THE BUCHAREST UNIVERSITY OF ECONOMIC STUDIES
FACULTY OF AGRI-FOOD AND ENVIRONMENTAL ECONOMICS
RESEARCH CENTER OF REGIONAL ANALYSES AND POLICIES

Partners
Republic of Moldavia: Academy of Economic Studies of Moldavia
Romanian Academy: Institute of Geography
Italy: "Parthenope" University of Naples, University of Catania, University of Verona, "Simone Cesaretti" Foundation
General Association of Economists from Romania, SOCAR, National Institute of Research and Development for Industrial Ecology

Media partner
"Quality – Access to Success" Journal

Editors

Florina BRAN
Ildiko IOAN
Tudor George MĂRUNȚELU
Carmen Valentina RĂDULESCU

INTERNATIONAL CONFERENCE
Eighth edition

ECOLOGICAL PERFORMANCE IN A COMPETITIVE ECONOMY

Bucharest – 03-04 March 2016

PEEC 2016

Proceedings

Supplement of **"Quality-Access to Success"** Journal
Volume **17**, **S1**, **2016**.
The journal is published by the Romanian Society for Quality Assurance,
The journal is indexed in SCOPUS, EBSCO Publishing, ProQuest and Cabell's Directory Management databases.
ISSN 1582-2559

WHICH APPROACH FOR SUSTAINABLE DELEVOPMENT OF SMALL-SCALE FISHERIES? THE CASE OF ITALY

Gabriella VINDIGNI
Professor in "Biotechnology Economics", University of Catania, Catania, Italy, vindigni@unict.it
Giuseppina CARRÀ
Professor in "Common Agricultural Policy", University of Catania, Catania, Italy, carra@unict.it
Clara MONACO
PhD student in "Food Economics", University of Catania, Catania, Italy, clamonaco@unict.it

ABSTRACT
Small-scale fisheries represent a wide segment of the whole Italian fishing sector and, as it is, it has been facing a crisis that started a decade ago. Its strong relationship with the territory implies that, without opportune management interventions, the survival of coastal communities depending on fishing activities is in jeopardy. From a sustainable development perspective, considering problems related to exploitation of living marine resources, and socio-economic difficulties of small-scale coastal fisheries, a crucial question is how to promote the sustainable development of the Italian fleet. This paper presents an overview of different management approaches applicable for the sustainable development of Mediterranean small-scale fisheries. After a description of small-scale coastal fisheries in Mediterranean Sea and their recent development in Italy, we undertake an empirical analysis of exchange methods where suitable management strategies are proposed to be implemented in order to promote sustainable development of Italian fisheries.
KEYWORDS
Indicators, Management, Mediterranean, Small-scale fisheries, Stakeholders, Sustainability

INTRODUCTION

To date the Italian fishing fleet recognized as small-scale coastal count 5 449 vessels which represent 44% of the entire national fishing sector. Over the last decade the fleet has shrunk by 24% showing in many coastal communities obvious signs of distress as a result of habitat degradation and resources over-exploitation (Silvestri et al., 2012). Italian small-scale fisheries are going through a period of crisis, often due to illegal and large-scale fisheries competition, lowered catches, rising costs, lack of a rational organization of the supply chain and need of a more efficient management (IREPA, 2011). Their communities bordering on the Mediterranean Sea show a high level of dependence on social and economic activities carried out by fishing, underlining the great importance of the whole national structure of production (Crescimanno and De Stefano, 2003; De Stefano, 2008).

Recent studies estimate that Italian total catches exceed by 2.6 times the data presented by FAO and that illegal, unreported and unregulated (IUU) fishing represented 54% of all catches (Pauly and Zeller, 2016). On the other hand the European Commission (EC) carry on to review fishing opportunities for certain fish stocks and groups of fish stocks (Council Regulation (EU) 2016/72).

From a sustainable development perspective, considering problems related to exploitation of living marine resources, and socio-economic difficulties of small-scale coastal fisheries in Italy, a crucial question is how to promote the sustainable development of the Italian fleet involved in small-scale fishing. We believe that to overcome weaknesses and to undertake a sustainable pathway for fisheries development the implementation of a holistic and efficient management is urgently needed.

