

The sea cucumber trade in Tunisia: Insights from the central Mediterranean Sea

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Abstract

This contribution provides a comprehensive analysis of sea cucumber trading in Tunisia, emphasising targeted species in the central Mediterranean Sea. Drawing insights from a diverse range of sources, it offers a detailed overview of the status of the sea cucumber trade in the region. The findings shed light on the dynamics of sea cucumber commerce in Tunisia, addressing key aspects such as species preferences, market trends, and the role of social media in shaping trade practices. This analysis contributes valuable insights for policy-makers, researchers, and industry stakeholders involved in the sustainable management and development of sea cucumber resources in the central Mediterranean.

Keywords: Sea cucumber fishery, Tunisia, central Mediterranean Sea, market trends, trade practices, species preference

Introduction

In the Mediterranean, the exploitation of sea cucumbers is relatively limited, and is not a thriving industry. Moreover, fishing, processing and marketing persist, frequently involving illegal and unregulated practices with no form of control. According to Rakaj and Fianchini (2024), insights from the literature reveal evidence of local sea cucumber consumption and exportation in Italy before the World War II. In this era, *Holothuria poli* and *H. tubulosa* were especially exploited.

Today, Turkey is the leading Mediterranean country for the harvest and export of sea cucumbers, mainly to Singapore and Hong Kong (Aydin 2008; Conand et al. 2014; Rakaj and Fianchini 2024). The sea cucumber fishery in Turkey mainly targets *H. tubulosa*, *H. poli* and *H. mammata* (Aydin 2008; Sicuro et al. 2012; González-Wangüemert et al. 2018).

In Tunisia, there are some references to the exploitation of *Holothuria tubulosa*, *H. poli*, *H. sanctori* and *H. forskali*, although information is scarce (Telahigue et al. 2014; Ben Mustapha and Hattour 2016a,b; Sellem et al. 2017; Sellem et al. 2019). Sellem et al. (2019) have delved into the diversity of sea cucumbers in Tunisian lagoons, providing a more nuanced perspective on the prevalence and ecological significance of these species in Tunisia.

Nonetheless, there is little information regarding sea cucumber stocks and fishery activities in the country. This study seeks to explore the current status and potential of sea cucumber fisheries in the region, underscoring the importance of implementing sustainable management practices in the face of increasing exploitation pressures.

Methodology

Facts presented in this study regarding target sea cucumber species in Tunisia are sourced from a review of available articles, checklists, reports, and social networking platforms such as Facebook. Data on total production and commercialisation were gathered from authoritative sources, including Tunisia's National Institute of Statistics and the Department of Fisheries and Aquaculture.

Results

Sea cucumber trading in Tunisia

Recent holothurian production data for Tunisia is presented in Table 1. Findings from the Tunisian National Institute of Statistics reveal a dynamic pattern in the marketing of beche-de-mer over time.

Exportation of this product started in 2013, but was notably absent in 2014 and from 2016 to 2019. Each year, the export of beche-de-mer was limited to one or two markets, spanning different countries across Asia, Europe, Africa and America where Hong Kong consistently stands out as the main destination for exports.

Sea cucumber production has been disorganised over the years, marked by a significant surge in 2020, reaching a total of 23,412 kg. The lowest production was about 120 kg while the largest was about 20,700 kg, which was destined for Turkey. This could be linked to external factors such as the fishing regulations implemented by Turkey during the same period which suggest a possible influence of these regulations on the trade dynamics. Turkey's measures, including a prohibition on fishing during the reproductive period, restrictions on specific fishing gear usage, and the implementation of quotas (Rakaj and Fianchi 2024), likely prompted changes in sea cucumber production patterns. The surge in production may be a response to increased demand or altered trade dynamics resulting from Turkey's efforts to

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restore and preserve wild stocks. It also serves Turkey's strategic goal to maintain its position as the primary exporter of sea cucumbers in the Mediterranean, ensuring control over its market.

Data on sea cucumber commercialisation, collected from the Tunisian National Institute of Statistics (on foreign trade) and the Department of Fisheries and Aquaculture, reveal that the most exploited species are *Holothuria tubulosa*, *H. poli* and *H. mammata*. Typically, these sea cucumbers are captured through diving, dredging or even by hand, as they mainly inhabit the shallow waters of coastal lagoons. These species are exported in raw, frozen and dried forms, yet, there is a lack of information regarding the processing method.

Through a basic Facebook search for pages related to sea cucumber commercialisation in Tunisia, over 10 pages were found to be devoted to selling Tunisian beche-de-mer. These pages offer raw, dried and powdered products, tailored to customer demand. It is worth noting that these pages do not represent formal company entities, but rather private enterprises. However, a fair number of Tunisian companies have been operating legally since 2016.

From the published photos, it was possible to discern that the main harvested and exported species are *Holothuria poli* and *H. tubulosa*, originating from diverse coastal regions spanning the northern to southern parts of Tunisia (Fig. 1).

There is currently limited demand for products derived from sea cucumbers in Tunisia because the exploitation of these creatures has only recently begun. Therefore, within their profiles, these pages provide information on the curative and gastronomic values of sea cucumbers, often sharing recipes associated with their culinary use.

Coastal lagoon fishing spotlight: *Holothuria poli*

Tunisia's sea cucumber fishery is chiefly concentrated in lagoons, notably the Bizerte Lagoon in northern Tunisia and the Boughrara Lagoon in the south, both intricately connected to the Mediterranean Sea. Sellem et al. (2019) identified seven holothurian species within these ecosystems, with the predominant species being *H. poli*. In Sidi Daoud Lagoon, over 43.7% of sea cucumbers were *H. poli*, thus showcasing its prevalence (Ben Mustapha and Hattour 2016a). Chammem (2021) reported that more than half of the *H. poli* specimens collected from northern Tunisia were found in Bizerte Lagoon (Fig. 2).

