

Plan to Promote IMTA in Shandong Province

NWG-M, UNDP/GEF Yellow Sea Large Marine Ecosystem (YSLME) Phase II

Project;

Yellow Sea Fisheries Research Institute, CAFS

1. Background description

Shandong Province is the major seafood production region in China, according to the Fishery Statistic Yearbook, Shandong province have produced about 6.56 million tons of cultured aquatic products in 2016, ranked second only after Guangdong province. The high aquaculture yield is dependent on the farming scale and intensive labor input, and there are varieties of aquaculture methods according to different geographical conditions.

With the increased aquaculture scale and the requirement on profit, the demand on aquaculture production is greatly increased. And according to the complicated maritime ownership and different culture methods in Shandong province, the management on the aquaculture industries and individuals is confronted a complex picture, and intensive aquaculture has been carried out by most individual aquaculture practitioners. Massive aquaculture has exerted pressure on the ecological environment in the coastal regions in Shandong province, as the reduced quality of the cultured seaweed and bivalves has been reported in recent years. The intensive aquaculture, which requires a high material cost, also resulted in an expensive labor cost. Although the local aquaculture practitioners have decades of experience in aquaculture, the disordered aquaculture management and lack of scientific and systematic knowledge on the aquaculture ecology have slowly causing an unsustainable trend in the local aquaculture with high cost - high risk - high ecological pressure. Such problem is a joint result of many factors including research, promotion and management.

Moreover, aquaculture industries are now facing serious environmental inspections from the environment ministry. The development concept “clear waters and green mountains are as good as mountains of gold and silver” advocated by president Xi Jinping has been implemented to all governmental departments. More stringent policies and regulations has been made and stronger enforcement measures has been taken for environmental inspection including the coastal seas. Traditionally, the aquaculture industry is considered to be one of the sources of pollution in the sea, as there is no solid evidence to prove the ecological service offered by aquaculture activities. Some aquaculture companies face the risks of being shut down due to environmental failures, fishermen who have long been engaged in aquaculture activities for their livelihood are facing a situation in which they lose their main source of income.

To improve the aquaculture management uniformity, to improve the quality of aquatic products, to improve the ecological service of aquaculture activities to satisfy latest environmental protection policies and to change its traditional impression in government agencies are urgent for the aquaculture industries in Shandong province. Sustainable aquaculture mode has to be practiced and promoted with strong scientific supports and successful demonstration.

The major problems challenging the sustainable development of aquaculture in Shandong province has been summarized as follows:

1. The complicate composition of the local aquaculture industries, including enterprise, collective and individuals. Governmental policy and regulations can be hardly implemented throughout all the business units with different culture mode and species. The enterprise self-management is more experience based than scientifically and technologically driven.

2. The accumulated knowledge of environmental ecology with Eco-farming aquaculture based on IMTA is not well distributed to the aquaculture industries. The management within some aquaculture enterprise are still experience and profit driven, sustainable aquaculture modes and spatial planning need greater promotion to survive in the gap between corporate profitability and environmental protection laws and regulations.

3. The extreme intensive aquaculture in some areas of Shandong Province, have imposed pressure on the local environment, and the cost of labour and material have high occupation in the total cost and squeezing the profit. The current aquaculture operation mode and workload have led to a low working enthusiasm of workforce at local villages and towns.

2. IMTA: Current Status in Shandong Province

The issues addressed above are mostly historical ones due to the aquaculture itself. However, related scientific research on the sustainable development of aquaculture has been carried out for a long time and has been well demonstrated in Sanggou bay in Rongcheng, Shandong province.

Sanggou bay is the major commercial Eco-farming IMTA site, the suspending culture species includes kelp *Saccharina japonica*, Pacific oyster *Crassostrea gigas* and scallop *Chlamys farreri*. As a major aquaculture industry within Sanggou bay, Chudao Aquatic Food Co, Ltd is the earliest batch to start the cooperation in “Production, Education and Research” with universities and research institute, the main research collaborators are Yellow Sea Fisheries Research Institute (YSFRI, CAFS), Institute of Oceanography (IOCAS), Institute of Marine Research from Norway (IMR) and etc. With the support from national research projects (National 973 projects, MOST projects and Modern Agro-industry Technology Research System for shellfish), Chudao have established different commercial scale IMTA production system (suspending seaweed-bivalves, seaweed-bivalves-sea cucumber) based on carrying capacity estimation. Currently the eco-farming method has been practiced and demonstrated on the 2,000 ha farming area in Chudao, and such method have achieved significant economic, social and ecological benefits. With the increasing area of the eco-farming method near Chudao, the naturally distributed eelgrass bed has been witnessed a recovering trend, which increased from around 100 ha in 1983 to about 200 ha in the beginning of 2008, such number have doubled and about 400 ha of eelgrass bed was estimated based on observation in the end of 2009.

Currently, the annual production of kelp, Pacific oyster and scallop is 84,500 tons (Dry Weight), 60,000 tons (Wet Weight) and 15,000 tons (Wet Weight) respectively. Alongside the production, efforts have been made to the in-situ experiment and trials in natural resource restoration and wild stock proliferation.

