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Fisheries statues in Derna coast, Eastern Libya

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Abstract

This study was carried out along the Derna coast from 2007 to 2015. A total of 200 fishing boats of four types were observed: 60.2% were "flouka", 33.0% "mator", 4.5% "Trawling" and 2.5% "batah". Most of them were concentrated in the Derna Port (25%), Ras El-Teen site (20%), Ras El-Helal site (20%), Gulf of Pomba (17.5%) and Karsa site (17.5%). The most common fishing gear used in the coastal area is the trammel net, which is used by flouka, mator and batah. Depending on the fishing season, the fish size and the target fish species, other fishing gear is also used occasionally. Annual fish production was 39314 Kg in 2007, increased to 160456 Kg in 2010, decreased to the lowest value 14759 Kg in 2011, increased to 148315 Kg in 2013 then decreased to 25950 Kg in 2015. In this study 35 native fish species of commercial value were found in different sites of the Derna coast, among them 10 Red Sea. The exotic herbivorous fish species *Siganus rivulatus* was found in greater abundance than the native herbivores Sarpa salpa. *Lagocephalus sceleratus* was found in greater number especially in Gulf of Pomba. It has already established a population which is colonizing new territories of the Eastern Mediterranean at a relatively rapid rate. Today, it is regarded to be among the worst invasive species in the Mediterranean Sea with a significant impact on the surrounding ecosystem and on the fisheries sector.

Keywords: Coastal area, exotic fish, fishing vessels, herbivorous fish, Derna coast, eastern Libya, species composition, trammel net.

Introduction

The Mediterranean Sea is an almost closed marine basin between Europe, Asia and Africa. It is connected with the Atlantic Ocean by the Straits of Gibraltar, which are fifteen kilometers wide and have an average depth of 290 m to a maximum 950 m. In addition to this natural connection, it has been connected to the Red Sea by the Suez Canal since 1869. The number of fish species recorded for the Northeast Atlantic and the Mediterranean Sea totals about 1,255 (EU, 2008), a total of 540 fish species was listed for the Mediterranean Sea, including 362 shore dwellers, 62 of them endemic (Tortonese, 1963). It is unreasonable to assume that the whole Mediterranean Sea has the same species composition, due to the evident regional speciation in this sea (Whitehead et al., 1984).

A number of studies have been conducted in Libyan waters. The first was by Vinciguerra in 1881 who recorded seventeen species when reporting on the ichthyofauna of Libya. The number of species known increased rapidly in the early 20th century (Ninni, 1914; Vinciguerra, 1922 and Tortonese, 1939). More detailed studies were conducted in the second half of the 20th century, Aldebert and Pichot (1973), for instance, concentrated on some flat fishes, Duclerc (1973) on Scorpaenidae. Some other surveys resulted in check lists: in the western part in 1972, for example, sixty two species were listed (Gorgy, 1972). A total of 131 fish species were registered by Sogreah (1977). Also in 1977, 39 cartilaginous fish species and 185 osteichthyes species were listed (Contransimex, 1977). Zupanovic and El-Buni (1982), using demersal fishing gear, reported that Libyan waters are potentially moderately productive in fish. They also stated that the Libyan fish fauna was mainly was related to the fauna of the eastern part of the Mediterranean Sea,

the Levant Basin. In the eastern part of Libya (Benghazi region) a list of bony fishes came up with a total of 201 species belonging to seventy one families and fifteen orders (Hassan and Silini, 1999). In 1993 a survey of the fishing fleet was carried out along the Libyan coast (Lambouwf and Reynolds (1994). Recently an investigation of artisanal fisheries was conducted along the Libyan coast (Lamouwf, 2000). In 2007 Shakman and Kinzelbach studied the commercial fishery and fish species composition in the coastal waters of Libya. The present study was an attempt to concentrate on the coastal area with the aims of: (a) identifying the most important fishing gear and fishing craft in this area (b) investigating the ichthyofauna collected by different fishing gear along the Derna coast.

Materials and Methods

This study was conducted from 2007 to 2015; the survey was performed along the Derna coast in an area extending from Karsa site to Gulf of Pomba in the eastern part of Libya (Fig. 1). The aim of this survey was to find out the number of boats, the type of boat and type of fishing gear used in the coastal area. Five active landing sites were visited; the number of boats, and the types of fishing gear were recorded for each region. Important information about fishing vessels and fishing gear was collected from local fishermen and fishermen's unions.

