

Oyster farming potential in Sabah, Malaysia

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Abstract

As the world population increases, demand for food is also on rise. In Malaysia, especially in Sabah, demand for seafood continues to rise due tourism booming and better local living standard. As Malaysia is slowly moving to aquaculture for food security, oyster farming is seen to have high potential to ensure food security and to sustain livelihood of coastal community. In collaboration between Universiti Sains Malaysia (USM) and Universiti Malaysia Sabah (UMS), Income Generation through Oyster Farming programme was introduced in Sabah. This programme is based on the low cost and simple technology required for oyster farming to eradicate poverty and to promote sustainable income generating activities that can be applied by local communities. Two locations within the Tuaran district were selected for this programme. The oyster farming has been proven successful with the community. Hence, this programme does not only address the issues of food security and environmental protection but it fits ideally in the Blue Economy for three pillars of sustainability, the people, planet and profit.

Keywords: Oyster, Oyster Farming, Sabah

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Introduction

Food security has been recognized as one of the world's main challenges and concerns globally. Fisheries and aquaculture have been an important source of food, nutrition, income and livelihoods for hundreds of millions of people around the world (FAO, 2016). As we entered the year 2020, Malaysia population has increased significantly and the demand for food continues to rise. Besides that, with the booming of tourism industry for the past few years together with the rise of the local living standard, the demand and consumption of luxury seafood were also increased. Growing demand for seafood has put additional pressure on the natural marine resources. Coastal fishing communities are facing a problem to capture and collect enough marine resources to sustain their livelihoods. There are many factors that have led to the depletion of wild fish and marine capture fisheries. Natural marine resources are declining due to number of factors including overfishing, habitat and coastal destruction, destructive fishing methods, marine pollution, invasive species, climate change and ocean acidification have led to ecosystem degradation habitat and biodiversity loss (Craig, 2012).

Aquaculture is the fastest growing food production industry. Malaysia is slowly moving to aquaculture for food security rather than heavily depend on wild catches and natural resources. However, for some coastal communities, not all of them are able to venture into other

existing aquaculture industry such as shrimp and fish aquaculture as both shrimp and fish aquaculture require high investment capital and man power. The other alternative that has a potential to ensure food security and on the same time able to sustain the overall livelihood of coastal community is oyster farming. Oyster farming is considered a clean form of aquaculture as no manufactured feed is required to feed the oyster. The farming techniques are simple and can be easily transferred to local growers. (Tan, 2015).

Bivalve cultivation is a selfregulate aquaculture that requires no additional feed, no antibiotic usage and minimal maintenance effort. The oyster was a permanent element of preferred shellfish in the annual food cycle in Malaysia and production of oysters had been the third place in mollusc culture in after blood cockle *Anadara granosa* and green mussel *Perna viridis* (DOF, 2018).

Due to the success of oyster farming programme under Knowledge Transfer Programme (KTP) initiated by the Malaysian Government and Universiti Sains Malaysia (USM) in West Malaysia before this, similar programme was expanded to another state in Malaysia. In collaboration with another local university in Malaysia, University Malaysia Sabah (UMS), Income Generation through Oyster Farming programme was introduced and conducted in Sabah, East Malaysia. Oyster farming in Sabah has high potential to be developed not only

because of the suitable and geographical location factors but also other factor such as high demand of seafood. The demand for seafood is expected to increase as tourism industry in Sabah becomes popular to both international and local tourist (Said, 2011).

Therefore, there is an urgent call to secure our seafood security for the long run to ensure constant and sustainable seafood supply in the future. In 2018, the aquaculture production for oyster in Malaysia is 455.22 tonnes and 399.32 tonnes was from Sabah. There was a total of 195 oyster culturist and 179 culturists are in Sabah alone. However, lack of knowledge and trained personnel is also recognized as a major constraint in oyster farming

Methodology and approaches

This programme is based on the low cost and simple technology required for oyster farming to eradicate poverty and increase the income of fishermen and on the same time to promote sustainable income generating activities that can be applied by local communities whether as part time or full-time basis. In a long run, this programme aims to develop sustainable oyster farms on a commercial scale that can provide returns to local communities through local and international markets which could lead to enhance access to quality and affordable basic physical and social infrastructure in rural area.

This programme is an opportunity to form collaboration between two

universities where as a Research University in Malaysia, USM able to share experience with UMS through this joint research collaboration. Besides that, this programme is also able to bridge the gap between local communities, institutions and entrepreneurs.

Site description

In Sabah, two sites have been identified to run the programme. The locations that have been selected are Kg. Lentuong, Mengkabong Bay ($6^{\circ}07'49''\text{N}$, $116^{\circ}10'11''\text{E}$) and Kg. Baru-Baru, Ambong Bay ($6^{\circ}17'58''\text{N}$, $116^{\circ}17'36''\text{E}$) (Fig. 1). Both areas fall under the administration of Tuaran District Office. The locations are partially enclosed area and protected from strong wind and waves as both sites strategically located inside the bay and lagoon and surrounded by mangrove forest.

