Oyster Farming: New Hope for Increasing Mariculture Production in India

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In recent times, the growth in aquaculture has outpaced the growth in human population. According to the FAO, worldwide, aquaculture production has grown at an average annual rate of 8.4% since 1970 and reached over 63 million tonnes in 2011. In the world aquaculture basket, bivalves hold a significant proportion fluctuating between 14 and 21%. Mariculture production (18.3 million tonnes) consists of marine molluscs (75.5 %, 13.9 million tonnes), fin fishes (18.7 %, 3.4 million tonnes), marine crustaceans (3.8 %) and other aquatic animals (2.1 %), e.g. sea cucumbers, and sea urchins. The share of molluscs (mostly bivalves, e.g. oysters, mussels, clams, cockles, ark shells and scallops) declined from 84.6 % in 1990 to75.5 % in 2010. Global oyster production in 2010 is estimated as 4.48 million tonnes and China, Korea, Japan, USA and France are the leading producers. India also ranks among the top fifteen in the world. Significantly, these animals come under the category of non-fed aquaculture, which is inherently a green and environment friendly aquaculture practice having low carbon footprint.

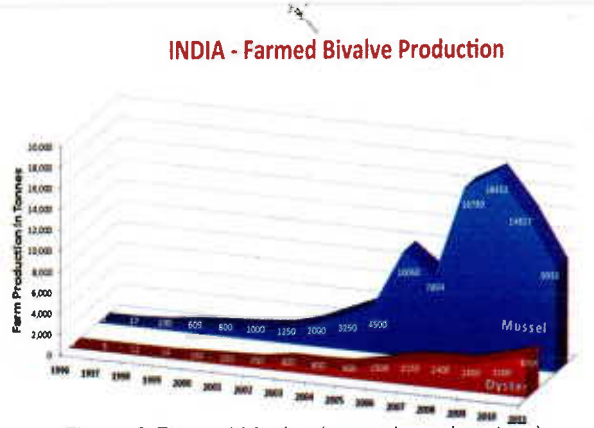

Figure 2.Farmed bivalve (mussels and oysters) production from India. Data collated from FISHSTAT

In India, bivalve farming has been in vogue for the past 16 years, mainly in the state of Kerala. Technologies were developed by CMFRI in the late nineteen seventies, and then through concerted demonstrations and extension efforts jointly with state fisheries agencies, commercial farming of mussels and oysters became a practice among small-scale fishers and women self-help groups. Although there has been a slip in production of mussels in recent times, the production of oysters has shown a steady increase albeit at a slow pace. Currently, mussels form 71% and oysters 29% of the production. The recent setback in mussel farming are attributed to lack of adequate seeds, quality of seeds and issues of environmental overcapacity in the main farming area.

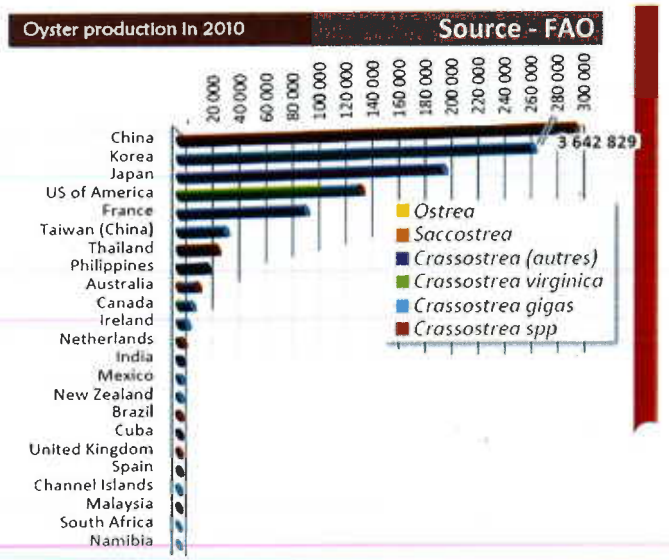

Figure 1. Bar chart showing global farmed oyster production during 2010. Data collated from FISHSTAT. India is currently in the 13th position.

