**CONCLUSION**

Fish contributes to the food security of people directly through providing high quality food including animal protein and some important micro-nutrients, and indirectly through providing income and livelihood to the producers. In developing countries, fish is particularly important for many poor people - often those at high risk of food insecurity. Aquaculture can hold the promise of becoming a viable alternative to capture fisheries, as depleting capture fisheries will not be able to meet the ever-increasing demand for fish.

The Latur district of Maharashtra State with its immense freshwater resources can contribute significantly to the country's inland fisheries development. The district has rich fishery resources of 18727 ha water area. The ponds and tanks offer enormous scope for fisheries development in the State. These water bodies form the abode for nearly 45 endemic fish species.

In spite of its high potential fishery resources, the district is yet to achieve self-sufficiency in production of fish. The present level of fish production in per ha in range of 0 to 2000 ha is 1452 kg/ha.

There is a tremendous scope for the development of aquaculture in the prevailing ponds and tanks. The productivity of these ponds and tanks at present level is much lower. Aquaculture can play an important role in the State's economy by way of providing livelihood to thousands of people directly or indirectly. If all the resources can be utilized for fish production through culture and capture fisheries, the State will be able to produce surplus fish even for export to neighboring countries.

The district has attained self-sufficiency in carp seed production. However the availability of genetically improved fingerling size fish seed is yet to be achieved uniformly throughout the district in time. Availability of a large number of cultivable water bodies, increased availability of fish seed and prevailing high demand of fish are some of the important factors which can support aquaculture development in the district.
The State Fisheries Department of Maharashtra, with its allied agencies and corporation like Fish Farmers Development Agency, District Rural Development Agency and Maharashtra Fisheries Development Corporation Ltd. can play a vital role in the economic emancipation of the people through its numerous productive schemes for scientific fish culture.

The major problem of fisherman’s of Latur district is of finance, which become a hurdle in the development of fishermen community of alternately the fish production. For this government has to provide funds under various schemes. These fund should be utilized for development of farmer's pond, community tank, various culture technique like composite fish culture, air breathing fish culture and integrated fish farming, fisheries extension, education and training and finally up gradation of research facilities in the district. Although efforts have been made in the national programme for development of fish farming through FFDAs to increase fish production to meet the demand, progress is not satisfactory as envisaged earlier and so it is essential to find out the socio-economic, technical, organizational or other factors which hamper the scheme to exhibit a satisfactory picture. At the same time it is also important to initiate corrective measures accordingly.

Information on techno-socio-economic framework of the fish farmers forms a good base for planning and development of this economically backward sector. Lack of adequate and authentic data on socio-economic conditions of the target population is one of the serious impediments in the successful implementation of developmental programmes. There is an immense scope of promoting fish farming technology in the district by utilizing the available resources for attaining sustainable production. Although the technology in practice is both in traditional and scientific systems, no information is available on the extent of farmer's knowledge and adoption of this technology and their economic feasibility. Keeping this in view an empirical research study entitled "Techno-socio-economic evaluation and problems of fishermen from Latur district" was conducted during 2008 - 2010.

Fish farming system adopted by the farmers in the study area were extensive and fish farming in large tanks/ponds fish farming co-operative societies. On an average 20 per cent respondents adopted the extensive fish farming. The average size
of the fishpond under this system was 0.1 to 1.0 ha. The main inputs used in this farming system were fish seed without any management practice. They used lime much lower than the recommended dose where as they stocked fish in higher density. The fish production obtained was 805 kg ha$^{-1}$ yr$^{-1}$. As a whole 75 per cent of the farmers adopted farming in large tanks. Under this type of fish farming, the average size of fishpond used by the farmers was 1 to 200 ha. The main inputs used were labour and fish seed without any management practice. The fish production obtained from this type of fish culture was 485 kg ha$^{-1}$ yr$^{-1}$.

In all the above farming systems farmers didn't maintain the recommended package of practices. The Indian Major Carp (IMC) remained the mainstay of stocking species. In addition to that they also stocked Chinese carps, and common carp.

