareo, specific underwater fishing for bentonic organisms, such as sea urchins, oysters, Arca Noae and sponges is practised. Another important segment is recreational fishing which consists of about 3 000 non-professional fishing vessels.

Moreover, Porto Cesareo's fleet is also being involved in a project called "Development of initiatives of collective interest in fisheries, with the active participation of operators, to improve the conservation and sustainable management of resources in marine protected areas" within the European Fisheries Fund – EFF 2007–2013 measure 3.1 Collective actions.

The fisheries sector has also seen, although with some delay, some initiatives to exploit the trade potential supplied by the arrival of so many visitors and tourists. In particular, the cooperative Pescatori dello Ionio has started up some income diversification initiatives linked to tourism. At present, there are two fishing tourism boats in Porto Cesareo that carry out recreational and educational activities, offering guided excursions and itineraries within the marine protected area.

Moreover, in 2015 the cooperative launched a direct fish selling service, involving different fishing vessels and creating a direct channel of communication with the final consumer. Fish products are marketed via a SMS to the cellular phones of the customers who join the service.

The initiatives on the multifunctionality of small-scale fisheries have been supported by the Local Desk for the Integrated and Sustainable Development of Small-Scale Fishing Communities, funded by the Fishinmed Project (under the ENPI CBC MED 2007-2013 programme). The Desk is intended to promote a shared strategy to diffuse multi-functionality and supply fishers with technical and legislative support in launching new multifunctional initiatives in order to fully exploit the funding opportunities provided by the fisheries local action group Jonico Salentino.

There is no well-structured and legally recognised port area. The Porto Cesareo municipality has different docking licences authorising private managers to rent out berths. There are also municipal stop-over areas, which do not have primary infrastructure services (water and electricity);

For over 15 years, the cooperative Pescatori dello Ionio has managed an area – that is property of the city – which it uses for the storage and restoration of fishing and pleasure boats.

There is no fish market in the area of Porto Cesareo.

There are no facilities (either fixed or temporary) allowing direct sale on the harbour side. There are different private facilities that supply and sell fish.

The fisheries local action group Jonico Salentino involves all coastal municipalities in the northern part of the Ionian Salento area and, for the past few years, it has served as a main reference point for fishers and local cooperatives to access funding under the EFF 2007–2013.

The Porto Cesareo Marine Protected Area Consortium is a reference point on the regulation of the activities in the area concerned. The marine area has the task of monitoring and regulating professional fishing activities, as well as releasing authorisations to pleasure-boat owners.

The cooperative was established in 1979. For the achievement of social and mutual purposes, members establish different working relationships, either as employment or self-employment, as under the law. The cooperative deals with the equipment of boats, it directs and coordinates the working activities and all work-related duties, as required, and it notifies the competent authorities of the list of fishing vessels subject to its guidelines on the boarding of members by regular agreement. Moreover, the cooperative is directly responsible for fulfilling the payment obligations of members, including for welfare and social protection of members. The cooperative also deals with the payment of taxes and the issuance of regular sales invoices. Fishers who decide to join the cooperative should become members and pay a monthly fee. The management of the Cooperative is delegated (by an election process every three years) to a Board of Directors made up of nine members.

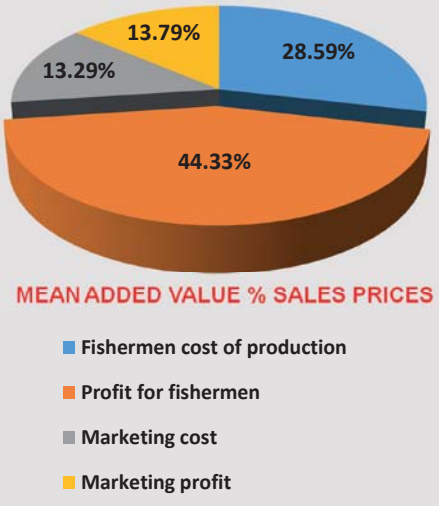
TABLE A5.1
Value chain analysis EUR

Fleet segment	1	2
Segment	6-9 m length with engine	10-12 m length with engine
Main fishing gear	Trammel and fish pots	Trammel, fish pots, longlines
Number of vessels	38	9
Mean engine power	10-40	40-80
Full time fishers	57	23
Part time fishers	0	0
Fishers: age (mean)	5.9% (< 30 years) 23.5% (30 < years < 40) 14.7% (30 < years < 50) 35.3% (50 < years < 60) 20.5%(< 60 years)	
Main species	Mullets, redfish, cuttlefish, white bream, octopus, seabream, pandora, bonito/mackerel, gilthead bream, meagre, picarel	
Marketing		
Wholesalers	55%	68%
Restaurant/hotel	30%	25%
Direct selling to consumers	15%	7%

Vessel category (fleet segment)	1	2	Total Euro
Total revenue in the area	433 238	389 331	822 569
Total variable costs	65 056	83 178	148 234
Total crew salary	79 800	94 500	174 300
Total profit	288 382	211 653	500 035
Marketing	166 630	139 023	305 653
Final consumer price	599 868	528 354	1 128 222

Vessel category (fleet segment)	1	2	Total	%
Total value chain	599 868	528 354	1 128 222	100
Fishers: cost	144 856	177 678	322 534	28.59
Fishers: profit	288 382	211 653	500 035	44.33
Marketing cost	81 000	69 023	150 023	13.29
Marketing profit	85 630	70 000	155 630	13.79
Total marketing	166 630	139 023	305 653	27.09

PORTO CESAREO



- 57 vessels and 115 fishermen, 38 vessels (6/10 m) and 9 vessels (10/12 m);
- Diversification economic activities (as pescaturismo and direct selling);
- MPA and high quality of the marine and coastal environment;
- Cooperative as a link between the fishermen and research institutions for improving responsible management and increase the stakeholder awareness;
- Integration of the fishing activities with the other sectors

PANEL 5

Putting the principles of the SSF Guidelines into practice: the case of the Mediterranean and the Black Sea

PANEL 5
Putting the principles of the SSF Guidelines into practice: the case of the Mediterranean and the Black Sea

Lena Westlund

EXECUTIVE SUMMARY

The Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines), endorsed in 2014 by the Committee on Fisheries (COFI) of the Food and Agriculture Organization of the United Nations (FAO), constitute an important tool for supporting actions leading to securing sustainable small-scale fisheries in the Mediterranean and the Black Sea.

The SSF Guidelines are based on international human rights standards, responsible fisheries governance and sustainable development, according to the United Nations Conference on Sustainable Development (Rio+20) outcome document "The future we want". The SSF Guidelines are closely linked to the Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (the Tenure Guidelines), endorsed by the Committee on World Food Security in 2012. The Voluntary Guidelines on the Progressive Realization of the Right to Adequate Food in the Context of National Food Security (the Right to Food Guidelines) are another important international instrument. This instrument was adopted by FAO Members in 2004 and considers economic, cultural and social rights as an integral part of the work of food and agriculture agencies.

On this basis, the SSF Guidelines outline a number of key guiding principles that will underpin their implementation: human rights and dignity; respect of cultures; non-discrimination; gender equality and equity; equity and equality; consultation and participation; rule of law; transparency; accountability; economic, social and environmental sustainability; holistic and integrated approaches; social responsibility; feasibility and social and economic viability.

At the Regional Conference on "Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea", organized by the General Fisheries Commission for the Mediterranean (GFCM) in Algiers, Algeria, 7–9 March 2016, Panel 5 discussed "Putting the principles of the SSF Guidelines into practice: the case of the Mediterranean and the Black Sea". The discussion made reference to key relevant parts of the SSF Guidelines and draw on background reports and case studies, prepared by the panel members and partner organizations, to provide examples from the region. In this context, the following five topics are discussed:

- Are there examples of policy and legal frameworks – national or regional – that specifically consider small-scale fisheries and that would facilitate/hinder SSF Guidelines implementation? The SSF Guidelines take a holistic perspective on small-scale fisheries and their needs, and their implementation needs to be cross-sectoral and involve government agencies and partners inside as well as outside the fisheries sector. Policy and legal frameworks may need to be reviewed to allow for addressing and integrating all the various dimensions of the SSF Guidelines: governance

of tenure and resource management; social development, employment and decent work; value chains, post-harvest and trade; gender equality; disaster risks and climate change.

- Who are the main stakeholder groups (government agencies, institutions, civil society, private sector and other actors) that need to be involved in SSF Guidelines implementation to ensure success? Not only do small-scale fishers and fish workers need to be directly involved in the governance and development of small-scale fisheries, but also other stakeholder groups have very important roles to play.
- What institutional structures exist and what is missing – at the national and regional levels – to allow for the SSF Guidelines implementation, considering the need for effective stakeholder participation, cross-sectoral collaboration, gender equality, etc.? The appropriate institutional structures need to be in place to allow for effective stakeholder participation, including women and people in the post-harvest sector.
- What are the key entry points for the implementation of the SSF Guidelines and what would be the first practical steps towards implementation according to priorities and taking into account current circumstances? Priorities and key entry points for SSF Guidelines implementation that are relevant to the specific local, national and regional circumstances need to be identified.
- What kind of interactions and collaboration with other initiatives would be required or desired, and how can coherence among related initiatives (in the fisheries and other sectors) be ensured? Interactions and collaboration with other initiatives will be needed to ensure actions that both directly address the needs of small-scale fisheries and more broadly mainstream the SSF Guidelines principles and provisions.

The SSF Guidelines comprehensiveness and inbuilt holistic framework for policy and action constitute a powerful tool for supporting small-scale fisheries. The implementation of the SSF Guidelines will, however, require concerted efforts by all as well as political will and resources. Governments, international and regional organizations, civil society organizations and non-governmental organizations, research institutions and all other stakeholders are called upon to support this process.

Implementation needs to be promoted at different scales and with different means. Two types of initiatives are needed: those which directly implement key provisions of the SSF Guidelines and those which support awareness-raising and experience-sharing, thus allowing a broad use of the SSF Guidelines in all activities related to small-scale fisheries. The SSF guidelines provisions should be mainstreamed in regional, national and local policies, strategies and action plans. Once the SSF Guidelines become an integral part of governance, management and development of the sector, a major step forward will have been taken towards securing sustainable small-scale fisheries for the benefit of those directly involved as well as of society at large.

RÉSUMÉ

Les Directives volontaires visant à assurer la durabilité de la pêche artisanale dans le contexte de la sécurité alimentaire et de l'éradication de la pauvreté (Directives PAD), adoptées en 2014 par le Comité des pêches (COFI) de l'Organisation des Nations Unies pour l'alimentation et l'agriculture (FAO), sont un outil majeur pour soutenir les actions destinées à assurer une pêche artisanale durable en Méditerranée et en mer Noire.

Les Directives PAD se fondent sur les normes internationales en matière de droits de l'homme, de gouvernance responsable de la pêche et de développement durable, conformément au document final de la Conférence des Nations unies sur le développement durable (Rio+20) «L'avenir que nous voulons». Les Directives PAD sont étroitement liées aux Directives volontaires pour une gouvernance responsable des régimes fonciers applicables aux terres, aux pêches et aux forêts dans le contexte de la sécurité alimentaire nationale (Directives foncières), adoptées en 2012 par le Comité de la sécurité alimentaire mondiale. Les Directives volontaires à l'appui de la concrétisation progressive du droit à une alimentation adéquate dans le contexte de la sécurité alimentaire nationale (Directives sur le droit à l'alimentation) constituent un autre instrument international majeur. Adopté par les Membres de la FAO en 2004, cet instrument considère que les droits économiques, culturels et sociaux font partie intégrante des travaux des agences spécialisées dans l'alimentation et l'agriculture.

Dans le même esprit, les Directives PAD mettent en avant un certain nombre de principes directeurs importants sur lesquels s'appuiera leur mise en œuvre: les droits de l'homme et la dignité humaine, le respect des cultures, la non-discrimination, l'équité et l'égalité entre les hommes et les femmes, des sexes, l'équité et l'égalité, la consultation et la participation, le respect du droit, la transparence, l'obligation de rendre des comptes, la viabilité économique, sociale et environnementale, les approches globales intégrées, la responsabilité sociale, la praticabilité et la viabilité économique et sociale.

Lors de la Conférence régionale «Construire un avenir pour une pêche artisanale durable en Méditerranée et en mer Noire» organisée par la Commission générale des pêches pour la Méditerranée (CGPM) à Alger (Algérie) du 7 au 9 mars 2016, le Panel 5 a débattu autour du thème «Mettre en pratique les Directives PAD: le cas de la Méditerranée et de la mer Noire». Le débat a porté sur les parties pertinentes des Directives PAD, en s'appuyant également sur les rapports d'information et les études de cas préparés par les membres du panel et les organisations partenaires afin de proposer des exemples régionaux.

Dans ce cadre, les cinq thèmes suivants sont abordés:

- Existe-t-il des exemples de cadres politiques et juridiques – régionaux ou nationaux – qui s'intéressent de manière spécifique à la pêche artisanale et qui pourraient faciliter/entraver la mise en œuvre des Directives PAD? Les Directives PAD s'intéressent à la pêche artisanale et à ses besoins sous un angle global. Leur mise en œuvre doit être intersectorielle et faire intervenir des organismes publics et des partenaires tant à l'intérieur qu'à l'extérieur du secteur de la pêche. Les cadres politiques et juridiques pourront être examinés afin de traiter et d'intégrer toutes les dimensions des Directives PAD: gouvernance foncière et gestion des ressources; développement social, emploi et travail décent; chaînes de valeur, activités après capture et commerce; égalité entre les hommes et les femmes; risques de catastrophe et changement climatique.
- Quels sont les principaux groupes de parties prenantes (organismes publics, institutions, société civile, secteur privé et autres acteurs) qui doivent être impliqués dans la mise en œuvre des Directives PAD pour garantir leur succès? Les artisans pêcheurs et les travailleurs du secteur de la pêche doivent être directement impliqués dans la gouvernance et le développement de la pêche artisanale mais d'autres groupes de parties prenantes (organismes publics,

institutions, société civile, secteur privé et autres acteurs) ont aussi un rôle très important à jouer.

