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**Towards Ecosystem Conservation and Sustainable
Artisanal Fisheries in the Mediterranean basin**

***WP5: Asses artisanal fisheries pressures on benthic
communities***

**Characterization of the selected
fishing meti rs and the selection
criteria**

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INTRODUCTION

One of the preliminary tasks for the scientists involved in ECOSAFIMED Project was the identification of local artisanal fishing activities and determinate the selected métiers of the artisanal fleet in those study areas selected to evaluate the impact of the artisanal fisheries in the seabed.

Nevertheless, the artisanal fishery is extremely complex and has many different characteristics in each country, and not only within the country, probably in each area. One of the special features of the artisanal fisheries in the Mediterranean is the use multiple gears for the exploitation of natural resources. For this reason, the definition of the studied métiers has been necessary and agreed in the project. This report offers a detailed explanation of the métier selected for each studied area.



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BACKGROUND

The artisanal fishery, as opposed to the industrial one, implies a relative small financial investment, the use of several types of gears and the exploitation of different target species, with each type of fishing carried out with particular gears, specific technical characteristics, in specific seasons. The combination of all of these characteristics is called *métier*.

A *métier* is internationally defined as *a fishing activity which is characterized by one catching gear and a group of target species, operating in a given area during a given season, within which each boat's effort exerts a similar exploitation pattern on a particular species or group of species*, i.e. the species composition and size distribution in catches taken by any vessel working in a particular *métier* will be approximately the same. A *métier* is indicative of where and how boats work, not of the port or original or landing.

For each *métier*, a standard description sheet should be given, which includes:

- a) gear(s) used.
- b) species targeted and by-catch.
- c) strategy of operation.
- d) ports and fleets concerned (length, gross tonnage, age, power).
- e) The activity time, which is accounted in boat-months, corresponding to the number of months during which the *métier* had been a significant activity for involved boats (but not necessary exclusive to one *métier*, because some *métiers* can be practised simultaneously).
- f) interaction between *métiers*, distinguishing interaction for resources (which can be direct, or indirect through discarding), interaction for fishing grounds and interaction of the activity of particular boats in several *métiers*. This last category is termed complementarity, which concerns *métiers* practised by the same boat during the year (an effect of seasonality of fisheries), or substitution, which is an observed or potential possibility of vessels changing *métier* for other reasons. On average, each boat is involved in two *métiers* during the year.
- g) regulation and management measures.
- h) trends and comments on the evolution of the *métier* and any other characteristics.



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The artisanal fishery typically develops its activity close to the shoreline, in some countries, as Tunis, is called “peche cotiere”, in Italia is “pesca costiera”. Usually the fishing grounds are a few hours of distance from the harbors and the number of fishermen for each boat is limited since this type of activity does not imply very long soak times. Fishing gears are extremely variable and may be used alternatively, depending on the season (Fig. 1), or in parallel during the same fishing survey.



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1. SELECTION CRITERIA

Due to the high number of métiers used by the Mediterranean artisanal fishery, a selection was made by the three partners based on the three most common used gears (trammel nets, gillnets and longlines). These gears were selected on the basis of their potential impact over the benthic communities, since they mainly operate on the bottom or in its proximity. The selection was operated also in consideration of both the work window for the three partners (summer for all three partners) and the necessity to act a common data elaboration.

During the Technical Workshop held on Genoa (Italy) in April 2014, the expertise in artisanal fisheries of the ECOSAFIMED team with the agreement of the technical committee defined the main strategic field works of the project, in particular: 1) 6 main study areas characterized by a 50-200 m depth range and the absence of trawling activities were identified; 2) final observer and fleet datasheets to collect data on fishing vessels, fish and bycatch during each field operation were produced; and finally, 3) three priority gears have been identified in the three countries, such that all experimental fishing surveys foreseen in the project will focus on métiers using these gears.

The definition of three priority gears was of extreme importance due to the fact that the three countries partly differ in terms of characteristics of the fishing activities. In Spain, only trammel nets have been evaluated due to the use of this metier during the season when the surveys where taking place (long lines and gillnets are used in autumn and winter) and because this is probably the most impacting metier. On the other hand, trammel nets, gillnets and long lines were assessed in Tunisia and Italy. Also, in terms of effort available in the project to evaluate the fishing bycatch the distribution is: 36 surveys for Spain, 70 for Tunisia and 60 for Italy. Therefore, in order to have the possibility to partially compare the results, it was impelling the accomplishment of a common strategy.

