

# Algeria's sea cucumber fishery: Challenges for a new fishery

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## Abstract

Traditionally in Algeria, sea cucumbers were only exploited on a very small scale, mainly as bait for fishing. There are no official data on the exploitation status of sea cucumber stocks along the Algerian coast. However, for some years, there has been clandestine networks that fish for and sell sea cucumbers, specifically for the benefit of the Chinese communities established in Algeria, and perhaps for export. Information collected from fishers and snorkelers indicate that exploitation started in 2013 on the western and central coast, before extending to the entire Algerian coast. The harvesting of sea cucumbers is still an artisanal activity but is growing rapidly and is capable of extracting significant amounts of these benthic animals, estimated at a few tens of kilograms wet weight per day and per person. Hence, the urgency of setting up a national management strategy for the nascent fishery, which, if we rely to the exploitation scheme already observed in other regions of the world, will soon face important challenges in terms of resource preservation and environmental impact.

**Keywords:** Sea cucumbers, exploitation status, stock management, Algeria

## Sea cucumber exploitation in Mediterranean countries

In the Mediterranean, there are 37 known sea cucumber species, belonging to 9 families and 5 orders (Fisher et al. 1987). The most coveted Mediterranean species are *Holothuria (Roweothuria) poli*, *H. (Holothuria) tubulosa* and *H. (Roweothuria) arguinensis*, which all belong to the order Aspidochirote (Jorge Antonio et al. 2016). European exporting countries include Greece at 353 tonnes (t) a year, Spain at 167 t and France 29 t. Importers (who probably re-export to Asian markets) are Spain at 2,152 t, France at 363 t and Belgium at 236 t (González-Wangüemert et al. 2018).

Turkey was the first Mediterranean country to engage in sea cucumber harvesting (in 1996), exporting primarily to Singapore, Hong Kong and Japan (Sicuro and Levine 2011). Its production (mainly frozen) increased from 20 t in 1996 to almost 80 t in 2007 (Aydin 2008), before reaching 600 t in 2011 (González-Wangüemert et al. 2014). Since then, production has dropped to less than 270 t in 2015 (Aydin 2017).

In Spain, 10 companies exploit *H. arguinensis*, generating profits estimated at USD 1–2 million for some

of them (Jorge Antonio et al. 2016). All production is exported to China. For southern Mediterranean countries, the interest in exploiting sea cucumbers came later. In 2001, Morocco managed to export 2.1 t to Hong Kong and waited until 2014 to complete a study on the status of stocks in the area of Essaouira on the Atlantic coast (Malouli Idrissi 2014). In 2014, the Government of Tunisia authorised the exploitation and marketing of natural stocks in Bizerte Bay (Ben Mustapha and Hattour 2016). The authors proposed as a precautionary approach to limit extractions to 50 individuals per day, for only three months a year, with the possibility of revising the rule when data on the ecological impact became available. Much sooner, in 1998, Egypt began exploiting its Red Sea stocks but was forced to impose a harvest ban in 2003 following observations of overexploitation (Ahmed and Lawrence 2007).

## Illegal exploitation of sea cucumbers in Algeria

Because sea cucumbers were not traditionally harvested in Algeria, except for some artisanal fishermen who used the animals as bait, no regulations were in place to manage their exploitation. The illegal exploitation of wild stocks began in 2013 by people who glean and use destructive harvesting

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**Figure 1.** *Holothuria tubulosa* specimens processed into beche-de-mer before being sold to local Chinese buyers. A) Dried product; B) quality product selection; C) bagging for sale. (images: Slimane-Tamacha 2018)

practices. The phenomenon reached such proportions that the administration in charge of the fisheries sector began looking to determine a minimum individual size in the hopes of regulating exploitation and preventing overfishing.