- Quelles sont les structures institutionnelles existantes et que manque-t-il – aux niveaux régional et national – pour permettre la mise en œuvre des Directives PAD, compte tenu de la nécessité d'une participation efficace des parties prenantes, d'une collaboration intersectorielle, de l'égalité hommes-femmes, etc.? Des structures institutionnelles adaptées doivent être en place pour permettre une participation efficace des parties prenantes, y compris les femmes et les acteurs du secteur après capture.
- Quels sont les principaux points d'ancrage pour la mise en œuvre des Directives PAD et quelles seraient les premières étapes pratiques de cette mise en œuvre en tenant compte des priorités et du contexte actuel? Les priorités et les principaux points d'ancrage pour la mise en œuvre des Directives PAD en fonction du contexte local, national et régional spécifique doivent être identifiés.
- Quels types d'interactions et de collaboration avec d'autres initiatives seraient nécessaires ou souhaitables, et comment assurer une cohérence entre les initiatives apparentées (dans le domaine de la pêche et les autres secteurs)? Des interactions et collaborations avec d'autres initiatives sont nécessaires pour que les actions répondent directement aux besoins de la pêche artisanale et, plus généralement, intègrent pleinement les principes et dispositions des Directives PAD.

L'exhaustivité des Directives PAD et leur cadre global intrinsèque en matière de politique et d'action constituent un outil puissant au service de la pêche artisanale. Cependant, la mise en œuvre des Directives PAD exigera des efforts ainsi qu'une volonté politique et des ressources. Les gouvernements, les organisations internationales et régionales, les organisations de la société civile et les organisations non-gouvernementales, les instituts de recherche et toutes les autres parties prenantes sont invités à soutenir ce processus.

La mise en œuvre doit être encouragée à différentes échelles et par différents moyens. Deux types d'initiatives sont nécessaires: celles qui mettent directement en œuvre les dispositions essentielles des Directives PAD et celles qui favorisent la sensibilisation et le partage d'expériences, permettant ainsi une large utilisation des Directives PAD dans toutes les activités relevant de la pêche artisanale. Les dispositions des directives doivent être pleinement intégrées aux politiques, stratégies et plans d'actions locaux, nationaux et régionaux. L'intégration des Directives PAD à la gouvernance, à la gestion et au développement du secteur constituera un grand pas en avant vers la concrétisation d'une pêche artisanale durable, dans l'intérêt des acteurs directement concernés mais aussi de la société dans son ensemble.

Background paper

Lena Westlund
Fisheries specialist at FAO
March 2016

INTRODUCTION

Background

Small-scale fisheries play an important role globally in food and nutrition security and poverty eradication. The sector contributes substantially to food supplies, employment and the local and national economies in the Mediterranean and the Black Sea region. Its importance is not always sufficiently recognized, and supporting data tend to be in short supply. However, the GFCM, acknowledging the need for secure sustainable small-scale fisheries, endorsed the First Regional Programme on Sustainable Small-Scale Fisheries in the Mediterranean and the Black Sea (2014–2018) at its thirty-eighth session (FAO headquarters, May 2014).

The development of this programme was based on the outcomes of a First Regional Symposium on Sustainable Small-Scale Fisheries in the Mediterranean and Black Sea held in Malta on 27–30 November 2013,[1] as well as on the recent adoption, in June 2014, of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines)[2]. The SSF Guidelines are the first international instrument specifically dedicated to small-scale fisheries. These guidelines were developed through a global participatory process that included consultations with over 4 000 stakeholders from 120 countries, and thus they have the broad support of governments, regional and international organizations, small-scale fisheries civil society organizations (CSOs), non-governmental organizations (NGOs) and academia. They represent a global consensus on small-scale fisheries governance and development, and promote an integrated and human rights-based approach to small-scale fisheries. The SSF Guidelines now need to be implemented to have the intended impact of enhancing the contribution of small-scale fisheries to food security and sustainable livelihoods.

Within this context, the regional conference on "Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea" will take place in Algeria on 7–9 March 2016. This regional workshop will provide the opportunity to discuss the way forward with regard to the implementation of the regional programme and the course of actions to be taken to ensure the sustainable development of small-scale fisheries, based on the application of the principles of the SSF Guidelines, with a view to tailoring them to the specificities of the GFCM area. It will focus on the main challenges (environmental, economic and social) for the development of sustainable small-scale fisheries.

FAO is organizing Panel 5 of the conference around "Putting the principles of the SSF Guidelines into practice: the case of the Mediterranean and the Black Sea". This brief background paper provides information on the structure and expected outputs of the panel session, and the overall context for the panel discussions.

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[1] Organized in partnership with the International Centre for Advanced Mediterranean Agronomic Studies – Mediterranean Agronomic Institute of Bari (CIHEAM-MAIB), the FAO Fisheries Department and FAO regional projects (AdriaMed, CopeMed, EastMed and MedSudMed), the FAO Subregional Office for North Africa, MedPAN and the WWF Mediterranean Programme.

[2] French: www.fao.org/3/a-i4356f/index.html; Spanish: www.fao.org/3/a-i4356s/index.html; and Arabic: www.fao.org/3/a-i4356a/index.html

PURPOSE AND FOCUS OF PANEL 5

At Panel 5 of the conference – Putting the principles of the SSF Guidelines into practice: the case of the Mediterranean and the Black Sea – the focus of the discussions will be on how to implement the SSF Guidelines in the region, what processes and institutional structures will be needed and what the roles of the various actors might be. It is hoped that the discussions will contribute to promoting collaboration and communication among the partners and the stakeholders within the region and globally. Also it is expected that, through the sharing of experiences and knowledge, the panel session will provide inputs into the development of implementation strategies at regional and national levels.

To achieve this, panellists of Panel 5 will share those experiences, both at the national and regional levels, which demonstrate the application of the SSF Guidelines. They will be asked to address the following questions:

1. Are there examples of policy and legal frameworks – national or regional – that specifically consider small-scale fisheries and that would facilitate/hinder SSF Guidelines implementation? The frameworks could refer to:
   - governance of tenure in small-scale fisheries and resource management;
   - social development, employment and decent work;
   - value chains, post-harvest and trade;
   - gender equality; and
   - disaster risks and climate change.
2. Who are the main stakeholder groups (government agencies, institutions, civil society, the private sector and other actors) that need to be involved in SSF Guidelines implementation to ensure success?
3. What **institutional structures** exist and what is missing – at national and regional levels – to allow for SSF Guidelines implementation, considering the need for effective stakeholder participation, cross-sectoral collaboration, gender equality, etc.?
4. What are the **key entry points** for SSF Guidelines implementation and what would be the first practical steps towards implementation according to priorities and taking current circumstances into account?
5. What kind of **interactions and collaboration with other initiatives** would be required or desired, and how can coherence among related initiatives (in the fisheries and other sectors) be ensured?

The panellists are:

- Mr Said Chakour, Centre National de Recherche et de Développement de la Pêche et de l'Aquaculture (CNRDPA), Algeria
- Mr Hacene Hamdani, Mediterranean Platform of Artisanal Fishers (MedArtNet)
- Mr Moussa Mennad, CNRDPA, Algeria
- Mr Brian O'Riordan, Low Impact Fishers of Europe (LIFE) Platform
- Mr Yassine Skandrani, Maghreb Platform for sustainable small-scale fisheries

The Panel 5 concept note can be found in Appendix 1.

SIDE EVENT

In addition to the panel discussion, there will also be a side event which will allow for presentations of some of the case studies, as well as an additional case study from Tunisia:

- Contribution et développement de la pêche artisanale: expériences de l'Algérie
- Said Chakour and Moussa Mennad
- La plateforme maghrébine et la mise en œuvre des Directives PAD
- Yassine Skandrani
- The revised European Common Fisheries Policy and small-scale fisheries – LIFE Platform
- Marta Cavallé and Brian O'Riordan
- Adoption des Directives PAD pour la réorganisation de la pêche artisanale: exemple de la Tunisie
- Asma Ben Abda

These presentations will follow the conclusion of the Panel 5 discussions.

STRUCTURE OF THIS PAPER

Part 1 of this paper begins with a brief recap of the SSF Guidelines, their principles and main contents. It then recalls the outcomes of the thematic session on "Setting up a regional platform to promote the implementation of the Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication" of the first GFCM small-scale fisheries symposium in 2013. Finally, it reports conclusions and recommendations of the Near East and North Africa Regional Consultation Towards the implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication that took place in Muscat, Oman, on 7–10 December 2015 in which several countries of the Mediterranean and Black Sea region participated.

Part 2 of this paper gives an overview of the topics to be discussed at Panel 5 of the regional conference on "Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea". The discussion will focus on the five questions outlined above, refer to related parts of the SSF Guidelines and also draw on the following background reports and case studies prepared by the panellists and partner organizations to provide examples from the region of strategies for developing small-scale fisheries:

- The National Fisheries and Aquaculture Development Strategy: How to develop sustainable small-scale fisheries – Centre national de recherche et de développement de la pêche (CNRDPA), Algeria;[3]
- The contribution of small-scale fisheries to integrated coastal development in Algeria: The case of Fouka Marine, Tipasa – CNRDPA, Algeria;
- Strengthening the role of stakeholders in the context of management and co-management schemes – World Wild Fund for Nature (WWF);[4]
- Implementing the SSF Guidelines – Maghreb Platform for sustainable small-scale fisheries; and
- Providing a framework for securing sustainable small-scale fishing livelihoods in the Mediterranean Sea: the opportunities and challenges for Europe's reformed Common Fisheries Policy (CFP) – LIFE.

[3] Support is provided by the United Nations Development Programme/FAO Project «appui à la formulation de la stratégie nationale de développement de la pêche et de l'aquaculture».

[4] This document was prepared by WWF as a background paper for Panel 2 on "Management and co-management options for SSF in the Mediterranean and Black Sea". It includes information on MedArtNet.

PART 1
The SSF Guidelines

In June 2014, the 31st Session of the FAO Committee on Fisheries (COFI) endorsed the SSF Guidelines, the first international instrument specifically dedicated to small-scale fisheries. This endorsement marked the conclusion of several years of work developing the SSF Guidelines through consultations and negotiations. The preparatory work on the instrument was carried out in close collaboration with CSOs representing fishers and fish workers, governments, academia, regional and other organizations, and stakeholders.

The SSF Guidelines are based on international human rights standards, responsible fisheries governance and sustainable development according to the Rio+20 outcome document "The future we want". The SSF Guidelines are closely linked to the Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (the Tenure Guidelines), endorsed by the Committee on World Food Security in 2012. The Voluntary Guidelines on the Progressive Realization of the Right to Adequate Food in the Context of National Food Security (the Right to Food Guidelines) are another important international instrument. The instrument was adopted by FAO Members in 2004 and considers economic, cultural and social rights as an integral part of the work of food and agriculture agencies.

On this basis, the SSF Guidelines outline an number of important key guiding principles that will underpin their implementation: human rights and dignity; respect of cultures; non-discrimination; gender equality and equity; equity and equality; consultation and participation; rule of law; transparency; accountability; economic, social and environmental sustainability; holistic and integrated approaches; social responsibility; and feasibility and social and economic viability.

With regard to subject matter content, the SSF Guidelines address:

- five main thematic areas:
  - governance of tenure in small-scale fisheries and resource management;
  - social development, employment and decent work;
  - value chains, post-harvest and trade;
  - gender equality (cross-cutting); and
  - disaster risks and climate change (cross-cutting).
- four areas related to creating an enabling environment and supporting implementation:
  - policy coherence, institutional coordination and collaboration;
  - information, research and communication;
  - capacity development; and
  - implementation support and monitoring.

The following sections of Part 1 briefly outline the outcomes of two meetings relevant to the SSF Guidelines and the GFCM region.

The thematic session on Setting up a regional platform to promote the implementation of the SSF Guidelines at the GFCM symposium in 2013

At the time of the 2013 GFCM small-scale fisheries symposium, the SSF Guidelines had not yet been finalized and endorsed but work was progressing on them, and the discussions at the session were forward looking. It was noted that the small-scale fisheries sector suffered from low visibility in spite of its importance, and the success of the SSF Guidelines would ultimately depend on increased recognition of and attention to the sector's importance. It was considered that the SSF Guidelines would offer a unique opportunity to support small-scale fisheries as they embody a comprehensive and holistic framework for both policy and actions. It was recognized that their implementation would require concerted efforts by a vast array of actors,

as well as political will and resources. CSOs – representing fishers, fish workers and their communities – governments, NGOs, research institutions and other stakeholders were, therefore, called upon to support the process of SSF Guidelines implementation. Collaboration, communication and the sharing of experiences and knowledge should define future actions to be undertaken.

In light of discussions during the session, the following actions were proposed:

- Increase the visibility of small-scale fisheries actors and facilitate the engagement of CSOs and other stakeholders in the implementation of the SSF Guidelines.
- Integrate the provisions of the SSF Guidelines in regional, national and local policies, strategies and action plans, taking into account the need to consider responsible fisheries in parallel with social and economic development and to apply a human rights-based approach, and allocate adequate human and financial resources for their implementation.
- Support the development of organizations and networks established for and by small-scale fisheries actors and which have clear and shared objectives and adequate funding to transform shared concerns and problems into shared solutions.
- Promote the inclusion of both men and women in the decision-making process, develop community-based monitoring and evaluation systems, ensure the collection of gender disaggregated data, support women's organizations and work towards gender equality.
- Work together within the remit of the proposed regional programme on small-scale fisheries to create one or more platforms of small-scale fishers for enhanced communication and information for the improvement of small-scale fisheries and the implementation of the SSF Guidelines.

