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To cite this version:

Mohamed Salah Romdhane, Chiheb Fassatoui, Moez Shaiek, Amel Ben Rejeb Jenhani, T. Changeux. Mugilids fisheries of Tunisian coasts and lagoons. Aquatic Living Resources, 2019, 32, pp.6. 10.1051/alr/2019005 . hal-02123575

HAL Id: hal-02123575

https://hal.science/hal-02123575v1

Submitted on 28 Jan 2020

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Mohamed Salah Romdhane, Chiheb Fassatoui, Moez Shaiek, Amel Ben Rejeb Jenhani, T. Changeux. Mugilids fisheries of Tunisian coasts and lagoons Aquatic Living Resources, EDP Sciences, 2019, 32, pp.6. ⟨10.1051/alr/2019005⟩

REVIEW ARTICLE

Mugilids fisheries of Tunisian coasts and lagoons

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Received 4 July 2018 / Accepted 15 February 2019

Handling Editor: Rutger de Wit

Abstract – With its 1300 km coastline and 110 000 ha of coastal lagoons, Tunisia offers important resources to demersal and pelagic fisheries. Among all the exploited fish species in Tunisia, mugilids are the most widespread. They are known in temperate, subtropical and tropical regions, and occur both in coastal areas, lagoon ecosystems and inland waters. Six mugilids species have been inventoried in Tunisia. Their migratory behavior consists of moving back and forth between brackish and saline environment where they spend a large part of their life cycles. This behavior results in a peculiar high vulnerability to human pressure. Consequently, they require special attention from fisheries managers for sustainable catches. This study was based on the data from the national fishing and aquaculture directorate (DGPA) statistics, and comprised time series from 1995 to 2015. We looked for clear tendencies and correlations between harvest from the coastal sea and lagoons of the different coastal regions, in relation to recruitment in coastal marine waters. We focused on two species, i.e. *Mugil cephalus* and *Liza aurata*, which are best appreciated for local consumption and, therefore, most targeted by the fishery in Tunisia. The Tunisian lagoons show a decreasing trend in mugilids landings. This may be explained by the disturbance of migratory ways and the degradation of the coastal habitats, by the harvest of fry used for the inland water-stocking program, and by the multiplication of droughts. Particularly the latter strongly limits the migration of juveniles. The harvest in the coastal zones is relatively stable, follows perfectly the total national landings, with although a clear increase since 2011 as a result of uncontrolled illegal fishing. The negative correlation between the total harvests of mugilids in the coastal sea and coastal lagoon was highly significant (Pearson coefficient $r = -0.702$, $p < 0.001$).

Keywords: Mugilids / diversity / landings / coast / lagoons Tunisia

1 Introduction

The Tunisian waters host about 350 marine and inland fish species, among which 6 are mugilids also known as mullets, i.e., *Mugil cephalus* (Linnaeus, 1758), *Chelon labrosus* (Risso 1827), *Liza aurata* (Risso 1810), *Liza saliens* (Risso, 1810), *Liza ramada* (Risso 1810) and *Oedalechilus labeo* (Cuvier, 1829). In practice, they are difficult to distinguish by non-specialists, especially the juvenile forms.

In the Mediterranean Sea, mugilids represent 22.1 millions of tons in 2014 with a value of 44.2 million of US dollars[1]. In Tunisia, the total mugilids harvest during 2015 was almost 3000 tons which represents 9.5% of the coastal and lagoon harvest and 2.26% of the total Tunisian fisheries harvest (DGPA, 2015).

Thus, mugilids in Tunisia, beyond their great economic importance, represent an important heritage and cultural value. Indeed, since antiquity times, from Punic to Roman ages, mullets were selected among species which are part in the preparation of "*Garum*", an essential condiment of the ancient gastronomy in the Mediterranean basin (Paskoff et al., 1991; Slim et al., 2004). Nowadays, mullets are very much sought after and constitute a highly appreciated product, both for their organoleptic and alimentary qualities. The "Bottarga", mainly made from the roe pouch of Flathead grey mullet *Mugil cephalus* is collected when the females are full (Beddih et al., 2005). This product, sometime called the "Mediterranean caviar" has a high market value exceeding 200 US dollars per kilogram.