This paper is expected to serve as a useful reference for experts on fisheries pursuing an overview of different management approaches applicable for the sustainable development of Mediterranean small-scale fisheries. The approaches that we are going to present arise from an empirical analysis of exchange methods where adapted management strategies are proposed to be undertaken and implemented in a single or integrated manner for sustainable development of Italian fisheries. Our work embraces multidisciplinary and participatory approaches that could lead to reach a more sustainable small-scale fisheries management though the reduction of impact deriving from fishing effort, the improvement of market efficiency of seafood products and employment of support models and indicators. The study examines dynamics and interactions among small-scale fisheries and explores the main types of management approaches including critical analysis and discussion on their application.

1. SMALL-SCALE FISHERIES IN MEDITERRANEAN SEA

Many Mediterranean fishing systems have a strong tradition and a lifestyle long established (Oliver and Franquesa, 2005). They are usually characterized by polyvalence of fishing units, scattering fishing and commercial activities along the coasts, and controversial coexistence of artisanal and industrial divisions (Breuil, 1997).

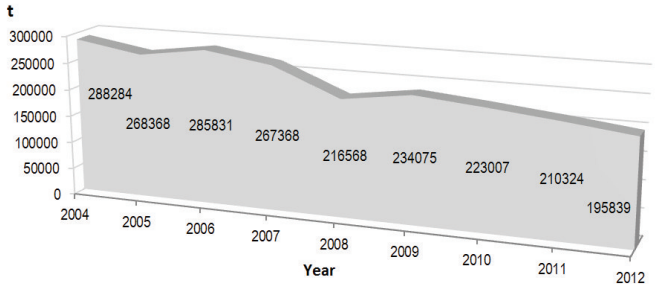
Mediterranean sea covers only 1% of the surface of all the oceans, here take place 2% of world catches (Calcagno and Giordan, 2010), representing 4% of the added-value due to caught species (Iani, 2007). Mediterranean Countries count a total fleet of approximately 125 000 fishing vessels, but a large portion of the fleet operate outside the Mediterranean. This is the case of France, Spain, Morocco, Egypt and Turkey, which also fish in the Atlantic Sea, the Red Sea and the Black Sea (CIHEAM, 2010). While 80% of Mediterranean fisheries (about 33.000 units) is practiced in coastal waters and on vessels less than 12 meters, features that identify a small-scale fishing fleet (ISMEA, 2007).

A downward trend in terms of numbers, fleet tonnage and power characterize European fisheries, at the same time Europe represents the largest market of seafood products imported and its dependence from importation does not cease to grow. In northern Atlantic, Mediterranean and Black Sea areas, fisheries production is decreasing since 2007. FAO area 37 (including Mediterranean and Black

Sea) recorded 1 282 090 catches in 2012, with a variation of -13.3% compared to 2003 and of -10.8% compared to 2011 (FAO, 2014; FAO, 2012). Furthermore, industrial fisheries practiced beyond Mediterranean territorial waters by Japan and some American Countries, intensify fishing effort add up to catch activities of Countries bordering the Mediterranean (Iani, 2007).
Small-scale fisheries can be considered a well-advanced activity for social and environmental sustainability, following naturally most of the recommendations of the Code of Conduct for Responsible Fisheries (FAO, 1995; FAO, 2014). The environmental benefits are mainly due to the high species-specific selectivity of many fishing gear used, which can allow fishermen to manage resources with awareness and responsibility; moreover it sets a good indicator of profitability due to low capitalization and to the depreciation impact (Berkes et al., 2001; Silvestri et al., 2012). For the Countries bordering the Mediterranean Sea, small-scale fishery has a unique role that allowed it to achieve a balance with the resource used and its ecosystem (Granzotto et al., 2001; Granzotto et al., 2004). It includes those small boats that use selective gear, such as nets, hooks, creels and other traditional tools. Each unit can have multiple licenses, enjoying more permissions which authorize the simultaneously use of tools with different capture modes. Moreover, the coastal environmental variability, due to the type of seabed and the seasonality, determines the presence of boats that during the year change several times type of fishing practiced (Signorello et al., 2004).
The target species of this coastal fishery, include molluscs, crustaceans and most of the representatives of the category of blue fish, such as anchovies, sardines, mackerel, sand eels, garfish, etc. (Ferreti et al., 2003). This food is always available in typical fishmongers, fresh and at low cost; it is a product with high nutritional value, also rich in Omega-3, and it represents the cultural and gastronomic traditions of each its area of origin (Candotti et al., 2011).
The EC has an important influence and a considerable responsibility on the management of world fisheries, including those Mediterranean. Throughout the Common Fisheries Policy (CFP) it sets rules and instruction for managing fishing fleets and for conserving fish stocks. Moreover, thanks to the European fisheries fund (EFF) and the European Maritime and Fisheries Fund (EMFF) it supports coastal communities in diversifying their economies, helping fishermen in the transition to sustainable fishing and improving quality of life along European coasts.