The 2015 Near East and North Africa Regional Consultation Towards the Implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication

In line with the recommendations of the SSF Guidelines, in particular Paragraph 13.6, FAO, together with its partners, organized a global[5] and several regional workshops in order to create awareness of the SSF Guidelines and to facilitate implementation planning.

The Near East and North Africa Regional Consultation Workshop entitled Towards the implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication was held in Muscat, Oman, on 7–10 December 2015 and was jointly organized by the Ministry of Agriculture and Fisheries of the Sultanate of Oman, FAO and the GFCM. The workshop was attended by 40 participants from countries in the Near East and North Africa region – Algeria, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Lebanon, Libya, Mauritania, Morocco, Oman, Saudi Arabia, Sudan and Tunisia – including representatives of governments, fisher-folk organizations, CSOs and academia, as well as representatives of regional and international organizations, NGOs and other relevant actors.

The workshop noted the socio-economic and cultural importance of small-scale fisheries in the region. Small-scale fisheries contribute to livelihoods, food security, and local and national economies. Fish is very important for nutrition, especially for

[5] See Proceedings of the Workshop on the Development of a Global Assistance Programme in Support of the Implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication, 8–11 December 2014, Rome, Italy, at www.fao.org/3/a-i4880e.pdf

population groups with limited purchasing power, and small-scale fisheries are a main contributor to local fish supplies.

It is of great importance that the implementation of the SSF Guidelines be carried out within the framework of food security and poverty eradication, and take local needs into consideration. It was noted that small-scale fisheries-dependent livelihoods go beyond fishing, and encompass social, economic and cultural values as well. The comprehensiveness of the SSF Guidelines was acknowledged and the need to take a holistic approach to small-scale fisheries governance and development was recognized.

Women make significant contributions to small-scale fisheries, mainly in post-harvest processing and trading but also in other downstream and upstream activities, although the rate of women's participation varies from one country to another. Women also play an important role at the community and household levels. However, women's work is often invisible and, hence, not sufficiently recognized.

There are encouraging developments in the Near East and North Africa region with regard to reviews of policies and strategies, recognition of the socio-economic dimensions of small-scale fisheries, and increasing emphasis on participation of small-scale fisheries actors in decision-making that concerns resource management and development. However, challenges persist, including – with some differences among countries – insufficient or weak organizational structures of small-scale fisheries actors, poor infrastructure facilities and services, heavily exploited fishery resources and a strong influence of demand on production, especially in the context of exports, and increasing risks due to climate change and disaster impacts.

The full summary and conclusions as agreed at the end of the workshop are included in Appendix 2.

PART 2
Session 5 panel discussion

As mentioned in the introduction of this paper, Session 5 discussions of the regional conference will focus on five questions related to how to put the principles of the SSF Guidelines into practice in the Mediterranean and the Black Sea:

1. Are there examples of policy and legal frameworks that would facilitate/hinder SSF Guidelines implementation?
2. What main stakeholder groups need to be involved in SSF Guidelines implementation to ensure success?
3. What institutional structures exist and what elements are missing at national and regional levels to allow for SSF Guidelines implementation?
4. What are the key entry points for SSF Guidelines implementation?
5. What kind of interactions and collaboration with other initiatives would be required or desired, and how can coherence among related initiatives be ensured?

The following sections of Part 2 give a brief introduction to the issues posed by each of the five questions.

Session 5 panel question 1:

Are there examples of **policy and legal frameworks** – national or regional – that specifically consider small-scale fisheries and that would facilitate/hinder SSF Guidelines implementation?

The frameworks could refer to:

- governance of tenure in small-scale fisheries and resource management;
- social development, employment and decent work;
- value chains, post-harvest and trade;
- gender equality; and
- disaster risks and climate change.

Policy and legal frameworks

For enabling the implementation of the SSF Guidelines, a fundamental requirement at the national level is that the provisions of the guidelines are reflected in policies and legislation. The SSF Guidelines are a voluntary international instrument but would become binding if their contents were legislated into national law. An enabling legal framework is important in many different ways. Of particular importance, it provides – as gleaned from the background reports and case studies on Algeria and the Maghreb Platform[6] – a legal basis for the participation of fishers and fish workers in decision-making that concerns small-scale fisheries management and development. Importantly, it also provides, as identified in the SSF Guidelines themselves, a context for protecting legitimate tenure rights (to fishery resources and land) through legislation (Paragraph 5.4). The principle of the SSF Guidelines to "recognize and respect all legitimate tenure right holders and their rights" is also the first general principle of the Tenure Guidelines.[7]

As the SSF Guidelines takes a holistic, integrated and human rights-based approach to small-scale fisheries governance and development, the policy and legal remit goes beyond fisheries. This makes policy and legislation for the SSF Guidelines challenging, as many sectors in addition to fisheries are involved. Chapter 10 of the SSF Guidelines notes the need for policy coherence, a need that also applies to legislation. The guidelines also point out specific areas where legislation that is not directly fisheries-related could be required, i.e. Paragraph 6.12 states that "States should address occupational health issues and unfair working conditions of all small-scale fishers and fish workers by ensuring that the necessary legislation is in place […]" and Paragraph 8.3 reads "States should establish policies and legislation to realize gender equality and, as appropriate, adapt legislation, policies and measures that are not compatible with gender equality, taking into account social, economic and cultural aspects".

While certain legal provisions are likely to be a prerequisite to making implementation possible, political support is a key factor for implementation. If the SSF Guidelines are supported at the highest political level, they may become operational even within an imperfect legal framework. With political support, the likelihood that the SSF Guidelines will be used to "guide amendments and inspire new or supplementary legislative and regulatory provisions" (Paragraph 4.2) is greater. Political support will also facilitate the availability of funding. Public budgetary allocations will be an important requisite for implementing policies on the SSF Guidelines.

[6] See the section Structure of this paper in the *Introduction* above.
[7] See http://www.fao.org/docrep/016/i2801e/i2801e.pdf

Session 5 panel question 2:

Who are the **main stakeholder groups** (government agencies, institutions, civil society, private sector and other actors) that need to be involved in the SSF Guidelines implementation to ensure success?

Stakeholders

The importance of involving small-scale fisheries actors directly in decision-making that concerns small-scale fisheries management and development is a key cornerstone and basic principle of the SSF Guidelines. The SSF Guidelines are the result of a participatory development process and their implementation should follow the same logic. It is important to remember that small-scale fisheries actors include those who work in the post-harvest sector and other ancillary activities, as well as the members of small-scale fisheries communities. Both men and women should be involved and considered, giving special attention to vulnerable and marginalized groups.

Accordingly, the objectives of the SSF Guidelines "should be achieved through the promotion of a human rights-based approach, by empowering small-scale fishing communities, including both men and women, to participate in decision-making processes, and to assume responsibilities for sustainable use of fishery resources, and placing emphasis on the needs of developing countries and for the benefit of vulnerable and marginalized groups" (Paragraph 1.2). The SSF Guidelines explicitly identify several situations where participation is crucial, e.g. in regional, national and local processes for defining small-scale fisheries" (Paragraph 2.4) and "in the design, planning and, as appropriate, implementation of [fisheries] management measures, including protected areas, affecting their livelihood options" (Paragraph 5.15). An important point made by the SSF Guidelines is that rights and responsibilities come together (Paragraph 5.14). This means that participation in decision-making also gives responsibilities in implementing decisions.

Given the above guidance, the principles to apply with regard to the participation of small-scale fisheries actors in the implementation of the SSF Guidelines would seem fairly clear. As mentioned, the SSF Guidelines also give some guidance regarding the process for identifying small-scale fisheries actors (Paragraph 2.4). However, other stakeholders are also likely to be involved and because of the broad scope of the SSF Guidelines, going beyond fisheries, there is a substantial need for cross-sectoral collaboration. The stakeholders and partners in other sectors also need to be identified and their engagement promoted.

At the government level, states need to promote institutional linkages for collaboration with non-fisheries departments and agencies (Paragraph 10.5). Likewise, small-scale fisheries stakeholders should promote collaboration and networking. Some examples of collaboration found in the background reports and case studies include:

- In Algeria, the implementation of the new Fisheries and Aquaculture Development Strategy and related legislation foresee the need for a socio-economic dimension and collaboration with, among others, the National Agency of Microcredit Management, the Agriculture and Rural Development Bank, the Algerian Chamber for Fisheries and Aquaculture, the Social Development Agency and the Ministry of Labour, Employment and Social Security.
- The European Maritime and Fisheries Fund (EMFF) that supports the implementation of the CFP, *inter alia* requires Member States with over 1 000 small-scale coastal vessels to provide "an action plan for the development, competitiveness and sustainability of small-scale coastal fishing". It also specifically points out the obligation to eliminate inequalities between men

and women, and supports networking with organizations promoting equal opportunities in the context of job creation (EMFF Article 29b).
– Co-management experiences, reported in the WWF background paper, point to a need for participatory research, hence implying collaboration between small-scale fisheries actors and scientists.

Session 5 panel question 3:

What **institutional structures** exist and what is missing – at national and regional levels – to allow for SSF Guidelines implementation, considering the need for effective stakeholder participation, cross-sectoral collaboration, gender equality, etc.?

Institutional structures

The issue of institutional structures is closely linked to stakeholder participation and cross-sectoral collaboration as discussed above. It spans several dimensions and also relates to capacity-building.

In order for small-scale fisheries actors to participate in decision-making, arrangements to allow for this participation are needed. The background reports and case studies provide examples, at different levels, of such arrangements, e.g.:

– In Europe, as part of the CFP reform, the Directorate-General for Maritime Affairs and Fisheries (DG Mare) of the European Commission established regional advisory councils (ACs) for including fishers and other stakeholders in the process of advising on fisheries management and the implementation of the CFP. Seats have been reserved for small-scale fishers and their representatives on the ACs, "to ensure appropriate representation of smallscale fleets".
– Lessons learned from the WWF review of co-management arrangements show that central administrations have to recognize the need for participatory processes at the local level, and the legislative and administrative frameworks need to support stakeholder engagement. Other factors that are also important for successful co-management include leadership and the sharing of knowledge and information.

In order to take advantage of participatory decision-making processes, small-scale fisheries actors need to be organized. Well-organized stakeholders can also promote the introduction of participatory processes. However, small-scale fisheries actors tend to have inadequate organizational structures. The SSF Guidelines include a section on capacity-building (chapter 12), which spells out the need for supporting small-scale fisheries actors to participate in decision-making, ensuring "that the range and diversity of the small-scale fisheries subsector along the entire value chain is appropriately represented through the creation of legitimate, democratic and representative structures" (Paragraph 12.1). All actors – governments, development partners and small-scale fisheries actors themselves – should help put organizations in place, building on existing capacities and structures, as appropriate. It is important to ensure that women and marginalized groups are also fairly represented, and special provisions may be required to ensure that this happens in practice.

Appropriate small-scale fisheries organizations are needed at different levels – local, national, regional and global. Some of the background reports and case studies were prepared by regional small-scale fisheries organizations and deal specifically with the issue. Regional small-scale fisheries organizations include the following:

– MedArtNet was established by six fishers from Greece, France, Italy and Spain and has recently been expanded with representatives from Algeria and Morocco. It aims at promoting a more balanced inclusion of small-scale

fishers into decision-making that concerns the Mediterranean, and it was involved in the reform of the European CFP. At the local level, the WWF paper reviews several co-management experiences and shows that adequate institutional structures are essential for strengthening collaboration among stakeholders, which is key to successful results.

– The Maghreb Platform for sustainable small-scale fisheries was created to allow small-scale fishers to take part in decision-making that concerns fisheries management and to promote responsible fisheries. The platform brings together national networks of small-scale fisheries actors in five North African countries.
– The LIFE Platform was set up to provide a dedicated voice in the decision-making process at the European level for the smaller-scale low-impact fishers across Europe, with a focus on fishers and fishing. LIFE has members in the Baltic and North Sea regions, the North West and South West waters, and in the Mediterranean, i.e. in Croatia (application in process), Greece, France (in process), Italy (in process) and Spain (in process).

These are important examples of small-scale fisheries institutional structures, but it would appear that there are still challenges in ensuring effective organizations and participation. They include how to ensure representativeness (both men and women, as appropriate), how to promote knowledge-sharing and to build the capacity of stakeholders to lead and run organizations, and how to manage limited financial resources. Often small-scale and large-scale fishers belong to the same organization. This tends to result in the further marginalization of smaller-scale interests in the decision-taking process.

Session 5 panel question 4:

What are the **key entry points** for the SSF Guidelines implementation and what would be the first practical steps towards implementation according to priorities and taking current circumstances into account?

Key entry points

The SSF Guidelines are a comprehensive guide to sustainable small-scale fisheries and span a broad spectrum of areas and, thus, reflect the reality of small-scale fisheries. The holistic perspective of the SSF Guidelines is their strength and one of the very reasons why they were needed. However, from an implementation point of view, the task may seem rather overwhelming. Hence, it may be necessary to implement in phases and from different angles, and there are likely to be many different entry points. Also, priorities for local, national and regional situations could be different – although values and principles are the same – so implementation may be somewhat different in different parts of the world.

In chapter 13 of the SSF Guidelines on implementation support and monitoring, some key areas of implementation work are mentioned. These areas are also reflected in the outline for implementation drawn up by FAO and presented to COFI in 2014 in relation to the need for support to implementation. FAO has developed an implementation mechanism along the lines of *Enhancing the contribution of small-scale fisheries to food security and sustainable livelihoods: FAO Umbrella Programme for the promotion and application of the SSF Guidelines*, which includes the following four areas of work, each as a possible entry point to broader implementation:

– raising awareness: knowledge products and outreach;
– strengthening the science-policy interface: sharing of knowledge and supporting policy reform;

– empowering stakeholders: capacity development and institutional strengthening; and
– supporting implementation: collaboration and monitoring.

