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Recent Advances in Aquaculture Development Worldwide and Opportunities in Nepal

Ram C. Bhujel

Aqua-Centre, School of Environment, Resources and Development (SERD)
Asian Institute of Technology (AIT), Thailand
Email: Bhujel@ait.asia or Director@aqua-centre.org

Culture of carps in China and India have the oldest history which dates back to around 3,000 years. Despite having long history, it remained low-cost and low-profit system. The most advanced form of present-day aquaculture is the Salmon farming which has a history of only 100 years. Starting from 1960s, Norway has become the leader of the technology followed by Chile, Scotland and Canada. They have developed faster growing strains through genetic selection, produced meat with attractive color through nutrition research and applied automatic feeding system using computer programs. They also use under water cameras to monitor the feeding behavior and swimming activities and have achieved FCR almost 1. Large volumes of Salmon are processed and delivered all over the world as a result it has become multibillion-dollar business. However, it has limited scope in terms of adoption worldwide as it requires cold and saline water. Very few countries can produce it. Pangasius farming rapidly developed in Vietnam as a new, specialized and advanced form of aquaculture due to its high productivity and high export demand for its white and boneless meat. Thousands of grow-out farmers in Vietnam produce an average of over 400 tons/ha/cycle of six-month, stocking at over 100 fingerlings/m^2 of pond area. Nearly one hundred processing factories make fillets daily employing thousands of women and men, and export all over the world valued at about two billion dollars annually. Bangladesh, India, Thailand and other countries grow but could not compete for price for export markets. Pangasius is mostly consumed locally in these countries which contribute to food security of the people especially the poor communities as it is cheaper than most of the other fishes. Among the finfishes, tilapia has become the most widely cultured fish which is commercially farmed in about 150 countries using ponds, cages, tanks, rice fields, ditches and so on. Mass scale monosex seed production technology has played a key role in its expansion. There are well-developed hatcheries supplying over 20 million monosex seed per month employing hundreds of technical staff in Bangladesh and Thailand. The fish has become no. 1 in Thailand and the Philippines and is becoming popular in many other countries. However, it has not been popular in Nepal yet. There is a need to support by policies and plans. In addition to finfishes, advances in technologies are occurring in shellfish culture especially crustaceans. Tiger prawn (*Penaeus monodon*), white shrimp (*Litopaenus vannamei*) and Giant freshwater prawn (*Macrobrachium* sp.) are the major species commercially grown in many countries. Even though white shrimp was considered to be saline water species, grow-out has been successfully done in freshwater. Moreover, freshwater mussels, crabs, snails and others also are grown in various parts of the world and they play important role in human nutrition but not much attention has been given in South Asia.

Nepal has abundant water resources with over 6,000 rivers, many lakes, swamps and reservoirs to be built. Land is increasingly becoming available for digging ponds as the youths are leaving the villages and even the country in search of jobs in the cities and abroad. Digging ponds and growing fish has become the best alternative use of fallow land. The cold water of the mountainous area is being utilized for trout farming to some extent. More efforts are needed to expand. In Terai, carps are doing fairly well, but productivity of those ponds need to be enhanced which can be done by applying advanced techniques, such as aeration, adequate feeding with better quality feed, and other techniques of water quality and health management, and adding other species in polyculture e.g. Pangasius and tilapia. If aquaculture develops fully, it can create more employments, increase income and enhance nutrition of the people as fish farming is more profitable than rice and other form of agriculture. For surplus fish, there are huge markets in Indian states of Bihar and Uttar Pradesh where aquaculture is not developed well. In conclusion, aquaculture has become an essential part of national and global food production, helping to meet the rising demand for aquatic food as wild fish stocks decline. It can contribute to several sustainable development goals (SDGs) established by UN. In addition to economic benefits, the focus on sustainability, technological innovation, and species diversification is shaping the future of aquaculture development. While challenges remain, the sector's ability to adapt to environmental changes and develop more efficient and sustainable farming practices will determine its long-term success.