# THE TRADITIONAL FISHERY «CHARFIA» IN CHEBBA (MIDDLE EASTERN TUNISIA): TECHNICAL CHARACTERISTICS, CATCH THE RELATED SOCIAL ISSUES

# Hamdi MOUSSA<sup>1\*</sup>, A. SHILI<sup>2</sup> and S. NASRAOUI<sup>3</sup>

<sup>1</sup> Faculty of aquatic sciences, Istanbul University,8 avenue Ordu, Laleli, Istanbul, 34134 - Turkey 2 Institut National Agronomique de Tunisie, 43 Avenue Charles Nicolle, 1082 Tunis - Tunisia <sup>3</sup>Ministry of Agriculture Water Resources and Fisheries, CRDA, Nabeul,8000 – Tunisia \*hamdi.moussa@ogr.iu.edu.tr

#### ملخص

دراسة تقنية الصيد البحري التقليدية الشرفية بالشابة والخصائص التقنية وأصناف الأسماك المستهدفة و المشاكل الاجتماعية التابعة : تتمثل هذه الدراسة في تقييم وضع مصائد الشرافي التقليدية الثابتة بجهة الشابة باستعمال استجواب للبحارة المختصين و زيارات ميدانية للشرافي لتحديد مواقعهم الجغرافية مع دراسة أنواع و فصائل الأسماك الناتجة عنها خلال الفترة الممتدة بين شهر فيفري و ماي 2014. الشرفية هي عبارة عن مجموعة جدران بالشباك تنتهي بغرف صيد تحتوي على فخ صيد أين تدخل الأسماك و تحبس إلى حين إخراجها من طرف الصياد بالشرفية. يتمتل هذه مع عبارة عن مجموعة جدران بالشباك تنتهي بغرف صيد تحتوي على فخ صيد أين تدخل الأسماك و تحبس إلى حين إخراجها من طرف الصياد بالشرفية. يتم مجموعة جدران بالشباك تنتهي بغرف صيد تحتوي على فخ صيد أين تدخل الأسماك و تحبس إلى حين إخراجها من طرف الصياد بالشرفية. يتم أيضا استعمال استعمال اسعف النخيل نادرا في أجزاء من الجدران. اغلب الأسماك هي ذات حجم متوسط و ذلك بسبب كثافة حركة الصيد و الصيد العشوائي. تمثل بعض الفصائل من الأسماك و تحبس إلى حين إخراجها من طرف الصياد بالشرفية. يتم أيضا استعمال سعف النخيل نادرا في أجزاء من الجدران. اغلب الأسماك هي ذات حجم متوسط و ذلك بسبب كثافة حركة الصيد و الصيد العسوائي نمثل بعض الفصائل من الأسماك و المحبذة في المناطقة. يمثل مكان الشرفية و بعدها عن خط أيضا استعمال معف الذيل نادرا في أجزاء من الجدران. أغلب الأسماك هي ذات حجم متوسط و ذلك بسبب كثافة حركة الصيد و الصيد العشوائي. تمثل بعض الفصائل من الأسماك و الإخطبوط و الحبار أهم المنتوجات المتوفرة و المحبذة في المنطقة. يمثل مكان الشرفية و بعدها عن خط الساحل حجمها و درجة العناية بها أهم العوامل المتدخلة في إنتاج الشرفية. بالإضافة إلى عامل الريح و التيارات البحرية التي تحد مسار الأسماك السماك و غرف صيد الشرفية. والم المن في ألماك الماك و على عامل الربح و التيارات البحرية و بعدها عن خط الساحل حجمها و درجة العناية بها أهم العوامل المتدخلة في إنتاج الشرفية. بالإضافة إلى عامل الربح و التيارات البحرية المان الأسماك نحو غرف صيد الشرفية. بالرغم من أن الشرفية تمثل تقنية محافظة على البيئة البحرية باعتبار ها مصيدة ثابتة في البحر و البيئة البحرية باعتبار ها مصيدة ثابئة في الموار دالمانة عليه نحو نحو غرف صيد الشرفية. بالرغم من أن الشرفية تمال تقنية

كلمات مفاتيح : المصائد الثابتة, الشرافي, الشابة, تقنية صيد ساحلية تقليدية.

