

Growth of forward and backward industries linked with aquaculture in Kolleru Lake area, Andhra Pradesh, India

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India is the second largest producer of fish through aquaculture in the world, next to China, with more than seven million people directly engaged in the fisheries and aquaculture sector. While states such as West Bengal, Orissa and Assam have a long tradition of aquaculture, others with high potential such as Punjab and Haryana are also becoming more involved, in addition to the already established Andhra Pradesh, an east coast state in southern India that has the second largest freshwater fish production. Culture of the Indian major carps in earthen ponds represents the first phase of aquaculture in this state, which has been sustained for more than quarter of a century.

The major part of fish production of Andhra Pradesh is from the Kolleru area. Kolleru Lake is the largest natural freshwater lake in India, located between the deltas of the Krishna and Godavari rivers, with a surface area of around 901 km² at +10' MSL contour. Kolleru Lake serves as a natural flood balancing reservoir for the two rivers. The lake is fed directly by the seasonal Budameru and Tammileru rivers and is connected to the Krishna and Godavari systems by over 68 inflowing drains and channels. The lake is an important habitat for a variety of resident and migratory birds, including the Grey or Spot-billed Pelican. A notified wildlife sanctuary, the lake was designated a wetland of international importance in November 2002 under the International Ramsar Convention.

The Kolleru region is inhabited by a population of 200,000 people (1981 census) distributed in 60 bed habitations and 98 belt habitations spread over in 73 revenue villages including hamlets. The bed villages are island villages and the belt villages are border villages of lake. The major occupation of the residents in the bed habitation is fishing. The major occupation of the people of the belt habitation is agriculture which includes the cultivation of the lakeside areas in the upper reaches. Kolleru has been dominated by capture fisheries and aquaculture practices in this region were initiated in the 80's and have undergone rapid expansion and intensification



Widely used plastic tanks and oxygen cylinders for live seed transportation.



Growth of fish needs centres.

taking the carp culture area in Andhra Pradesh state to about 80,000 ha. Almost 98% of the carp culture in Andhra Pradesh state is developed in and around Kolleru. Freshwater aquaculture incorporating carp species is a popular enterprise in Kolleru Lake region. The semi-intensive culture system practiced by the farmers has a production range of 7.5 – 12.5 metric tonnes/ha/year and contributes the major share to annual state production of 600,000 metric tonnes, achieved by growing basically two species rohu (80%) and catla (20%) with rare addition of mrigal or other species, in heavily fed and fertilized ponds of different sizes (Ramakrishna, 2007). In the course of time fish farming in this region has gathered a lot of momentum and grown into a substantial industry, stimulating the growth of a number of subsidiary industries. This has boosted the rural economy of the region with a huge potential for additional income and employment generation. The system is not only supporting thousands of people engaged directly in farming but also hundreds of thousands of people in allied industries and services. Taking into account this huge potential of aquaculture development in Kolleru Lake, a survey was conducted to study the growth of various backward and forward linkage industries related to aquaculture because input and supply agencies, services etc. form an important value chain in aquaculture systems.

Methodology

The authors made personal visits to the sites to take stock of the prevailing situation through close observations of the operations as they were being performed, and through interaction with the farmers, members of fishermen communities, farm managers, entrepreneurs, industrialists, suppliers and providers of various services engaged in different stages of value chain during 2007. Facts have also been gathered from various secondary published sources for an in-depth study.

Salient observations

Unlike traditional fishing activities geared mainly to self-consumption or for local marketing, fish farming has been mainly conducted as a business venture where production is undertaken primarily to meet the market demand. Increasing demand for fish in domestic markets and the complex network that affects the supply and price of fish is influencing aquaculture production both at national and regional levels. The study reveals that aquaculture practices in Kolleru Lake, although initiated in the eighties have added a new dimension to the economy of the region within a very short period, with the lake recognised by the FAO as one of the fastest growing aquaculture sites in the world.

As a growing economic activity, aquaculture has made it possible to introduce and try new and improved technologies, which have opened up new opportunities such as hatchery production of fish seed, feed production units, input suppliers, aqua-shops, net making units, ice plants, packaging industry and transport networks. In the process it has promoted the growth of a whole chain of activities, from hatcheries to marketing to retailing and export of fish and prawn, that have not only added value to the product, but also increased the demand and profitability of aquaculture at the farm level.

Kolleru aquaculture, as a business venture is undertaken primarily for the markets located at Kolkata, eastern, north and northeastern states of India and even Bangladesh. The latest survey indicates that progressive farmers are trying to establish post harvest facilities eyeing the markets of Thailand, Singapore, Vietnam and other Asian countries.