2. DEVELOPMENT OF ITALIAN FISHERIES

From a cross-checking data from different sources including the Italian National Statistics Institute (ISTAT), the Institute of Economic Research of Fisheries and Aquaculture (IREPA) and the Ministry of Agriculture, Food and Forestry Policies (Mipaaf), emerges that in the last decade the Italian fishing industry has had a negative trend marked by the fall in production levels and the growth of intermediate costs. The reduced production is due to the decrease in the number of active vessels, as well as to the new restrictions introduced by the EC Regulation 1967/2006 and subsequent derogations, which regulate the mesh sizes of the nets, the minimum distance from the coast, the size and amount of seafood products.
Fishing caught by the Italian fleet in the Mediterranean, has undergone a continuous contraction that, from 2004 to 2012, led to a decrease of more than 92 000 tons of the total catch (32%) (fig. 1).

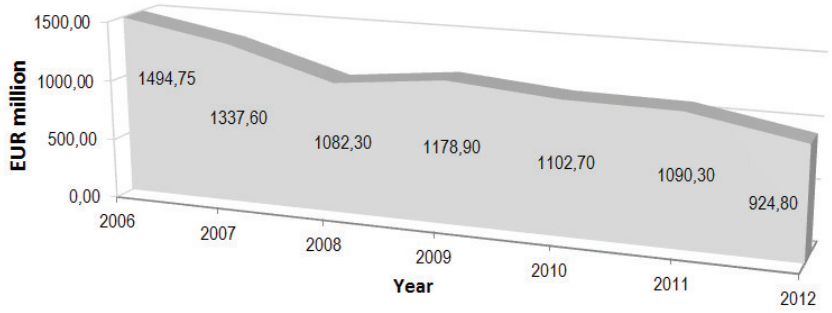


(Source: our elaboration on Istat-Irepa data, 2016)

Figure 1. Total catches of the Italian fishing fleet in the Mediterranean Sea (quantities expressed in tonnes) – (2004-2012).

Examining the regional production data of 2012, the major fishing producers are Sicily (36 857 t), Apulia (25 167 t), Emilia-Romagna (23 142 t) and Veneto (22 253 t). Comparing the total catch of different fishing systems reveals that trawling occupies a significant position in national production, reaching a peak in 2006 with 100 894 t, and then regressing to 65 732 t in 2012. Other fishing systems are maintained at levels much lower than trawling and are also subject to a constant reduction of production. Grouping catch by species, fish are the most representative category with 132 441 t (68%), followed by mollusks (43 775 t; 22%) and shellfish (19 623; 10%). The decline in seafood production is also reflected in the national total revenues that, for the Italian fishing fleet operating in the Mediterranean in the period 2006-2012, suffered a decrease of 570 million euro, a decline of 38% (fig. 2). On the other hand, each vessel registers an average activity of 122 days per year, with a decrease of 13% in the last decade (Carra et al., 2014).
Analysing revenues by fishing systems, trawling and small-scale fisheries are clearly detached from other fishing systems, representing the highest levels of gain, respectively with 740 and 381 million euro in 2006, and with 449 and 241 million euro in 2012. This continuous significant decline is also found in all other fishing systems, which remain below 100 million euro per year.
Examining fishing systems by their target species, we see that trawling and small-scale fisheries intercept the largest number of seafood species, including fish, molluscs and crustaceans. Other systems generally include one seafood category, usually fish, with the exception of hydraulic dredges for shellfish, remaining below the 60 000 thousand euro per year. It is indicated that 57% of total revenues are

