Chapter - II

REVIEW OF LITERATURE
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In this chapter there are three sections in which some of the relevant reviewed research have been summarized under the following heads.

1. Production aspects.
2. Marketing aspects.
3. Constraints aspects.

1. Production aspects:

Singh R and Singh I.J. (1991) - The process of taking out of fishes from the pond as a great importance in the aquaculture. The success or failure of the fish development is solely dependent upon this process. In the case in any water area where the fishes are been kept in case there population increases in proportion to the expenditure of three up keep and fish culture, it is desirable that the excess fishes should be taken out. The rate of increase in number of the fishes depends upon the favourable condition of the water of the ponds for the fish development. However this rate can only be increased up to fixed limit. In respective of this availability of fertilizer or organic manure.

Singh I.J. and Khan, S (1991)- Discuss in their paper, silver carp, and Gross carp, normally take two years to attains maturity for breeding purposes, though some profess have came to light where this fishes headatain maturity for breeding within age of one year. The weight of silver carp and gross carp becomes from 2.5 to 5 kg and from 2 to 4 kg in the age of two years. The male fishes attain maturity little a time as compared to the female fishes.
Singh S.K., Pathak M.P. and Tiwari, P.P. (1991): Discuss in their article, to get the maximum benefit the farmer should play special attain to the following precautions.

(1) The dept. of water in the pond should always kept at the level of 1 to 1.25 mt.

(2) Do not show singhara in the ponds.

(3) To prevent the water from either over flowing or coming over the ponds in the ponds.

Singh, I.J. and Khan, S. (1991) in his paper discusses to prepare self the common carp for the fishes after the selection of male and female breeder fishes the hatching, pond should be finalized according to the area proporsionate.

Swami K. Alagra Currently about 65000 ha. of brackish water area is under aquaculture in India of which over 52000 ha. are under traditional farming practices in west Bengal, Kerla, Karnataka, and Goa. The average production rate in this system is about 1450 kg/ha./year.

Tripathi, S.D. (1991) in his paper discusses plankton production in ponds fertilized with raw cow dung. The percentage increase in the growth of C. Carpio was 182 in biogas slurry as against 57 in dung. This was being tested in two ponds match (Distt. Howarah.) In 90 days Catla had grown from 20 to 550 gms silver carp from 0.75 to 500gm, rohu from 20 to 350 gms. mrigal from 20 to 310 gms and common carp from 5 to 200 when stocked at a combined density of 7, 500 Fingerlings. /Ha.

(12)
According to M. Sabthivel (1994) India is known today fresh
water fish production of carps such as Catla, Rohu, mrigal and the
canmon carp. There are negligence, quantity is exported to west asia
and U.K. The over seas market for carps is limited export potential of
these varieties such as the carry fish brown the varieties is estimated at
500 million a year.

The diversified fishing, products and markets are buzz words in
India fishery, Tuna and cephaloponds have been identified as potential
exports. The world market for Tuna n 16, 73081 to worth $ 3.677
million. The world market for cepholopods is 6, 7384 T worth $ 1771
million. Both the tune and Cephalopods markets are exported to grow
rapidly.

S.K. Sarkar (1996) Application of Nitrogen at the rate of 40
kg/ha. (obtained from calcium ammonium nitrate) exhibited belt
serviced growth and faccadity of fish in pond. At different rate of
nitrogen (20, 40, 80, 60, 32 kg/ha) dissolved oxygen ammonium
nitrate, nitrogen phosphate productivity of water available nitrogen
available phosphorus.

Singh S.K. (1995) The study concluded that large farmers in
Jaunpur district invest more on fish seeds transportation, organic
fertilizers, watering hence their yield is also high as compared to other
categories. But their total cost does not increase much through their
investment in the above mentioned items. There is an account of the
lesser amount that spend on watering, labour charge etc. While their
total area remains high. The producer share in consumer rupee for
small and medium farmers are 100 percent where as in the cost of large
farmers, it comes to 68.93%. the middlemen's margin in about 28
percent and the marketing cost about 3.27 percent of the consumers purchase price. The total marketing cost is observed Rs. 96.50 per quintal out of which about 50 percent i.e. Rs. 44.50 is paid by producer itself. The large farmers are getting higher returns followed by small and medium farmers. However, small farmer's yield remaining the least as compared to other two categories but they get higher returns than the medium farmers. This happened so because they are getting higher price at the ponds and in local mandies.