Paragraph 13.6 of the SSF Guidelines mentions the need for a global assistance programme and also regional plans of action in order to support implementation. The regional conference workshop for the Near East and North Africa region, reported in Part 1, was one in a series of regional workshops organized by FAO in collaboration with its partners to support the regional planning process. The March 2016 GFCM conference, aiming to provide inputs for developing harmonized strategies for the governance, development and management of the small-scale fisheries sector at the national and regional level, in accordance with the SSF Guidelines, is another important step in this region to promote implementation.

Still, while the regional process can provide important support to implementation, real impact will only be created at the national and local levels. Hence, it is encouraging to see governments and other stakeholders take initiatives to promote the SSF Guidelines, e.g. through the Algerian Fisheries and Aquaculture Development Strategy and the establishment of regional platforms such as the Maghreb Platform, MedArtNet and LIFE. These are important first steps for creating the necessary enabling environment and for making progress on SSF Guidelines implementation.

Entry points for SSF Guidelines implementation can also be found through other initiatives that have their origin outside the fisheries sector but involve the small-scale fisheries sector. These could be initiatives to promote decent work, to promote gender equality, to combat child labour or to manage integrated coastal zones. Spatial planning approaches are promoted by the SSF Guidelines (Paragraph 10.2) as a means for integrating small-scale fisheries concerns into broader land and resource use planning. In such an approach, the principles of the SSF Guidelines should be considered.

Session 5 panel question 5:

What kind of **interactions and collaboration** with other initiatives would be required or desired, and how can coherence among related initiatives be ensured?

Interaction and collaboration

As mentioned, the SSF Guidelines are by their nature broad and cross-sectoral. By promoting a holistic perspective of addressing both the need for responsible fisheries and sustainable economic and social development, wide-ranging collaboration is not just an option but a necessity. However, in many cases this may be easier said than done, as the mandate of fisheries administrations – wherein the SSF Guidelines would be "hosted" – rarely extends to non-specific fisheries issues such as livelihood support, social protection or labour regulations. The need for promoting national (government) institutional structures that allow for cross-sectoral collaboration has already been mentioned above.

As part of implementation, raising awareness of the SSF Guidelines also outside the fisheries administration and sector would appear to be important. Government departments working on gender, climate change and disaster risks, and social development should be made aware of the SSF Guidelines and learn how to cater to the needs of small-scale fishing communities. Governments are often supported by development partners active in the fisheries sector as well as in other sectors. Also, it may be useful to target development partners in efforts to create awareness about the SSF Guidelines. If the principles and provisions of the SSF Guidelines can be integrated into overall development processes, the positive impact is likely to be at a larger scale.

CONCLUDING REMARKS

The SSF Guidelines constitute a powerful tool for supporting small-scale fisheries given their comprehensiveness and inbuilt holistic framework for policy and action. Their implementation will, however, require concerted efforts by all, as well as political will and resources. Governments, international and regional organizations, CSOs and NGOs, research institutions and all other stakeholders are called upon to support this process.

Implementation needs to be promoted at different scales and with different means, and initiatives directly implementing key SSF Guidelines provisions as well as initiatives supporting awareness-raising and experience-sharing – allowing a broad use of the SSF Guidelines in all activities related to small-scale fisheries – are both needed. The provisions of the SSF Guidelines should be mainstreamed in regional, national and local policies, strategies and action plans. Once the SSF Guidelines become an integral part of everything concerning governance, management and development of the sector, a major step forward will have been taken towards securing sustainable small-scale fisheries for the benefit of those directly involved as well as of society at large.

APPENDIX 1. Concept note

BACKGROUND

In November 2013, the GFCM organized the First Regional Symposium on Sustainable Small-Scale Fisheries in the Mediterranean and Black Sea (27–30 November, Malta), in partnership with the International Centre for Advanced Mediterranean Agronomic Studies – Mediterranean Agronomic Institute of Bari (CIHEAM-MAIB), the FAO Fisheries Department and FAO regional projects (AdriaMed, CopeMed, EastMed and MedSudMed), the FAO Subregional Office for North Africa, MedPAN and the WWF Mediterranean Programme.

In light of the outcomes of the symposium and the adoption in June 2014 of the SSF Guidelines[8], the First Regional Programme on Sustainable Small-Scale Fisheries in the Mediterranean and the Black Sea (2014–2018) was endorsed by the GFCM at its thirty-eighth session (FAO headquarters, May 2014).

Within the framework of this programme, a second event on small-scale fisheries in the form of a regional conference is scheduled to take place in Algeria on 7–9 March 2016. The regional conference participants will discuss the way forward for the implementation of the regional programme and the course of actions to take to ensure the sustainable development of small-scale fisheries, based on the application of the principles of the SSF Guidelines, with a view to tailoring the guidelines to the specificities of the GFCM area of competence. The regional conference will focus on the main challenges (socio-economic and environmental) for the development of sustainable small-scale fisheries.

PANEL 5 – PUTTING THE PRINCIPLES OF THE SSF GUIDELINES INTO PRACTICE: THE CASE OF THE MEDITERRANEAN AND THE BLACK SEA

FAO is organizing the technical Panel 5 of the conference "Putting the principles of the SSF Guidelines into practice: the case of the Mediterranean and the Black Sea". The panel will explore how the SSF Guidelines can be implemented in the GFCM region within the framework of national strategies/policies and regional cooperation mechanisms. Panellists will share experiences, both at the national and regional levels, which demonstrate the application of the SSF Guidelines. They will be asked to address the following questions:

1. Are there examples of **policy and legal frameworks** – national or regional – that specifically consider small-scale fisheries and that would facilitate/hinder SSF Guidelines implementation?
   The frameworks could refer to:
   - governance of tenure in small-scale fisheries and resource management;
   - social development, employment and decent work;
   - value chains, post-harvest and trade;
   - gender equality; and
   - disaster risks and climate change
2. Who are the **main stakeholder groups** (government agencies, institutions, civil society, private sector and other actors) that need to be involved in the SSF Guidelines implementation to ensure success?
3. What **institutional structures** exist and what is missing – at national and regional levels – to allow for the SSF Guidelines implementation, considering the need for

8 French: www.fao.org/3/a-i4356f/index.html; Spanish: www.fao.org/3/a-i4356s/index.html; Arabic: www.fao.org/3/a-i4356a/index.html

effective stakeholder participation, cross-sectoral collaboration, gender equality, etc.?

4. What are the **key entry points** for the SSF Guidelines implementation and what would be the first practical steps towards implementation according to priorities and taking current circumstances into account?
5. What kind of **interactions and collaboration with other initiatives** would be required or desired, and how can coherence among related initiatives (in the fisheries and other sectors) be ensured?

The panel will be informed by a background paper that will include references to a number of case studies and reports that have been prepared for the conference.

The outcomes of the panel are expected to support the implementation of the SSF Guidelines in the GFCM region and will include elements for regional and national plans of action.

TENTATIVE PANEL 5 AGENDA – 9 MARCH 2016

Opening remarks
Presentation of background paper and introduction to panel discussion
Panel discussion based on case studies/background papers from Algeria (two studies), the Maghreb Platform for Small-Scale Fisheries, WWF and the LIFE Platform
Question 1: Are there examples of **policy and legal frameworks** that specifically consider small-scale fisheries and that would facilitate/hinder SSF Guidelines implementation?
Q&A with floor
Question 2: Who are the **main stakeholder groups?**
Q&A with floor
Question 3: **Institutional structures** – what exists and what is missing?
Q&A with floor
Question 4: What are **key entry points** for the SSF Guidelines implementation in the region?
Q/A with floor
Question 5: What is the scope for **interactions and collaboration with other initiatives?**
Q/A with floor
Conclusions: Recommendations to support the implementation of the SSF Guidelines in the GFCM region

APPENDIX 2. Summary conclusions and recommendations of the Near East and North Africa regional consultation workshop towards the Implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication

Muscat, Oman
7–10 December 2015

INTRODUCTION

The Near East and North Africa regional consultation workshop Towards the Implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication was held in Muscat, Oman, on 7–10 December 2015, and was jointly organized by the Ministry of Agriculture and Fisheries of the Sultanate of Oman, the Food and Agriculture Organization of the United Nations (FAO) and the General Fisheries Commission for the Mediterranean (GFCM). The workshop was attended by 40 participants from countries in the Near East and North Africa region – Algeria, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Lebanon, Libya, Mauritania, Morocco, Oman, Saudi Arabia, Sudan and Tunisia – including representatives of governments, fisher-folk organizations, civil society organization (CSOs) and academia, as well as representatives of regional and international organizations, NGOs and other relevant actors.

The overall objective of the workshop was to raise awareness and support the implementation of the *Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication* (SSF Guidelines) in the region. During the workshop, participants reviewed the situation and current status of small-scale fisheries in the region, shared experiences through regional and topical presentations and discussions, and made suggestions with regard to the implementation of the SSF Guidelines in the region, including identification of priorities and recommendations for actions.

The workshop noted the socio-economic and cultural importance of small-scale fisheries in the region. Small-scale fisheries contribute to livelihoods, food security, and local and national economies. Fish is very important for nutrition, especially for population groups with limited purchasing power, and small-scale fisheries are a main contributor to local fish supplies.

It is of great importance that the implementation of the SSF Guidelines be carried out within the framework of food security and poverty eradication, and take local

needs into consideration. It is noted that small-scale fisheries-dependent livelihoods go beyond fishing, and encompass social, economic and cultural values as well. The comprehensiveness of the SSF Guidelines is acknowledged, and the need to take a holistic approach to small-scale fisheries governance and development is recognized.

Women make significant contributions to small-scale fisheries, mainly in post-harvest processing and trading but also in other downstream and upstream activities, although the rate of women's participation varies from one country to another. Women also play an important role at the community and household levels. However, women's work is often invisible and, hence, not sufficiently recognized.

There are encouraging developments in the region with regard to reviews of policies and strategies, recognition of the socio-economic dimensions of small-scale fisheries, and the increasing emphasis on participation of small-scale fisheries actors in decision-making that concerns resource management and development. However, challenges persist and include – with some differences among countries – insufficient or weak organizational structures of small-scale fisheries actors, poor infrastructure facilities and services, heavily exploited fishery resources and the strong influence of demand on production, especially in the context of exports, and increasing risks due to climate change and disaster impacts.

The workshop participants recognized that the implementation of the SSF Guidelines and of the outcomes of this workshop need to be linked and integrated with other ongoing initiatives in the region and at national level; for example, the FAO Blue Growth Initiative and the ecosystem approach to fisheries. There is also an important potential for countries in the region to share experiences with one another.

OUTCOMES OF WORKING GROUP DISCUSSIONS

Key priority areas of actions to be further considered in national and regional implementation planning processes proposed by the workshop included:

Governance of tenure in small-scale fisheries and resources management (chapter 5 of the SSF Guidelines)

- *The small-scale fisheries sector is constrained by the lack of specific small-scale fisheries areas, and the regulatory framework does not grant preferential access rights*. Countries should develop or improve legislation, policies, strategies, plans and institutional structures to grant fair access and user rights for sustainable small-scale fisheries, both to men and women. At the regional level, experiences with small-scale fisheries support infrastructure (e.g. processing/landing sites, fishing villages) should be shared.

- *Existing institutional frameworks do not always enable the participation of all relevant small-scale fisheries actors to achieve sustainable management.* At the regional level, producer organization platforms and other appropriate mechanisms/organizations are needed to contribute to participatory decision-making. These organizations need training and capacity development as concerns the sustainable use and management of resources. At the national level, these organizations can play an important role in supporting the development and strengthening of fishers and fish workers, including women, and their associations. National regulatory frameworks should be reviewed, as necessary, to ensure the participation of organizations in the sustainable management of small-scale fisheries.

- *Data and information necessary to support sustainable management of small-scale fisheries are often lacking or insufficient*. The awareness of all stakeholders about the importance of data and information needs to be raised, and the capacities

to process and use data should be developed, including at local levels, so that small-scale fisheries actors can participate in data collection. Modern technologies should be used in the collection, processing and analysis of data, and results need to be documented and disseminated to all relevant stakeholders. One institution at national level should be in charge of providing official information on small-scale fisheries.

Social development, employment and decent work, and gender equality (chapters 6 & 8 of the SSF Guidelines)

- *Small-scale fisheries actors in the region, particularly deprived categories, women and migrants, are not always sufficiently organized to actively participate in fisheries management and policies.* It is expected that increased participation could also contribute to the creation of additional employment possibilities. Valuable existing national experiences of organizational development should be shared in the region to inform organizational strengthening. In addition, regulatory frameworks and their implementation need to be assessed in relation to their supportive functions for organizations.

- *Small-scale fishers and fish workers, in particular women and deprived groups, often lack access to social security protection.* Better organization of small-scale fisheries actors and the provision of awareness-raising and training on the benefits of social protection and on how to access these schemes should be provided. In addition, various funding mechanisms for social protection need to be explored across the region and beyond, taking into account the specificities of the sector.

- *Safety at sea and other decent working conditions, including for women, are currently insufficient in small-scale fisheries.* A regional workshop on decent working conditions (including safety at sea and occupational safety and health) should be organized with relevant partners. In this context, the impact of climate change on working conditions in fisheries should also be considered. Appropriate legislation should be developed and enacted at national level, and small-scale fishers and fish workers should benefit from training on safe technologies for better working conditions. The use of information and communication technology to improve working conditions should be promoted, and cost-efficient safety equipment solutions should be developed with the involvement of fishers.