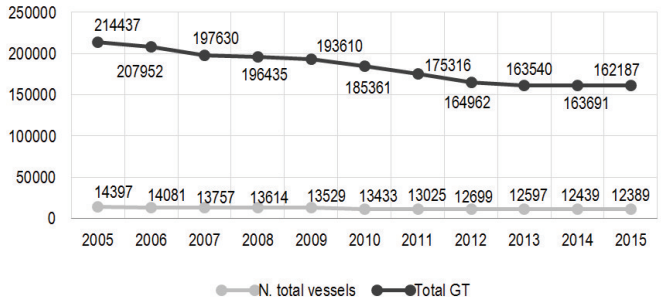
related to the capture of fish (527 000 thousand euro), followed by crustaceans (207 000 thousand euro; 22%) and shellfish (190 000 thousand euro; 21%). An important note is that market value of different seafood species depend on the used capture fishing system.
Decreasing in production values could be attributed to two factors: the depletion of fish stocks and the reduction of fishing effort. In fact, in the last decade there has been a 14% reduction of vessels.
In Italy a craft is considered as a fishing vessel if equipped for the commercial exploitation of marine resources and registered in the Italian fishing vessel register. Italian authorities require the vessels to be in possession of a fishing licence that be renewed every four years by the national administration (Art. 3 (C, D) of Council Regulation (EEC) N° 3760/92).



(Source*:* our elaboration on Istat-Irepa data, 2016)

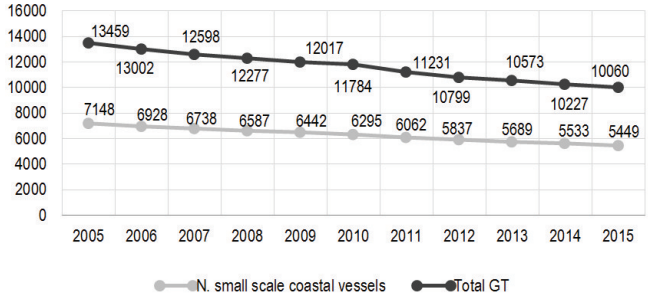
Figure 2. Total revenues of the Italian fishing fleet in the Mediterranean (million euro) – (2006-2012).

According to data from the European Union (EU) Fleet Register (FR), the capacity of the Italian fishing fleet is changed from 14 397 fishing units in 2005 to 12 389 in 2015 (fig.3. Updates on 31st December of each year), passed from 214 437 GT to 162 187 GT total tonnage and from 1 223 539 kW to 1 000 224 kW total power. In addition, the loss of profit of recent years depend on both the high age of the vessels (in 2012 they had an average age of 34 years) and the rising cost of fuel, which is the main expense for fishing activities. In 2011, after a significant fall in the price, there was a new peak (0.78 € / l), after which new values remain even so at very high level.



(Source*:* our elaboration on FR data, 2016)

Figure 3. Dynamics of the fishing fleet in Italy by number of vessels and total Gross Tonnage – (2005-2015).



(Source*:* our elaboration on FR data, 2016)

Figure 4. Dynamics of the small-scale fishing fleet in Italy by number of vessels and total Gross Tonnage – (2005-2015).

Regarding the tonnage, trawlers are the largest reaching up to 80 GT, against vessels involved in small-scale fishing with 2 GT. This last intercept 48.8% of boarded, and is followed by trawlers with 29.4%.
Small-scale coastal fishing is the most widespread practice. It counts 5449 vessels, representing 44% of the entire fishing sector and including 50% of its employees, followed by trawling (2 657; 20%) and other minor techniques. Nevertheless, small scale coastal fishing has suffered a reduction of its fleet by 24% since 2005, passing from 7 148 to 5 449 fishing units, from 13 459 GT to 10 060 GT total tonnage and from 189 468 kW to 144 534 kW power (fig. 4).

3. HOW TO CONTAIN IMPACT FROM FISHING EFFORT

Small-scale coastal fisheries co-exist with many other forms of fisheries. First of all, it has to compete with large-scale or industrial fisheries for the same limited resources, in the same environment and for the same markets. Many conflicts arise from interactions with recreational fisheries and other catch activities classified as illegal, unreported and unregulated (IUU) fishing. Differences in level of technology, scale of operation, employment generation and degree of capital and investment are evident. Legislation on industrial fishing could impact small scale fisheries modifying existing competition dynamics for inshore resources; however the weak application of regulations by fisheries authorities and a scarce compliance of fishing communities frustrate any policy objective to ensure environmental balance and different dimensions of sustainability. Furthermore, considering that small-scale coastal fisheries exploit many of the same stocks of other fisheries categories and also exploit a number of smaller stocks, a certain degree of competition is present also between different small-scale gear users that exploit the same resource (Plagányi, 2007; Berkes et al., 2001).