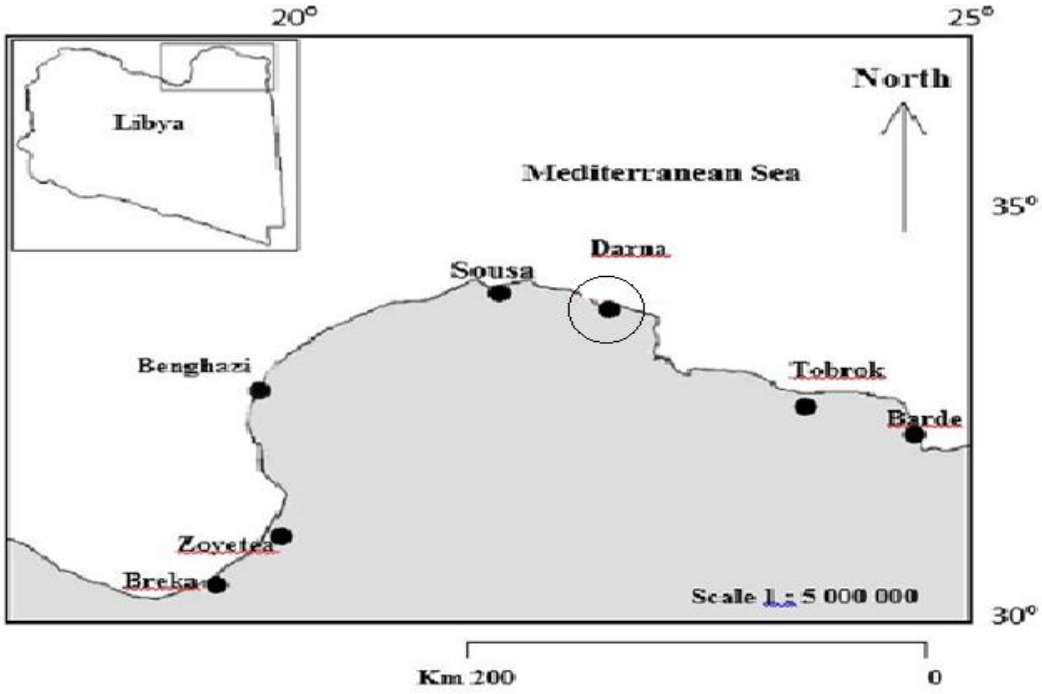

Figure (1): Map showing the Derna coast, eastern Libyan coast

Results

1- Type of boats:

A total of 200 fishing boats of four types were observed: 60.2% were "flouka", 33.0% "mator", 4.5% "Trawling" and 2.5% "batah" (Table 1 & Figure 2). Most of them were concentrated in the Derna Port (25%), Ras El-Teen site (20%), Ras El-Helal site (20%), Gulf of Pomba (17.5%) and Karsa site (17.5%) (Table 2 & Figure 3).

Table (1). Types and percentage of fishing boats which operating along Derna coast during 2007- 2015.

Types of fishing boats	The average no. of boats	%
Flouka	120	60.0
Mator	66	33.0
Trawling	9	4.5
Batah	5	2.5
Total	200	