- *In order to enable small-scale fisheries to be a driver for development, integrated approaches that reconcile environmental, social and economic development are needed*. All countries in the region should use the SSF Guidelines as a reference framework when developing policies and strategies. Research, in particular on socio-economic aspects, should contribute to improved conditions for small-scale fisheries. Importantly, monitoring the capacities of all stakeholders to assess progress needs to be developed. At the regional level, coordinated management and research agendas in relation to shared stocks should be encouraged and regulations should be harmonized.

- *In general, the small-scale fisheries sector is often characterized by limited access to education and professional development opportunities, in particular for children/women.* The implementation of International Labour Organization (ILO) guidance on decent work should be promoted to support better professional development in the sector. Moreover, functional basic literacy needs to be ensured.

Value chains, post-harvest and trade (chapter 7 of the SSF Guidelines)

- *Small-scale fisheries actors need to be empowered to reap more of the benefits of and income from the sales of their produce*. Their marginalization should be eliminated and their self-esteem improved. At the national level, fisheries departments need to provide support, e.g. through establishing better marketing facilities, following the successful experiences of "model fishing villages". The negotiating power of small-scale fisheries actors vis-à-vis intermediaries (middlemen) needs to be strengthened, in particular in the context of exports. At the regional level, better coordination among governments is needed to negotiate trade agreements with importing countries, taking small-scale fisheries into consideration. Countries should be more proactive and promote changes in mandates/functionality of regional organizations, as required, to be become more effective.

- *The links between trade (demand) and production need to be better understood and considered*. Adverse impacts of international trade on resource utilization and local food security should be avoided by creating awareness among intermediaries and consumers on resource implications of demand. Diversification of small-scale fisheries products should be promoted, and the access of small-scale fisheries actors to knowledge on new markets and products should be facilitated. The current dependence of small-scale fishers and fish workers on intermediaries for financing and provision of inputs needs to be reduced by providing them with the necessary support and services to become more independent, e.g. through cooperatives, improved regulations, fair competition and transparency with regard to the role of intermediaries.

- *The organizational structures of small-scale fisheries actors need to be strengthened along the value chain to enhance their negotiating power* with other segments of the market and allow them to get better returns from their production activities. Strong organizations are also needed to enable effective participation of small-scale fisheries stakeholders in policy and decision-making processes. Governments should ensure that small-scale fisheries effectively participate at all levels of decision-making, and small-scale fisheries actors need to ensure that their organizations have clear statutes, promote compliance and are representative.

- *The availability of trade-related information facilitating the access to domestic, regional and international markets needs to be improved*. Appropriate links and networks for sharing and exchanging information should be strengthened, making use of relevant regional organizations and structures. Trade-related information systems should be developed that can provide real-time information on prices in different markets to small-scale fisheries actors. These need to be based on a suitable platform and make use of appropriate technologies.

- *There is a lack of adequate conditions and controls to ensure the quality and prices of fishery products.* Small-scale fisheries actors need capacity development to improve their handling and marketing opportunities, based on international good practices, to increase the value of their products. Requirements and specifications of the products to ensure quality should be determined at national level, based on international norms.

- *Investments are needed* for small-scale fisheries in appropriate infrastructures and equipment, marketing facilities and financial support, as well as in the development of technical and human capacities for value addition and reduction of post-harvest losses.

Small-scale fisheries actors should be supported with regard to the improvement of product quality and value addition. There is also a need to increase their awareness of product quality and safety requirements.

- *The context of food security and poverty eradication is essential* and priority should be given to improved value added to the benefit of small-scale fishing communities and the improvement of their well-being, but also remembering the needs of consumers. Macroeconomic objectives, including exports, need to be accompanied with mechanisms to ensure that small-scale fishing community development needs are satisfied.

Climate change and disaster risks

- *Climate change and disasters negatively affect small-scale fisheries in the region* (e.g. through sea-level rise, changes in water temperature and salinity, damages to infrastructure by storms, red tides and human-induced pollution, such as chemical). Studies to better understand the impact of climate change and disasters at the regional level are needed, and the small-scale fisheries sector needs to be included in national climate change adaptation strategies. In addition, forecasting, prevention and preparedness capacities of all stakeholders to deal with disasters need to be enhanced.

NEXT STEPS

The workshop identified the following next steps to actively promote SSF Guidelines implementation at the national and regional levels:

- *All participants* should encourage the use of the outcomes of the workshop to provide a road map for national action planning in relation to small-scale fisheries, using the SSF Guidelines as a general reference framework.
- *All participants* should raise awareness about the SSF Guidelines and the workshop outcomes, including through:
    - distribution of the SSF Guidelines to all relevant stakeholders;
    - preparation and dissemination of simplified and other national and local language versions and multimedia communication products;
    - organization of information meetings with different stakeholder groups, including ministries/government agencies, CSOs, fishing cooperatives, federations, unions, etc., to agree on actions and distribute tasks; and
    - dissemination through electronic networks and web sites as well as local and national media (e.g. newspapers).
- *Regional bodies and organizations* should be more involved in the implementation of the SSF Guidelines, e.g. through:
    - the regional network for fisheries research institutes in the Maghreb countries;
    - including SSF Guidelines implementation in the work programme of, for example, the Regional Commission for Fisheries (RECOFI); and
    - the use and strengthening of the Maghreb Platform for SSF and MedArtNet and other similar organizations.
- *The Ministry of Agriculture and Fisheries of Oman* should include information on the SSF Guidelines and the outcomes of the workshop in the Senate Al Bahar forum.

The need to identify and secure funding and synergies by all stakeholders is acknowledged. This should include reviewing possibilities to include SSF Guidelines implementation in ongoing and planned projects and programmes. Proposals for new projects focusing on SSF Guidelines implementation could be prepared for

consideration by development partners, bilateral donors and embassies at country level, and NGOs. Fisheries administrations should also strive to include SSF Guidelines implementation in their regular budgets. The establishment and access to national funds, like the Agriculture and Fisheries Development Fund in Oman, should be encouraged. Also, taxes and levies generated by the sector itself should be reinvested in its development.

Interactions with relevant non-fisheries ministries and departments at all levels and clarification of responsibilities for the mainstreaming of the SSF Guidelines in relevant policies, strategies and plans as well as public-private partnerships in support of the SSF Guidelines should be encouraged. Possibilities to receive support from large private-sector companies, e.g. through corporate social responsibility schemes or polluter pay principle application, should be explored. Similarly, access to climate change adaption funds and the establishment of disaster risk funds should be promoted.

The workshop called on:

- countries from the region to participate in the GFCM regional conference on "Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea" to be held in Algeria in 2016; and
- FAO to improve awareness of national FAO Representations on SSF Guidelines implementation needs.

Participants thanked the Ministry of Agriculture and Fisheries of the Sultanate of Oman, FAO and GFCM for hosting and organizing the workshop.

Muscat, 10 December 2015

CONCLUSIONS

Conclusions of the Regional Conference on "Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea"

(ALGIERS, ALGERIA, 7–9 MARCH 2016)

PREAMBLE

The Regional Conference on "Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea" (Algeria, March 2016) enjoyed the robust attendance of over 200 participants, which included policy-makers, scientists, practitioners, representatives of fishers, fish workers, civil society organizations, non-governmental organizations (NGOs), research institutions, international organizations and more. The conference was organized by the General Fisheries Commission for the Mediterranean (GFCM) and the Fisheries and Aquaculture Department of the Food and Agriculture Organization of the United Nations (FAO), including its Mediterranean regional projects, in collaboration with the Algerian Ministry for Agriculture, Rural Development and Fisheries and in partnership with the International Centre for Advanced Mediterranean Agronomic Studies – Mediterranean Agronomic Institute of Bari (CIHEAM-MAIB), the Network of Marine Protected Areas Managers in the Mediterranean (MedPAN) and the World Wide Fund for Nature (WWF).

In 2013, on the occasion of the First Regional Symposium on Sustainable Small-Scale Fisheries in the Mediterranean and the Black Sea (Malta, November 2013), the main challenges and opportunities for the sustainable development of the small-scale fisheries sector in this region were brought to the forefront. Since then, such issues have continued to gain prominence in discussions on small-scale fisheries management in the context of the Blue Growth Initiative in the Mediterranean and the Black Sea.

This regional conference was conceived as a practical response to the outcomes of the symposium in Malta, seeking to capitalize on the momentum already generated in order to offer a tangible strategy for the future sustainable development of this sector. Concrete case studies were carried out, which further explored key themes identified through the symposium, and their results were presented in a format which deliberately sought to promote discussions, express opinions and share experiences in order to better grasp priorities and opportunities for this sector.

There is no doubt that small-scale fisheries in the Mediterranean and the Black Sea play a significant social and economic role. These fisheries constitute over 80 percent of the fishing fleet, employ at least 60 percent of total on-vessel fishing labour and account for approximately 25 percent of the total landing value from capture fisheries in the region. At their best, small-scale fisheries exemplify sustainable resource use: exploiting marine living resources in a way that minimizes environmental degradation while maximizing economic and social benefits. Yet concerted effort is needed to ensure that best practices become standard practices.

In recognition of this need for a concerted action for the sustainable development of the small-scale fisheries sector, the Algerian Ministry for Agriculture, Rural Development and Fisheries graciously offered to host the regional conference with a

view to mobilizing such an effort. This event is perfectly aligned with the "Aquapêche 2020" strategy, recently launched by Algeria as a result of a nation-wide consultation process with all stakeholders and with the support of the United Nations Development Programme (UNDP) and FAO. Consistent with Blue Growth principles, this strategy is also expected to provide a decisive contribution towards the promotion of sustainable small-scale fisheries, both at the national and regional levels.

The following conclusions have been developed based on the outcomes of the regional conference. The conclusions are put forth to urge actions in support of sustainable small-scale fisheries in the Mediterranean and the Black Sea and they are grouped, first, under a cluster of general and transversal proposals and, next, under five clusters relating to the specific thematic sessions of the conference.

GENERAL CONCLUSIONS

In light of the United Nations Sustainable Development Goals which, among other issues, stress the importance of providing access for small-scale fisheries to marine resources and markets, the importance of the Regional Conference on "Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea" was acknowledged. Widespread support was expressed by conference participants for the conference objectives to raise awareness, share knowledge and devise future strategy to promote this crucial fishing sector.

In particular, the following general proposals were made:

- Tailor the implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) to the Mediterranean and Black Sea context and provide support to GFCM member countries in the implementation of these guidelines.
- Launch a comprehensive and region-wide survey to develop accurate, timely and complete baseline data on the value and economic impact of small-scale fisheries, with a view to ultimately informing policy interventions.
- Launch wide-ranging consultations, including a mechanism for the sustainable development of the small-scale fishing sector and specific actions to develop coordinated policy to support this sector. To this end, implement a joint regional strategy which builds on existing regional networks and platforms and promotes a level playing field throughout the Mediterranean and the Black Sea.
- Develop a regional programme aiming to provide support and technical assistance, in particular to developing countries, in order to build capacity in the field of small-scale fisheries. Carry out at the national level, where necessary, an analysis of legislation and institutional mechanisms which ensure the full participation of small-scale fishers in all activities regarding the sustainable development of the sector (development of alternative activities, co-management, financial support, labelling, traceability, right to decent work, social protection, etc.).
- Build the political will to invest in small-scale fisheries as a crucial tool to transform fisheries management, particularly within the context of the Blue Growth initiative and the implementation of the reformed Common Fisheries Policy of the European Union (EU). It was suggested that the GFCM member countries, the European Commission and FAO provide joint leadership in this regard (i.e. through the organization of a high-level event).
- Disseminate the conclusions of the Regional Conference on "Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea" to relevant international meetings, such as GFCM regular sessions, the FAO Committee on Fisheries (COFI) and relevant EU meetings.

SPECIFIC CONCLUSIONS RELATING TO THE PANELS

PANEL I – Supporting the sustainable development of small-scale fisheries in the Mediterranean and the Black Sea under the Blue Growth perspective

Blue Growth is a recent concept that seeks to create sustainable economic, environmental and social development in the aquatic environment. As Mediterranean and Black Sea fisheries are dominated by small-scale fishing activities, if the exploitation of fish resources in these seas is to contribute to Blue Growth, then small-scale fishing will necessarily play an integral role in Blue Growth strategies.

In light of the discussions held during the panel, it is proposed to:

- Develop indicators to measure the economic and social impact of small-scale fishing, both in quantitative and qualitative terms. In particular, efforts should be made to estimate not only the value of the output produced by such fishing and its economic impact on coastal communities in the Mediterranean and Black Sea, but efforts should also be made to measure the impact of small-scale fishing on related sectors such as fish processing and tourism. Furthermore, an analysis of the interaction of small-scale fishing with other sectors, particularly those also engaged in Blue Growth strategies (i.e. marine transportation, oil and gas, tourism, etc.), is needed for a better understanding of the wider economic and social impacts of small-scale fishing as well as the risks these other sectors may pose to small-scale fishing communities.
- Examine the economic impact of small-scale fishing under different exploitation arrangements, with a view to identifying circumstances under which this activity might generate an investable surplus and undertake studies to estimate the potential size of this surplus. Similarly, efforts should be made to identify points of entry for technological, management, marketing and policy interventions that would facilitate the above-mentioned favourable circumstances.
- Identify relevant parameters – having acknowledged the need to develop a common definition of small-scale fisheries – for the classification of "small-scale fishing" in the Mediterranean and Black Sea, based on relevant regional characteristics (e.g. dimension of the vessel, gear used, activities of non-vessel based fisheries) and in relation to the harvested resources.
- Disseminate information on the effectiveness of the GFCM Data Collection Reference Framework (DCRF) and promote its use as a data collection tool for small-scale fishing. Provide technical assistance in the practical application of the DCRF in the collection of standardized data on smallscale fishing in the Mediterranean and the Black Sea.
- Produce a desk study on the social protection systems and national legislations in place and available to small-scale fishers in the Mediterranean and Black Sea riparian states, with a view to identifying and promoting the most successful options.
- Identify policy interventions which facilitate income and livelihood diversification for smallscale fishers. In particular, efforts should be made to identify opportunities for crossover between the small-scale fishing and small-scale aquaculture sectors.
- Develop, in collaboration with GFCM Members, a pilot programme that would test ways to both better integrate small-scale fisheries into a Blue Growth approach, as well as better integrate small-scale fisheries in the decision-making processes of other sectors whose Blue Growth activity may have an impact on small-scale fisheries.