Similarly, fishing for mugilids is one of the most ancient fishery practices in Tunisia. Thus, antique representations such

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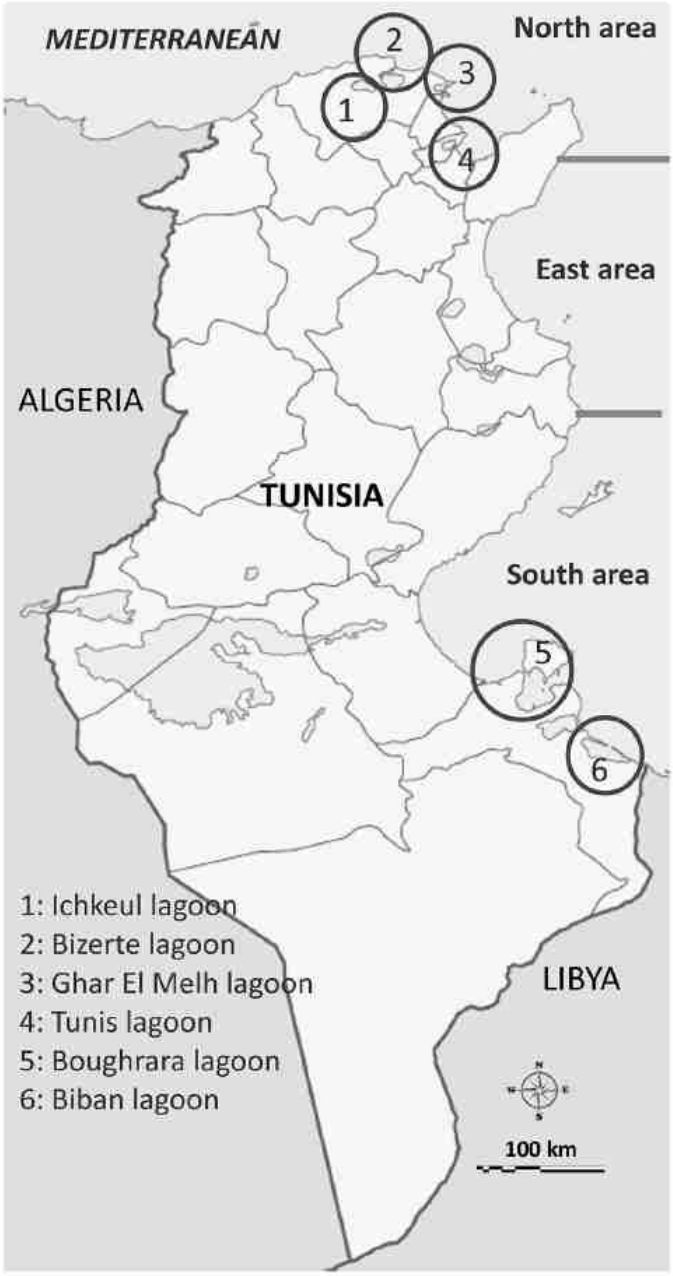

Fig. 1. Coastal areas and lagoons of Tunisia.

as the "mosaic of Sidi Abdellah" or the "Baths of Fundus Bassianus" (Bardo Museum) illustrate mugilids fishing in Bizerte lagoon by means of ancestral techniques (castnet). Ancient texts also mentioned old fishing techniques for mugilids, some of which are still practiced today like the peculiar use of female to attract other individuals (Paskoff et al., 1991; Slim et al., 2004).

The mugilids live in groups in coastal waters as well as in coastal lagoons and inland fresh waters, in lakes and dams reservoirs (Bauchot and Pras, 1980; Fischer et al., 1987; Feheri- Bedoui and Gharbi, 2005). However and because of their complicated life cycle as an euryhaline migratory species, they need good ecological status of both the coastal and lagoon habitats, on the one hand, as well as good connectivity between these different habitats, on the other hand.

The first scientific studies on the ecology, biology, growth, and fishing of mugilids in Tunisia were done by Heldt (1948), who included descriptions of stocks. Since him, studies have multiplied considering growth, reproduction, migration, nursery habitat, stocking and fishing techniques (Farrugio and Quignard, 1974; Farrugio, 1975; Bruslé and Bruslé, 1977; Chauvet and Mkaouar, 1977; Chauvet, 1979; Romdhane, 1985; Vidy and Franc, 1987; Fehri-Bedoui and Gharbi, 2005).