In Algeria, it is permissible to collect sea cucumbers by gleaning and by diving (Order of 16 July 2008), but not to exploit them commercially because they are not listed in the marine living resources regulation text that defines minimum authorised sizes for resources commercial exploited. This did not, however, prevent their clandestine commercial exploitation at the artisanal scale. A recent survey conducted by the fishery administration, indicates that sea cucumbers are not available for sale at fish stalls or at traditional outlets and are not appreciated by Algerian consumers. However, an investigation on the network and chain of the fishery product in the Oran region (western Algeria) (Slimane-Tamacha unpublished data) showed that harvested animals (mixed species) are eviscerated by fishers before being sold to an intermediary (Fig. 1). The later processes the product to a dried form before selling it to the local Chinese community. Fishers manage to get a price between DZD 300 and 800<sup>3</sup> a kilogram (wet weight).

Another investigation (Neghli, personal inquiry), conducted in the central region, revealed the existence of an incipient network of intermediaries collecting holothurians without knowing for sure the final destination of the beche-de-mer. This unregulated exploitation poses a serious threat to natural stocks, as fishing takes place mainly during the

summer season, which for the majority of targeted species coincides with their spawning season (Mezali et al. 2014) (Table 1).

Indeed, it was shown that the highest biomass or density ratios were recorded in the summer (Mezali et al. 2006). The fact that adults migrate to the shallower waters to feed and reproduce (Mezali et al. 2014) at a period of the year when fishing activities are at their peak, exposes them to overfishing. The other threat to the fishery comes from overseas markets. Even if initially sea cucumbers in Algeria were mainly sold to the Chinese community in the country, the economic stakes have since increased dramatically, and investors are becoming more and more insistent about opening up the exploitation of national stocks for export.

### Recommendations before opening the sea cucumber fishery in Algeria

The administration in charge of the fisheries sector recently attempted to regulate the exploitation of sea cucumbers through the introduction of a minimum size for specimens to be traded. Considering the experiences from other countries, and given the current scattered and fragmentary data available in Algeria, the approach chosen can only be of short term. It can be justified as a precautionary approach, or as a measure to ensure the sustainability of the resource and to the fishery. Vulnerability to human predation is an important concept to understand in the case of sea cucumber stocks. These animals are totally helpless because they have no real escape mechanism.

<sup>3</sup> DZD 100 = USD 0.85 as of 28 February 2019

**Table 1.** Length and weight of the smallest observed mature individuals and the spawning period of the most common Mediterranean holothurian species.

	Length and weight of the smallest observed mature individuals	Spawning period
<b>HOLOTHURIIDAE</b>		
<i>Holothuria (H.) tubulosa</i> Gmelin 1790	Length not mentioned; 220 g whole weight. Pagasitikos, Greece (Kazanidis et al. 2014)*	Summer (August–September) Algeria (Neghli 2013; Mezali and Soualili 2015), Turkey (Aydin and Erkan 2015) and Greece (Kazanidis et al. 2010)
<i>Holothuria (H.) stellati</i> Delle Chiaje 1823	No data	No data
<i>Holothuria (P.) sanctori</i> Delle Chiaje 1823	150 mm relaxed length for 40–45 g gutted weight. Central region of Algeria (Neghli 2013; Mezali et al. 2014) 201–210 mm relaxed length for 101–110 g weight. Canary Islands, Spain (Navaro et al. 2012)*	Summer (July–August), Algeria, (Neghli 2013; Mezali et al. 2014)
<i>Holothuria (R.) poli</i> Delle Chiaje 1823	135 mm relaxed length. Oran region (Slimane-Tamacha et al. unpublished data)	Summer (July–September), Algeria (Neghli 2013) (Slimane-Tamacha et al. unpublished data) Turkey (Aydin and Erkan 2015)
<i>Holothuria (P.) forskali</i> Rowe 1969	~ 180 mm relaxed length or ~ 85 g gutted weight Glénans Archipelago, Atlantic, France (Tuwo and Conand 1992).	Winter (February–March), Algeria (Neghli 2013); France (Tuwo and Conand 1992)
<i>Holothuria (R.) arguinensis</i> Koehler and Vaney 1906	210–230 mm relaxed length or 110–130 g eviscerated weight. Iberian Peninsula (Marquet et al. 2017)*	Summer (June–October) Portugal (Marquet et al. 2017)
<b>CUCUMARIIDAE</b>		
<i>Ocnus planci</i> Brandt 1835	No data	March–April (André and Le Granché 2014) in the Mediterranean Sea
<b>STICHOPODIDAE</b>		
<i>Parastichopus regalis</i> Cuvier 1817	No data	No data

\* Sizes reported are length and weight at first maturity.