PANEL II – Strengthening the role of stakeholders in the context of management and co-management schemes

Acknowledging concrete evidence on how co-management can be an effective approach for both resolving conflicts and developing innovative solutions for the management of small-scale fisheries, key actions were identified that would create enabling conditions for the institutionalization of stakeholder engagement through co-management schemes. Such key actions include the need for stronger investment in capacity building, both for institutions and for fisher organizations, and the need for a better understanding of legal and institutional frameworks that allow for the participation of fishers in fisheries management. The panel stressed that while Blue Growth presents important opportunities for small-scale fisheries, the effects of Blue Growth in other sectors may also present a risk to these fisheries. Stronger organization and co-management initiatives are needed in order to guard against such risks.

In light of the discussions held during the panel, the following actions are proposed:

- Conduct an analysis to assess national and international legal frameworks with a view to identifying institutional contexts that allow for the establishment of small-scale fisheries co-management schemes and with a view to defining general rules for the engagement and compliance of small-scale fishers with these schemes.
- Prepare best practice guidelines for the enforcement of small-scale fisheries co-management schemes in the Mediterranean and the Black Sea. Such guidelines should be linked directly to the SSF Guidelines and, in addition to providing advice on the institutional and legislative context, should provide direction for the elaboration and implementation of participatory processes, co-management settings and tools, approaches for monitoring, control and surveillance schemes and indicators to monitor the effectiveness of management measures.
- Provide support to ongoing co-management processes in the Mediterranean and build commitment for their multiplication across the region. A regional programme, based on a solid institutional framework and building on existing experiences and partnerships, should be established to offer a longer-term vision on how co-management can benefit small-scale fisheries at the regional scale.
- Map fishing activities in order to provide relevant information to be integrated into marine spatial planning processes. Such processes are crucial to securing tenure rights and access to the resources for small-scale fishers, and thus ensuring livelihoods and the sustainable development of communities reliant on small-scale fisheries. The GFCM, on behalf of its member countries, should advocate for this issue at a high-level with the European Commission, prior to the commencement of the marine spatial planning processes.
- Establish a capacity-building programme devoted to supporting stakeholder roles in smallscale fisheries co-management and tailored to different targets (institutional, marine protected areas administration, local administrations, natural and social scientists, civil society, small-scale fishers and other resource users).

PANEL III – Improving the efficiency of marine protected areas (MPAs) as fisheries management tools and benefits from involving the small-scale fisheries sector

Recognizing the priority socio-economic and environmental challenges for the management of marine ecosystems, MPAs offer a potential solution to concurrently address a multitude of issues. Indeed, an important strategy for reconciling conservation and sustainability objectives is the integration of the small-scale fisheries sector into management decisions in and around MPAs. Action must be taken at the local and national levels in view of reaching international and regional agreements. Such action can be effected by decision makers, MPA managers, fishers, scientists and the private sector.

In light of the discussions held during the panel, it is proposed to:

- Adapt and draw lessons from the experience of MPAs with no take zones and regulated buffer zones that have been successful in involving fishers in management decisions and in processes that both safeguard wild resources, while also preserving the livelihoods upon which small-scale fishers depend. Given the socio-economic benefits obtained by small-scale fishers in these exemplary MPAs, learning from such cases would provide guidance on how to sustain economic, social and cultural aspects of the profession. To support replication of these successful MPAs, adequate legal frameworks, political will and financial and human capital would be required.
- Replicate examples of collaboration at the inter- and intra-ministerial levels that demonstrate the successful management of small-scale fisheries in and around MPAs when working "hand in hand". Such integrative models could encourage top-down and bottom-up processes in many riparian countries for securing the future sustainability of the profession, while also providing international technical guidance.
- Improve the management of MPAs, including multiple use MPAs, by relying on the scientific and traditional knowledge of fishers, by involving concerned users/stakeholders and by using adaptive approaches. To this end:
    - Tailor management in light of the outcomes of long-term comparative monitoring of biological features, ecological effects of small-scale fisheries and socio-economic benefits in and outside MPAs;
    - Develop adaptive participatory approaches for management plans for small-scale fisheries in and around MPAs, based on biological and socio-economic data, which could be jointly formulated, implemented and revised by MPA practitioners and fishers;
    - Adopt regulations to overcome conflicting uses of MPAs which could have a negative impact on the livelihood of small-scale fisheries, having regard to relevant conservation objectives;
    - Consider participative management, in cases of use conflicts, specifically those between small-scale fisheries and recreational fisheries, to create a balance between the sustainable development of small-scale fisheries and, where applicable, the sustainable development of responsible tourism, so as to achieve conservation objectives.
- Consider conservation efforts, and MPAs in particular, as an investment in natural capital rather than as a public expenditure. As such, efforts should be made to protect this investment from risks, such as conflicting marine-based activities and land-based pollution.
- Safeguard the small-scale fisheries sector in and around MPAs, including by setting up cooperatives, through strategies that are integrated in development plans devised by local authorities and that provide a market edge in favour of responsible and sustainable fisheries practices.

PANEL IV – Enhancing small-scale fisheries value chains

The value chain of small-scale fisheries is enhanced by a favourable environment where fishers are strongly connected with other local actors, including public and private institutions and even consumers. This permits the creation of competitive economic clusters, which can foster the development of coastal communities. Clustering must be encouraged, eliminating all possible bottlenecks. In the case of SSF in the Mediterranean and Black Sea, four relevant areas of intervention have been identified: sustainability aspects (including governance and MPAs), marketing strategies (quality aspects), inter-sectoral integration and provision of infrastructures and services (in particular, access to markets and credit).

In light of the discussions held during the panel, it is proposed to:

- Identify best practices for value creation, especially in the fields of labelling, direct sale, processing, diversification, inter-sectoral integration and vertical coordination. Additional case studies should be carried out to further examine such best practice interventions and to promote their replication in various Mediterranean and Black Sea contexts.
- Model successful value chains, particularly in cases where clustering of various coastal economic activities occurs, to identify entry points for innovation and to better understand the scope for fisher cooperation in resource management and in product marketing.
- Establish a capacity-building programme to support stakeholder roles in the creation of cooperatives, formulation of agreements with public and private institutions, development of partnerships and projects for coastal development.
- Better study and analyse issues related both to credit and financial institution support. Public institutions should provide basic infrastructures and services to foster value chains and to prevent market failure. Access to formal finance is a crucial concern. This includes access to both formal credit for capital expenses and financing for fishing operations. Facilities and financial products can be developed in partnership with banks for medium to long-term investment. Formal financing schemes (production contracts, storage receipts) can be applied with the participation of fishers, traders and public authorities.

PANEL V – Putting the principles of the SSF Guidelines into practice: the case of the Mediterranean and Black Sea

The SSF Guidelines constitute an important tool for supporting actions to securing sustainable smallscale fisheries in the Mediterranean and the Black Sea. These guidelines take a holistic perspective on the needs of small-scale fisheries and recognize that the implementation of these guidelines will necessarily be cross-sectoral. With a view to adapting these guidelines to the regional context, key elements to operationalize the principles of the SSF Guidelines were explored: i) policy and legal frameworks; ii) main stakeholders; iii) institutional structures; iv) key entry points; and v) collaboration with other initiatives. The panel noted the importance of action at the local level and the need for effective participation of fishing communities. There are already positive developments taking place in the region in support of the SSF Guidelines implementation, for instance the existence of regional organizations and platforms such as the Maghreb Platform for sustainable small-scale fisheries, the Mediterranean Platform of Artisanal Fishers (MedArtNet), Low Impact Fishers of Europe (LIFE) and the Mediterranean Advisory Council (MedAC), and the development of national policies and initiatives (e.g. Aquapêche 2020 in Algeria, SSF national action plan proposals in EU countries).

In light of the discussions held during the panel, it is proposed to:

- Establish a GFCM working group on small-scale fisheries to facilitate the implementation of the SSF Guidelines in the GFCM region by developing national action plans and taking into account recommendations from relevant events and existing experience within the region and beyond.
- Strengthen the GFCM engagement with small-scale fishing communities by establishing a mechanism for supporting organizational development and agreeing on a *modus operandi* for meaningful collaboration. In particular, FAO's work on small-scale fisheries should be taken into account and special efforts should be made to collaborate with existing small-scale fisheries organizations and platforms, as well as to include women and marginalized groups in such collaboration.
- Promote, without compromising environmental sustainability, the improvement of socio-economic conditions within small-scale fisheries, particularly through the promotion of livelihood diversification as appropriate, and the endorsement of the principle of decent work, as defined by the Work in Fishing Convention (C188) of the International Labour Organization (ILO). Furthermore, ratification of this convention by GFCM member countries should be encouraged.
- Promote and facilitate the development of a forum for small-scale fisheries associations of northern and southern Mediterranean riparian countries, particularly through specific projects financed by member countries or by other international, governmental or non-governmental entities.

ACKNOWLEDGEMENTS

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Conclusions de la Conférence régionale «Construire un avenir pour une pêche artisanale durable en Méditerranée et en mer Noire»

(ALGER, ALGÉRIE, 7-9 MARS 2016)

PRÉAMBULE

La Conférence régionale «Construire un avenir pour une pêche artisanale durable en Méditerranée et en mer Noire» (Algérie, mars 2016) a enregistré une forte participation, avec la présence de plus de 200 participants, notamment des responsables politiques, scientifiques, professionnels, représentants des pêcheurs, travailleurs du secteur de la pêche, organisations de la société civile, organisations non-gouvernementales (ONG), instituts de recherche, organisations internationales, etc. Cette conférence a été organisée par la Commission générale des pêches pour la Méditerranée (CGPM) et le Département des pêches et de l'aquaculture de l'Organisation des Nations Unies pour l'alimentation et l'agriculture (FAO), y compris ses projets régionaux en Méditerranée, en collaboration avec le Ministère de l'Agriculture, du Développement Rural et de la Pêche de la République Algérienne Démocratique et Populaire, et en partenariat avec le Centre international de hautes études agronomiques méditerranéennes – Institut agronomique méditerranéen de Bari (CIHEAM-IAMB), le Réseau des gestionnaires d'aires marines protégées en Méditerranée (MedPAN) et le Fonds mondial pour la nature (WWF).

En 2013, le Premier symposium régional sur la pêche artisanale durable en Méditerranée et en mer Noire (Malte, novembre 2013) avait permis de mettre l'accent sur les principaux défis et les opportunités pour le développement durable du secteur de la pêche artisanale dans la région. Depuis, ces questions n'ont cessé de gagner en importance dans les discussions portant sur la gestion de la pêche artisanale en Méditerranée et en mer Noire et dans le cadre de l'initiative en faveur de la croissance bleue.

Cette conférence régionale se présente comme une occasion pour apporter une réponse pratique aux résultats du symposium de Malte, en vue de tirer profit de l'élan généré pour proposer une stratégie tangible pour garantir le développement durable de ce secteur à l'avenir. Les études de cas concrètes réalisées ont permis d'approfondir davantage les thèmes clés qui se sont dégagés du symposium et la présentation de leurs résultats s'est déroulée de manière à encourager les discussions et les échanges d'idées et à partager les expériences afin de mieux saisir les priorités et les opportunités de ce secteur.

La pêche artisanale joue incontestablement un rôle social et économique de premier plan. Elle représente plus de 80 pour cent de la flotte de pêche, emploie au moins 60 pour cent des travailleurs directement engagés dans les activités de pêche à bord et contribue à environ 25 pour cent de la valeur totale des débarquements provenant des pêches de capture dans la région. La pêche artisanale offre l'un des meilleurs exemples d'utilisation durable des ressources: l'exploitation des ressources biologiques marines se déroule de manière à minimiser la dégradation de l'environnement tout en maximisant les bénéfices économiques et sociaux. Pourtant, un effort concerté est nécessaire pour faire en sorte que les meilleures pratiques deviennent des pratiques courantes.

Reconnaissant la nécessité de mener une action concertée en faveur du développement durable de la pêche artisanale, le Ministère de l'Agriculture, du Développement Rural et de la Pêche de l'Algérie a aimablement accepté d'accueillir cette conférence régionale dans l'optique de mobiliser un tel effort. Cet événement va dans le sens du Plan «Aquapêche 2020», récemment lancé par l'Algérie à l'issue d'un processus de concertation national avec l'ensemble des acteurs et avec l'appui du Programme

des Nations Unies pour le Développement (PNUD) et de la FAO. En accord avec les principes de croissance bleue, cette stratégie devrait également apporter une contribution déterminante à la promotion d'une pêche artisanale durable à l'échelon tant national que régional.

Les conclusions suivantes ont été formulées à partir des résultats de la conférence régionale, dans l'optique de préconiser des actions à l'appui d'une pêche artisanale durable en Méditerranée et en mer Noire. Ces conclusions sont tout d'abord présentées sous la forme d'un ensemble de propositions générales et transversales puis regroupées suivant les cinq sessions thématiques de la conférence.