This study mainly focused on two species, i.e., the Flathead Grey Mullet *Mugil cephalus* (Linnaeus, 1758) and the golden mullet *Liza aurata* (Risso, 1810). Indeed, both species represent together the essential of mugilids landings in Tunisia (DGPA, 2015). According to Fehri-Bedoui and Gharbi (2005), *Liza aurata* represents alone 45% of the total national landings of mugilids. The aim was to find clear tendencies and correlations between coastal and lagoon landings, either between spawning, growth in inland (rivers, natural and artificial lakes), littoral ecosystems (lagoons) and recruitment in coastal marine waters.

This review on the diversity and exploitation of mugilids in Tunisia includes three main axes: the spatial distribution of species through lagoons and coastal areas; the specific fishing gears and the analysis of the landings status and trends.

2 Tunisian coastal areas and lagoons

The spatial distribution of mugilids is constrained by local and geographical conditions. We distinguish three marine coastal areas (North, East and South), five coastal lagoons (Bizerte, Ghar El Melh, Tunis, Boughrara, Biban) and a single inland lagoon (Ichkeul) where mugilids are fished (Fig. 1).

The Tunisian coasts extend over 1298 km and represent a hinge zone between the two Mediterranean basins. Based on biogeographic and bioclimatic criteria, the fishing zones of Tunisia are subdivided into three main coastal areas (see Tab. 1 and Fig. 1): the Northern area (extended Gulf of Tunis), the Eastern area (Gulf of Hammamet and Sahel region) and the Southern zone (Gulf of Gabes).

The coastal lagoons are shallow inland water bodies, separated from the ocean by a barrier, connected to the ocean by one or more restricted inlets which remain open at least intermittently (Kjerfve, 1994). According to the geomorphological, hydrological and climatic aspects, 10 lagoons are identified in Tunisia (Quignard and Zaouali, 1980), here we focus on six lagoons that are most important for fisheries (Tab. 2):

- lagoon of Ichkeul, the only inland lagoon, which is connected to the Bizerte lagoon and the receptacle of six semi-permanent rivers;
- Bizerte lagoon with a 300-m wide marine channel as the inlet;
- Ghar El Melh with a 20 to 50-m wide inlet;
- Tunis lagoons (north and south) communicate throw hydraulic tidal gates;
- Boughrara the largest lagoon of Tunisia with a 3000-m wide inlet;
- Biban lagoon communicates with a 400-m wide inlet.

Table 1. Major characteristics of marine coastal area of Tunisia (Ktari-Chakroun and Azouz, 1971; Ben Othman, 1973; Oueslati, 1993).

Fishery Zones	Spatial delimitation	Common substrates	Common Fishing zones
Northern coast	Gulf of Tunis	Rocky bottoms and movable bottoms	Tabarka, Sidi Mechreg, Bizerte, Ghar El Melh, Goulette
Eastern coast	Gulf of Hammamet	Sandy bottoms	Kelibia, Beni Khiar, Hergla, Sousse, Monastir, Teboulba, Mahdia
Southern coast	Gulf of Gabes	Sandy and sandy-muddy bottoms	Sfax, Kerkennah, Mahres, Skhira, Gabes, Zarat, Houmt Souk, Zarzis, Ketf

Table 2. Major characteristics of the Tunisian lagoons.

Lagoons	Surface	Mean depth	Temperature ranges	Salinity ranges	Water exchange	References
Ichkeul (37°81'N 9°83'E)	8000 to 12 000 ha (summer to winter phase)	1 to 2 m	10 to 33 °C	0.20 to 80 psu	Bizerte lagoon	Ben Hassine, 1974; Ben Rejeb Jenhani, 1989; Beji Sassi, 1999; Ben M' barek, 2001; ANPE, 2007
Bizerte (37°10'N 09°50'E)	15 000 ha	8 to 12 m	11 to 29 °C	33.9 to 35.8 psu	Mediterranean sea	Harzallah, 2002; Béjaoui et al., 2010; Boukef et al., 2010; MeHSIP-PPIF, 2011
Ghar El Melh lagoon (37°08'N 10°10'E)	2600 ha	0.5 to 1 m	9.7 to 27.4 °C	25.0 to 46.0 psu	Gulf of Tunis	Romdhane, 1985; Burgis and Symoens, 1987; Lemoalle, 1987
Tunis Lake						
North part: (36°49'N10°14'E)	2200 ha	1 to 3 m	10 to 29 °C	34 to 42.5 psu	Gulf of Tunis	Ben Charrada, 1992; Ben Maiz, 2008; Jouini et al., 2005
South part: (36°47'N 10°13'E)	710 ha	2 to 4 m	10 to 32 °C	37.2 to 37.4 psu		
Boughrara (33°36'N 10°49'E)	50 000 ha	4 m	11.2 to 27.4 °C	36.9 to 44.4 psu	Gulf of Gabes	Jedoui et al., 1981; Romdhane et al., 1998; Ben Aoun et al., 2007; Kharroubi et al., 2012
Biban (33°14'N 11°15'E)	30 000 ha	4 m	6 to 30 °C	40.0–50.0 psu	Gulf of Gabes	Medhioub, 1979; Lemoalle and Vidy, 1984; Jouili et al., 2017

Lagoon biodiversity is relatively important where different faunistic and floristic groups are represented, with a distribution largely conditioned by the specificity of each lagoon (Tab. 3).