## RESUME

Les pêcheries traditionnelles Charfia de la Chebba : Caractéristiques techniques, composition des captures et les problèmes sociaux reliés : Le présent travail constitue une évaluation de l'état des lieux de la filière Charfia de la Chebba moyennant une enquête menée et des prospections en mer sur l'aspect technique ainsi qu'une analyse biologique relative aux captures issues de ces Chrafi pendant la période s'étalant de Février à Mai 2014. Aussi, a-t-on procédé à la localisation de leurs positions géographiques. Les « Chrafi » de la Chebba sont aux nombres de 15 installées sur une plate-forme de hauts fonds. L'engin est confectionné essentiellement en nappes de filets intercalées rarement par des palmes. La production des Chrafi est tributaire de l'emplacement de l'engin, sa dimension et de l'entretien qu'il subit. En plus, on note une variation quantitative et qualitative d'une Charfia à une autre. L'accession des poissons aux nasses des Chrafi est régie par les courants marins, les vents et la lumière. Bien que la Charfia soit considérée comme engin passif, elle est touchée d'une évolution qui se manifeste par le changement des matériaux biologiques qui la constituent ce qui diminue la sélectivité de l'engin.

Mots clé : Pêche traditionnelle, Pêcheries fixes, Charfia, la Chebba.

#### ABSTRACT

The « Charfia » is a traditional, sustainable fishing method that catches fish alive. The study emphasizes the first assessment of this technique in Chebba area. It provides a catch analysis, and aims to characterize its technical aspect as well as mapping its implementations. In Chebba area 15 implantations of Charfia traps were identified and located. Traps are mainly made out of multifilament gillnets interspersed with palm leaves. These fisheries are of complex type, formed out of multiple consolidated implantations. Scale based plan of all the Charfia implantations was made. Some factors are influencing the production in Chrafi as the position of the implantation and its maintenance. We noticed a quantitative and qualitative variation from one Charfia to another. Furthermore, fish accession to the Chrafi's fish traps is governed by the sea currents, tides, anticyclonic winds and other hydrodynamic factors. Charfia have been affected by the changes in the traditional materials constituting it, which might impact negatively the environment and the fisheries resources. *Key words:* Charfia, traditional, fishery, traps, Tunisia, Chebba.

#### INTRODUCTION

The existence of fixed fisheries appears to be very old in the Mediterranean, since the installation of a trap is mentioned in the texts attributed to Homer, published 2,600 years ago. These fixed fisheries, as we perceive them from the modern era, can be grouped under several categories (Zaouali, 1985). The Charfia (Plural: Chrafi) to which this article will be devoted, constitute the third main type of fixed fisheries in the Mediterranean. The morphologic and hydrodynamic characteristics of the coastline of Kerkennah islands and Chebba area in the gulf of Gabes in Tunisia have promoted the practice of this specific passive fishing technique. It is a unique fixed fishery in the Mediterranean Sea with its special implantation using palm leaves in an arrow-shaped line for building walls in the water.

Fish caught in this trap are harvested selectively and appropriately following a legacy of knowledge handed down from generation to generation. This technique is mostly present in Kerkennah islands (Bejaoui, 1988; Romdhane, 1998; Sdiri, 2000;Ben atitallah,2008) and in Chebba region (Boughedir *etal.*, 2014).

The fisheries date back to the Phoenician era. Since antiquity, people in Kerkenna Island had started to use this technique as the sea has always been the first source of living for Kerkennah's population. The coastal marine fringe of the islands has been entirely divided into plots and gived to the local family where they installed the Chrafi (Louis, 1961).

In Kerkennah, we encounter the first fisheries with palm. Until Djerba, Zarzis and the Libyan border, where the waters of the coast are shallow and easily exploitable, there is almost an uninterrupted series of fisheries (Depincé, 1909; Boughedir *etal.*, 2014).

In central eastern coast of Tunisia as well, the presence of marine sites sheltered from the prevailing and frequent northwest winds along the eastern coastlines, particularly the Chebba area, and the topographical and hydrodynamic characteristics of this area are sufficient conditions for establishment of a small-scale fishing zone (Romdhane, 1998), especially Charfia fixed fishery that needs a shallow water to be installed, is used in this area for a long times. It has been a major contributor to the economic growth of city for long time.

Chebba area is contributing significantly, with its different fishing activities, to the total catch production in Tunisia and especially in Mahdia area's fisheries production.