CONCLUSIONS GÉNÉRALES

L'importance de la Conférence régionale «Construire un avenir pour une pêche artisanale durable en Méditerranée et en mer Noire» a été reconnue, à la lumière des objectifs de développement durable des Nations Unies qui soulignent notamment la nécessité de fournir au secteur de la pêche artisanale un accès aux ressources marines et aux marchés. Les participants ont témoigné d'un très large soutien en faveur des objectifs de la conférence visant à susciter une prise de conscience, partager les savoirs et élaborer une stratégie future pour la promotion de ce secteur crucial de la pêche.
Les propositions générales suivantes ont notamment été formulées:

- Adapter à la région de la Méditerranée et de la mer Noire la mise en œuvre des Directives volontaires visant à assurer la durabilité de la pêche artisanale dans le contexte de la sécurité alimentaire et de l'éradication de la pauvreté (Directives PAD).
- Lancer une étude socioéconomique approfondie à l'échelon régional en vue d'obtenir des données de référence précises, actualisées et complètes sur la valeur et l'impact économique de la pêche artisanale et fournir ainsi, à terme, des éléments utiles aux interventions politiques.
- Engager un vaste processus consultatif comprenant notamment le lancement d'un mécanisme pour une stratégie régionale en faveur du développement durable du secteur de la pêche artisanale ainsi que des actions spécifiques visant à développer une politique coordonnée en soutien à ce secteur. Mettre en œuvre pour cela une stratégie régionale commune qui repose sur les réseaux et les plateformes existants au niveau régional et s'assurer que tous les acteurs de la Méditerranée et de la mer Noire soient sur un pied d'égalité.
- Développer un programme régional ayant pour objectif de fournir un appui et une assistance technique, en particulier aux pays en développement, afin de renforcer leurs capacités relatives au secteur de la pêche artisanale.
- Procéder dans chaque pays, le cas échéant, à une analyse de la législation et des mécanismes institutionnels permettant d'assurer la pleine participation des artisans pêcheurs à toutes les activités permettant d'assurer le développement durable du secteur (activités connexes, cogestion, soutien financier, labellisation, traçabilité, droit à un travail décent, protection sociale, etc.).
- Renforcer la volonté politique d'investir dans la pêche artisanale en tant qu'instrument fondamental pour transformer la gestion des pêches, en particulier dans le contexte de l'initiative en faveur de la croissance bleue et de la mise en œuvre de la réforme de la politique commune de la pêche de l'Union européenne (UE). Il a été suggéré que les pays membres de la CGPM, la Commission européenne et la FAO œuvrent à des initiatives conjointes à cet égard (à savoir dans le cadre d'une manifestation de haut niveau).
- Diffuser les conclusions de la Conférence régionale «Construire un avenir pour une pêche artisanale durable en Méditerranée et en mer Noire» dans le cadre de rencontres internationales pertinentes telles que les sessions annuelles de la CGPM, les sessions du Comité des pêches de la FAO (COFI) et autres réunions au sein de l'UE.

CONCLUSIONS SPÉCIFIQUES RELATIVES AUX PANELS

PANEL I – Soutenir le développement durable de la pêche artisanale en Méditerranée et en mer Noire dans l'optique de la croissance bleue

La croissance bleue est un concept récent qui vise à créer un développement économique, environnemental et social durable dans le milieu aquatique. Étant donné que la pêche artisanale est un secteur dominant en Méditerranée et en mer Noire, elle aura nécessairement un rôle crucial à jouer dans la croissance bleue si l'exploitation des ressources halieutiques doit s'inscrire dans le cadre de cette stratégie.

À la lumière des discussions tenues au sein du panel, il est proposé de:

- Mettre au point des indicateurs pour mesurer l'impact économique et social de la pêche artisanale, en termes quantitatifs et qualitatifs. Plus précisément, les efforts ne devraient pas se limiter à estimer la valeur de la production de cette pêche ainsi que ses effets sur les communautés côtières en Méditerranée et en mer Noire, mais devraient également s'attacher à mesurer l'impact de la pêche artisanale sur des domaines connexes tels que la transformation du poisson et le tourisme. En outre, une analyse des interactions de la pêche artisanale avec d'autres secteurs, en particulier ceux pris en compte dans les stratégies de croissance bleue (à savoir les transports marins, le secteur pétrolier et gazier, le tourisme, etc.) est nécessaire afin de comprendre les effets économiques et sociaux à plus grande échelle de la pêche artisanale ainsi que les risques que ces autres secteurs pourraient poser pour les communautés de pêche artisanale.
- Analyser l'impact économique de la pêche artisanale dans différentes conditions d'exploitation en vue de déterminer les circonstances dans lesquelles la pêche artisanale pourrait générer un excédent susceptible d'être investi et permettre de mener des études afin d'estimer l'ampleur potentielle de cet excédent. De la même manière, les efforts devraient se concentrer sur l'identification de points de départ pour des interventions en matière de technologie, de gestion, de marketing et de politique, dans le but de contribuer à la mise en place des circonstances favorables mentionnées ci-dessus.
- Déterminer des paramètres appropriés – reconnaissant la nécessité d'établir une définition commune de la pêche artisanale – pour la classification de la «pêche artisanale» en Méditerranée et en mer Noire, en s'appuyant sur ses caractéristiques régionales pertinentes (par exemple, dimension des bateaux, engins utilisés, activités de pêche effectuées sans bateau) et en fonction des ressources exploitées.
- Diffuser des informations sur l'efficacité du Cadre de référence pour la collecte de données de la CGPM (DCRF) et promouvoir son efficacité en tant qu'outil pour la collecte de données sur la pêche artisanale. Fournir une assistance technique pour l'application pratique du DCRF en vue de la collecte de données harmonisées sur la pêche artisanale en Méditerranée et en mer Noire.
- Réaliser une étude théorique sur les systèmes de protection sociale et les législations nationales en vigueur et accessibles par les artisans pêcheurs dans les pays de la Méditerranée et de la mer Noire en vue de déterminer et promouvoir les options les plus performantes.
- Relever des interventions politiques qui facilitent la diversification des revenus et des moyens de subsistance des artisans pêcheurs. En particulier, il convient de déployer des efforts pour déterminer des opportunités transversales entre les secteurs de la pêche artisanale et de l'aquaculture à petite échelle.
- Élaborer, en collaboration avec les membres de la CGPM, un programme pilote permettant de tester des modalités pour intégrer au mieux la pêche artisanale dans une approche en faveur de la croissance bleue ainsi que dans les processus décisionnels d'autres secteurs où les activités liées à la croissance bleue pourraient avoir un impact sur la pêche artisanale.

PANEL II – Renforcer le rôle des parties prenantes dans le cadre des mécanismes de gestion et de cogestion

Compte tenu de l'existence d'exemples concrets démontrant l'efficacité de l'approche de cogestion pour résoudre les conflits tout en apportant des solutions innovantes dans la gestion de la pêche artisanale, des interventions clés susceptibles de créer les conditions propices à l'institutionnalisation de l'engagement des parties prenantes grâce à des schémas de cogestion ont été identifiées. Celles-ci portent principalement sur la nécessité d'investir davantage dans le renforcement des capacités, à l'échelon institutionnel comme à celui des organisations de pêcheurs, et d'améliorer la compréhension des structures institutionnelles et juridiques existantes prévoyant la participation des pêcheurs à la gestion des pêches. Le panel a souligné que, si la croissance bleue offre des opportunités importantes pour la pêche artisanale, ses effets dans d'autres secteurs peuvent aussi constituer un risque pour cette pêche. Une meilleure organisation ainsi que des initiatives de cogestion sont nécessaires afin de se prémunir contre de tels risques.

À la lumière des discussions tenues au sein du panel, il est proposé de:

- Mener une analyse visant à évaluer les cadres juridiques nationaux et internationaux afin d'identifier des contextes institutionnels favorables à l'établissement de mécanismes de cogestion de la pêche artisanale et d'élaborer des normes générales encadrant l'engagement des pêcheurs et le respect des règles dans l'application de ces schémas.
- Formuler des directives portant sur les meilleures pratiques pour l'application des mécanismes de cogestion de la pêche artisanale en Méditerranée et en mer Noire. De telles directives devraient être directement liées aux Directives PAD et fournir non seulement des indications sur le contexte institutionnel et législatif mais aussi des orientations pour l'élaboration et la mise en œuvre de processus participatifs, de mécanismes et outils de cogestion, d'approches de suivi, contrôle et surveillance et d'indicateurs de suivi de l'efficacité des mesures de gestion.
- Fournir un appui aux processus de cogestion en vigueur en Méditerranée et favoriser l'engagement pour multiplier ces initiatives dans l'ensemble de la région. Il convient de mettre en place un programme régional reposant sur une structure institutionnelle solide, ainsi que sur les expériences et les partenariats existants, afin d'obtenir une vision à long terme des avantages potentiels que peut apporter la cogestion à la pêche artisanale à l'échelon régional.
- Cartographier les activités de pêche afin de fournir des informations pertinentes à intégrer aux processus de planification spatiale marine. De tels processus sont déterminants pour garantir aux artisans pêcheurs des droits d'utilisation des ressources et d'accès à celles-ci et assurer la subsistance et le développement durable des communautés qui dépendent de la pêche artisanale. La CGPM, au nom de ses membres, devrait préconiser la prise en compte de cette question à haut niveau avec la Commission européenne, et ce, en amont du processus de planification spatiale marine.
- Établir un programme de renforcement des capacités afin d'appuyer le rôle des acteurs dans la cogestion de la pêche artisanale et d'adapter ce programme en fonction des différents objectifs visés (institutions, administration des aires marines protégées, administrations locales, experts en sciences sociales et naturelles, société civile, artisans pêcheurs et autres utilisateurs des ressources).

PANEL III – Améliorer l'efficacité des aires marines protégées (AMP) en tant qu'instruments de gestion des pêches et examiner les avantages de la participation du secteur de la pêche artisanale

Reconnaissant les priorités socioéconomiques et les enjeux environnementaux pour la gestion des écosystèmes marins, les AMP représentent une solution potentielle pour aborder simultanément de multiples questions. En effet, une stratégie importante pour concilier les objectifs de conservation et de durabilité consiste à intégrer le secteur de la pêche artisanale aux décisions de gestion au sein et autour des AMP. Des mesures doivent être prises au niveau local et national en vue de parvenir à des accords internationaux et régionaux. De telles actions peuvent être réalisées par les décideurs, les gestionnaires d'AMP, les pêcheurs, les scientifiques et le secteur privé.

À la lumière des discussions tenues au sein du panel, il est proposé de:

- Adapter et tirer les enseignements des expériences réussies d'AMP comprenant des zones de pêche interdite et des zones de protection réglementées et impliquant les pêcheurs dans les décisions de gestion et les processus visant à assurer la sauvegarde des ressources sauvages tout en préservant les moyens de subsistance dont dépendent les artisans pêcheurs. Compte tenu des avantages socioéconomiques obtenus par les artisans pêcheurs dans ce type d'AMP, les enseignements tirés de ces expériences pourraient fournir des indications sur la façon de soutenir les aspects économiques, sociaux et culturels de la profession. Favoriser la répétition de ces exemples réussis d'AMP nécessiterait un cadre juridique adéquat, une volonté politique ainsi que des moyens financiers et humains.
- Reproduire les exemples de collaboration efficace à l'échelon inter et intraministériel de la pêche artisanale qui démontrent la cogestion réussie de la pêche artisanale au sein et autour des AMP en travaillant main dans la main. Ces modèles d'intégration pourraient encourager des processus descendants et ascendants dans nombre de pays riverains pour assurer la durabilité future de la profession tout en fournissant des orientations techniques de nature internationale.
- Améliorer la gestion des AMP, y compris les AMP à usage multiple, en s'appuyant sur les connaissances scientifiques et le savoir traditionnel des pêcheurs, en impliquant les utilisateurs/acteurs concernés et en adoptant des approches adaptatives. À cette fin:
    - Ajuster la gestion à la lumière des résultats d'un suivi comparatif à long terme des caractéristiques biologiques, des effets écologiques de la pêche artisanale et des avantages socioéconomiques au sein et en dehors des AMP;
    - Élaborer, à partir de données biologiques et socioéconomiques, des approches adaptatives et participatives pour des plans de gestion de la pêche artisanale au sein et autour des AMP, qui pourraient être formulés, mis en œuvre et revus conjointement par les professionnels des AMP et les pêcheurs;
    - Adopter des réglementations visant à résoudre les utilisations conflictuelles des AMP susceptibles d'avoir un impact négatif pour la subsistance de la pêche artisanale, tout en tenant compte des objectifs de conservation;
    - Prendre en considération la gestion participative des conflits d'utilisation, spécifiquement ceux entre la pêche artisanale et la pêche récréative, afin de créer un équilibre entre le développement durable de la pêche artisanale et, le cas échéant, celui du tourisme responsable, en vue d'atteindre des objectifs de conservation.
- Considérer les efforts de conservation, et les AMP en particulier, comme un investissement en capital naturel plutôt que comme une dépense publique. À ce titre, il convient de déployer des efforts afin de protéger cet investissement contre les risques tels que les conflits entre diverses activités liées à la mer ainsi que la pollution terrestre.
- Sauvegarder le secteur de la pêche artisanale au sein et autour des AMP, y compris à travers la mise en place de coopératives et par des stratégies intégrées aux plans de développement formulés par les autorités locales fournissant une part de marché favorable à des pratiques de pêche responsables et durables.

PANEL IV – Promouvoir les chaînes de valeur de la pêche artisanale

La chaîne de valeur de la pêche artisanale est améliorée par un environnement favorable dans lequel les pêcheurs sont étroitement reliés aux autres acteurs locaux, notamment les institutions publiques et privées, voire les consommateurs. Cela permet la création de pôles économiques compétitifs aptes à favoriser le développement des communautés côtières. De tels regroupements doivent être encouragés afin d'éliminer le plus d'obstacles intermédiaires possibles. Dans le cas de la pêche artisanale en Méditerranée et en mer Noire, quatre domaines d'intervention pertinents ont été identifiés: la durabilité (y compris la gouvernance et les AMP), le marketing (aspects relatifs à la qualité), l'intégration intersectorielle et le développement d'infrastructures et de services (notamment l'accès aux marchés et au crédit).