3 Mullet fishing gears and techniques

Despite a homogeneous distribution of the six mugilids species over all sites (Tab. 4), the harvests remain dependent on fishing gears and efforts. According to the recent fishing gear guide of Tunisia, (Romdhane et al., 2014), mullets are caught multi-specifically (with other fishes, meaning the fishing is non-selective) by various types of gillnets, trammel nets and combined nets. Mugilidae are caught by two types of traps, namely the weir (in lagoons), and the fixed traps (artisanal Charfia).

The veranda net is another gear targeting specifically mullet (Farrugio, 1975; Romdhane, 1998; Romdhane et al., 2014). This gear is used mainly on the coast (concentrated in the eastern and southern regions of Tunisia).

Finally, a bait fishing technique, quite unique and dating from antiquity (Slim et al., 2004), is used up to now and it targets specially mullets. The traditional fishing by females' attraction is practiced mainly in the northern Tunisia (Romdhane, 1998). We have noted that mullets can be caught incidentally by other types of fishing encircling nets purse seine or "Lamparo" (light fishing). Major fishing gears targeting mullets are listed in Table 5.

Table 3. Tunisian Lagoon biodiversity.

Lagoons	Phytoplankton (N species)	Macrophytes (N species)	Zooplankton (N species)	Invertebrates (N species)	Fishes (N species)	Hydrological specificities	References
Ichkeul	32	21	12	20	22	2nd degree lagoon with continental water tributaries and communicating with Bizerte lagoon	Ben Rejeb Jenhani et al., 1991; Chaouachi and Ben Hassine, 1998; Romdhane, 2002; Kraïem et al., 2003; Shaiek et al., 2016
Bizerte	56	86	21	150	45	Large and deep lagoon with deep channel as the inlet	Azouz, 1966; Zaouali, 1980; Beji, 2000; Sakka et al., 2003
Ghar El Melh	74	13	41	84	49	Shallow lagoon with restricted lagoon-sea exchanges	Romdhane, 1985; Romdhane and Ktari, 1986; Shili et al., 2002; Kraïem et al., 2009
Tunis	56	38	43	85	15	Medium surface and depth lagoon with tide-regulated water exchange (gates)	Ben Maiz, 2008; Turki, 2004
Boughrara	84	15	48	100	31	Large and deep lagoon with large lagoon-sea exchanges in the West and limited exchanges in the East	Zaouali, 1980; Daly Yahia and Romdhane, 1994; Ben Rejeb Jenhani and Romdhane, 2002; Shili and Ben Maiz, 2003
Biban	47	35	19	80	42	Large and deep lagoon with considerable lagoon-sea exchanges	Zaouali, 1982; Lemoalle and Vidy, 1984

Table 4. Mugilids distribution in Tunisians waters.

Zones/Species	*Mugil cepahlus*	*Liza ramada*	*Chelon labrosus*	*Liza saliens*	*Liza aurata*	*Oedalechilus labeo*	Major disturbance	Authors
Lagoons								
Ichkeul*	X**	X**		X	X		Drought and limited recruitment	Ben Hassine, 1974; Farrugio, 1975; Bruslé and Bruslé, 1977; Vidy and Franc, 1989; Fehri-Bedoui and Gharbi, 2005; ANPE 2007, DGPA, 2015
Bizerte*	X	X**	X		X		Water pollution	Heldt, 1948; Farrugio, 1975; MeHSIP-PPIF, 2011; DGPA, 2015
Ghar El Melh*	X**	X		X	X**		Recruitment disturbance	Heldt, 1948; Farrugio, 1975; Romdhane, 1985; Vidy and Franc, 1989; DGPA, 2015
Tunis*	X**	X**	X	X	X		Tidal regulated recruitment, IUU fishing	Heldt, 1948; Farrugio and Quignard, 1974; Farrugio, 1975; Vidy and Franc, 1989; Ben Maiz, 2008; DGPA, 2015
Hergla	X	X	X	X	X		Recruitment disturbance shallow water	Blel et al., 2008; DGPA, 2015
Boughrara*	X	X		X	X		Pollution	Farrugio, 1975; Vidy and Franc, 1989; Guetat et al., 2012; DGPA, 2015
Biban*	X	X	X**	X**	X		IUU fishing	Heldt, 1948; Farrugio, 1975; Vidy and Franc, 1989; Blel et al., 2008; DGPA, 2015

Table 4. (continued).