Chebba's domestic fisheries production in 2017 was approximately 13990.355 tonnes, 33.82 % of which is from small scale capture fisheries. Additionally, more than 72% of Mahdia fisheries landings are taken by small scale vessels using passive gears which target various demersal species.

About 1978 vessels are involved in the small scale fisheries along the whole Chebba coast, of which 1120 boats are vessels with engine. In terms of percentage it represents 58 % of the total fishing fleet of Mahdia, including the boats without engine (DGPA, 2017).

In Kerkennah islands the average of annual production is around 4 tons per fishery. Annual production is around 250 and 300 tons per year (Sdiri, 2000). The average of the daily production of a fishery is 12.7 kg with a maximum of 30 kg and the

most productive season is spring (Ben atitallah, 2008).

The Charfia catch sistem is based on the principle of blocking the road and guide the fishs to the trap. Fish follows the palm leaves and gillnets shadows (Bejaoui, 1988). Indeed, relatively little is known about Charfia fisheries in Chebba coastal waters. It is necessary to investigate these rare fisheries, protect them and understand the issues threatening it. Charfia has been in decline for years and is threatened by the effects of various external and internal factors, including the impact of industrial fishing. It has become practically abandoned on the North and East banks of the Kerkennah Archipelago in favour of techniques that have become more productive, such as gill nets (Bejaoui, 1988; Romdhane, 1998; Kacem and Neifar, 2013). Some other issues related to the change in the construction materials are being considered and threatening the natural aspect of the traps (Romdhane, 1998).

It is in this context that we try to highlight the importance of this traditional technique in Chebba area, and contribute to ensure its durability as a smallscale fishing practice and a heritage in the region. The aim of this study is to investigate the technical aspect of the Fisheries and its geo-coordinates, follow quantitatively and qualitatively the catch, determine the catch composition, as well as providing some information about the crew and the social aspect and issues.

# **MATERIAL & METHODS**

This study was conducted in the coastal area of Chebba area in the high sea bed area between the following geo-coordinates: 35°10' N 11°9' E and 35°5' N 11°13' E, as appeared in (Figure1). The area is a seagrass meadow (Clairefond et Cochet, 1979; Hattab *etal.*, 2011) with a depth between 0, 5 m and 2 meters with a relatively large tidal range. The study area is a part of the Gulf of Gabes, which is located along the south-eastern coast of Tunisia extending from «Ras kabudia» (Chebba) to the Tunisian-Libyan borders including Kerkennah Island. This area is highly productive where we found a high species richness. In fact, the seagrass leaves are an ideal spawning ground for all marine organisms, and especially a nursery for juveniles of several species (Turki etal., 1995 in Hattab, 2011). Some physical and hydrodynamic aspect distinguish this region, it has the highest tidal range in the Mediterranean sea with a maximum of 2 m a feature attributed to the low slope of the continental shelf. Water circulation is influenced by the tides, the effect of anticyclonic winds, the sediment texture and sea grass density (Othmani etal., 2017; Aleya *etal.*, 2018). Experimental fishing trips were conducted in the Chrafi fisheries area (Figure 1) during the period of



Figure 1: Study area: Geo-coordinates of study area and the distribution of 15 fixed fisheries Charfia ▲ Charfia fishery

February to May 2014. Fishing was carried out on board small commercial fishing vessels (LOA: 3-8 m, <50 hp) normally operating in the study area. The study period matches with the fishing season of the Chrafi fisheries, knowing that Charfia fishing activity occurs throughout the year. We monitored the daily fishing activities. Every fishery was regularly visited twice per week. We record the Geo-coordinates of each part of the 15 fisheries especially the fishing chambers' coordinates in order to draw the general plan of the each Charfia (Table I). The data relating to the technical characteristics is then recorded: Gillnets mesh sizes, main wall length, capture chambers characteristics, traps inside the chambers. The nature of the sea bed and the depth are also registered. Social data were collected through interviews regarding crew's social situations and issues that were being carried out in the fishing area. We monitored the total catch regularly during the four months of the study. Fish species were identified and validated by referencing Fish Base (Froese and Pauly, 2013). Length and weight data were recorded for all commercial fish species observed during the fishing trips. Total lengths (TL) for fishes, mantle length (Lm) for the cephalopods (the cuttlefish) were recorded to the nearest 0.1 cm and total weight (Wt) was measured to the nearest 0.01 g. The data was recorded and treated by Excel. Scale based plan of all the Chrafi was made using Adobe Illustrator CC.