Mussels are purely marine organisms. They are grown in the backwaters during marine conditions in the summer months to avoid the risks of sea farming. But mussel farming in backwaters does face additional risks of sudden changes in salinities (due to non-seasonal rain) and other environmental factors. On the other hand, oysters are a euryhaline brackishwater species, which are quite adept at growing in a wide range of salinities available in brackishwater regions of the country. These characters combined with the 'green' nature of the farming practice, place oysters as a commodity which can rapidly expand the production base of

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mariculture in India. The intrinsic nutritional factors in oysters, particularly the relatively high content of natural zinc and selenium, are also an additional plus point. Probably, the only reason to hold back the development of oyster farming in India is the lack of market acceptability and the rather difficult post-harvest processing in oysters.

Appreciating the above, from 2008, the CMFRI embarked on an ambitious programme funded by the World Bank under the National Agriculture Innovation Project (NAIP) to develop a production to consumption value chain for oysters. This programme which was executed in collaboration with the NIFPHATT (National Institute of Fisheries Post Harvest Technology and Training) proved to be trend setter of sorts. Some of the new processes and products developed jointly by CMFRI and NIFPHATT under the NAIP are listed.

These new developments were documented through videos and placed in websites (www.oysterandlobster.naip.org.in) and YouTube for wider dissemination. A promontory advertisement for live oyster consumption was also broadcast on television. Oysters are an excellent source of zinc, iron, calcium, and selenium, as well as vitamin A and vitamin B12. Oysters are low in food energy; one dozen raw oysters contain just 110 kilocalories (460 kJ). Oysters are considered the healthiest when eaten raw on the half shell. Traditionally, oysters are considered to be an aphrodisiac. A team of American and Italian researchers analyzed oysters and found they were rich in rare amino acids that trigger increased levels of sex hormones. The oysters have to be eaten raw to be most effective, because cooking reduces the quantity of amino acids D-Asp and NMDA molecules. Their high zinc content also aids the production of testosterone.

Since oysters are filter feeders, they can accumulate pollutants and microbes in the water. Therefore, before live consumption it is very necessary to purify (depuration) the oysters thoroughly through a simple process. Designs and working models of depuration systems for bivalves are currently available. The project has also been able to design portable depuration display units for high-end restaurants in order to increase customer confidence in the product.

- **Live Oyster Supply by SHGs**
- Taj Malabar – 4085
- Casino Hotel - 4740
- Brunton Hotel 280
- Taj Vivanta - 480

- First consignment of live oysters airlifted to Taj Mumbai

- Rate per live oyster increased from Rs.1 to Rs.5 for non-depurated and Rs. 7.5 for depurated oysters

The live oyster value chain has developed in the city of Kochi on a small-scale and has great scope to expand to other metro cities in the country. Details of live oysters sold by women SHGs during 2011-12 are shown in Box. As the Indian middle class and upper middle class grows there is great scope for tapping this large market by enterprising oyster farmers. As an extremely soft and delicate meat, processed oyster value chain can also be developed both on the domestic and export front. Trial marketing of processed oyster products through NIFPHATT Fish Stall in Kochi showed high consumer acceptance, with the entire product range being sold-out in a couple of weeks.