Zones/Species	*Mugil cepahlus*	*Liza ramada*	*Chelon labrosus*	*Liza saliens*	*Liza aurata*	*Oedalechilus labeo*	Major disturbance	Authors
Costal zones (marine ecosystems)								
Northern zone	X	X	X	X	X	X	Fry collecting	Quignard and Raibaut, 1971;
Eastern zone*	X	X	X	X**	X	X	Fry collecting	Tortonese, 1972;
Southern zone	X	X	X**	X	X	X	Fry collecting and Pollution	Ben Hassine, 1974; Farrugio and Quignard, 1974; Farrugio, 1975; Vidy and Franc, 1993; Blel et al., 2008; Bradai, 2000; DGPA, 2015

* *Lagoons and zones were specific mullets fishing activities are performed*
** *dominants species*
Note: All authors have confirmed up to now the absence of Oedalechilus labeo in lagoon ecosystems. It is an exclusively marine species.

Table 5. Fishing gears used in Tunisian lagoons and coastal areas.

Gears	Lines	Long lines	Cast net	Trammel net/gillnet	Fyke net	Encircling net	Trawl	Veranda net	Weirs Charfia	Bordigue (trap net)
Ichkeul*				x	x					In use
Bizerte*	x	x		x						Left on 1948 in operation until 1948 then abandoned
Ghar El Melh*		x	x	x	x					Left on 1973
Tunis lake*	x		x	x	x					Reinstalled in 2005 (north lake) Left on 1995 (south lake)
Korba			x							Project in 1897
Hergla			x		x					Project in 1897
Khniss			x	x						Left on 1990
Boughrara*		x	x	x						
Biban*	x	x		x						In use
Northern zone			x	x		x	x			
Eastern zone			x	x		x	x	x		
Southern zone			x	x		x	x	x	x	

* *Lagoons were mugilids fishing activities are performed*

4 Mullets landings in Tunisia

Statistics of mullet harvest catches or landings were collected from national fisheries and aquaculture directorate (DGPA, Direction Générale de la Pêche et de l'Aquaculture) of the Ministry of Agriculture, Water Resources and Fisheries of Tunisian Republic. These statistics come from the databases that constitute the Tunisian system for collecting fishing data from the regional port directorates along the Tunisian coasts. The data were structured to obtain total landings per year, by fishing origin (coastal and lagoon), by region (Northern, Eastern and Southern of Tunisia) and by main mullet categories. Descriptive analyzes were performed to underscore a potential correlation between landings and stocks of several mullet fishing origin (total, coastal and lagoon landings). A complete time series of statistical data was obtained for the period 1995 to 2015.

4.1 Total landings of mullets in Tunisia

The average total mullet landings per year is around 2184 (SD = 413.44) tons over the studied period. A long and relatively stagnancy period of the annual landed fish quantity is observed from 1995 to 2011, when an increasing landing occurs and maintained up to 2015 (Fig. 2). When we compare the current period of investigation (1995/2015) to earlier observation periods in the twentieth century, i.e., 1923–1937 and 1969–1971 reported by Farrugio (1975), we notice respectively a significant increase in terms of quantities 597, 1311 and 2184 tons, but a significant decrease in terms of percentage of the total fisheries captures: 8.6, 4.85 and 2.03%. On the basis of monthly average landings of mullets, for the period 1995–2015, the highest seasonal catches were recorded from September to January with a maximum of 450 tons in October (Fig. 3).