Data obtained from General Authority for Developed of Fish Resources

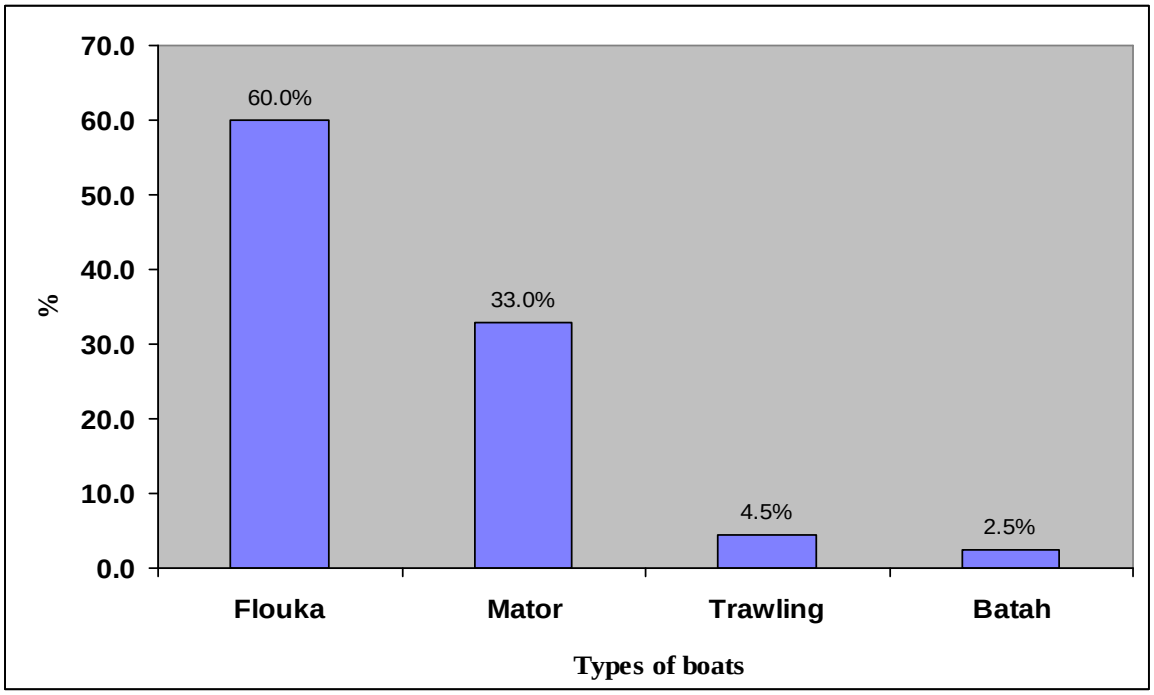

Figure (2): Types and percentage of fishing boats during (2007-2015).

Table (2). The number of boats in different fishing sites which operating along Derna coast (2007-2015).

Fishing sites	Number of boats	(%)
Derna Port	50	25.0
Ras El-Teen site	40	20.0
Ras El-Helal site	40	20.0
Gulf of Pomba	35	17.5
Karsa site	35	17.5
Total	200	

Data obtained from General Authority for Developed of Fish Resources

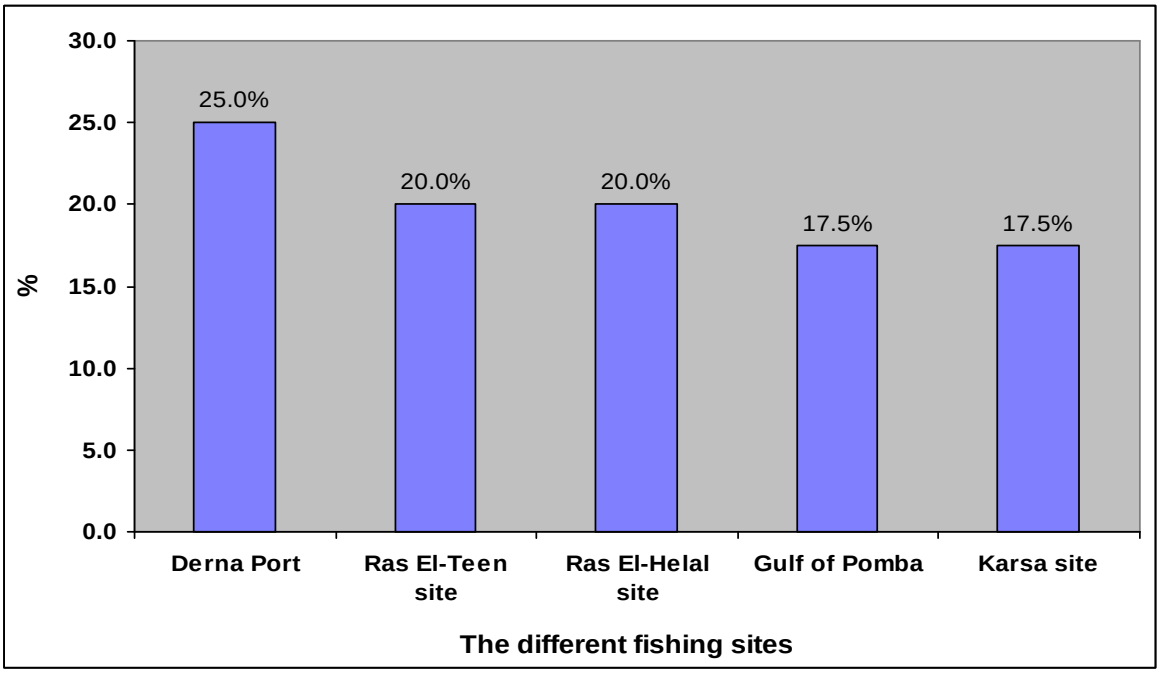

Figure (3): The percentage of fishing boats in different fishing sites during (2007-2015).

2- The annual fish production:

Annual fish production was 39314 Kg in 2007, increased to 160456 Kg in 2010, decreased to the lowest value 14759 Kg in 2011, increased to 148315 Kg in 2013 then decreased to 25950 Kg in 2015 (Table 3 & Figure 4).