The site in Mengkabong is located at the pocket part of the bay and Kg. Baru- Baru is located at the southeast side of Ambong Bay. The locations were chosen based on certain criteria such as suitability of the area to farm oyster, accessibility of the area by boat and car and the willingness of the community members to participate in this project. Some crucial in-situ water physical parameters such as temperature, salinity and pH were also checked to determine the suitability of the area to farm oyster (Temperature: 28°C - 31°C , Salinity: 25-28ppt, pH: 7-8).

Training of participants

The participants selected were local fishermen with monthly income of US\$200-400. Each participant was assigned a 20 ft x 20 ft floating cage to be filled with oyster spats. Once the participants were selected, the university team proceeded with purchasing cage materials and training to build the floating cages. Participants were taught on how to build a floating oyster cage as designed by the university team. Project funds were used to build the floating oyster cages, basic culture material (rope, float, and trays) and oyster spats which were supplied by commercial hatchery. Under the programme, interns to carry out the project and dealing with the participants were selected from local post graduates of UMS. The interns were involved in training and working together with participants. In this programme, training sessions on oyster farming were conducted monthly by the interns. Participants were trained in oyster handling, maintenance, grading and sorting.

Cage management

As with any farming and culture, regular maintenance and monitoring were needed to ensure high survival and good growth rates of the oyster. Participants are required to check the basket daily for mortality, predators and to shake off suspended particles such as mud particles from covering the oyster and tray. From time to time, the

participants are required to thin out and separate oyster juveniles from fusing and sticking to one another.

About twice a week, biofouling organisms such as sponges, barnacles and others were removed from the basket to avoid the biofouling organisms from blocking flow of water that bring food particles (plankton) and dissolved oxygen into the trays. The condition of the cages was also checked monthly for any broken planks and rope, damaged floater and tray. Repairing work of the cage is also under the responsibility of the participants.

Oyster marketing

Along the pipeline, the project will incorporate into technology to convert the oysters to other marketable products such as freshly frozen oyster (whole and shucked), dry oysters, shucked meat in saline water and extraction of the juice for other usage like oyster sauce or pharmaceutical purposes.

Expected result and discussion

Oyster farming is a newly emerging seafood industry in Malaysia. It has enormous potential for growth, in both local and international markets. The current oyster trade in Malaysia is valued at USD6 million (Malaysia's Trade Statistics) in 2015. This represents only 14% of the demand for oysters in Malaysia. This is a reflection of great opportunity for production and demand. The demand is imposed by the limitation in oyster seed supply and

long culture cycles. Currently, oyster farming can rely on hatchery-produced seeds instead of the natural seeds, which are inconsistency in amount and seasonal.

Therefore, the oyster industry in Malaysia should be able to take off if we are to transfer the oyster farming technology to the local communities or growers. Through this programme, participants were able to receive new knowledge and technique while the interns have the opportunity to gain hands on experience working side by side and directly with community. The local communities are now able to do grading and sorting of oysters as well as monitoring the biofouling in the culture trays. The local communities are also able to construct the floating cages and set-up their own floating cages when they have the capital. In addition, the local communities do not need to invest oyster feed because oysters are filter feeders, which feed on phytoplankton available naturally in the water. Due to the needs of clean water and protection of mangrove areas for oyster farming, oyster farmers are trained and been informed of the importance of protecting the environment for the sustainable of oyster farming activities. Through oyster farming, public awareness on environmental protection can be executed effectively among the coastal communities as well as the younger generations.

Oyster farming can also be an attraction for eco-tourism or knowledge-based tourism. For long

term benefits, the local communities will soon start to enjoy the benefits from the oyster farming activities, where oysters can be sold continuously after the first 8-10 months of culture. With the income they have generated, the culturists now will be able to purchase their own oyster seeds to sustain the farming. Oyster farming is a sustainable activity because it is a clean aquaculture and involves minimal investment after the setup of the floating cages. The local communities can extend their farming activities in the future by building more floating cages to increase the holding capacity for the oysters. The local communities are expected to have an additional income of USD0.50 per oyster after 8-10 months.

Generally, they are able to earn USD1000 for every 2000 oysters sold per month. The participants will be able to expand their culture system once more income had been generated from the sales of the oysters. The local communities will be able to sell their oysters to the industries for further processing of products such as frozen oysters, dry oysters, oysters in saline water and industries dealing with food technology or pharmaceutical companies. There is opportunity for the local communities to be social entrepreneurs when they are taught to manage their own eco-tourism business through oyster farming. Oyster farming can be an approach to eco-tourism as well as public awareness for environmental protection.

Conclusion

Oyster farming has been proven successful with the community and similar approach can be used to create an industry for Malaysia through the partnership between university, government, industry and community. Oyster farming is not only able to address the issues of food security as well as protection to the environment (Green and Clean Aquaculture), it fits ideally in the Blue Economy for three pillars of sustainability (People, Planet & Profit).

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