The adaptability of *H. poli* was evident in various environmental conditions, thriving in both coastal and open sea environments, thereby demonstrating its robust capacity to endure diverse biotic and abiotic factors. Classified as an euryoecious species, *H. poli* exhibited wide ecological range, colonising habitats from the Red Sea to the Mediterranean Sea.

On the other hand, despite its smaller size, *H. poli* is a widely cultivated and popularly exploited sea cucumber in the Mediterranean, offering nutritional richness with high protein and mineral content and a low-fat profile (Benedetto and Jay 2011; Sellem et al. 2017; Rakaj et al. 2019). Biandolino and colleagues (2022) further report on the health benefits of consuming *H. poli*, emphasising its valuable nutritional contributions and indicating a low risk of chronic systemic effects.

Table 1. Beche-de-mer production in Tunisia (in kilograms), 2010–2023.

National Institute of Statistics – Tunisia														
INFORMATION BY PRODUCT														
Export by product in quantity (kg) 030819-others ``Beche- de-mer''														
Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Turkey	-	-	-	-	-	-	-	-	-	-	20700	-	-	-
Senegal	-	-	-	-	-	-	-	-	-	-	-	-	-	200
Canada	-	-	-	120	-	-	-	-	-	-	180	-	-	-
Unites States	-	-	-	250	-	-	-	-	-	-	-	-	-	-
United Arab Emirates	-	-	-	-	-	235	-	-	-	-	-	-	-	-
Hong Kong	-	-	-	-	-	-	-	-	-	710	1455	749	1895	1613
Singapore	-	-	-	-	-	-	-	-	-	-	225	-	-	-
Undetermined countries	-	-	-	-	-	-	-	-	-	-	852	500	-	-

Source: Tunisian National Institute of Statistics - Exports



Figure 1. The three forms of exported sea cucumber, as found on Facebook: powdered, dried and raw.

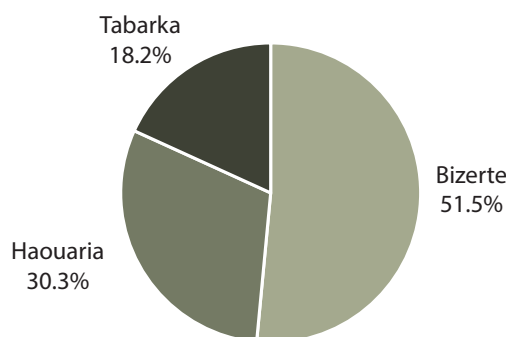


Figure 2. Percentages of *Holothuria poli* collected at different stations from northern Tunisia.

Source: Chammem 2021

Discussion

The sea cucumber fishery in Tunisian lagoons is of ecological importance, particularly for *H. poli*. This species, however, is under threat from overexploitation, illegal fishing and habitat destruction. Coastal lagoons in Tunisia face challenges such as illegal fishing and environmental degradation due to industrial and harbour-related activities that lead to wastewater and sewage pollution (Ben Garali et al. 2009; Guetat et al. 2012; Ben Mustapha and Hattour 2016a,b).

Recognising the vital ecological role of holothurians in marine ecosystems is crucial to establishing a structured framework for sea cucumber management and exploitation in Tunisia, and to ensuring the persistence of stocks.

Sea cucumber exploitation in Tunisia began in 2013 as a response to illegal fishing pressure in lagoon environments. Despite its recent introduction, commercialisation remains limited and disorganised. To ensure sustainability, it is recommended that measures such as restricting harvesting in terms of number, times and space be implemented. Critical components include controlling the number of catches and maintaining detailed biological records, including systematic classification, age at maturity, and biometric data. Ben Mustapha and Hattour (2016a) suggested limiting catches to 50 individuals per day for three months, only during a

specific period each year. Furthermore, harvesting is strictly forbidden from June to August, corresponding to the reproduction season of sea cucumbers.

Knowledge about sea cucumber biological diversity, stock status, and processing methods is significantly limited in Tunisia. Additionally, data related to their reproduction, recruitment, growth and mortality is largely absent. To address this, it is recommended that states regulate fishing efforts, allowing only licensed fishermen to collect holothurians in well-defined periods and areas.

Efforts should prioritise technical support for stock assessments, training, and promoting sea cucumber breeding, especially among young researchers. The Higher Institute of Fisheries and Aquaculture in Bizerte has commendably initiated sea cucumber aquaculture, focusing on *Holothuria forskali*, and is actively studying diversity, abundance, exploitation and processing in Bizerte Lagoon. While this initiative is commendable, it needs to be funded and implemented nationwide. Otherwise, a common management approach involves licensing exporting agents for overseeing beche-de-mer exports and limiting illegal trade. Agents must submit detailed reports, and fishers and customers need to be educated about sea cucumber conservation and good management.

Conclusion

Sea cucumber exploitation in Tunisia began in 2013, and is marked by challenges and opportunities. Achieving sustainable management is imperative, and there is a critical need for controlled harvesting practices and thorough data collection. The lack of understanding about sea cucumber biology and reproduction underscores the importance of regulatory measures, technical support for stock assessments, and targeted training for researchers. Although commendable efforts are underway, a comprehensive, well-funded and nationwide approach is essential for the effective and responsible management of sea cucumber resources in Tunisia.

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