 

 Table I: The Chrafi local names, geo-coordinates and total areaof Chebba Chrafi fisheries (Arrêté du 28 septembre 1995; Present work)

		Total			Total
		area	Charfia local		area
Charfia local name	Coordinates	(m2)	name	Coordinates	(m2)
1.El Jerida	35°10'46"N 11°9'11" E	400	9.MabdoûaElhay	35°8'24" N 11°12'33"E	4000
2.El Mengouba	35°10'21"N 11°9'43" E	400	10.Zarb Eloued	35°7'50"N 11°11'57" E	4000
3.Madda Ben Fradj	35°9"51"N 11°10'17" E	5000	11.ElKebliya	35°7'7"N 11°12'20" E	6000
4.Zarb Elhili	35°9'14"N 11°9'17" E	4000	12.Elgartil	35°6'37"N 11°12'33" E	5000
5.Medda Brahim	35°9'21" N 11°10'48" E	3000	13.Elnagaâ	35°6'22"N 11°12'39" E	4000
6.El Medda Elkébira	35°8'57"N 11°11'25" E	6000	14.El Mabdoûa	35°6'8"N 11°12'58" E	7000
7.Zarb El Arab	35°8'30" N 11°11'35" E	7000	15.Ras dser	35°5'41"N 11°13'33" E	11000
8.Zarb El Fekih Hassen	35°8'13"N 11°11'39" E	4000	16.Tchareg	Not active	-

## RESULTS

## Technical characteristics of the fisheries

The Charfia is a fixed fishing system. In Chebba 15 Charfias are active. These fisheries are of complex type, formed out of multiple consolidated implantations (a set of successive modules); each module is composed by the following part (Figure 2): \*Main wall: principal axis of the fishery «Rjel».



Figure 2: Chafia fishery general structure

\*Catch chamber: Big chamber «Dar» itself can contain or not a first big chamber called «Sodra» \*Secondary smaller catch Chamber «Jerbi».

\*Secondary Walls: «Radded» and « Kharraj».

People are now a days using gillnets rarely interspersed with palm tree leaves to build a kind of labyrinth into which the fish swim and, when the tide chamber are installed containing each one a small fishing trap known as «Drina». The Main wall «Rjel» is constructed with PA gillnets whose mesh size varies between 52 and 56 mm. The Catch chambers are made of PA gillnets with a mesh size between 40 and 44 mm. The walls are made of PA and/or Palm leaves with a mesh size varying from 48 falls, are trapped alive in a special trap, from where they are collected by the fishermen the morning. This method is a very slow method that allows fishermen to select the fish for harvest. At the end part of each Charfia one principle and one/two secondary catch to 56 mm.

The total height of the nets varies between 1,5m and 2,5 m according the depth of the waters in which is installed the fishery. The implantation is maintained by plastic ropes attached to the seabed and by stakes. The Stakes can be PVC or wood. The trap « Drina » is made with PA gill net or wire netting. The mesh size of the « Drina » varies from one fishery to another between 40 and 44 mm. Its total length is 1.5 m and the diameter of the «Drina» varies between 0.5 and 1 m. The smallest Charfia contains in total 10 catch chamber and 10 fishing traps. The biggest one, contains 48 chambers with 54 « Drina ». Scale based plan of all the Charfia implantations was made (Figure 3). We noted a remarkable variation in the use of palm leaves and PA nets from one Charfia to another. Only two fisheries («El Mengouba» and «Madda Ben Fradj») are made mainly in palm leaves. In all other Chrafi, palm leaves are rarely used (Table II).



