

Country report from South Korea

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General remarks on the Manila clam fishery

Manila clams, along with oysters and mussels, represent one of the most important bivalve fishery resources in Korea. Manila clam production is largely divided into coastal aquaculture and marine fishery. In coastal aquaculture, clam seeds are planted in tidal flats, and once they mature into adults, they are harvested. In marine fishery, wild Manila clams living in subtidal zones are harvested using fishing dredges. Clam aquaculture is developed in the western coast because tidal flats are well formed, whereas marine fishery of Manila clams has been predominant in the southern coast because it has a well-developed ria coast. Although Manila clam production in South Korea amounted to only 10,000 tonnes in the early 1970s, it increased rapidly to over 80,000 tonnes by the end of the 1980s, because of continued advances in aquaculture methods. However, the production started to decrease rapidly from the early 1990s, and dropped to approximately 30,000 tonnes by the middle of 1990s, with this trend continuing until the early 2010s. In 2014, Manila clam production was only about 20,000 tonnes after continued decline in production. This rapid decline in Manila clam production was caused by the rapid decrease in coastal aquaculture production rather than the decreased yield from marine fishery. The decline in Manila clam production from coastal aquaculture is attributed to low yields from the provinces of Jeonbuk, Gyeonggi, and Jeonnam, which have been the major producers of clam through coastal culture. It has been speculated that the rapid decline in Manila clam production in these areas were caused by the reduction in habitat areas due to tidal flat reclamation, which caused reduction in development areas for young clams and mass

mortality during the spring and summer seasons. This decline in production is causing serious shortage of supply, leading to the import of Manila clams for meeting the consumer demand. From 2008 to 2014, 30,000–40,000 tonnes of live Manila clams have been imported each year, which exceeds the total Manila clam production in Korea. Furthermore, import of Manila clams include not only adult clams for direct consumption, but also young bivalves; in the 2010s, approximately 5,000 tonnes of young bivalves were imported in Korea. Hence, part of the Manila clams produced in Korea by coastal aquaculture are from the imported clam seeds.

Basic information on fishery

Geography and geomorphological characteristics: Manila clam fishing is mainly operated in sandy tidal flats and shallow sub-tidal waters.

Fishing method: Clam digging, clam dredge.

Fishery management: No regulation.

Standing stock assessment: Statistical survey by local governments and fishermen's associations

Basic information on aquaculture

Environmental characteristics: Aquaculture of the Manila clams is mostly conducted on fishing grounds in tidal flats of Korea.

Culture methods: The most commonly used culture method is aquaculture: natural Manila clam seeds or imported clam seeds from China are planted in tidal flats, and once they mature into adults, they are harvested.

Operational management: Fishing village cooperatives have been established in each area of tidal flats to manage production, culture, and sale of

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Manila clams.

Major constraints and countermeasures

Habitat degradation: The area of tidal flats in South Korea totaled 3,203.5 km² in 1987, which, according to a survey in 2008, has reduced by 22.3% to 2,489.4 km². This reduction in tidal flat areas has caused reduction in Manila clam habitats.

Overfishing: Although overfishing is believed to have caused reduction in Manila clam brood stock, which has affected recruitment of clams, there have been no studies on this aspect.

Diseases and parasites: Most Manila clams inhabiting the tidal flats of the western coast have been infected with *Perkinsus olseni*, from which serious inflammatory responses to the infection have been observed. Although some Manila clams from the western and parts of the southern coasts have shown low infection rates, they have been infected with brown ring disease (*Vibrio tapetis*). Infection by *Marteilioides* sp., a species of Paramyxean parasites, along with *Cercaria tapidis*, *C. tapes*, and *Parvatrema timondavidi*, types of trematodes, have also been reported. Recently, mud shrimps (*Upogebia major*) have multiplied in great numbers in the habitats of Manila clams in the tidal flats of the western coast, which inhibit Manila clams from burrowing the substratum, leading to the decline in Manila clam population due to failure in habitat competition.

Climate change: Although a report speculated that the decline in Manila clams may have been caused

by increased water temperature during summer and cold waves during winter leading to mortality, this has not been proved.

Proposed international collaborative studies in the future: Since China, Taiwan, Japan and Korea have active trade relationships and all these countries are affected by the Kuroshio Current, there is a high probability of transmission of pathogens between these countries. Therefore, there is a need to develop a joint monitoring program for pathogens of Manila clams that inhabit these areas.



Fig. 1. Major Manila clam production areas in South Korea

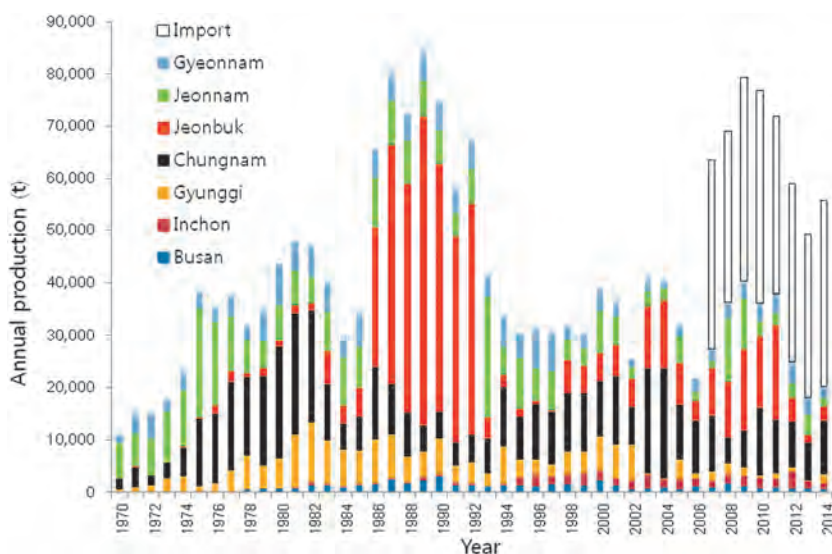


Fig. 2. Annual production and imported amount of Manila clam in South Korea.