Growth of forward and backward linkage industries in aquaculture

Aquaculture in the Kolleru Lake area has had a significant positive effect on rural and urban fish supply and on income and employment generation. We have observed that there is a well-established linkage of aquaculture with various forward and backward industries. It is noteworthy that plastic tanks and oxygen cylinders are available on the road side in many places on the highway connecting Eluru and Bhimavaram. These are given out on rent for transportation of fish seed in the Kolleru lake area. This business has creating a significant scope for employment. We have also observed that the whole chain of activities beginning from the backward linkage



Growth of poultry farms.



Growth of boatmaking industry.

activities of production and marketing of fish seed, feed and other inputs like fertilizers and medicines, and forward linkage activities of icing and packing, transportation, storage, processing and retailing of the product have also made significant contribution to employment and income generation and revitalized aquaculture by opening up far-off markets.

Another important cottage industry that has arisen in the area is boat making. Boats are made of discarded telephone poles which are flattened in the industry before being used as a basic raw materials. The majority of ponds in Kolleru Lake area are large in size. Hence boats are frequently used for applying fertiliser, feed, lime and other inputs. The presence of poultry farms around Kolleru offers a supply of poultry manure, a basic organic input for pond fertilization, at a low price.

Many fish seed centers and aqua-shops have come up in Eluru, Bhimavaram and neighbouring areas catering to range of farmers' requirements by providing inputs and information services to them.

The large pond size has made it feasible to go for a high degree of intensification. Producers have a high production potential and do have access to the capital or credit, which is required to take up aquaculture on a larger scale. They have also high risk bearing capacity, which the small farmers do not have. Kolleru aquaculturists being resourceful have better purchasing capacity of all the inputs required for production. They are better educated and experienced. Wherever suitable they can even think of integrating the aquaculture with other farming practices for higher profit and optimum utilization of resources.

The entire process of aquaculture seems to have been stimulated through interventions at three levels: (i) commercialization of production through adoption of scientific technologies and market-oriented approach (ii) development of forward linkages through improved post-harvest services like packaging, processing, storage, transport, efficient marketing systems and opening up of new markets as well, and (iii) backward linkages through the provision of inputs like seeds, fertilizers, manures, feed, medicines and aquaculture machinery. Wider availability of land resources in both size and suitability and assured supply of water has led to the commercialization of aquaculture production at Kolleru Lake area.



Rice mills are supplying huge quantities of husk to packers.

Production from the aquaculture ponds have efficient forward linkages with marketing chains. The marketing infrastructures are organized and efficient. The harvests are segregated and graded. There are several ice factories and rice mills supplying ice and husks for packaging of fishes.

Rice mills around Kolleru lake area have paved the way for successful aquaculture. They supply cheap rice bran, an important ingredient for fish feed. Husk produced at rice mills is used in packaging of fish as an insulator to maintain the cool conditions for a longer time, and can considerably slow the melting of ice. The labourers involved in packaging are efficient in quick packing of the produce whether at the pond site or at the ice factory premises. The organized transport agencies in the locality play a very important role in transporting the fishes to various places of the country quickly and efficiently. Producers sell the produce to the contractors, who in turn send the produce to different wholesalers located at various locations. Finally the consumers get their fish from the retailers/ vendors who have got it from the wholesalers.

Growth of aquaculture has led to simultaneous growth of ancillary industries such as ice factories, feed mill plants, packaging centers and lorry supply agencies. Due to mass fish production many ice plants have been established in the local village areas namely Jalipudi, Sreparru, Pedapadu, Kalakarru, Singapuram, Akiveedu and other places. The ice is being used for packaging and keeping the fish fresh for several days. The ice plants are observed to employ many people for its operation who earn a good income. The credit for their well being goes to aquaculture development. Ice factories are the forward linkages of aquaculture. The husks from the rice mills are also used by the packers to prevent the ice melting for hours due to non-conductive nature of the material.

Along with huge export potential, the lorry supply agencies have come up in a good number employing many people. On an average 200 lorry loads of fish are flagged off daily from Kolleru lake area (Roy et al. 2008).

Several thermocol and plastic factories manufacturing plastic crates and thermocol boxes for carrying the fishes from the production centers to various places have come up in the locality. Themocol boxes being light and cheap have relative advantages over plastic crates. Being less costly they can be discarded after a single use and need not be brought back to the packing center for reuse. On the other hand the

plastic containers are heavy and costly. The empty crates are brought back in lorries to the packing centers for repeated use, which involves substantial transport charges.