Figure 3: An example of scal ed plan of Charfia: Case of «El Jerida» Charfia

Charfia	% of use of palm leaves	% of use of PA gillnets		
1. El Jerida	0%	100%		
2. El Mengouba	90%	10%		
3. Madda Ben Fradj	80%	20%		
4. Zarb Elhili	15%	85%		
5. Medda Brahim	10%	90%		
6. Medda Elkébira	10%	90%		
7. Zarb El Arab	5%	95%		
8. Zarb ElFekih hsan	10%	90%		
9. Mabdoû Elhay	10%	90%		
10. Zarb Eloued	20%	80%		
11. ElGuebliya	5%	95%		
12. Elgartil	10%	90%		
13. Elnagaâa	5%	95%		
14. Mabdouâ Elmayt	10%	90%		
15. Ras dser	5%	95%		

Table II: Percentage of use of palm leaves and PA gillnets in the Chrafi fisheries

The maintenance of the fisheries implantations such as the regular renewal of the palm leaves is important to insure high fish capture. The ropes must be well tied every day to avoid the downfall of the installations. The fish catch is governed by the sea currents and the prevailing winds. The entrance of the fish to the chamber and then to the fishing trap is depending on the current and tide. The Fish follows the palm leaves and gillnets Shadow and finish by being trapped in the Drina. It is during the ebb tide when the water level is lowering that the trapping operation take place. The Fish let itself be driven by the flow currents towards the shore for nutritional reasons. Once the ebb currents start, the fish, frightened, try to regain the depths by because they feel the water falls. It is during this phase of return that the fish is being caught in the traps.

Some of the Charfia fisheries contain two catch zones; the main fishing zone is catching during the ebb tide during a low tidal phase. The reversed Zone catch fish is working during the flood tide when the fish are moving towards the shallow waters for feeding. Light is also an important effect that influences the capture operation of fish in the Charfia as (Bejaoui, 1988) had demonstrated for the case of Kerkennah island's fisheries, since the light intensity is determining the fish distribution in the shallow waters. The same case for the Chebba fisheries, more the fishing chamber are big more the fish capture is more frequent. The fish when engaged in the chamber, with presence of a good natural illumination feels that is going to find an issue until being caught in the «Drina» Trap. The fishes are harvested every day the morning when the water depth is low, so that the fisher can collect it easily. This operation can take from one to four hours depending on the size of the

fishery. It is during the spring tide (king tide) period of the month that the production of the Charfia is more important. That is can be explained by the fact that, during this period the sea currents are stronger. Other factors are influencing the production in Charfia, such as the position of the fishery. More the distances between two fisheries is high more the catch production of those is better.

#### **Catch composition of Chrafi Fisheries**

In Charfia fishery, a total of twenty species were captured. In spring season, Sparidae, Labridae, Serranidae and Cephalopods are the main target groups. The daily production of the different visited Charfia was monitored in order to calculate the average of daily production per fisheries during the different seasons (Figure 4, Figure 5, Figure 6 and Figure 7). The two species from labridae family was considered together in the figure 7. All specimens were identified to species. The commercial fish species were the gilt-head bream (Sparus aurata), the Salema (Sarpa salpa), the Painted comber (Serranus scriba), the annular Seabream (Diplodus annularis) and the East Atlantic peacock wrasse (Symphodus tinca). For Mollusc species the commercial target species were: The common octopus (Octopus vulgaris) is followed by the common cuttlefish (Sepia officinalis). All the target and frequent species are resumed in the (Table III). Others less frequent species, such as Gobius sp, Dicentrarchus labrax, Sciaena umbra, Anguilla anguilla, Liza aurata, Trachurus Trachurus, Lithognathus mormyrus, Scorpaena scrofa and Loligo vulgaris were present rarely in the catch. The total length was measured for the commercial target species. It was then compared to the minimum legal size. A total of 300 individuals







Family	Species	Fishing period (month)
Sparidae	Sparus aurata	
	Sarpa salpa	February to May
	Diplodus annularis	reducing to May
	Diplodus sargus	
Labridae	Labrus viridis	February-March
	Symphodus tinca	April-May
Serranidae	Serranus scriba	April-May
Scorpaenidae	Scorpaena porcus	March to May
Mullidae	Mullus sp	April-May
Soleidae	Solea solea	May
Sepiidae	Sepia officinalis	February to May
Octopodidae	Octopus vulgaris	

Table III:	The princ	ipal target	species for	Chrafi f	isherv in	Chebba
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belonging to 8 species (8 families) were sampled and measured in this study. The most abundant species were *Sparus aurata* and *Octopus vulgaris* (Figure 8 and Figure 9). Approximately 45 % of the catch was represented by these two species followed by *Sepia officinalis* and *Sarpa salpa*. The best represented family was Sparidae with four species. Around half of the measured Sea bream (48 %) was above the minimum legal size (20 cm), the rest were specimen with Total length varying between 10 and 20 cm while for *Sarpa salpa* just 18% of measured specimens are above the MLS (20 cm) (MLS for this two species). *Serranus scriba, Symphodus tinca* and *Diplodus annularis* had respectively 60 %, 70% and