Table (3). Total annual fish production for Derna coast during 2007- 2015.

Year	Fish production (Kg)	%
2007	39314	6.20%
2008	40744	6.42%
2009	133469	21.00%
2010	160456	25.30%
2011	14759	2.30%
2012	22407	3.50%
2013	148315	23.30%
2014	48658	7.60%
2015	25950	4.00%
Total catch	634072	

Data obtained from General Authority for Developed of Fish Resources

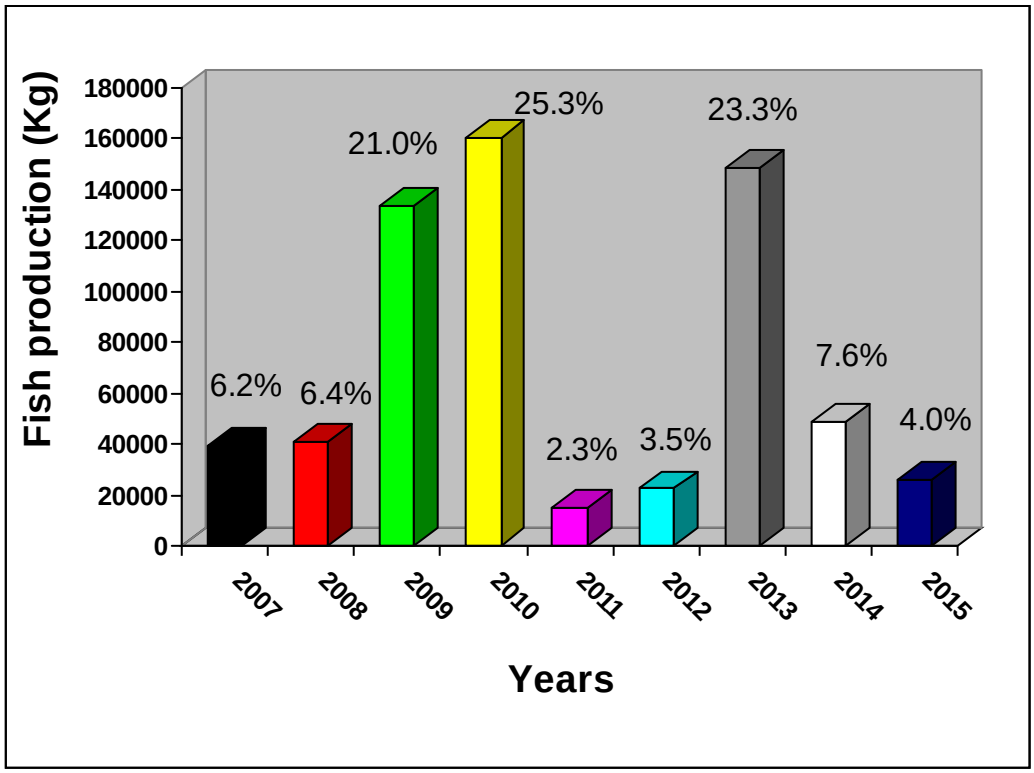

Figure (4): Annual landing of Derna coast (2007-2015).

3- The list of fish production:

In this study 35 native fish species of commercial value were found in different sites of the Derna coast, among them 10 Red Sea (Tables 4 &5).

Table (4). The native fish species which were collected from the different sites in Derna coast (2007-2015).

Family	The native species	The common name
Thunnidae	*Thynnus thynnus*	Blue-fin tuna
	Thynnus albacares	Yellow-fin tuna
	Katsuwonus pelamis	Skip-jack tuna
Scombermoridae	*Sarda sarda*	Atlantic bonito
Xiphiidae	*Xiphias gladius*	Sword-fish
Scombridae	*Scomber japonicus*	Chub mackerel
	Scomber scombrus	Atlantic mackere
Coryphaenidae	*Coryphaena hippurus*	Common dolphin-fish
Clupeidae	*Sprattus sprattus*	Sprat
	Sardinella pilchardus	European pilchard
	Sardinella aurita	Round sardinella
Engraulidae	*Engraulis encrasicolus*	European anchovy
Belonidae	*Belone belone*	Gar-fish
Carangidae	*Trachurus mediterraneus*	Mediterranean horse-mackerel
	Trachurus trachurus	Atlantic horse-mackere
	Seriola dumerili	Greater amber-jack
	Lichia amia	Leer-fish
Mugilidae	*Mugil cephalus*	Flat-head grey mullet
	Chelon labrosus	Thick-lip grey mullet
	Liza auratus	Golden grey mullet
	Liza ramada	Thin-lip grey mullet
Mullidae	*Mullus surmuletus*	Striped red mullet
	Mullus barbatus	Red mullet
Sparidae	*Pagrus pagrus*	Common sea-bream
	Pagellus erythrinus	Common Pandora
	Dentex dntex	Common dentex
	Lithognathus mormyrus	Striped sea-bream
	Oblada melanura	Sadled bream
	Spondyliosoma cantharus	Black sea-bream
	Sarpa salpa	Salema
	Boopes boopes	Bogue
	Sparus aurata	Gilt-head sea-bream
Scorpaenidae	*Scorpaena scorfa*	Red scorpion fish
Triglidae	*Aspirigla cuculus*	Red gurnard
Sciaenidae	*Umbrina cirrosa*	Shi drum