Creation of rural employment opportunities in sorting, packaging, transporting and marketing

It is estimated and reported that for a one-hectare pond two permanent labourers and 300 man days of casual labour are engaged for aquaculture. The traditional system allowed only casual labour for a period of 4-6 months in a year when the peak activities of fish culture go on. In addition to the direct labour employment in the culture practices, indirect employment in allied activities like ice factories, packing centers, lorry supply agencies and marketing is noteworthy. Marketing practice is observed to be absolutely labour intensive which leaves employment for labours in various stages like harvesting, sorting, packaging and weighing, icing at factory, loading and unloading at wholesale market and retailing in the consumer markets (Roy et al. 2008).

Conclusion

We feel that production activity, undertaken principally for self-consumption, cannot attain the scale needed for efficient resource allocation and technological advancement. On the other hand, aquaculture undertaken as an economic venture on commercial scale provides inputs and services needed for on-farm production, markets for farm products and livelihood opportunities like local seed and fingerling supply, production of feeds using local materials, and fabrication of various materials for farming activities. For all these activities several actors are involved in aquaculture chain e.g., fish farmers, hatchery and nursery operators, seed vendors, commercial fish feed manufacturers, domestic resume based feed producers, fishing equipment manufacturers, fish processors, fish traders and exporters etc. The additional employment and income generated in the value chain create demand for other products and support the growth of other economic activities. The key challenge in aquaculture development in medium and small-scale operation is to reduce poverty, vulnerability and marginalisation among people. It is quite satisfactory to note that growth of various forward and backward industries in aquaculture in Kolleru Lake area have helped in strength-



Fish packaging in an ice factory.



Manufacture of thermocool boxes for fish transportation.

ening resource management systems providing return, creating employment opportunities of the fishers living in the bed and belt villages leading to self sustainable aquaculture.

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References

- Ramakrishna, R. (2007). Kolleru carp culture in India: An aquaplosion and an explosion, *Aquaculture Asia*, 12 (4):12 –18.
- Roy, A.K., G.S. Saha, P. Kumaraiah, N. Sarangi, B.S.Giri and S.Ayyappan (2008). Socio and techno economic aspects of carp culture in Kolleru Lake, Andhra Pradesh, Central Institute of Freshwater Aquaculture, Bhubaneswar.
- Sarangi, N., P. Kumaraiah, P. V. Rangacharyulu and Bandla S. Giri (2004). Status of freshwater aquaculture in Krishna – Godavari Delta – a profile. Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar-751 002, pp: 29.

Effective marketing strategies for economic viability of prawn farming in Kuttanad, India

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Kuttanad is a low-lying deltaic wetland ecosystem in South India formed from four river systems, with an area of some 1,160 km² and a population of more than one million people. Agriculture and fisheries provide the main source of income to the people of Kuttanad, and an intricate polder system (low-lying tract of land surrounded by dikes) has been constructed over the years for agricultural purposes.

Kuttanad is the home ground of the giant freshwater prawn, *Macrobrachium rosenbergii*, often sold under the trade name 'scampi'. Although paddy cultivation in rice fields is being practiced on a regular basis, the successful integration of scampi in the rice fields had in fact evoked much response among farmers of Kuttanad as a means for improving their economic status. During the past decade, there has been a phenomenal increase in the cost of rice production. Paddy farming has, therefore, become less attractive and due to the diminishing returns, there is a strong tendency among the farmers to abandon rice cultivation and look for alternative uses of their fields. The integration of paddy farming with prawn/fish culture has turned out to be the only viable alternative to effectively utilize the vast expanse of fertile derelict water bodies available in Kuttanad¹.

Freshwater prawn farming is carried out in three types of natural grow-out environments such as 'polders', which are utilized for rice culture mostly only once a year, the 'homestead ponds' and 'coconut garden channels'. The extent of the polders generally varies from 0.5 to 100 ha. Homestead ponds are comparatively smaller and their area ranges from 0.01 to 0.2 ha. The 'coconut garden channels', on the other hand, usually have water area in the range 0.2 to 7 ha. The



duration of culture varies from 5-6 months in polders to 8-10 months in coconut garden channels. In Kuttanad the majority of prawn farming activities occur in polders (65-75%) followed by coconut garden channels (15-25%) and homestead ponds² (10-15%). Unlike penaeid shrimp culture, the economic yield of *M. rosenbergii* in grow-outs is not a linear function of total biomass produced owing to the predominance of non-marketable undersized prawns in the harvested population. The differential growth pattern evinced in this species is one of the major bottlenecks confronting the profitability in the farming of this species³. The different size groups of prawns at the final harvest enable the exporters to grade them under different weight classes and prices. Hence larger prawns demand better prices, while the undersized prawns are usually low priced or not marketed.