Figure 8: Weight frequency of *Octopus vulgaris* measured during the study period



Figure 9: Total length frequency of *Sparus aurata* measured during the study period

54 % of the total length bigger than 11 cm (MLS for this three species). *Mullus sp* had an average of 16.9 cm of total length with a majority of legal size higher than MLS (12 cm). 82 % of measured *Sarpa salpa* had total length smaller than 20 cm. *Octopus vulgaris* had a mean weight 3,6 kg with a maximum of 6 kg per specimen knowing that the minimum landing weight of this species is defined by 1 kg according to the Tunisian fisheries legislation. Furthermore, no individuals weight less than one kilogram for Octopus. 6 % of measured common Cuttlefish *Sepia officinalis* had a LM smaller than 10 cm (MLS). The means of total length for the fish species are resumed in (Figure 10).



Figure 10: Mean of Total length (cm) for the measured commercial species.

# Social Characteristics of the Chrafi fisheries community

Chrafi fisheries in Chebba, has been an activity employing many people from different age categories. The Figure 11 shows that more than half of the Chrafi population is between 35 and 55 years old. 20% of the fishermen are relatively young, which indicate that this fishing technique is well preserved with a transfer of knowledge from generation to another. Moreover, many Charfia operators are brothers and cousins (Figure 11.) The experience in this kind of fishing «Metier» is acquired by inheritance and by practice with parents and grandparents along the years. 70 % of the population is less educated (Primary school). This is due to the fact that the parents encourage their children to devote themselves since the childhood to Charfia fishing in order to preserve the fishery on behalf of the family (Figure 12).

## The social issues related to Chrafi and its owners

The site of the Chrafi, as we have located, is a shallow area suitable for different traditional fisheries gears. This is making a competition for fishing accompanied by conflicts between Chrafi owners and other small-scale fishermen. The excessive increase in the number of chambers compared to which fixed by law for each Charfia is generating problems



Figure 11: Age structure of the Chrafi fisheries crew

between. This excess of using the authorized area causes the closing of the distances separating two successive Charfia, which hinders the passage of the other fishers' vessels from the shore to offshore. Moreover, there is a Competition at the annual rental of Chrafi. New people want to participate in the annual rental, which is refused by more experienced people using Chrafi for long time, confirming that they are only capable to practice this type of fishing. Due to the unavailability of the Palme leaves in the south of Tunisia, and the increase of its price, those have been changed to small mesh size gillnets. These structural changes introduced to this fishing technique have raised some issues such as the conflict between the Charfia holders and the others small scale fishers seeking the same resource by different gears in the Charfia's area.

#### DISCUSSION

Our study has been a general characterization of the Charfia traditional fishery used in Chebba area. Knowing that previous studies are rare especially in the case of Chebba, our study will be useful in future to develop more detailed studies dealing with the size composition of the Chrafi's catch during all the fishing season along the year. The kind of Chrafi fisheries as described by (Bejaoui, 1988) needs a shallow water to be installed, the natural condition of Chebba areas encourage the practice of such fishing activities. In Kerkenna islands (Southern Tunisia) the same traps are installed with approximately a total of more than 450 implementations (Bejaoui, 1988), with majority of traps of simple model containing one to three fishing room. The total number of modules and catch chamber in the case of Chebba is higher than the case of the Chrafi of Kerkennah Islands (Bejaoui, 1988; Ben Atitallah, 2008).

The Studies on the catch composition and the target species size composition of the small scale fisheries in the Chebba area not so frequent. According to



Figure 12: Level of study of the Chrafi fisheries crew

(Boughdir *etal.*, 2014), Chrafi's catch is renowned for its excellence with a wide diversity of species that vary according to the seasons. Two important fishing periods or «Missra» can be distinguished, from October to January and from March to June. The first campaign mainly concerns Mugilidae, Seabream, Salema fish and Octopus. The second one during it they target are the Sar, Cuttlefish, and the Annular Seabream, and in smaller quantities the octopus. All species that exist in the area are likely to be fished via Charfia fishery.