On an average farmers earned a net profit of Rs.15350.00 in 0.16 hectare under extensive fish farming where as under large size ponds/tanks the net profit obtained was Rs.8296.00. The cost of fish production in extensive and size ponds/tanks were Rs. 10.5 and Rs. 11.4 respectively.

The farmers are also categorized on the basis of the fish species cultured. The majority of the farmers adopted composite fish culture (IMG and exotic carps).

As the district has immense potential for integrated fish farming, but due to lack of knowledge and culture technology fish farmer did not practice integrated fish farming.

The inputs used for fish farming in the study region like fish seed and labour were considered to have significant effect on fish production.

From the above it can be concluded that the present fish production was very much lower than the National fish production level. Factors which were responsible for such lower production are.

a. **Seed** – The stocking density used in study area was much lower than the recommended stocking density. Reason behind this was, non availability of required quantity of fish seed also when the tank over flows due to the heavy rain the seed along with water flows out which decrease the stocking density.
b. **Labour** – Labour charges was very high, which increases the operational cost. Pouching was the major problem faced by the fish farmers. To prevent pouching extra labour charges have to paid, which increases the total cost of fish production. Due to large size of the ponds/tanks, harvesting becomes difficult. Harvesting operation is carried on contract basis. Farmers have to pay half amount to the harvesting labour from the total amount of catch. On an average labour for harvesting operation shared 68.9 per cent of the total operational cost. Because of which cost of production increases and ultimately net profit decreases.

The two marketing systems prevailing in the study area are fresh fish marketing, dried fish marketing. In fresh fish marketing demand is maximum for cat fishes, Indian Major carps followed by exotic varieties of carp. Dried fish marketing comprises all marine fish varieties viz. Bombay duck, mackrel, asetus etc. There was no any cold storage facility were present in the study area. Drying of fresh water fish is not practiced due to lack of skilled workers. Marketing of fresh fish was done by two methods one was by auction method other was by contract system, so fish farmers were not getting there full returns.

Majority of the respondents (83.75%) had family members more than four. The caste pattern of the respondents reveals that OBC ST and SC altogether constituted major proportion (47.5%) of the respondents practiced fish culture. As government has provided financial assistant through various schemes for upliftment of these categories people to gear up fish farming. On an average 20.41 per cent of the respondents in the study area of Ahmadpur and Latur districts were living in huts, whereas 50.41 per cent and 28.75 per cent were living in kutcha and pucca houses respectively. Majority of the respondents (70%) were literate. Majority of the respondents are living in Kutcha houses which represents their backwardness. Literacy rate of the respondents is (70%) more than the illiterate. Among the literates (42.9%) majority of the respondents educated up to high school level. As literacy rate of the respondents was more but rate the adoption of the technology about fish culture practice was lower so they were lacking behind in increasing fish production.
Major occupation of 57 percent of respondents was agriculture followed by fishery (17.4%), business (16.2%) and government service (9.1%). This reveals that major portion of the land was used for agriculture purpose and less for fish culture purpose. As people are not mentally prepared to convert agriculture land in to fish ponds due to scarcity of required amount of water for fish culture. Analysis of the socio-economic profile of the respondents revealed that majority of the respondents (65.8%) had 8-16 years of experience of fish farming in their own way.

About 25.4 per cent had annual family income in the range of Rs.30,000-40,000. The average annual expenditure of a fish farmer household worked out at Rs.27,000 and Rs.32,000 in Ahmadpur and Latur blocks respectively. This low level of income and high level of expenditure on food alone reflects their poor economic condition which was not sufficient to maintain their normal livelihood. They cant afforded much for fish culture actives.

Fish farmers got information for fish-culture from vendors, fisheries extension personnel, radio, TV and newspaper. The problems for adopting scientific fish culture practices for more than fifteen (15) per cent respondents were lack of finance, lack of extension service and lack of timely availability of quality fish seed, fish disease and non-availability of medicine and treatment measures.