In this report we synthesize the characteristics of the métiers that were selected in each study areas.



Fig. 1. Utilization of multigear activity in the artisanal fishery implies to storage of a large bulk of materials.

2. METIERS USED BY AREA

2.1 Spain

2.1.1. Trammel nets:

Spiny lobster (*Palinurus elephas*)

The European spiny lobster (*Palinurus elephas*) (Fig. 2) is widely distributed in the NE Atlantic and Mediterranean waters where it lives on rocky, coralligenous and maërl 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. In recent decades, the most productive Mediterranean lobster fisheries appear to occur around islands in the Eastern Adriatic (Soldo et al., 2001), Corsica (Campillo, 1982; Marin, 1987), Sardinia (Secci et al., 1995), Sicily (Gristina,



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2002), Balearic Islands (Quetglas et al., 2004), and off northern Tunisia (Zarrouk, 2000). A great productivity is also noted in high rocky bank area as Esquerqis bank in Tunisian water (Gaamour et al. 2005).

The stock structure of red spiny lobster in the Mediterranean Sea is still not well known and needs further studies. Indeed, studies showed genetic variability between Mediterranean areas, with a higher genetic diversity for the Tunisian population. This led to suppose that there may be more than one stock unit in the western basin. However, Goñi et al. 2007, found out that after the egg hatching, the pelagic phyllosoma larvae drift for 4-5 months, corresponding to its larval life period (January-May) therefore suggesting a potential wide larval drifting between different areas of the Mediterranean Sea.

P. elephas is intensively exploited in the Mediterranean Sea and the north-eastern Atlantic Ocean (Goñi et al., 2003a). It is traditionally targeted by artisanal fisheries, but the change in fishing strategy (from traps to trammel nets) that took place 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 the western Mediterranean Sea, *P. elephas* commands high prices and its fisheries have great socio-economic importance, supporting a large number of small-scale artisanal vessels (Fig. 3).

P. elephas is signalled in the appendix III of Barcelona convention as species with regulated exploitation and in the appendix III of Berne convention as protected fauna species in the Mediterranean Sea. A variety of regulations are used to manage spiny lobster fisheries in the Western Mediterranean basin: 1) Fishing season varies among countries and even among regions, but in most cases the fisheries are closed during the breeding period; 2) there is a minimum landing size of 90 mm of carapace length (EU Regulation 1967/2006); 3) it is not permitted to catch berried females. The mesh size and the total length of trammel nets per boat even the soak time also have been regulated at national or regional level.

In the Spanish Mediterranean waters, the fishery is regulated by an annual 7-month closure during egg bearing period (September-March), minimum landing sizes (90 mm CL) and the prohibition of landing berried females.

In Italian water, the MLS is 300 mm TL (or 107 mm CL), the fishery is closed from January to April which covers only one part of breeding season and berried females are to be returned to the water (Gristina et al., 2002; Gristina et al. 2005).

In Tunisian waters, the MLS 200 mm TL (or 70 mm CL), the fishing activity is regulated by an annual closure during the period July-February for territorial water and 15 September-February for international waters, and by a ban on catching berried females. According to this species biological studies in Tunisian water (Gaamour et al., 2009; Rjeibi, 2012), the annual closure don't covers the pick of breeding season which occurs during August and MLS is smaller than the length at the first functional maturity which is about 80mm CL corresponding to 23cm of TL. The mesh size of outer panels in trammel nets may also be regulated and the size of a minimum of 70mm was proposed. This last regulation is only considered by the artisanal vessels called "langoustiers" which red spiny lobster is a target species.



Fig. 2 European spiny lobster (*Palinurus elephas*).



Fig. 3 Trammel net with several European spiny lobsters captured in a artisanal boat.

2.1.2 Longlines

2.2 Italy

In the Italian selected areas, Ponza and Patti, a total of five different métier, exploiting the three selected gears, have been identified and monitored during the field activities:

2.2.1 Spiny lobster fishing with trammel nets

Palinurus elephas is a crustacean decapod belonging to the Family Palinuridae. It presents a sub-cylindrical carapace, larger in the inferior quarter, showing numerous conical spines slightly pointed at their apex. Along the anterior part of the carapace it shows two triangular spines separated by a v-shaped space. The coloration is brown-reddish with a wide variability of coloration patterns. The spiny lobster is present in the entire Mediterranean Sea, with the exception of the south-eastern basin and the Black Sea, in the Atlantic Ocean from Norway to Morocco. It lives on hard bottoms of sub-outcropping rocks or coralligenous concretions, rarely mixed with sand, at depth varying from 10 to 160 m (more commonly between 10 and 70 m depth). Below this depth it is substituted commonly by the co-generic *Palinurus mauritanicus*.