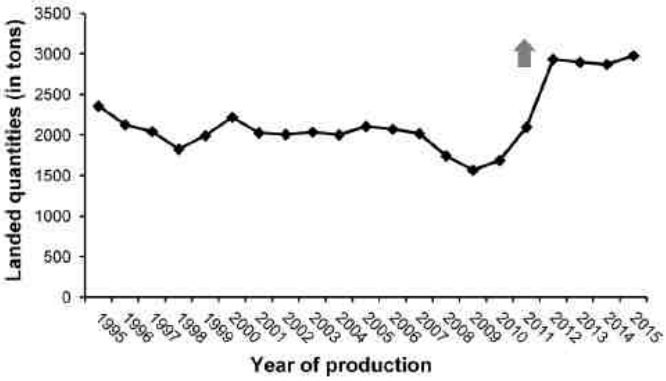

Fig. 2. Total national landing quantities of mullets per year in Tunisia between 1995 and 2015 (graph built according to the statistics of the national fishing and aquaculture direction of the Ministry of Agriculture, Water Resources and Fisheries of Tunisian Republic).

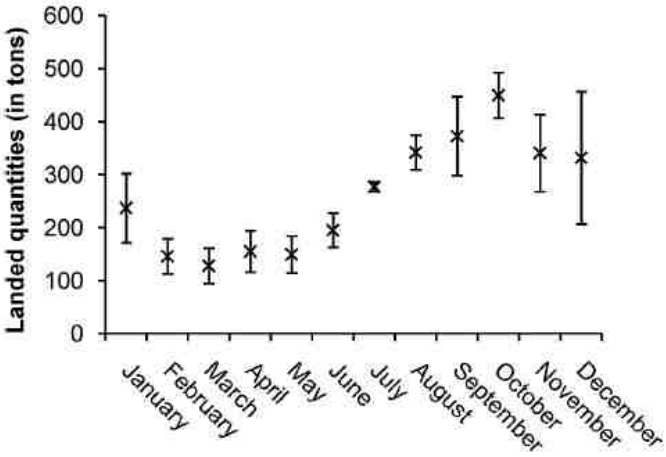

Fig. 3. Variation of the monthly mean mullet landings in Tunisia and its standard deviation for the period 1995–2015.

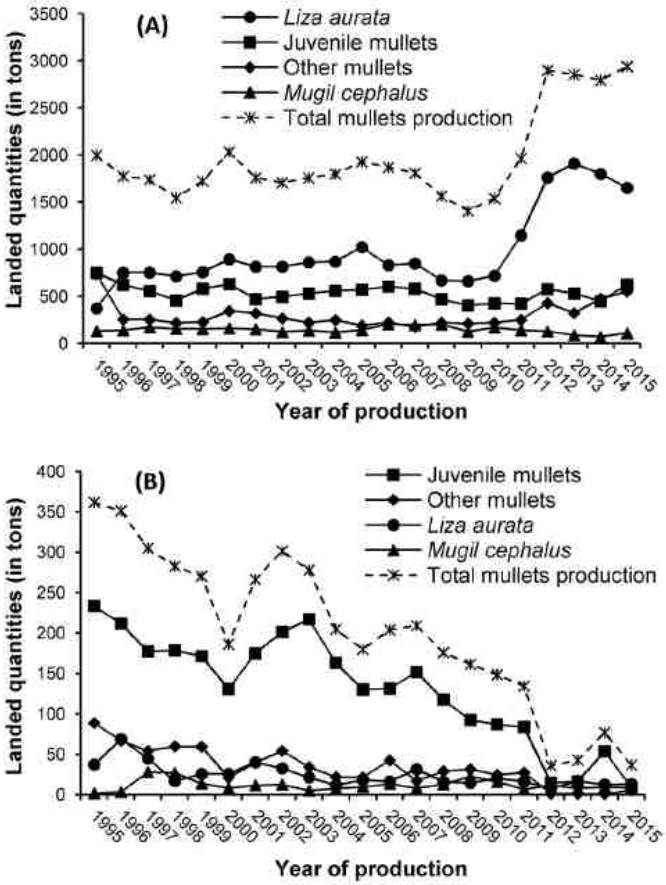

Fig. 4. Evolution of coastal landings (A) and lagoon landings (B) of the total and the major species of mullets (*Liza aurata,* juvenile mullets, other mullets, *Mugil cephalus*) during period from 1995 to 2015 in Tunisia (graph was built according to the statistics of the national fishing and aquaculture direction of the Ministry of Agriculture, Water Resources and Fisheries of Tunisian Republic).

4.1.1 Coastal landings of mullets in Tunisia

The total frame landings follows closely the profile of marine coastal landings with an average over years of about 2173 ± 410 tons. The general tendency of the global national landings of the mugilids shows the same decline trends as marine coastal landings (Fig. 4A). A slight stability is observed during the period 1995–2010.The decline of the mullet landings is the most significant for the first time in 1998 (1697.27 tons). Then, the general landings evolution tends to decrease, year after year to the lowest level in 2009 (1568 tons). Since 2011, a rapid and significant increase occurs and remains relatively stable until 2015.

