

Country report from Portugal

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General remarks on the Manila clam fishery

The Manila clam (*Ruditapes philippinarum*) is a bivalve species introduced into Portuguese estuarine environments since 1984. Originally from the Indo-Pacific region, it was introduced in Europe in the early 1970s in North European Atlantic and Mediterranean coastal waters for commercial cultivation; it was introduced in Northern Adriatic Sea in 1983 from an English hatchery. As for Portugal, it is believed that its introduction dates back to 1984, when it was reported at Ria Formosa. Since then the Manila clam was introduced in several different estuarine systems, such as the Tagus and Sado estuaries, Ria the Aveiro and Óbidos and Albufeira coastal lagoons.

Before Manila clam introduction, and until 2011, the clam production in Portugal was primarily based on two native species: *Venerupis corrugata* (Gmelin, 1791) and *Ruditapes decussatus* (Linnaeus, 1758). However, since the first appearing in FAO statistics in 2009, in the last 5 years the landing values of Manila clam improved consistently. Starting from 9 tons in 2009, the Portuguese production reached to more than 1000 in 2014. This phenomenon is particularly evident for the Tagus estuary (Trafaria and Costa da Caparica, Lisbon), where Manila clam has a wide distribution, densities of more than 5 ind/m² at some locations, and represents almost the entire clam production. Main declared landing sites also include Torreira (Ria de Aveiro), Sesimbra and Setúbal (Sado Estuary). The constant decline of native species populations determined a change of the local fishing activities, as most commercial fishermen moved to more lucrative Manila clam catching.

The main issue concerning the Manila clam regards the high occurrence of illegal fishing, especially in the Tagus Estuary, conducted by unauthorized fishing devices, without permission and in interdicted production areas (heavy metal concentrations and microbiological contamination). Illegal harvesting of the Manila clam is most likely to represent more than 90% of the total catch.

A management plan for fishing of Manila clam, including the release of certified fishing concessions, is urgently needed in all productive sites.

Basic information on fishery

Geography and geomorphological characteristics: Manila clam fishing is mainly operated in sandy, muddy and oyster shell intertidal and subtidal areas (0 - 20 m) in estuarine coastal lagoons and estuaries.
Fishing method: Mechanical clam dredging, scuba diving and snorkeling, hand-raking, hand-operated tongs.

Fishery management: Commercial harvesting is limited to a maximum of 80 kg/day. No size limit or closure periods are regulated.

Standing stock assessment: Statistical survey of Manila clam fishing activity by DGRM (General direction of Natural resources, security and Maritime services) started in 2009, and currently a specific monitoring project is ongoing "2014 - Manila Clam - Current status, impact and fishing management in the Tagus estuary" funded by the Fisheries Program (PROMAR 31-03-01-FEP161)".

Basic information on aquaculture

No aquaculture based-production is actually

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occurring in Portugal.

Major constraints and countermeasures

The major constrain about Manila clam production is related to the illegal fishing, conducted by unauthorized collectors, using impacting fishing tools, in no-fishing zones. The absence of management plans for a sustainable exploitation and for clam traceability are the weak points in Portuguese market.

Habitat degradation: Although no specific studies have been conducted on the habitat degradation in the Tagus estuary, previous studies on areas where the Manila clam has been exploited indicated significant changes in the physical chemical characteristics of the water and sediments. Filter feeders are key elements in the control of primary production, water clarity and nutrient cycling. The action of dredges physically disrupts benthic substrate and may suspend sediment, increase turbidity, alter substrate composition, and cause sediment plumes. The re-suspension process of contaminated sediments (e.g. metals, tri-butyl tins, polycyclic aromatic hydrocarbons, polychlorinated biphenyls and pesticides) will release contaminants into the surrounding water column that may then

become biologically available. There are highly contaminated areas in the Tagus Estuary, which coincide with the area of occurrence of the Manila clam.

Overfishing: Over catching could be a risk as the production is improving, without a management regulation. Although harvesting has been intense along the last 5 years, the clam stock in the Tagus Estuary seems to be maintained with similar abundances.

Diseases and parasites: Occurrence of *Perkinsus olseni* has been reported for Portuguese populations of Manila clam, in the Tagus and Sado Estuaries, as in the Albufeira Lagoon. However, low frequencies have been observed, with no associated mortalities.

Climate change: No data are available.

Economic aspects: Mean price for kg ranges from 0.66 to 4.1 euros depending on time of the year and catching location. For example, in the Tagus Estuary is generally lower than 3 euro/kg.

Proposed international collaborative studies in the future: Patterns of genetic diversity for stock management and clam traceability; environmental quality and biomarkers assays for metal and organic contamination; management and fisheries/cultivation strategies.



Fig. 1. Main coastal lagoons and estuaries where *Ruditapes philippinarum* has been introduced and/or is currently exploited.