Therefore, the adopted approach must imperatively be followed by a more elaborate management plan based on well-thought-out and well-structured scientific surveys, centred around a research programme that includes all stocks open to exploitation.

Since the first works undertaken in the early 1990s (Mezali 1998; Mezali and Semroud 1998), several attempts have been made to set up a research programme to study wild stocks of Algerian aspidochirote sea cucumbers. Unfortunately, the projects submitted to the National Research Program failed to convince decision-makers because sea cucumbers were not identified as a priority resource by the sectorial development plan, especially as sea cucumbers are not part of the typical Algerian diet. Since then, the world economic situation has forced Algerian decision-makers to make urgent decisions that do not necessarily accommodate the time needed for adequate scientific studies of sea cucumbers.

Research results concerning aspidochirote species do, however, exist and can be very useful. Some of these studies have investigated the population dynamics of Mediterranean species (Mezali et al. 2006), and the biological and ecological role of those invertebrates in the ecosystems to which they belong (i.e. *Posidonia oceanica* ecosystem) (Mezali and Francour 2012; Belbachir et al. 2014; Belbachir 2018).

It is also worth mentioning the results of studies on the reproduction and exploitation of Algerian aspidochirote sea cucumbers (Neghli 2013; Mezali et al. 2014; Slimane-Tamacha and Mezali 2018), as well as all studies from the Department of Marine Sciences and Aquaculture research team at the University Abdelhamid Ibn Badis of Mostaganem (Algeria). The information provided by these studies should allow to set some minimum rules, or at least a kind of code of conduct before a proper management plan can be put in place.

In addition, the previously cited works all concluded that the distribution and specific composition of sea cucumbers varies from one site to another, in connection with prevailing environmental conditions (mainly trophic ones) and the substrate. An assessment of each site of exploitation, even an approximate one, is therefore necessary before the beginning of the fishing season in order to carry out an inventory of species and determine the state of the stocks before fishing starts. Harvesting must absolutely be prohibited during breeding season of the target species (see Table 1) for two obvious reasons: 1) to ensure spawning success, and 2) because of the reproductive behaviour of these animals, which exposes them to overfishing during large breeding assemblages. It is also recommended to ban night fishing, which is another period of vulnerability during which animals come out of hiding to feed. It's also necessary to define minimum capture sizes for each species based on local data and on other Mediterranean studies when local data are lacking (see Table 1).

Finally, the limited knowledge of the systematics of some species, and the possible confusion between species – the two unidentified groups of species of *H. tubulosa* and the two *H. sanctori* morphotypes (Mezali and Francour 2012; Mezali 2013) – can be a problem. Efforts must be carried out, particularly in the direction of operators (fishers, intermediaries and traders), to facilitate species identification for strict monitoring of the fishery.

Establishing permanent study sites and protected areas (taboo areas) will be essential as they will constitute reference points for a continuous readjustment of the fisheries management plan. Detailed documentation on harvesting must be required, and product sales outside of controlled outlets should be prohibited. Also, making exploitation data available to the scientific community would ensure greater transparency and enable more informed management decisions.

The development of an aquaculture sector could help relieve pressure on wild stocks by supplementing fishing activity. For that purpose, the Department of Marine Sciences and Aquaculture could provide a good scientific basis.

Concerning the definition of commercial legal size for sea cucumbers, because of their body plasticity, measuring individual length is far from being a reliable method as size depends on the amount of water stored in the internal cavity (Conand 1983). Drained weight is a more stable measure of sea cucumber age (Mezali 1998; Neghli 2013).

Finally, following an efficient and an ecosystem-based approach to exploitation is essential in order

to monitor the recruitment of wild stocks, the health of the ecosystem and the socioeconomic systems exploiting the sea cucumbers (FAO 2010).

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