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This métier is widely practiced on the Italian territory, being one of the most profitable. For what concern the project, this fishing is mainly practiced on the rocky sea bottoms of Ponza (Fig. 4), while in Patti, being the Gulf almost entirely muddy, this species is only an occasional target, especially when the fishing ground is around the rocky capes of the gulf.

In the area of Ponza, this métier is carried out with low trammel nets, 1.5 m high, with 210/9 and 210/12 nets which are robust enough to work directly on the rocky shoals. These nets are also relatively short, due to the fact that they are precisely set exactly where the echosounder finds interesting elevations on the sea floor. This type of fishing needs longer soak time (72 hours) due to the fact that the nets need to first entrap fish, which, by dying, represent the true bait for the lobster. The lobster, attracted by the baits, crawl on the nets and remain entrapped. The depth at which these nets are set may vary between 60 and 120 m depth.

In Patti, the length of the trammel net for the lobster fishing is about 1000-2000m with an height of 1.2-2m. Because the mesh of this gear are larger than usual (200mm the external and 45-60mm the internal) it is usually referred to as "tramaglione", large trammel net, and is set around 60-110m depth especially in spring-summer.

The fishing of spiny lobsters is ruled by a strict national regulation. The minimum size of the captures is 90 mm of carapace length (Reg. CE n. 1967/2006) and 30 cm of total length (D.P.R. 1639/68). The fishery is closed from the 1st of January to the 30th of April (D.P.R. 1639/68) (covering only part of the breeding season) and is always forbidden the collection of mature females with eggs below the abdomen (Reg. CE n. 1967/2006 e DPR 1639/68).



Fig. 4 Salvatore Romano from Ponza recovering lobsters from a trammel net.

2.2.2 Fish fishing with trammel nets

Trammel nets are widely used also to fish mullets, as monitored in the area of Patti. In this area, the main target species of this métier (Fig. 5) are represented by two species belonging to the Mullidae Family, *Mullus surmuletus* and *Mullus barbatus*. The two species may be distinguished one from the other because the first has a more reddish coloration and the presence of various yellow longitudinal bands on the flanks and additionally some marked transversal yellow or orange bands on the dorsal fin. The two species are widely distributed in the entire Mediterranean basin, in the Atlantic Ocean from Scandinavia to Senegal. Both species are present from the coast to 500 m depth and are fished all the year round. Mulletts are target species for trawlers, but they are mainly fished by artisanal fishermen with trammel nets. When the trammel is addressed to mulletts the internal net has a mesh of 45 mm.

The minimum size following the CE Regulation n. 1967/2006 is 11 cm total length.



Fig. 5 Hauling a trammel net for mullets in Patti.

2.2.3 Groupers fishing with longlines

The groupers (*Epinephelus* spp.) are large demersal fish belonging to the Family Serranidae. They may reach significant sizes (120 cm) and massive weights, up to 70 kg. They have an elongated, oval body shape, covered by numerous scales and a large head with a wide mouth with an protruding inferior jaw. Groupers have one dorsal fin, one anal fin and a rounded caudal fin. The colour is reddish or yellow-brown with dark spots. Groupers live from the rocky shores to various hundreds of meter and occasionally they may be found on detritic bottoms bordering *Posidonia* meadow. They are relatively common in the Mediterranean Sea and in the Eastern Atlantic Ocean; they are present in all Italian seas were they live usually as solitary individuals in caves or clefts.



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This métier is carried out in the Gulf of Patti targeting the species *Epinephelus marginatus* e *Epinephelus aeneus*. The groupers are important preys for the diving fishermen and is as well a prey of professional fishermen with deep longlines, trawlers and trammel nets. The longline targeting groupers is a demersal one, usually 1200m long, armed with 200-500 hooks, 10 Mustad size, triggered with sardines.

The minimum size following the CE Regulation n. 1967/2006 is 45 cm total length.

