Royal Sea Farming and Aquaculture Demonstration Project
Under the Initiatives of Her Majesty Queen Sirikit
Bang Kaew Sub-district, Ban Laem District, Phetchaburi Province

The Royal Sea Farming and Aquaculture Demonstration Project, under the initiatives of Her Majesty Queen Sirikit is situated in Bang Kaew, Ban Laem District, Phetchaburi Province. The Project aims to serve as a learning center to facilitate the dissemination of fisheries–related knowledge and technologies to farmers, so that such technologies could be adopted and adapted to the conduct of fishing as well as aquaculture practices as appropriate in their respective locality.

**Background**

Her Majesty Queen Sirikit deeply concerns on the declining fishery resources in Thai waters. With the increasing fuel price and other costs to conduct fishing activities, while fishermen also have to go fishing much farther in the sea, resulting in less profit or even loss for them. Her Majesty the Queen therefore came up with initiatives to help people whose living were affected by such hardship.

**The Royal Initiatives**

On 1 July 2008, Her Majesty Queen Sirikit expressed her concern to Mr. Sahat Boonyawiwat, Advisor to the Royal Household Bureau, and to Dr. Jarantoha Karnasuta, Permanent Secretary of the Ministry of Agriculture and Cooperatives at the time, on the situation where fishermen could no longer go out fishing in the sea due to the high fuel price:

"Seafood products produced through integrated, environmental–friendly and balanced farming system could, in the future, be one of the important alternatives to coastal fishing activities."

Her Majesty the Queen also initiated an integrated demonstration sea farm in the salt pan areas of approximately 13 hectares donated by Ms. Wassana Thephussadin na Ayuthaya. The purposes of the demonstration farm are to facilitate fishermen, aquafarmers as well as interested public to observe, learn and get knowledge and experiences, with the aim that the activities could be further applied in their respective locality.

**Objectives**

1) To develop a demonstration sea farm, following Her Majesty the Queen initiatives on fisheries and aquaculture, and create job opportunities to local people in the area.

2) To provide demonstration on full-cycle integrated farm management, with natural food mechanism and water recirculation system within and among sub–farms with different ranges of salinity.

3) To study and develop harvesting techniques for aquatic animals to remain alive and could be harvested continuously.

4) To serve as a learning center for farmers to observe, learn, and get knowledge and experiences.

**Implementation Approach**

The Royal Sea Farming and Aquaculture Demonstration Project in Phetchaburi Province comprises both freshwater and marine aquaculture activities, using water flow accelerator to create continual water movement that simulate natural tidal flows, carrying mineral, organic substances and nutrients to algae and aquatic plants, and creating balance to the ecosystems. By such system, aquaculture activities could be undertaken either for diadromous species, such as giant freshwater prawn, milkfish, as well as marine species such as coral trout, groupers, giant grouper, etc.
1.5) Development and demonstration on closed culture of salinity-tolerance species

Brine shrimps or Artemia are cultured to filter-feed and utilize nutrients derived from aquaculture process as well as from other organic matters in the farm. Brine shrimp production could serve as live food for juvenile aquatic animals or as supplementary food for adult fish. In addition, brine shrimp production could create extra income to the farm.

1.6) Development and demonstration on culture of rare marine mollusks and invertebrates

Rare marine mollusks and invertebrates, such as giant clam, abalone, sea cucumber, etc., are collected and exhibited to create awareness for conservation of natural resources.

The species being collected include:

- abalone
- giant clam
- sea cucumber

1.7) Development and demonstration on production of "sea salt" and "natural seawater salt"

Demonstration was made on production of "sea salt", and "natural seawater salt" as a graft-on activity for salt pan. The activity creates extra income from normal sea salt production, and provides alternative occupation to people in the area.

2) Sea-based demonstration activities

- Development and demonstration on raft culture of green mussels (floating artificial reefs)

Demonstrations are made on raft rope mussel culture. In addition to mussel production, a number of mussel ropes hung on the sea surface also provide shelter for marine fishes and animals to inhabit, grow, and result in increasing abundance of fishery resources in the future.