3. IMTA Promotion: Enterprise Alliance

According to the current situations of aquaculture industries in Shandong province, to form an enterprise alliance would be of great benefit to help deal with the management challenge and to better promote the eco-farming method based on IMTA which has been successfully practiced in Sanggou bay. The major measures including:

Enterprise alliance foundation with major aquaculture industries in Shandong Province

To establish an enterprise alliance which includes at least 50 members with aquaculture industries in Shandong province, the potential members will cover the major aquaculture industries. Elect the chairman and the executive council within the enterprise alliance, the executive committee will be responsible for conference organization, constitution formulation and activity planning.

The enterprise alliance will be the representative to cooperate with local governmental fishery department to deal with the management issues and the promotion of the eco-farming method based on IMTA system with firm scientific support. The alliance council will invite domestic/abroad scholars in the aquaculture research field to set up an expert committee, with the scientific background covering the aquaculture production processes for different method and species. Expert advice will be important reference for the decision making in the future development direction of the aquaculture industry in Shandong province. The enterprise alliance can be a platform for alliance members to contact the world latest aquaculture experience and research outcomes.

Technical trainings and scientific workshops by enterprise alliance

The enterprise alliance, which act like a platform, will strengthen the connection with research institute such as YSFRI, IOCAS and organize scientific workshops and technical trainings aiming at aquaculture enterprise, individuals, aquaculture related researchers and governmental officers. Domestic and abroad scholars, technicians and industrial representatives will be invited to share the experience and latest technologies. The aquaculture industry Chudao Aquatic Food Co., Ltd is qualified for the national sea-ranching farm in 2018, and the commercial IMTA production system has received on-site inspections and visits by international experts from Norway, Canada, the U.S., Japan, South Korea, Australia and other countries. Based on the IMTA research in Chudao and other regions, with the experience from the Yellow Sea Large Marine Ecosystem phase II, the research team together with Chudao have contributed to the composition of training materials for IMTA, which can be an example for the operation of the enterprise alliance. The dedicated training center at Chudao with about 1000 m² built-in area and latest multi-media equipment can serve as the training center in the early stage of the alliance. Sub-training centers can be setup considering the promotion condition with the enterprise alliance.

IMTA demonstration zone

YSFRI and Chudao Aquatic Food Co. Ltd have already make widely accepted demonstration with the commercialized eco-farming mode. Which provide a good example for the enterprise alliance, the ecological farming management based on IMTA and previous research results will be promoted to further aquaculture regions in Shandong province. Another demonstration zone is planned to be established in Laizhou bay for the bottom culture in the inter-tidal zone. Latest culture technologies and harvest devices will be introduced through the promotion and to attract the employed populations to aquaculture industries.

Demonstration zones of IMTA is important for displaying the advantage of the system, a detailed monitoring system is under construction in the Chudao demonstration zone as to depict the whole cycle of IMTA with detailed data. The corresponding economic benefit analysis will be tracked through production cycles and formed demonstration database.

Project Stakeholders

Aquaculture enterprises: major stakeholders, through the enterprise alliance, to participate in the training session and eco-farming demonstration, to enhance the enterprise technology content and competitiveness. To reduce the labour cost and the pressure on the culture environment, promote the sustainable development of aquaculture. The alliance will be a good platform to promote the products and expand the influence of the enterprise.

Aquaculture individuals: major beneficiary of the project; the latest culture method and harvest device will help to enhance the ecological service of aquaculture systems and reduce the workload and pressure on the environment.

Local fishery governmental department: As the governmental department, they will benefit from the enterprise alliance for the communication with aquaculture practitioners. And through the participation of the training and communication with experts and representatives from different countries, the knowledge of different aquaculture management regulation and policies will be shared.

Research institutes: as the major scientific service supplier, the principal collaborated research institute will organize the training and promotion of eco-farming mode, which helps to carry out on-site studies and promote the specific knowledge sharing with experts from different aquaculture environment, help to accumulate research results, experience and opportunities for further collaboration with domestic and international research and industrial partners.

Anticipated Results/outcome

The expected outcomes including:

A well-established enterprise alliance in Shandong province with rational regulations which greatly contribute to the management of the eco-farming aquaculture. The enterprise alliance expects to have at least 20 members including the major aquaculture enterprise like Lidao Ocean Technology Co, Ltd (Weihai), Mingbo Aquatic Food Co, Ltd (Yantai), Longwei Aquatic Food Co, Ltd (Weifang) and etc. To promote the eco-farming method for different culture methods and species based on the carrying capacity estimation. The enterprise alliance will cover most of the aquaculture sites with the area exceed 60,000 ha.

Through the training and conferences, enhance the communication of the local enterprise with domestic and abroad enterprises and research institute from different culture practice. Promote the awareness of ecological importance to local aquaculture environmental systems for aquaculture enterprises. Promote the combination of “Production, teaching and research” within the province. To conduct technical accumulation for further sustainable development of aquaculture based on the facilities and constructions in Chudao for the early stage.

To promote the eco-farming mode at a larger demonstration zone outside Sanggou bay, establish another eco-farming demonstration zone based on carrying capacity estimation in Laizhou bay. To encourage the local and other aquaculture enterprise and individuals to practice the eco-farming mode based on IMTA, trying to lower the labor cost, and to improve product quality and increase revenue. Through the introduce of latest harvest device and culture technology, to reduce the workload and enhance the efficiency. Promote the innovation in new culture method and management, and finally enhance the profit for local residents.