The limited capacity to manage small-scale fisheries may be caused by the use of conventional fisheries management methods that were not totally adapted to this distinctive category. One of the lines of latest management approaches applied in Italy aims to reduce overexploitation and environmental degradation and has provided many regulations that often have had negative indirect consequences for small-scale fisheries. The main interventions were represented by the definition of Total Allowable Catches (TACs) and quotas for most commercial fish stocks, by-catch limitations, compulsory landing requirement and fishing zones restrictions. Another instrument for the sustainable management of fisheries is the introduction of biological rest periods for conserving fish stocks. Conversely, artisanal fishers that operate at small-scale in many coastal areas denounce the impossibility to access subsidy instead guarantied for trawling activities; generally the rest of fishery activities is not simultaneously observed in time and place; furthermore unsuitable periods of prohibition could cause damaging rather than maintaining fishing activity outside the rest periods.

Italian fleet, as well as those of other Member States, is also obliged to respect a very strict entry-exit regime based on fishing capacity measured in terms of tonnage and power (Art. 13 of Council Regulation 2371/2002; Art. 6 and 7 of Commission Regulation 1438/2003). The regime provides that each entry of capacity into a national fleet has to be compensated by the exit of at least the same amount of capacity. Many public aids were allocated for scrapping vessels, whose capacity leaving cannot be replaced. It means that the capacity of the Member States fleets cannot longer increase, but as many fishers continue their catch activity with new boats and gears without any license an increase in illegal fisheries can be observed.

Next management approaches should be context-specific, adapted to local communities, and the governability of small-scale fisheries well enhanced and assessed through processes that promote interactive communication and learning, improving sustainability, production and profitability (Jentoft and Chuenpagdee, 2015). A coordinated and integrated approach involving policy makers and relevant stakeholders, fishers included, to provide a mixed strategy of resources management for economic and community development, represents a solution to a success line of management. This participatory form of co-management should provide fishers and their families a wider range of livelihood options, reducing the household's economic dependence to fishery. Within the CFP and the EMFF fishermen are facilitated in the transition to sustainable fishing and coastal communities are supported in diversifying their economies. However, these actions require a strong linkage between Member States, national, regional and local administration to ensure coordination and cooperation for planning and implementation of sustainable small-scale fisheries.

4. WHICH INSTRUMENTS FOR A MORE EFFICIENT MARKET ORIENTED FISHERY

Within the agri-food sector, EU guidelines highlight the need of an efficient tracking system in order to confer more confidence in seafood products to consumers (Indicod, 2012). Italian and Community directives clearly define the responsibilities of each operator in the supply chain and provide to consumers accurate information to choose hygienically safe products and to know their origin. The Italian seafood market is also governed by appropriate rules on food labelling (Regulation (EU) 1169/2011; Regulations (CE) n. 1792/2006, n. 2065/2001, 104/2000, n. 2406/96; D.Lgs. n. 531/1992). In the light of a sustainable development of fisheries market oriented, products certification and eco-labelling could be valid tools in supporting their management (Bellia et al., 2016; Wessells et al., 2001).

Before detailing brands and labelling opportunities, we consider worthwhile to highlight EU rules that provide food information to consumers and contribute to more transparency on the market enabling them to make informed choices, also thanks to last requirements and mandatory information introduced for fishery products (European Commission, 2014). New labelling rules for seafood products include information such as the commercial designation and scientific names of the species, production method, catch area, country, body of water, fishing gear, if defrosted, "Best before" date and "Use by" date, and allergens. While this type of certifications are compulsory, food business operators are encouraged to provide additional voluntary information about date of catch and landing, port of landing, nutrition declaration and more detailed information on vessel and fishing gear employed. This type of certification could help to prevent and dissuade IUU fishing, however aiming for sustainable management and the implementation of control systems, local markets based on fishery products need a market oriented approach.