The studies on participation of women in fisheries indicated that very few women population is engaged in fishery’s activities majority of the women participated in agriculture activities this was due to the difference daily wages, as they were gating more money than fisheries. Their socio-economic studies revealed a majority of them were illiterate and were living in kutcha house. About fifteen (15) per cent of the women had annual family income less than Rs. 50,000.00.

Most of the respondents of both the districts had medium to low knowledge about fish culture. Almost all the respondents had correct knowledge about selection of species, type of fish feed, harvesting method and marketable size of fish. However, they lacked exact information on some important aspects of composite fish culture like recommended dose of lime, organic manure, inorganic fertilizer and fish seed, stocking density, ratio, time interval of using these inputs and controlling measure of diseases.
Majority of the respondents (77.5%) were medium category adopters. While 17.4 percent and 16.6 percent of then belonged to low and high adoption categories respectively.

The adoption of fish culture practice by the respondents was positively and significantly co-related to the knowledge level of respondents. Total family income and experience were positively and significantly correlated to the adoption of fish culture by the respondents of both the district, whereas age was negatively and significantly correlated to the adoption of fish culture. The independent variables like social participation, size of pond, total family expenditure, and education had no significant relationship with adoption.

Since there are significant differences in the adoption level of fish farming practices in the two districts, the first hypothesis that there is no significant difference in the level of adoption among the fish farmers of the two districts is found to be not correct. However the farmers are very much conscious about cost reduction and profit maximization in fish farming practices in the two districts and hence the second hypothesis that the farmers are very much conscious about cost reduction and profit maximization in fish farming practices is found to be correct.
SUGGESTIONS

The fish pond size of 0.5 to 1 ha is found to be more profitable as compared to the bigger size of ponds. The unit cost of fish production in smaller size pond is lower than that of bigger size ponds. Fish culture in this small size fishpond can be operated with the available family labour without using hired labour so that it can be a family enterprise. This will help to solve the increasing unemployment problems in the State.

Excellent opportunity exists for stepping up of rural economy in the State through development of small-scale fish culture enterprises. Most of the ponds, centered and scattered in the hinterland of the State should be used for aquaculture purpose.

Farmers are advised to go for semi-intensive farming system since cost of fish production per kilogram is less and profit is high in such type of farming. Even in semi-intensive farming system the inputs are currently not used to the required level for maximizing profit. Profit can be increased by increasing the inputs like lime, cow dung, inorganic fertilizer and feed. The locally available inputs like cow dung, rice bran are to be used optimally to reduce the cost of production.

Profitability in Indian major carp and composite fish culture systems are more or less same indicating farmers can adopt these species specific farming systems according to their convenience.

Pig-cum-fish culture even though is more profitable as compared to paddy-cum-fish culture is having its own limitations such as religious taboo and location specific restrictions for its widespread adoptions. It is ideal only in certain areas where there are no such restrictions.

Labour and fish seed are overused mainly because of easy availability of seed at a comparatively lesser cost and excess use of family labour. The disguised unemployment is highly prevalent. Even if some labour are removed or even mandays are reduced, level of production will not be effected. Stocking density of fish seed should be considerably reduced to increase
profit. But other input feed can be increased from the average level for maximizing profit.

- The cost of production would be lower if larger fingerlings are used instead of small fry. Since mechanization has not yet been developed to replace intensive use of labour, labour cost forms one of the major expenses of aquaculture. Efficient management and use of labour are essential in reducing the cost of production.

- Some efforts should be put to produce fish seed of air-breathing fish as it has high market demand. There should be some legislation to sell fingerlings of standard size and permitted species only. Total ban on undesirable species like Clams gariepinus (Thai magur) and production cum distribution of uneconomic species is important. Easy, availability of large quantity of fish seeds of different varieties would bring down seed prices and reduce pressure on natural seed resources and improve natural fauna.