Air compressor Wind Machine for fish farm water treatment

This machine wind turbine is designed by engineering faculty of Rajamangala University of Technology Thanyaburi RMUTT. The machine is used for wastewater treatment application in the farm. Wind energy is clean power resource that can be applied into many useful works. This wind machine is special designed using in low wind speed zone. As in many applications and areas, the electricity is not the main requirement but the need of air and oxygen is required. Especially, in agriculture areas and some industrial sites, the water pollution is a big issue to be solved. Therefore, the use of wind machine for compressed air was studied and presented in this area. From the experimental site this prototype was generated 3 bar of air pressure circulates of 1.5 m³/hr volumetric at wind speed of 2 m/s average into the fish farm. It indicated that this machine could be applied in wind turbine designed for fish farm water treatment at low wind speed areas.

Designed and Engineered by Dr. Wirachai Roynarin
RMUTT
Within the farm, water flow system was set-up to connect all sub-farms, in order to use wastewater from these sub-farms to culture brine shrimp (Artemia). As brine shrimp could efficiently filter-feed all kinds of organic substances from water. In addition, brine shrimps itself could also be harvested and serve as live feed for juvenile aquatic animals in the project farm.

Further, the very high salinity water after brine shrimp culture would be used for saltpan demonstration plot, and for graft-on activity in producing “natural seawater salt”. The production of “natural seawater salt” creates additional value to the normal production of “sea salt”; and at the same time allows aquaculture to be undertaken conveniently even in the areas far away from the coast.

At the final stage of salt production, organic sludge could also be collected and used as fertilizer for growing plant trees in the farm. The farm therefore has absolutely no wastewater to be discharged to the environment, or so-called “zero waste” farm.

In addition, at sea, demonstration plots were arranged for green mussel culture using raft-rope system, a new method that could reduce mortality of the mussels. Mussel rafts could also perform as floating artificial reefs to provide nursing ground and shelter for fish and other small aquatic animals, creating even higher productivity to the sea.

**1.2) Development and demonstration on closed culture of diadromous species**

Aquatic species that could tolerate wide ranges of salinity, between 5-35 ppt, such as the giant freshwater prawn, milkfish, mullet, long whiskered catfish, goby, etc., are gathered and raised to serve as broodstock for mass production of seedlings for aquaculture under closed farming system.

**1.3) Development and demonstration on closed culture of marine species**

Aquatic species that could be raised in normal sea salinity, ranging between 25-35 ppt, such as the Indo-Pacific mackerel, pomfret, golden snapper, white asean seabass, golden trevally, batfish, etc., are raised to mature as broodstock for the production of seedlings for aquaculture under closed farming system.

**1.4) Development and demonstration on broodstock culture of rare marine species**

Rare marine aquatic species, such as the giant grouper, red snapper, trevally, cobia, etc., are gathered and raised to serve as broodstock for mass production of seedlings for aquaculture under closed farming system.

The species being gathered include:

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**Project Activities**

**1) Land-based demonstration activities**

**1.1) Re-introduction of salt marsh crabs**

Activities are carried out to replant sea purslane, an indigenous vegetation species, to cover soil surface. This will provide habitat and food to bring back salt marsh crabs into the areas. Demonstrations are also made on plantation of various species of useful evergreen halophytes.
Anticipated benefits from the Project

1) "Zero waste" sea farming model
Development of closed water recirculation model by imitating marine ecological systems, with wide range salinity and the flow that enables self-conditioning of water. Water would continuously flow and be used along the farming system, which allow nutrients and natural food to be fully and spontaneously utilized, resulting in in-farm benefits with zero discharge of waste from farm to the environment.

2) Community floating fish bank
Raft-ropes culture of green mussels would enhance marine mollusks, such as green mussels, oysters, etc., and serve as floating artificial reefs for aquatic faunas, such as crabs, shrimps, fish, etc., to inhabit, feed and reproduce, which would eventually bring back aquatic resources to near shore communities. Fishermen could gain benefit from catching fishes from the surrounding areas, while the rafts itself also help reducing impacts from harsh sea waves to the shorelines.

3) Learning center
The project would also serves as a "learning center" for fishing communities to visit, learn and exchange ideas and experiences on integrated sea farming, as well as for farmers/fishermen to adapt technologies developed and demonstrated through the farm in order to earn extra incomes and have better livelihood.

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