In the case of Italy, small-scale coastal fisheries are characterized by a strong link with the territory and tradition, which give to their products very high quality features; this aspect makes the sector an important asset to protect, especially in view of a global economy, characterized by the market entry of imported products, often coming from faraway seas and with lower quality requirements (Nasti, 2011). Considering local traditions, the use of designations of origin and geographical indications (PDO and PGI), certificates of specific and distinctive quality, may reflects the strong link between the intrinsic properties of a product and the territory from which it is originated (Bellia and Safonte, 2015; Platania et al., 2015). Therefore, supporting local fishing does not only mean to ensure the presence of a

quality product, but also the persistence of traditional social and cultural realities through support and valorisation actions, in order to encourage the sustainable development of resources in the Mediterranean Sea (Carrà, 2005; Carrà et al., 2002). So the enhancement of the seafood products of Italian coastal communities became a strategic tool to make small-scale and artisanal fisheries market competitive, providing a possible resolution to the current crisis of the sector. Otherwise, on the perspective of the eco-labelling, certification concerning sustainability of certain fishing techniques have to be encouraged. In the process of sustainable development and innovation once again prevails the need of a participatory approach, where valorisation of local seafood products could induce an awareness mechanism also among fishermen and retailers on the need to practice sustainable fishing for the conservation of resources. In this case, eco-quality brand for fishery products could provide incentives for coastal communities from different point of view: ecological, economic (e.g. by strengthening local supply chains), social (e.g. offering more jobs), for the identity and the local culture.
Beyond the possibility to display information on small-scale fisheries products with regulated certification or specific labels, the implementation of regulations and control on fisheries and sale activities are required. Human and financial resources should to be adequately managed by local, national and Community administration in order to allow these products a suitable access to the market. In this framework, market oriented management approaches can be supported by initiatives such as improving fishing vessel registration and licensing system, applying more strict sanctions lines against IUU fishing activities, and other direct actions that envisage a strong cooperation between policy-makers and other stakeholder involved in data collection, enforcement and other fisheries related functions.

5. A MANAGEMENT SUPPORTED BY SPECIFIC MODELS AND INDICATORS

Fisheries impact multiple components of marine ecosystems inducing changes in their structure and function (Griffiths et al., 2010). Effective interactions deriving from capture activities on fishery resources should be better known in order to understand and intervene on events such as by-catch of non-targeted species, physical damage to habitats and food-chain effects.
In recent years different approaches for modelling ecological interactions in marine ecosystems exploited by fisheries has been developed in order to assess their implications for fisheries management. These integrated evaluations require different type of analysis and simulations and help to maximize fisheries production reaching environmental and economic benefits through the selection of more sustainable management options (FAO, 2008).
Among currently available modelling approaches for ecosystem-based management there are models for whole ecosystem and dynamic system, for minimum realistic, bioenergetics, and individual-based. Ecological models and ecosystem approach to fisheries (EAF) applied for maintaining the ecosystem's health and sustainability can be also supported by the development of mutually related indices and indicators that work as tools for provision of scientific information on fisheries in specified contexts.
Examples of sustainable development indicators show how participatory, multistakeholder and multidisciplinary approaches could lead to the selection of sets of indicators achieving their adoption in the framework of sustainable management.
Through a participatory "Approach system" applied at local scale in Mediterranean, currently underway studies are following a selection process that nests principles, criteria and linked indicators to the actors' issues and representations. It constitutes a collective process also denominate of co-construction that by the establishment of diagnoses of assets and constraints promotes the implementation and appropriation of sustainable development (Monaco et al., 2013; Rey-Valette et al., 2010). Processes like this help to connect indicators and promote interactions among individual, collective and scientific knowledge. In the light of researches on fishing rates and patterns that aim to maximize ecological, social and economic outputs, there is a need to strengthen and take advantage of these interactions for exploring relations between single-species and multispecies or ecosystem approaches to practical fishery management. In fact the increasing attention on multi-dimensional indicators for sustainable development, bring to incorporate information from stakeholders and science, considering in an integrated mode, ecological, economic, social and governance issues, relating them with the sustainability of fisheries management and the development of coastal areas (FAO, 2010; Garcia, 1996). Besides, indicators observed over time are capable to produce a comprehensive representation of the sustainability of a given fisheries sector and of the necessary actions to be taken to the sustainable management of its resources (Fortun-Lamothe et al., 2012; Prabhu et al., 2000).
Since Italian small-scale fisheries are crossing a period of transition arising from EU policies, starting to exploit alternative stocks with as much changing in fishing techniques and gears, participatory and adaptive approaches should be taken into consideration so that experimental studies support fisheries management approach contributing to long term benefits in coastal communities, remembering that an assessment method and associated recommendations are unable to successfully achieve conservation when management fails (Plagányi, 2007).