For the current study, according to the interviews with the local fishers and the catch monitoring during the study period we identified the same fishing seasons, the first is between march and June with a production pic during march (Especially the octopus) may-June (Annular seabream), the second occurs between September and January with a pic in November (fishing season of Mullet and Sea bream). This kind of fixed fishery having a selective property as a passive gear, however some of the captured fish are below the regular Minimum landing size (MLS). Some of the captured specimens are juvenile. This is can be the result of the use of illegal mesh size in «Drina» traps (Boughedir *etal.*, 2014).

More generally, the gulf of Gabes, hosting a big number of fleet, has experienced a substantial decrease in fish catch during the last two decades because of the subsequent combined pressure of overfishing and pollution (Aleya etal., 2018). Additionally, the illegal gear called «Kiss» that evaluated from 4 gear in 1980 to several hundred today (Boughedir etal., 2014), is nowadays one of the biggest problem in the Gulf. The situation of the gulf is endangering the entire ecosystem. It is also affecting the contiguous environment as declared the Chrafi owners. The quantities of *Octopus* especially had declined during the last decades and the drop in the proportion of legal-size fish can be due to the excessive industrial offshore fishing. The species list resulting from the inventory and the follow during the

study are consistent with that done by (Ben atitallah, 2008). The same study explain the drop of Chrafi's catch production and the decrease of the big size fishes, as a consequence of the overexploitation via the trawls used in shallow waters (-50 m) and the using of the «Kiss». The model of Charfia described by Louis (1961) and Bejaoui (1988) was adopted as a reference to study the evolution of the fishery over the years. The Charfia was considered for long time as a passive selective trap, it is for longtime affected by the changes in the natural materials constituting it. It had been constructed by biodegradable Materials (wood and Palme leaves). The Palm leaves have been changed by small mesh gillnets causing the capture of juveniles which might impact negatively the fishery resources and the environment (Kacem and Neifar, 2013). Although the specifications for Chrafi Stated by the ministry that obliges the use of the palm leaves for all parts of the Charfia except its catch chambers (Chapter 8 of the Decree Law of 28 September 1995), these Chrafi are currently constructed in Polyamide nets and the palm leaves are rarely used in the main walls of the fishery. Environmentally, the clogging of the nets is caused naturally by the phenomenon of Fooling which is manifested by the fixation of organisms. Clogging makes the nets heavier and makes it easier to fall when the wind is strong. The great availability of modern materials has imposed this modification of gear as Bejaoui (1988) points out. It should be added that the development of new industrial fishing techniques and the practice of illegal fishing are putting undue pressure stock of fish. This has caused the Chrafi to fall in profitability and fishermen find in the use of Gillnets the solution to increase their income. Furthermore, the fisheries are nowadays threatened by various factors. For instance, offshore trawlers illegally entering shallow waters, including areas occupied by Chrafi, cause a great deal of damage to the Chrafi installations. In addition to trawling, there is the «Chenchoul» purse seine fishery, which according to the Chrafi holders, is a cause of depletion of the pelagic stock.

Apart from their advantages, as the facility of manipulation, modern materials are losing the ancestral knowledge and the traditional and aesthetic aspect of fixed fisheries that made a charm of the site (Bejaoui, 1988). This is nowadays the case in the Chrafi of Chebba. The natural charm of the palms has decreased in the site.

## CONCLUSION

Artisanal fishing is the most reliable element for the issue of sustainable management of fisheries resources. This fishing category is typical and rare fishing technique. Being a unique traditional technique in the Mediterranean Sea mostly present in Kerkennah islands, Charfia is also a major contributor to the economic growth in the city of Chebba. Charfia has been in decline for years and is threatened by the effects of various external and internal factors, including the impact of industrial fishing and lower productivity compared to modern techniques. Many problems related to these fisheries and its structural modifications are currently being considered. The Modernisation would have a positive impact on profitability; however, these changes might impact on the other hand the environment and the fishery resources. Awareness of the protection and the preservation of this type of fishing are nowadays required.