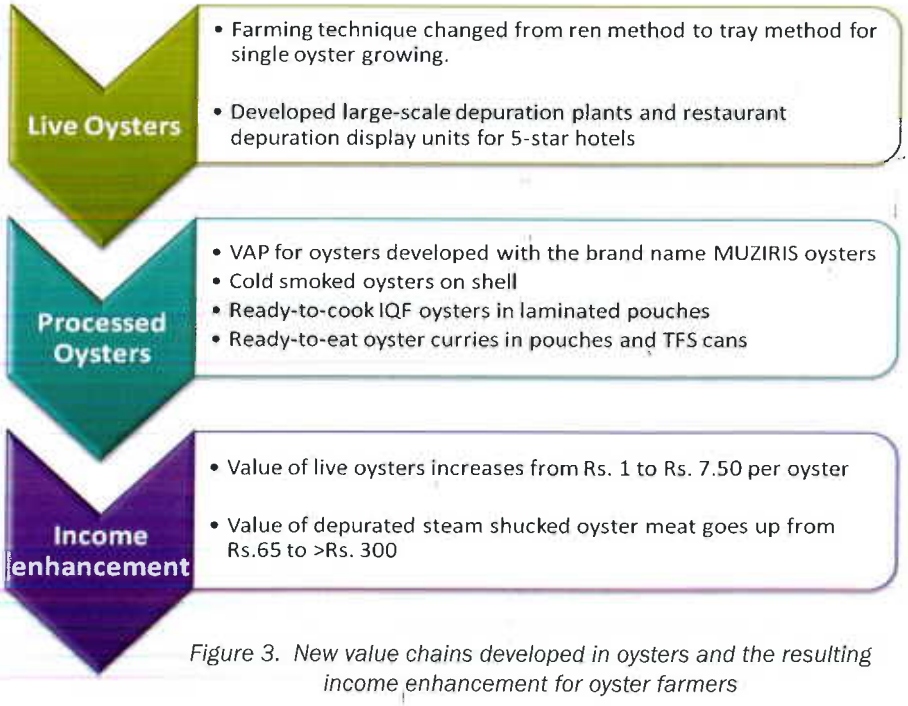

Figure 3. New value chains developed in oysters and the resulting income enhancement for oyster farmers

Advantages of oyster farming to the ecosystem and the community

- As a keystone species, oysters provide habitat for many marine

species. Most oysters inhabit the intertidal and sub-tidal zones. The hard surfaces of oyster shells and the nooks between the shells provide places where a host of small animals can live. Hundreds of animals, such as sea anemones, barnacles, and mussels, inhabit oyster reefs. Many of these animals are prey to larger animals, including fish. An oyster reef can increase the surface area of a flat bottom 50-fold.

- As filter feeders, oysters remove plankton and organic particles from the water column. Many studies have shown individual oysters are capable of filtering up to 10 litres of water per hour, and thus oyster reefs can significantly improve water quality and clarity.
- Oysters consume nitrogen-containing compounds (nitrates and ammonia), phosphates, plankton, detritus, bacteria, and dissolved organic matter, removing them from the water. What is not used for animal growth is then expelled as solid waste pellets, which eventually decompose into the atmosphere as nitrogen. It is estimated that 19,000 tonnes of nitrogen is removed from seawater by oysters every year, equivalent to the purification capacity of 109,000 km^2 forest.
- Oysters also contribute to absorb the dissolved CO_2 from seawater. The amount of CO_2 used by oysters was roughly estimated as 1.2 million tonnes. Thus, oysters contribute to alleviate greenhouse effect.
- Oyster farming is a resource saving aquaculture as it does not require supplementary feed and therefore saves on use of fish oils and other fish feed ingredients. Non-fed aquaculture is an environment friendly industry and oyster is globally considered as the most promising species for such aquaculture.
- Oyster shell is also an important natural resource. Oyster shells contain high density calcium carbonate. Ca^{2+} ion is useful as an additive in health food products and for its bactericidal activity. This can provide for additional source of income for farmers.
- The nutritional qualities of oysters have been already mentioned. To the young generation it is a high quality brain food and can help build up a smarter generation for the country.

National Award winning Cine Actor Mr. Salim Kumar vouching for the safety and taste of live oysters along with Chef Jose Varkey of Casino Group of Hotels

From the foregoing account it is abundantly clear that oyster farming is an environment friendly aquaculture practice which needs to be promoted by development agencies in the country. There is immense scope for enhancement of incomes of coastal fishers and women

SHGs through oyster farming.

For references and further reading

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