CONCLUSION

Fisheries management has increased in importance in recent years, and comprehensive frameworks on sustainable development now exist in EU Countries. Indeed the EC supports coastal communities in diversifying their economies, helping fishermen in the transition to sustainable fishing and improving their quality of life. Nevertheless small-scale fisheries are facing different issues because of policies often not fitting their real needs. To overcome weaknesses and to undertake a sustainable pathway for fisheries development the implementation of a holistic and efficient management appears urgently needed. Consequently, approaches here described about the reduction of impact deriving from fishing effort, the improvement of market efficiency of seafood products and the employment of support models and indicators, could be assembled together in a single integrated strategic plan for sustainable small-scale fisheries.
As shown by this study, even if specific approaches are provided for diverse branches and areas of specialization in fisheries management, a coordinated and integrated methodology with participatory and multidisciplinary attitudes could represent a successful

innovative instrument for pursuing the objectives of sustainable development. In this framework, due to the difference of many small-scale fisheries case studies, whether local and Community stakeholders should be involved in order to ensure coordination and cooperation for the construction of adaptive planning aimed to encourage ecological, economic and social sustainability of Mediterranean fisheries.

REFERENCES

1. Bellia, C., Latino S., & Bracco S. (2016). Agriculture, territory and multifunctionality: the case of South-East of Sicily. *Quality - Access to Success,* 17.
2. Bellia, C., & Safonte, G. F. (2015). Prodotti agroalimentari e segni distintivi di qualità. Dimensione economica dei prodotti contrassegnati da marchi dop/igp in forza delle normative comunitarie e strategie di valorizzazione. *Rivista Economia agro-alimentare*. Franco Angeli, Vol. 1, pagg. 81–105
3. Berkes, F., Mahon, R., McConney, P., Pollnac, R., & Pomeroy, R. (2001). Managing small-scale fisheries: alternative directions and methods. 304p.
4. Breuil, C. (1997). *Les pêches en Méditerranée: éléments d'information sur le contexte halieutique et les enjeux économiques de leur aménagement*. FAO. 36 p.
5. Calcagno, R., & Giordan, A. (2010). Méditerranée : splendide, fragile, vivante. Institut océanographique. 180 p.
6. Candotti, P. (2011). Opuscolo : Ecco perché mangi pesce sicuro. Ministero della Salute. Istituto Zooprofilattico della Lombardia e dell'Emilia Romagna.
7. Carrà, G. (2005). Strategie competitive dei prodotti agroalimentari tipici. *Atti del XLII Convegno della SIDEA, Biodiversità e tipicità. Paradigmi economici e strategie competitive, Pisa*, 22-23.
8. Carrà, G. (2002). Valorizzazione dei prodotti lattiero-caseari tipici e tradizionali della Sicilia. *POP Sicilia Misura*, *10*. 185 p.
9. Carrà, G., Monaco, C., Peri, I., Prato, C., Safonte, F., & Vindigni, G. (2014). DIVERSO: Diversificazione delle attività di pesca e sostenibilità delle zone costiere della Sicilia. Rapporto intermedio. Università di Catania.135 p.
10. CIHEAM. (2010). Fisheries and aquaculture: the wealth of the deep. In *Atlas of Mediterranean agriculture, food, fisheries and rural areas*. Mediterra 2010, 6. p. 95-101.
11. Crescimanno, M., & De Stefano, V. (2003). L'economia della piccola pesca nella gestione integrata della fascia costiera del Golfo di Castellammare (Sicilia nord-occidentale). *Università degli Studi di Palermo, Palermo*. 106 p.
12. De Stefano V. (2008). Analisi di scenario del settore della pesca marittima in Sicilia. Università degli Studi di Palermo.
13. European Commission. (2014). A pocket guide to the EU's new fish and aquaculture consumer labels. Publications Office of the European Union. 16 p.
14. FAO. (1995). Code of conduct for responsible fisheries. 43 p.
15. FAO. 2008. Fisheries management. *FAO Fisheries Technical Guidelines for Responsible Fisheries.* (No. 4). Food & Agriculture Org.
16. FAO. (2010). Indicators for sustainable development of aquaculture. Food & Agriculture Org.
17. FAO. (2012). La situation mondiale des pêches et de l'aquaculture. 241 p.
18. FAO. (2014). The state of world fisheries and aquaculture: opportunities and challenges. 223 p.
19. Ferreti, M., Tarulli, E., & Palladino, S. (2003). Classificazione e descrizione degli attrezzi da pesca in uso nelle marinerie italiane con particolare riferimento al loro impatto ambientale. 128 p.
20. Fortun-Lamothe, L., Litt, J., Coutelet, G., & Gidenne, T. (2012). A participatory approach to define objectives, criteria and indicators for evaluating the sustainability of rabbit rearing units. p. 821-825.
21. Garcia, S. (1997). Indicators for sustainable development of fisheries. *FAO Land and Water Bulletin (FAO)*.
22. Granzotto, A., Franzoi, P., Longo, A., Pranovi, F., & Torricelli, P. (2001). La pesca nella laguna di Venezia: un percorso di sostenibilità nel recupero delle tradizioni. Lo stato dell'arte. 60 p.
23. Granzotto, A., Pranovi, F., Libralato, S., Torricelli, P., & Mainardi, D. (2004). Comparison between artisanal fishery and Manila clam harvesting in the Venice lagoon by using ecosystem indicators: an ecological economics perspective. 32 p.
24. Griffiths, S. P., Young, J. W., Lansdell, M. J., Campbell, R. A., Hampton, J., Hoyle, S. D., Langley, A., Bromhead, D., & Hinton, M. G. (2010). Ecological effects of longline fishing and climate change on the pelagic ecosystem off eastern Australia. *Reviews in Fish Biology and Fisheries*, *20*(2), 239-272.
25. Iani E. (2007). Mediterraneo, un mare di pesca. Agriregionieuropa (No 3), 10. p. 32-34.
26. INDICOD. (2012). Linee guida per la tracciabilità e l'etichettatura dei prodotti ittici. 44 p.
27. IREPA Onlus. (2012). Osservatorio economico sulle strutture produttive della pesca marittima in Italia 2011. p. 252.
28. ISMEA. (2007). Il settore ittico in Italia e nel mondo: le tendenze recenti. 390 p.
29. Jentoft, S., & Chuenpagdee, R. (2015). Interactive Governance for Small-Scale Fisheries. *Global Reflections. Dordrecht, MA: Springer*.
30. Monaco, C., Peri, I., & Carrà, G. (2013). Indicateurs de durabilité : une proposition pour la valorisation de la petite pêche artisanale en Sicile. In *I Symposium Régional sur la Pêche Artisanale Durable en Méditerranée et en Mer Noire*.
31. Nasti A. (2011). Tracciabilità e sicurezza alimentare. Progetto Tra.ce. Lands Onlus.
32. Oliver, P., & Franquesa, R. (2005). La pêche. In *Agriculture, pêche, alimentation et développement rural durable dans la région méditerranéenne*. CIHEAM. p. 185-235.