- Necessary steps have to be taken to motivate farmers to invest more for fish farming through technological and financial aid. An appreciable change in aquaculture methodologies in the form of species and input use pattern is the need of the hour to increase fish production.

- In Latur district, fish marketing system is in a primitive stage. With the advent of aquaculture in the region it is highly essential to provide better marketing infrastructure to facilitate the fish farmers to get a remunerative price. At present the farmers find it difficult to dispose their product at the farm gate so that they loose their bargaining capacity. It is suggested that the fish farmers co-operative society for both input and output marketing can be formed under the initiative of Fish Farmers Development Agency.

- Based on the knowledge level studies, the extension personnel should identify farmers of low level knowledge and necessary training facilities should be extended to them. At the same time it is also essential to find out low and high level adopters and steps should be taken to update their farming practices.

- A positive and significant relation between level of knowledge and extent of adoption shown in the present study reveals that efforts to improve
knowledge level of farmers about fish culture would help in increasing their adoption of this technology. The present study identifies the level of knowledge and adoption behavior. The extension agencies (State Departments) may take plan and implement suitable strategies through training programme, demonstration, exhibition and distribution of extension literature to update their knowledge.

- It is found that lack of trained extension personnel and adequate extension service, inadequate finance, non-availability of quality fish seed, fish disease like EUS, non-availability of medicines are the major constraints for the farmers to adopt scientific fish culture. Due attention should be given by State Fisheries Department and Fish Farmers Development solve these problems of the farmers.

- Emphasis should be given for community fish farming practice. Community based aquaculture schemes have the potential to reach many small-scale producers, including women. Planned intervention, however, is required to help the poor share the benefits of aquaculture technology more equitably.

- A direct linkage between fish farmers and fisheries specialist / scientist is required to be developed. At the same time a system has to be evolved to facilitate constant interaction between extension personnel and the scientists to refine the technology available to the farmers based on their feedback knowledge. Problems faced by the farmers have to be sorted out and their solutions should be found out in their field condition. A need based extension programme for speedy dispersion of the technology in the rural areas in the need of the hour.

- Although training programmes are organized by State Fisheries Departments and FFDA, their frequency and coverage is very less. Since training is the most preferred and credible source of fisheries information, short duration training programme on general aspects of fish farming should be organized to cover large number of people. Standardized, location-specific practice with more practical orientation should be introduced in these time bound training programmes with specific prescribed inputs. The contents of
the programme should be of authentic one rather than on activity to fix up the number.

- Farmers mostly use rice bran and oil cake and the quantity used depends upon the availability of these inputs and their price. There is not even a single feed plant existing in the study area. So to encourage fish farming practices provision should be made to supply feeds at subsidized rate. The Govt. may arrange supply of feeds on credit basis which may be realized after harvest. At the same time the govt. may take necessary steps for establishment of feed plants to make up the shortage in the supply of feeds,

- Necessary steps for conducting demonstration programmes regarding the use of various instruments to check desirable water quality parameters would help in the adoption of the modem scientific technologies of pisciculture. The government should arrange mobile laboratory units for testing of soil and water at regular intervals.

- Adequate preventive measures on control of disease should be made available to the farmers. They should be trained properly to avoid the disease situation and also to get healthy stock. The State Fisheries Departments should open a publicity wing to make the farmers aware of various available disease controlling measures.

- Paddy-cum-fish culture / pig-cum-fish culture / duck-cum-fish culture can be adopted in potential areas. Such potential areas should be identified and policy should be formulated to adopt the culture technology by creating the necessary infrastructure.

- The prevailing system of institutional financing in the State is not encouraging the fish farmers with their cumbersome and lengthy process to extend financial support. Due to the complexity and delay of the process most of the farmers don't feel to approach the banks. The loan sanctioning procedures should be made simple and easy and the time lags should be minimized. The amount of loan with subsidy should meet their entire requirement for operation of the practice. The bank can also play important role in propagating the fish culture practices in rural areas. The insurance coverage is very essential for the protection of their crop against probable natural calamities.