2.2.4 Pelagic fish fishing with longlines

This métier is a typical carried out mainly in the area of Ponza targeting snappers (*Dentex dentex* and *Pagrus pagrus*) or seabreams (*Spondyliosoma cantharus* and *Diplodus vulgaris*) all of them belonging to the Family Sparidae (Fig. 6). This métier is not common among the artisanal fishery of Ponza (that mainly work with pelagic longlines targeting swordfish) and this type of fishing is mainly carried out by recreational fishermen.

The fishing targeting snappers uses longlines with filament and hooks of larger size with respect to the one used for the other two sparids. The longlines targeting snappers are usually set at 60-90 m depth while those targeting seabreams are set at 45-60 m depth. The soak time is approximately 2-4 hours.

The minimum sizes following the CE Regulation n. 1967/2006 are 15, 18, 15, and 18 cm total length, respectively for *D. dentex*, *P. pagrus*, *S. cantharus* and *D. vulgaris*.



Fig. 6 Some catches of the longlines in Ponza.

2.2.5 Fish fishing with gillnets

Gillnets are widely used to fish mullets and hakes, as monitored in both the areas of Ponza and Patti.

During the fishing targeting mullets, carried out at about 60-90 m depth, it is important to identify groups of shoals where to set the net. The direction of the net is therefore less straight with respect to the one for hakes otherwise the recovery would take a large amount of time on a rough bottom with a higher risk to remain entangled. The set is made before dawn and the hauling is carried out just after the sunrise. Mulletts move exactly during this period of light changing and does not tolerate long soak time otherwise are immediately attacked by other organisms directly on the nets.



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The hake (*Merluccius merluccius*) is a demersal fish belonging to the Family Gadidae with a size commonly comprehended between 30 and 40 cm, whether it may reach 90 cm of length and 12 kg of weight. It shows a silver grey coloration on the back and a white one on the stomach. This species is uniformly distributed in the Mediterranean Sea, Black Sea and Atlantic Ocean and is very common in the South Tyrrhenian Sea.

The hake lives on muddy bottoms (sometimes mixed with sparse rocks) from 30 to 400 m depth. It makes seasonal migrations favoring the shallower waters in the summer season. Reproduction is carried out all the year round with fertility peaks from December to June. The hake fishing is practiced with trawlers, longlines, gillnets and trammel nets. It is one of the principal target species of both the Ponza and Sicilian artisanal fisheries all the year round. The minimum size allowed by the CE Regulation n. 1967/2006 is 20 total length.

In Ponza the hake gillnets are used on muddy bottoms or mixed bottoms (mud and rocks) starting from 100 m to 500 m depth. This métier is practiced all the year round whether the most productive period is late autumn and winter. In summer, some vessels continue this métier but with lighter nets than those used in winter time. The summer gillnet targeting hake is typically made of a monofilament net 0.25 mm in diameter, 3.2 m high and with a stretched mesh of 56 mm. The winter version is a monofilament net in nylon 0.35 mm in diameter, 4.2 m high and with a stretched mesh of 72-80 mm. The direction of the nets for hakes is usually more straight than that of gillnets targeting mullets, because they are set on sandy or muddy bottoms showing less entanglements. The nets are set before dawn and the soak time is up to one or two hours after sunrise (Fig. 7).

In Patti, typically, the gillnet used for hakes is made by one or more meshes of polyamide net, with a 3 to 4 m height and a mesh size of around 50 mm. The net is usually set between 90 and 300 m depth.



Fig. 7 Gillnets targeting hakes in Ponza.



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2.3 Tunisia

In Tunisia x métiers were took into consideration, represented by:

2.3.1 Spiny lobster fishing with trammel nets

In Tunisian waters, the MLS 200 mm TL (or 70 mm CL), the fishing activity is regulated by an annual closure during the period July-February for territorial water and 15 September-February for international waters, and by a ban on catching berried females. According to this species biological studies in Tunisian water (Gaamour et al., 2009; Rjeibi, 2012), the annual closure don't covers the pick of breeding season which occurs during August and MLS is smaller than the length at the first functional maturity which is about 80mm CL corresponding to 23cm of TL. The mesh size of outer panels in trammel nets may also be regulated and the size of a minimum of 70mm was proposed. This last regulation is only considered by the artisanal vessels called "langoustiers" which red spiny lobster is a target species.