À la lumière des discussions tenues au sein du panel, il est proposé de:

- Déterminer les meilleures pratiques pour la création de valeur, en particulier dans les domaines de l'étiquetage, la vente directe, la transformation, la diversification, l'intégration intersectorielle et la coordination verticale. D'autres études de cas devraient être réalisées afin d'examiner plus en détail ces meilleures pratiques et de promouvoir leur reproduction dans différents contextes en Méditerranée et en mer Noire.
- S'inspirer des exemples réussis de chaînes de valeur, notamment les cas de regroupement de différentes activités économiques côtières, pour déterminer les points de départ pour l'innovation et développer une meilleure compréhension du champ d'application de la coopération entre pêcheurs en matière de gestion des ressources et de marketing.
- Mettre en place un programme de renforcement des capacités destiné à promouvoir le rôle des parties prenantes dans la création de coopératives, l'élaboration d'accords avec des institutions publiques et privées et le développement de partenariats et de projets de développement côtier.
- Étudier et analyser de manière plus approfondie les aspects liés au crédit et aux institutions financières. Les institutions publiques devraient fournir les infrastructures et les services de base afin de promouvoir les chaînes de valeur et prévenir la faillite du marché. L'accès à la finance formelle est une question cruciale qui englobe à la fois l'accès au crédit formel pour les dépenses de capital et le financement des opérations de pêche. Les infrastructures et les produits financiers peuvent être développés en partenariat avec les banques d'investissement à moyen et long terme. Les schémas de financement des chaînes de valeur (contrats de production, reçus de stockage) peuvent être appliqués, avec la participation de pêcheurs, de commerçants et des autorités publiques.

PANEL V – Mettre en pratique les Directives PAD: le cas de la Méditerranée et de la mer Noire

Les Directives PAD sont un outil fondamental à la promotion des actions à l'appui de la pêche artisanale durable en Méditerranée et en mer Noire. Ces directives abordent selon une approche globale les besoins des artisans pêcheurs et insistent sur la nécessité d'une action intersectorielle pour leur mise en œuvre. Le panel a déterminé les éléments clés pour l'opérationnalisation des principes des directives, dans le but de les adapter au contexte régional: i) cadres politiques et juridiques; ii) principales parties prenantes; iii) structures institutionnelles; iv) points de départ; et v) collaboration avec d'autres initiatives. Le panel a reconnu l'importance d'actions à l'échelon local et le besoin d'une participation efficace des communautés de pêcheurs. Des évolutions positives ont déjà lieu dans la région à l'appui de la mise en œuvre des Directives PAD, notamment la mise en place d'organisations et de plateformes régionales telles que la Plateforme maghrébine de la pêche artisanale, la Plateforme méditerranéenne d'artisans pêcheurs (MedArtNet), l'organisation Low Impact Fishers of Europe (LIFE) et le Conseil consultatif de la Méditerranée (MedAC) et l'élaboration de politiques et initiatives nationales (par exemple, Aquapêche 2020 en Algérie, propositions de plan d'action national pour la pêche artisanale dans les pays de l'UE).

À la lumière des discussions tenues au sein du panel, il est proposé de:

- Mettre en place un Groupe de travail de la CGPM afin de faciliter la mise en œuvre des Directives PAD dans la zone d'application de la CGPM en élaborant des plans d'action nationaux et compte tenu des recommandations issues de manifestations pertinentes ainsi que des expériences existantes au sein de la région et au-delà de celle-ci.
- Renforcer la participation de la CGPM au sein des communautés de pêche artisanale en établissant un mécanisme visant à appuyer le développement organisationnel et convenir d'un mode opératoire pour instaurer une collaboration significative. En particulier, les travaux de la FAO sur la pêche artisanale devraient être pris en compte et des efforts spécifiques devraient être faits pour collaborer avec les organisations et les plateformes de pêche artisanale existantes et inclure les femmes et les groupes marginalisés dans une telle collaboration.
- Promouvoir, sans compromettre la durabilité de l'environnement, l'amélioration des conditions socioéconomiques de la pêche artisanale, notamment en encourageant une diversification des moyens de subsistance, le cas échéant, et en souscrivant au principe de travail décent dans la pêche tel que défini par la Convention sur le travail dans la pêche (C188) de l'Organisation internationale du travail (OIT). En outre, la ratification de cette convention par les pays membres de la CGPM devrait être encouragée.
- Promouvoir et faciliter la mise en place d'un forum entre les associations de pêche artisanale des pays côtiers du nord et du sud de la Méditerranée, notamment dans le cadre de projets spécifiques financés par des membres de la CGPM ou par d'autres organismes internationaux, gouvernementaux ou non gouvernementaux.

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APPENDIX 2
Conference programme

MONDAY, 7 MARCH 2016

8:15 – 9:00 REGISTRATION

9:00 – 10:00 OPENING OF THE CONFERENCE

- Introduction
- Official statements
  - *Stefano Cataudella, GFCM President*
  - *Árni M. Mathiesen, FAO Assistant-Director General for fisheries and aquaculture*
  - *His Excellency Sid Ahmed Ferroukhi, Ministry of Agriculture, Rural Development and Fisheries*
- Presentation of the programme and organization of the thematic panels

10:15 – 13:15 PANEL 1

Supporting the sustainable development of small-scale fisheries in the Mediterranean and the Black Sea under the Blue Growth perspective (GFCM and FAO regional projects) - Moderated by Steve Cunningham and Nadia Bouhafs

- Introductory video
- Opening remarks (by GFCM Secretariat and FAO regional projects)
  - *Introduction of case study experts*
- Presentation of the background paper based on relevant case studies (by Steve Cunningham)
- Q&A session:
  - *Question 1: What role do fisheries, and in particular small-scale fisheries, play in a Blue Growth strategy?*
  - *Question 2: What is meant by the "sustainable development" of small-scale fisheries and what trade-offs does this imply?*
  - *Question 3: What potential do small-scale fisheries hold to increase the value of their activities and how can this be achieved?*
  - *Question 4: Which means of monitoring are appropriate for small-scale fisheries?*
- General conclusions of the panel

13:15 – 14:00 SIDE EVENT OF PANEL 1

Important small-scale fishery targeting rapa whelk along the Southern Black Sea Coast (by Mustafa Zengin)

Current state of small-scale fisheries in Greece, with emphasis on the social aspect (by Maria Oikonomou)

La gestion du thon rouge (Thunnus thynnus) en Méditerranée, un processus d'harmonisation juridique inadapté à la pêche artisanale (by Bertrand Cazalet)

Mario Puretić: the invention of power block (by Jakov Dulčić)

15:15 – 18:15 PANEL 2

Strengthening the role of stakeholders in the context of management and co-management schemes (WWF) – Moderated by Giuseppe Di Carlo, Said Chakour, Saša Raicevich and Marie-Émilie Guélé

- Opening remarks (by WWF)
  - Presentation of the background paper based on relevant case studies, including:
  - Experiences from case studies on strengthening the role of stakeholders in management and co-management (by moderators)
  - Special presentations on stakeholder engagement within marine protected areas (MPAs) and institutional support of co-management (by invited experts)
- Q&A session:
  Question 1: Can industrial fisheries and small-scale fisheries coexist?
  Question 2: What role do environmental NGOs play in facilitating small-scale fishers?
  Question 3: Can co-management take place only within MPAs?
  Question 4: Where are capacity building activities needed and how can institutional and legal frameworks be reinforced?
- General conclusions of the panel

18:15 – 18:45 SIDE EVENT OF PANEL 2

Medfish, a new approach to drive sustainability improvements in fisheries (by Margaux Favret)

Drivers of unsustainable development in eastern Mediterranean small-scale fisheries: an effort to convey fishers' views (by Vassiliki Vassilopoulou)

Projet d'identification des nouvelles activités alternatives intégrées et/ou complémentaires réglementées, pour la pêche artisanale comme ressource (by Nadia Ramdane and WWF)

TUESDAY, 8 MARCH 2016

9:30 – 12:30 PANEL 3

Improving the efficiency of marine protected areas as fisheries management tools and benefits from involving the small-scale fisheries sector (MedPAN) – Moderated by Purificacio Canals, Nadia Ramdane, Toni Font and Josep Lloret

- Opening remarks (by MedPAN)
- Presentation of the background paper based on relevant case studies, including:
  - Introducing thematic challenges for enhancing the small-scale fisheries sector in MPAs – paving the path for implementing solutions (by moderators)
  - Multidisciplinary discussion for shaping solutions: how can different perspectives converge for a brighter future for sustainable small-scale fisheries in MPAs? (by Chloë Webster)
- Q&A session:
  Question 1: Can fishers' engagement, also using traditional knowledge, help tackle the biological challenge of sustaining the resource and the environment in MPAs while raising the economic benefits to small-scale fisheries?
  Question 2: How can different types of MPAs be used for managing fisheries?
  Question 3: What are the emerging concerns of MPA managers and small-scale fishers with regard to recreational fisheries?

Question 4: On Institutional configurations, MPA regulations, management processes and communication: what are the best options for building a future for fishers?

- General conclusions of the panel

12:30 – 13:00 SIDE EVENT OF PANEL 3

Apport de la télédétection et des observations in-Situ à la cartographie d'habitats marins d'intérêt pour la pêche artisanale dans la Baie de Bou Ismail (by Souad Lamouti)

Cultures and valuing processes in the implementation of coastal marine protected areas: a determining issue (by Serge Collet)

AGIR pour la mise en œuvre participative des bonnes pratiques au sein des aires marines protégées à des fins de pêche dans la Méditerranée (by Jamila Ben Souissi)

14:30 – 17:30 PANEL 4

Enhancing small-scale fisheries value chains (CIHEAM Bari) – Moderated by Rabea Zerrouki, Giulio Malorgio and Roberto Ugolini

- Opening remarks (by CIHEAM Bari)
- Presentation of the background paper based on relevant case studies (by Giulio Malorgio)
  - Focus on Algiers fishing port (by Rabea Zerrouki)
- Q&A session:

  Question 1: What role might quality labels play in the enhancement of small-scale fishery products?

  Question 2: How can intersectorial integration contribute to the added value of small-scale fishery products?

  Question 3: Do credit constraints at a local level have implications for the rest of the value chain?

  Question 4: Can dimensions of sustainability, such as co-management or MPAs, add value to small-scale fishery products?
- General conclusions of the panel

17:30 – 18:00 SIDE EVENT OF PANEL 4

The GOLION project: creation and development of a trademark for the promotion of products of small-scale fisheries in the French Mediterranean (by Bertrand Cazalet)

Marine aquaculture opportunities for small-scale youth fishers and technicians in Egypt (by Mohamed El Araby)

WEDNESDAY, 9 MARCH 2016

9:30 – 12:30 PANEL 5

Putting the principles of the SSF Guidelines into practice: the case of the Mediterranean and the Black Sea (FAO Fisheries and Aquaculture Department) – Moderated by Lena Westlund, Rachid Annane and Cherif Touelib

- Opening remarks (by FAO)
- Presentation of the background paper based on relevant case studies (by moderators)
- Q&A session:

  Question 1: What are some examples of policy and legal frameworks that specifically consider small-scale fisheries and that would facilitate/hinder SSF Guidelines implementation?

Question 2: Who are the main stakeholder groups? / Institutional structures: what exists and what is missing?
Question 3: What are key entry points for the SSF Guidelines implementation in the region?
Question 4: What is the scope for interactions and collaboration with other initiatives?

- General conclusions of the panel

12:30 – 13:10 SIDE EVENT OF PANEL 5

Contribution et développement de la pêche artisanale : expériences de l'Algérie (by Said Chakour and Moussa Mennad)

La plateforme Maghrébine et la mise en œuvre des 'SSF Guidelines' (by Yassine Skandrani)

The revised European common fisheries policy and small-scale fisheries - LIFE Platform (by Marta Cavallé and Brian O'Riordan)

Adoption des 'SSF Guidelines' pour la réorganisation de la pêche artisanale : exemple de la Tunisie (by Asma Ben Abda)

15:30 – 17:30 CLOSURE OF THE CONFERENCE

- Presentation of the final Conference conclusions
- Concluding remarks

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Regional Conference on Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea

7–9 March 2016
Algiers, Algeria

The Regional Conference on "Building a future for sustainable small-scale fisheries in the Mediterranean and the Black Sea" was held in Algiers, Algeria, from 7 to 9 March 2016. This event was organized by the General Fisheries Commission for the Mediterranean (GFCM) and the Fisheries and Aquaculture Department of the Food and Agriculture Organization of the United Nations (FAO), including its Mediterranean regional projects, in partnership with the International Centre for Advanced Mediterranean Agronomic Studies – Mediterranean Agronomic Institute of Bari (CIHEAM-MAIB), the Network of Marine Protected Areas Managers in the Mediterranean (MedPAN), the World Wide Fund for Nature (WWF), and in collaboration with the Algerian Ministry for Agriculture, Rural Development and Fisheries.

More than 200 participants attended the conference and discussed about the main challenges and opportunities for the sustainable development of the small-scale fisheries sector. Building upon the momentum created by the First Regional Symposium on Sustainable Small-Scale Fisheries in the Mediterranean and Black Sea (Malta, 27–30 November 2013), organized by the same partners, the conference was intended as a practical response to the outcomes of this first event. The conference focused on the main socio-economic and environmental challenges for the sustainable development of small-scale fisheries with the aim to promote political commitment towards tailored strategies for the Mediterranean and the Black Sea region.

Discussions were structured around five interactive panels addressing challenges and priorities for the future of this essential activity in the region. Based on the outcomes of the discussions held, conclusions were put forth to urge action in support of sustainable small-scale fisheries in the Mediterranean and the Black Sea. The conclusions agreed upon by all participants reflect the need for concerted efforts to support the sector, raise awareness, share knowledge and devise future strategies to promote its sustainable development.

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