4.1.2 Lagoon landings of mullets in Tunisia

At first glance, the lagoon mullet landings appear unchanged from year to year, and show a low correlation with coastal landings, as well as the total national landings of mullets. When we refined the scale to have a better view of the lagoon landings in front of the important quantities of the costal landings (Fig. 4B), the average lagoon mullet landings per year is around 200 ± 99 tons.

The yearly productivity of lagoons varies from 0.5 to 6.5 kg.ha^{-1}, where juvenile catches are dominant. Moreover, lagoons with the highest marine exchanges (Bizerte, Tunis, Boughrara and Biban) show the lowest yields (Tab. 6).

Landings from lagoons show an important inter-annual variation with a downward trend perceptible during the last decade, and especially in 2012 when catch statistics showed a net drop falling to about 36.32 tons (Fig. 4B).

One explanation of this decline could be inherent to a juvenile recruitment deficit linked to natural disturbance of sea-lagoons exchanges related to swell nourishment or erosion of the inlet, and maybe also be related to the removal of mullets fry required for inland water reservoirs stocking. Thus, according to Touzeau and Gouzé (1995), there is not necessarily a straightforward "stock-recruitment mathematical function", which does not mean that there is no relationship between these two entities. In addition, the decline of river inputs (due to hydraulic derivation, drought consecutive to

Table 6. Mean yearly harvest (in kg/yr/ha) of mugilids during the period 1995–2011.

	Ichkeul	Bizerte	Ghar El Melh	Tunis	Biban	Boughrara
Other mugilids	2.6	0.2	1.4	0.6	0.1	0.2
Juvenile mugilids	3.3	0.5	4.9	1.7	0.3	1.9
Mugil cephalus	0.5	0.0	0.3	0.0	0.1	0.0
Liza aurata	0.0	0.1	0.1	0.1	0.0	0.4
Total	6.5	0.8	6.7	2.5	0.5	2.5

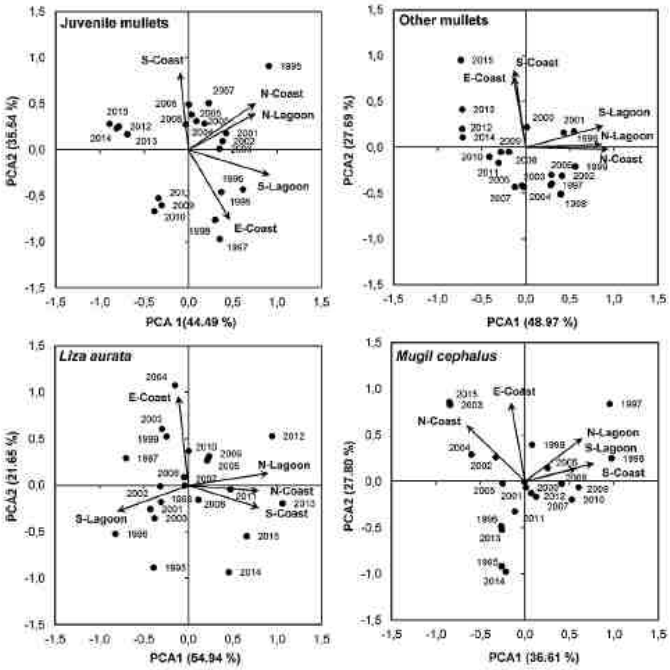

Fig. 5. Principal component analyses based on annual landings of mullets between 1995 and 2015 for the two major species and two other categories (undetermined juveniles, adults of other mullet species) separately and according to fishing origin (coastal and lagoon) and region in Tunisia (N: Northern region, E: Eastern region and S: Southern region).

global warming, etc) may be an additional explanation as these rivers contribute supply of nutrients and stimulate the productivity of the various trophic levels, both in lagoons and in coastal areas (Salen-Picard et al., 2002; Darnaude et al., 2004).

The comparison of the lagoon mullet harvest with the coastal mullet harvest over years shows a relative controversial evolution. Indeed, coastal harvest of mullets seems to be negatively correlated with lagoon harvests. The most important increasing harvest peaks of lagoon mullet harvest correspond to declining ones in the coastal harvest (Fig. 4B) especially discernible from 2011, a politically vulnerable period, when illegal fishing has grown in coastal areas.