33. Plagányi, É. E. (2007). *Models for an ecosystem approach to fisheries* (No. 477). Food & Agriculture Org.
34. Platania, M., Rapisarda, P., & Rizzo, M. (2015). Italian Trade Specialization: Persistence and Change in Regional Agri-Food Production. *Agris On-Line Papers in Economics & Informatics*, *7*(4).
35. Pauly, D., & Zeller, D. (2016). Catch reconstructions reveal that global marine fisheries catches are higher than reported and declining. *Nature communications*, *7*.
36. Prabhu, R., Colfer, C. J. P., & Dudley, R. G. (2000). *Directives pour le développement, le test et la sélection de critères et indicateurs pour une gestion durable des forêts* (No. Manuels de criteres et indicateurs pour la gestion durable des forets (C&I Toolbox Series) no. 1, p. 158p). CIRAD-Foret and CIFOR, Montpellier, France.
37. Rey Valette, H., Clément, O., Aubin, J., Mathé, S., Chia, E., Marc, L., ... & Baruthio, A. (2010). An approach to co-construct sustainable development indicators in aquaculture.
38. Signorello, G., Cucuzza, G., De Salvo, M., & Pappalardo, G. (2004). La pesca nel basso ionio. Strutture produttive, performance economiche e sostenibilità ambientale. Università degli Studi di Catania. 298 p.
39. Silvestri, R., Ligas, A., Sartor P., & Sbrana M. (2012). La pesca artigianale: peculiarità e problematiche della pesca artigianale in Italia. Rete Nazionale della Ricerca in Pesca.
40. Wessells, C. R. (2001). Product certification and ecolabelling for fisheries sustainability (No. 422). Food & Agriculture Org.