



Pearl Culture: An Emerging Industry, Source of Revenue and Status of India

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A pearl is a hard, glistening object formed within the soft tissue (specifically the mantle) of a living shelled mollusk and considered as symbol of royalty, love, peace and purity. To meet the commercial demand, pearls are cultivated with the assistance of human intrusion and the practice is termed as pearl culture. Pearl farming is the culture of rearing oysters and mussels to form pearls. A pearl formed by inserting a foreign agent such as sand particle between the mantle and shell of an oyster is called a cultured or artificial pearl. It is called mantle graft implementation technique and is used to obtain pearls at a commercial scale. The pearling trail in Bahrain, which is a significant part of the country's culture, has been formally recognized by UNESCO as a world heritage site, so Bahrain is the nation known to be 'Island of pearl'. Pearl City of the India is Hyderabad the capital of Andhra Pradesh and one of the major cities in the country for pearl industry, in spite of the fact that Hyderabad is neither a coastal area or for that matter near a coastal area.



There are plethora of pearl species in every nook and corner of the world. If we talk about its distribution in India, species such as *Pinctada anomoides*, *P. atropurpurea*, *P. fucata*, *P. margaritifera* and *P. sugillata* are abundant in Bombay, Madras and Andaman, Gulf of Kachch, Gujrat and Tuticorin. Three species of freshwater pearl mussel i.e. *Lamelliden's Marginalis*, *L. corrianus* and *Perreysia corrugata* are available in the Harike wetland and the surrounding areas (canal) in Ferozpur district of Punjab and Bhakhra and Nangal areas of Himachal Pradesh. These species are abundantly available in the states's aquatic bodies and can be used for the production of pearl in North West states of India. Physico-chemical parameters should be monitored carefully in freshwater aquatic resources of Punjab where freshwater pearl species are available because fluctuation in these parameters due to anthropogenic activities can diminish the quality as well as quantity of the species. As per the current findings cleared that Ludhiana city discharge industrial effluents into river Sutlej via Buddha nullah that finally reached at Harike wetland deteriorating the nutritional quality of flora and fauna, especially fishes such as *Labeo rohita* and *Sperata seenghala* published by Dr. Navpreet kaur (Assistant professor in the Department of Zoology, DAV University, Sarmastpur, Jalandhar during her Ph. D. research in the Department of Zoology and Environmental Sciences, Punjabi University, Patiala recently in reputed springer nature journals: Environmental Science and Pollution Research (2021) and Environmental monitoring and Assessment (2023). Further, these toxic substances can also influence the quality of pearl, so there future research is necessary. As per the Directorate of Environment and Climate Change, 2019, Harike wetland collects the industrial effluents of 2028 industries

of Ludhiana city, via Buddha Nullah, which enters in the River Sutlej and ultimately reaches Harike wetland. Also, it receives industrial effluents of 395 industries from Jalandhar, via the Kala Sanghian drain which are causing serious concern for aquatic life existed over there, so these pollutants may certainly deteriorate the quality of freshwater pearl mussel available there. So, external pressures such as urbanization as well as industrialization, have placed pressures on the pearling industry that require appropriate management practices that support sustainable industry growth.

Pearl culture can be integrated with carp polyculture system as the implanted mussels are kept in nylon bags suspended in an earthen pond from a bamboo frame. There is a vast scope of pearl culture in India and the farmers/small entrepreneurs can start it as allied business which may provide employment opportunities and can take economic advantages. Apart from income, a few thousand oysters can purify and clean gallon of water, so the eco-friendly nature of this aquaculture interest of people and professionals as well as farmers globally now involving in this sustainable practice. Cultured pearls have an significant place in global trade and nowadays supports industries in more than 30 countries such as, China, Japan, Australia, Indonesia, French Polynesia, Philippines, Thailand, Malaysia, India, Sri Lanka, Myanmar and Mexico, of which China has the largest production. Food and agriculture organization global analysis report shown that from 2005 to 2014, the average annual output of Chinese pearls was 3540 tonnes (t) valued at 15 million USD. This production accounted for over 98% of global cultured pearl production, of which freshwater pearls accounted for 99.5%. Japan has been the world's major marine pearl producer for over a century, and has developed advanced technology in pearl oyster culture and pearl production. In the past few years, the average annual value of marine cultured pearl production in Japan was 127 million USD, accounting for 51.6% of global pearl output value. Average annual production of marine cultured pearls was 23 t in Japan, 18.6 t in China and 12.9 t in French Polynesia. Chinese pearl production is typified by a high-yield, low-value industry structure. Compared with other aquaculture sectors, pearl production has a complex process and a relatively long farming cycle which make it economically risky.

The ICAR-Central Institute of Freshwater Aquaculture (CIFA), Kausalyaganga, Bhubaneswar, India, has created a base technology for cultivating pearls in freshwater habitats, recognising the scope and value of freshwater pearl production. Indian pond mussel, *Lamellidens marginalis* is the major species used in freshwater pearl aquaculture. In addition, ICAR-CIFA has pioneered a novel feature of freshwater pearl farming. The Institute has also taken the lead in disseminating freshwater pearl culture technology to the country's fish farming communities, entrepreneurs, researchers, and students to build a sustainable model for the country's socio-economic development. India may soon become a significant player in the business of pearl culture if the current venture of Central Institute of Freshwater Aquaculture (CIFA) would work out more efficiently in the perpetuity. Today our country, India spends billions each year, importing pearls from China and Japan, dependence on imports sometimes results in delays and higher cost. But it is possible to produce very good quality pearls from inland resources itself the analysis in CIFA. Due to huge organic residue easily available by-product of poultry farming and animal husbandry, integrated aquaculture farming may turn out a big source of income for poor farmers for the pearl fishing.

Farmers in developing countries like India have a limited grasp of modern aqua farming procedures, including pearl farming, which should be followed in their respective fields. Through research, teaching, and training, many people are working hard to transfer this critical technology of pearl farming to the needy. Many farmers, entrepreneurs, and women who are interested in this subject have already received training in recent years. Freshwater pearl farms have been developed in various states across the country, including Odisha, Maharashtra, Gujarat, West Bengal, Bihar, Uttar Pradesh, Chhattisgarh, Kerala, and a few

more that are still in the early phases of development with the technical support of ICAR-CIFA. But our Punjab state is lacking in pearl culture which is a serious concern, because our wetlands such as Harike as already mentioned are enriched with some species of pearl and we are not utilizing the available resources from our state. Time has come to educate more people about pearl farming, and guide them to attend trainings on pearl farming as this aquaculture technology is expected to generate a lot of employment and money in the upcoming years.



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