4.2 Landings of the major mullets species in Tunisia

As said in introduction, there is a high probability of confusion for species identification in mullet landings. The computation and/or logging data for fishing administration is not always performed by specialists. To overcome such problems when assessing mullet landings, two miscellaneous categories were created including "juvenile of mullets" and "other mullets" (other than *Liza aurata* and *Mugil cephalus*), respectively. The assessments of the total coastal and total lagoon landings of the major species of mullets during the period from 1995 to 2015 in Tunisia are shown in Figure 4A and B. The most important coastal landings is recorded for the golden grey mullet (*Liza aurata*), followed respectively by "juvenile mullets", "other mullets" species, and finally the flathead grey mullet (*Mugil cephalus*). The landings of the major species of mullets are almost the same and stable over years. Only, the coastal-landed quantity of *Liza aurata* presents a high landings value since 2011 with a peak in 2013 of 1910.50 tons. However, the total lagoon landings, despite its very low value compared to coastal landings, shows that "juvenile mullets" are the most caught, followed by "other mullets", then *Liza aurata* and *Mugil cephalus*. Variation of lagoon landings over years is observed mainly for "juvenile mullets" and "other mullets" with an overall decreasing trend. In contrast, the landed quantities of *Liza aurata* and *Mugil cephalus* from lagoon are relatively stable over the years studied.

To better characterize the landings of mullets by major species in Tunisia, we carried out a principal component analysis (ACP) taking into account the year of landings of each species separately according to the main administrative coastal and lagoons regions (northern, eastern and southern landings in Tunisia).

According to the ACP results, it appears that *Mugil cephalus* is more abundant in landings of the southern coasts and northern and southern lagoons of Tunisia. However, *Liza aurata* is more present in the northern coasts and southern lagoons landings. Eastern coastal landings of mullets contribute weakly in the total national landings. The total annual landings of "juvenile mullets" and "other mullets" are mainly supported by the southern coastal regions (Fig. 5). The landings of "juvenile mullets" in southern and northern lagoons have a similar tendency.

The national coastal landings of *Mugil cephalus* and *Liza aurata* have almost the same trend as "other mullets" and "juvenile mullets" landings. These landings are mainly supplied by coastal landings of southern region, clearly far ahead to the northern and eastern landings. These two regions contribute secondarily to the national landings.

For lagoon landings, in the case of *Mugil cephalus* and *Liza aurata*, national landings are supplied by southern and northern lagoons, on close proportions. This similarity between Southern and Northern landings is more important for *Liza aurata* than for *Mugil cephalus*. Thus, unshipped

quantities of mullets in the southern region contribute to the supply of the national landings more clearly for the coastal landings than for lagoon landings.

Another important point to note from ACP results is that the landings of 2014 for *Mugil cephalus* and "juveniles mullets" show a remarkably low catches. This might be due to uncontrolled fishing or even to natural disturbance. Indeed, the environments they inhabit are strongly affected by anthropogenic and climate changes. The estuaries they need to cross are more and more often dried out during their migration phase. Furthermore, when water resource is enough, dams are constructed and form impassable barriers.

5 Conclusion

The mullet exploitation in Tunisian lagoon and coastal areas focuses on five species among the six Tunisian mullet species, while the statistics only describe three species in detail together with one multi-specific juvenile group. The irregular landings of mullets in lagoons are commonly linked with the recruitment; but the increasing of the coastal landings of juvenile can be interpreted as a consequence of overfishing. Regarding the high commercial and culinary value of mugilids in Tunisia, these species currently representing about 2.03% of total fisheries catch, are targeted by a considerable fishing effort. Catch data analysis reveals a specific disparity where quantitatively *Mugil cephalus* predominates in the South and *Liza ramada* in the North. Moreover, mullet exploitation seems to reach overexploitation as confirmed by continuous regression of the proportion of mullets in total fish catches, but also by the increase of small mullets (Bigeron) catches. The lagoon yield has fallen sharply during recent decades, probably in relation to the fry fishery intended for stocking inland reservoirs. Hence, control of recruitment and mullet breeding appear to be essential and vital for the sustainability of the mullet fisheries in Tunisia.

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Cite this article as: Romdhane MS, Fassatoui C, Shaiek M, Ben Rejeb Jenhani A, Changeux T. 2019. Mugilids fisheries of Tunisian coasts and lagoons. *Aquat. Living Resour.* 32: 6