Data obtained from General Authority for Developed of Fish Resources

Table (5). The exotic fish species which were collected from the different sites in Derna coast (2007-2015).

Family	The exotic species	The common name
Siganidae	*Siganus rivulatus* *Siganus luridus*	Marbled spine foot Dusky spine foot
Atherindae	*Atherinomorus lacunosus*	Hardhead silverside
Tetraodontidae	*Lagocephalus sceleratus*	Puffer fish
Mugillidae	*Liza carinata*	Roving gray mullet
Hemiramphidae	*Hemiramphus far*	Spotted halfbeak
Sphyraenidae	*Sphyraena flavicauda*	Striped barracuda
Sparidae	*Crenidens crenidens*	Kärnten sea bream
Monacanthtdae	*Stephanolepis diaspros*	Lozenge file fish
Fistularidae	*Fistularia commersonii*	Blue spotted crone fish

Data obtained from General Authority for Developed of Fish Resources

Discussion

Marine species have been accidentally or intentionally transferred among the world's seas for as long as humans have crossed the oceans for exploration, colonization, commerce and war. However, biological invasions are being nowadays recognized as a major agent of global change following the spectacular increase of invasions by non-native marine and estuarine species in various regions of the world (Sghaier et al., 2013). Furthermore, biological invasions can interact with climate change and other components of global change such as increasing deposition of nitrogen and pollutants, and habitat disturbance by human activities (Boudouresque & Verlaque, 2010). Many of the marine alien species exhibit aggressive invasive behavior and represent significant ecological pressures on marine and estuarine communities (Sala et al., 2011). In addition to alterations in ecosystem functioning and biodiversity loss, alien species can also cause serious economic (fisheries, tourism and aquaculture) and health impacts (Pimentel et al., 2000). The Mediterranean Sea is highly concerned by species introductions. Based on updated checklists (Zenetos et al., 2010, 2011, 2012), a total of 986 alien species were known in the Mediterranean by December 2012: 775 in the Eastern basin, 308 in the Western basin, 249 in the Central basin and 190 in the Adriatic Sea. According to the Mediterranean Action Plan for Invasive Species (UNEP-MAP-RAC/SPA, 2005), the main known pathway/ vector of species introduction into the Mediterranean Sea is the Suez Canal followed by shipping (ballast water and sediments, anchoring and fouling), aquaculture (both marine and brackish species) and trade in live marine species (aquarium activities, fishing baits, seafood). This is in agreement with recent evaluation of pathways at Pan European level (Katsanevakis et al., 2013a). Since the opening of the Suez Canal in 1869, at least 300 Indo-pacific marine animal species penetrated the Mediterranean Sea. They are known as *Lessepsian migrants* (Por, 1978). About sixty five fish species were recorded among them in the Mediterranean Sea with new immigrant species regularly being added to the list (Golani, 2006). These introductions have produced important changes in the species composition of Mediterranean communities and have resulted in mixed Red-Mediterranean communities (Fishelson, 2000). Although it is clear that Lessepsian fish migrant species have had an enormous impact on the eastern Mediterranean ecosystem, there has been no special study to assess this impact. Mediterranean biota are driven towards a 'tropicalization' as most of the alien species introduced there are of tropical affinity and origin (Bianchi & Morri, 2003). Libya is located in the Central Mediterranean Basin as adopted and described under the Marine Strategy Framework Directive (MSFD) (EU, 2008). Data regarding alien species are scarce and fragmented due to the lack of long term monitoring survey undertaken in a framework of national initiatives on alien species. It is worth mentioning the inventory of exotic fish reporting 16 introduced species (Ben-Abdallah et al., 2005) updated by Shakman & Kinzelbach (2007c); Milazzo et al., (2012) and Sghaier et al., (2013)

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