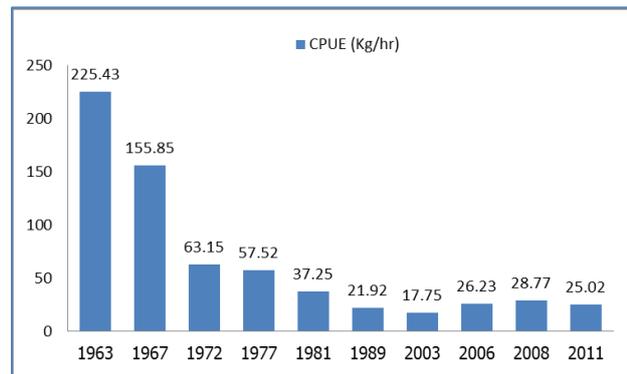


Thai Shrimp Industry Adaptation toward Limitation of Marine Environmental Condition in the Gulf of Thailand

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The vulnerability of marine ecosystem and environment in the Gulf of Thailand has continuously increased, due to: 1) increasing population during the past 30-40 years, from 20 million to 65 million; 2) rapid development of agriculture activities; and 3) expansion of industries and urbanization. Increasing demand for food security has resulted in fishing capacity level that exceeds the natural recovery capacity. This could be observed from the value of Catch Per Unit Effort (CPUE) in the Gulf of Thailand, which has drastically decreased since the introduction of modern capture technologies. Based on the recent report, the CPUE figure is only 9%, comparing to the original figure in the past. The total fishery production has also reduced to only 1.3 million tons. Nevertheless, throughout the past 20 years, production from aquaculture, particularly marine shrimp, has increased to substitute the reduction from marine capture fisheries. The marine shrimp production in 2013 has a total value of 2,773.9 million USD.



Catch per unit effort in gulf of Thailand reported by DoF survey trawler

The Gulf of Thailand is considerably small in size, only 300,858.76 sq. kilometers, with limited water circulation, as the Gulf is not directly connected to the ocean. The total coastlines in the western and eastern sides of the Gulf are 1,334 and 544 kilometers. In addition, the coastline of the Andaman side adjacent to the Indian Ocean is 937 km. These areas provide shrimp culture areas of 28,820 hectares; this figure yet to include other coastal aquaculture and inland aquaculture.



Thai shrimp farm typically earthen pond

The characteristics of marine shrimp farming in Thailand are mainly small-scale, with high stocking density of 60-200 individuals/sq. meter. Shrimp culture could be done either in traditional earthen ponds or modern plastic lining ponds. In order to produce 1 kilogram of shrimps, the culture requires approximately 1.1-1.3 kilograms of pelleted feed, depending on

pond management scheme, as approximately 20% of feed would turn into waste. The Department of Fisheries has played an important role in promoting environmentally friendly marine shrimp culture since the beginning of the shrimp industry. Examples of this are: 1) the Kung Krabaen Bay Royal Development Study Center (established in 1981) which makes use of mangrove forest to absorb organic waste from shrimp farm's discharge; and 2) the Royal Sea Farming and Aquaculture Demonstration Project Under the Initiations of Her Majesty Queen Sirikit (established in 2008), with integrated farming system, by circulating water from shrimp pond to seaweed culture pond, and water could be subsequently reused. By culturing of aquatic species with different multi-trophic levels, the farm could have zero discharge.



*Kung Krabaen Bay Royal Development
Study Center*

However, most of Thai farmers are familiarized with culture of shrimps with super high density, even in the traditional earthen ponds. Several farms also use super high stocking densities using modern techniques and equipment. Only few farmers have adequate understanding on ecological and environmental system, and have intention to develop shrimp farming system to be environmentally friendly. Most of the shrimp farmers shift farming areas from the inner gulf of Thailand, where water quality is poor, to southern and eastern part of the country, where water quality is better. There have always been environmental problems in the Gulf of Thailand throughout the past years, such as red tide and coral bleaching. We have to admit that this is partially resulted from the shrimp culture industry. The vulnerability of the environment in the Gulf of Thailand also creates new diseases and epidemic, which in turn, resulted in uncertain level of shrimp production over the years.



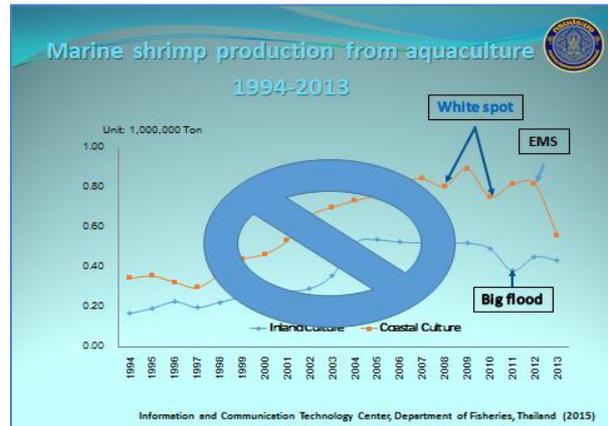
*Water recycling ditch
of Bunjonk farm
planting mangrove
tree to absorb
dissolved organic*

To adapt and adjust with the aforementioned situation:

- 1) The Government of Thailand has issued the new Royal Ordinance on Fisheries in 2015, to replace the Fisheries Act (1947). The new Royal Ordinance emphasizes on promotion of sustainable fisheries and responsible aquaculture, as well as maintenance of ecosystem balance in the near shore and marine areas.

2) Private Sector during the past 4-5 years has also been very active. They have learnt from the past mistakes, and developed techniques for waste management, such as:

- Adoption of the multi-trophic aquaculture
- Renovation of farm water management by increasing the proportion of water storage/conditioning pond and cultivation pond to 70:30
- Development of technique for reuse of organic waste
- Adjustment of feed industry to develop feed with less environmental impacts, such as using less fishmeal and phosphate, etc.



Nevertheless, both government and private sectors involving in Thai shrimp industry still have lots of work to do, by reducing wastes and discharge from farms and production system, preservation and expansion of mangrove areas, in order to reach shrimp production target of 500,000 tons annually without creating impacts to the ecosystem of our Gulf of Thailand.



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