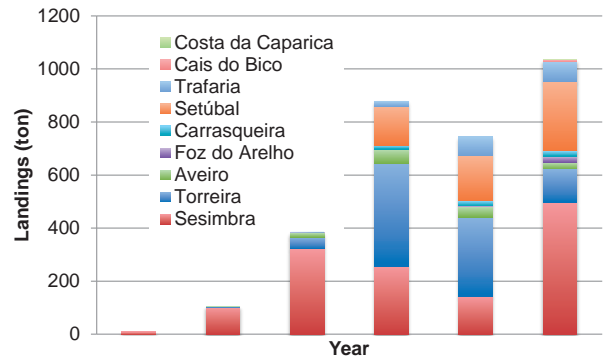


Fig. 3. Annual production of *Ruditapes philippinarum* in Portugal; sorted by main harbors.

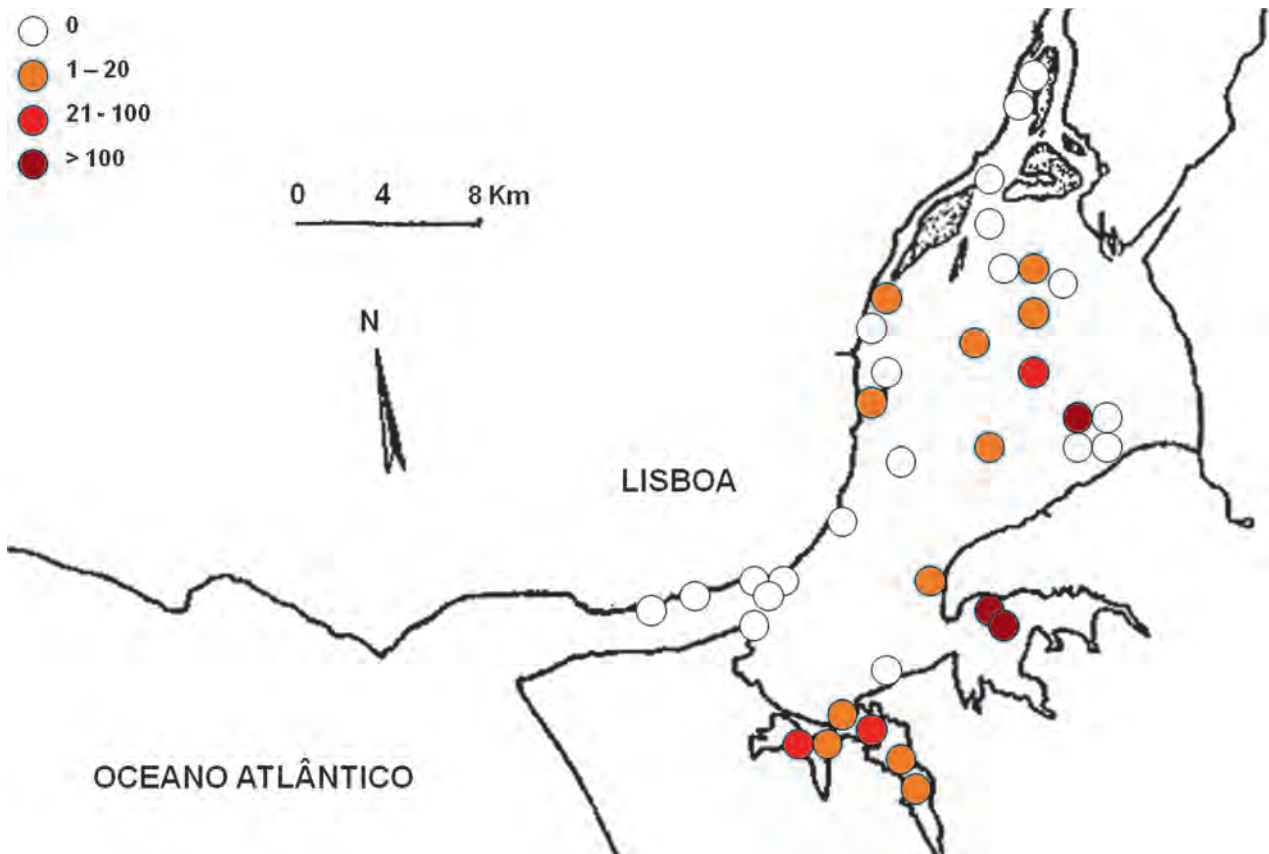


Fig. 2. Manila clam densities in 2011 in the Tagus Estuary (ind/m²). Original source: Garaulet, L.L. 2011. “Estabelecimento do bivalve exótico *Ruditapes philippinarum* (Adams & Reeve, 1850) no estuário do Tejo: caracterização da população actual e análise comparativa sobre a congénere nativa *Ruditapes decussatus* (Linnaeus, 1758) e macrofauna bentónica acompanhante”. Tese de Mestrado em Ecologia Marinha, Faculdade de Ciências da Universidade de Lisboa, 77 p.