## BIBLIOGRAPHY

- Aleya, L., Béjaoui B., Dhib A., ZiadiB., Fertouna-Bellekhal M., Helali M.A., Khedhri I., Oueslati W., Rym Ennouri., YamashitaC., Zaaboub N., Othmani A., El Bour M., TrabelsiL., Abdel-Daim M., Galgani F., Virgínia M., Martins A., Turki S., 2018. Tunisia. P. in World Seas: An Environmental Evaluation: Volume I: Europe, The Americas and West Africa. Second Edition, Academic Press. Sheppard, C, London, UK.
- Arrêté du 28 septembre 1995 réglementant l'exercice de pêche, Chapitre 8 : Dispositions particulières aux établissements fixes, Article 51. Journal officiel de la république Tunisienne n° 80 du 6 octobre 1995, P. 1896-1900. Bejaoui, N., 1988. Les techniques traditionnelles de pêche aux îles Kerkennah, DEA, Biologie Marine et Océanographie, Faculté des sciences de Tunis, Tunisie, 193 p.
- Ben Atitallah A., 2008. Caractérisations de la pêche à la Charfia au sud des îles de kerkennah. PFE, INAT, Tunisie, 86p.
- Boughedir, W., Raouian, G., Souissi, J. B., Sternberg, M., Faget, D., & Rifi, M., 2014. Les pêcheries fixes artisanales. Etudes de cas : les chrafi de la Chebba, Pêches méditerranéennes. Origines et mutations – Protohistoire-XXIe siècle, Maison méditerranéenne des sciences de l'homme, 203-222.
- Clairefond P., Cochet G., 1979. Géologie Méditerranéenne : la mer pélagienne. Tome VI édition l'université de Provence. ISNN : 0397-2844.
- Froese R. & Pauly D., 2013. FishBase. World Wide Web electronic publication. <u>www.fishbase.org</u> (05/2014).
- DGPA., 2017. Annuaires statistiques de la pêche et de l'aquaculture en Tunisie 2000-2012, Direction générale de la pêche et de l'aquaculture, Ministère de l'agriculture, Tunisie, 143 p.

- Depincé Ch., 1909, Congrès de l'Afrique du Nord Tenu à Paris du 6 au 10 octobre 1908- Compterendu des travaux, I, Paris.
- Hattab, T., Ben Rais Lasram, F., et Sammari, C., 2011. Modélisation de l'habitat des ressources halieutiques dans le golfe de Gabès et projections selon un scénario de changement global. Bull. Inst. Natn. Scien. Tech. Mer de Salammbô, Vol. 38.
- Hattab T., 2011. Modélisation des habitats des ressources halieutiques dans le golfe de Gabès et projections selon un scénario de changement global. Mémoire de Mastère, INAT, Tunisie, 126 p.
- Kacem, H and Neifar, L., 2013. La transformation des Charfias et son impact sur l'écosystème marin. Poster présenté au *Premier symposium* régional sur la pêche artisanale durable en méditerranée et mer Noire, Malta.
- Kchaou, N., Elloumi, J., Drira, Z., Hamza, A., Ayadi, H., Bouain, A., and Aleya, L. (2009).
  Distribution of ciliates in relation to environmental factors along the coastline of the Gulf of Gabes, Tunisia. Estuarine, Coastal and Shelf Science, 83(4), 414-424.

- Louis A., 1961-1962, Les îles Kerkena (Tunisie), Étude d'ethnographie tunisienne et de géographie humaine, Tunis, *Publications de* l'Institut des belles lettres arabes (IBLA), 2 vol.
- Moussa H., 2014. Contribution à l'étude des pêcheries fixes « Chrafi » de la région de la Chebba (Mahdia), PFE, INAT, Tunisie, 98p.
- Othmani, A., Béjaoui, B., Chevalier, C., Elhmaidi, D., Devenon, J. L., & Aleya, L. (2017). Highresolution numerical modelling of the barotropic tides in the Gulf of Gabes, eastern Mediterranean Sea (Tunisia). Journal of African Earth Sciences, 129, 224-232.
- Romdhane, MS., 1998. La pêche artisanale en Tunisie : évolution des techniques ancestrales, Mélange de l'école française de Rome Antiquité, 61-80.
- Sdiri F., 2000. Les engins et les techniques de pêche côtière utilisés dans le golfe de Gabès. PFE. INAT, Tunisie, 71 p.
- Zaouali J., 1985. La Mer des Bibans (Tunisie méridionale), aperçu général et problèmes de la pêche, Actes du 3e Congrès international d'Étude des cultures de la Méditerranée occidentale (Jerba, 1981) : 301-313.