V.R.P. Sinha (1995) To support sustainable development research efforts need to be directed as properly using the primary productivity of the ponds with proper water and soil quality control.

Fish production has increased from 28.01 Lakh tones in 1984-85 to 46.8 Lakh tones in 1993-94 27 Lakh tones from marine and 20 lakh tones of Inland water's the combined growth rate was about 6% made up of 5.5% in marine and 6.8% in land sector.

Ravikant (1996). The result of study is based on eleven fish bonds belonging to small farmers in Azamgarh district. The other has worked out the economics of production and marketing of inland fish. The total cost of an own fish pond was worked out Rs. 20169. The average yield of fish per acre was recorded to be 24.60 quintals.

M. Sadhana and B-Neelakantan (1996) Keeping the lipid vitamin and mineral content and constant in the diets of Ju vemile peneaus merguiensis the effect of dietary protein level on growth was studied. The growth of shrimps increased with increased in dietary protein level from 34.5 to 42 percent (P>0.05) and it declined with further increase indicatory protein. Food conversion was relatively less efficient in shrimps feed diet above 42% protein level.
A.C. Pandey and M.K. Sharma (1997) An analysis of the Valued of relative condition factor (Kn) of the individual specimens of grass carps. Scale carps big head and silver carp grown in the highly sodic soil conditions (PH 0.08 Ec 0.33 organic carbon 0.20%) showed that the growth was best (Kn more than 1 to 60% individual in the case of grass carp.

Kathia, Pradeep et. al. (1998) The fish marketing institutions in inland fisheries are very few and their performance has been appraised and compared with the other marketing agencies. The present study concentrates on one such institution in the state of Himanchal Pradesh, namely "the gobind Sagar fisheries co-operative marketing and supply federation ltd. Bilaspur." Constuted in 1976 under the revised reservoirs fishery policy to procure and market the fish catch from Gobind Sagar or Bhaakra Dam to different fish markets in country. The major objective of the paper are to study fish marketing channel; evaluate the price spread for various marketing channals at different markets and seasons. Compare the performance of marketing institution (cooperative marketing Federation) with other non-institutional market functionaries (contractors) and appraise their marketing efficiency out of the fish catch of Gobind Sagar procured only by the institution under study, 65 percent was disposed off by the federation itself and the remaining 35 percent was handed over to the contractors. Most of the catch was sold either at Bilaspur and UNO fist markets in Himanchal Pradesh or at Delhi market outside the state. For local disposal, two marketing channels observed were fisherman federation-consumer and fisherman -federation-contractor-consumer. Based on the appraisal of working and organization set up of the
federation measures have been suggested to improve upon the functioning and efficiency of this first marketing institution.

According to Debutt Behura and Durgacharan Pradhan (1998), more fish production in Orissa has increased significantly. They are from 38.70 thousand tones in 1980-81 to 133.46 thousand tones during 1996-97. The existing marketing structures do not favour the food fisheries of the state and both the fisherman and consumers have not benefited. In this study, an attempt has been made to find out whether marine fish markets in the state are integrated to bring about efficiency in the marketing system.

A study by S.S. Walia and Balbir Singh (1999) aims at selecting the suitable time series pre-cast model for marine fish catch. In this study, forecast mode is based on moving averages and exponential smoothing have been applied to the pooled over marine fish catch data of Eastern as well as Western states of India. It has been found that 'Winter's model based on exponential smoothing is the most suitable for precasting seasonal of annual marine fish catch in India.

A.K. Gupta and S. Hussain (2000) conducted an investigation. In the present investigation, dietary requirement of Vitamin-E for the fingerlings of C. Catla was evaluated considering various parameters. Significant absolute growth SGR and FCE for the fingerlings were observed to range 20-40 mg Vitamin-E/Kg of diet. The relative efficiency of various levels of dietary Vitamin E on growth, SGR and FCE for the fingerlings was estimated as 20<40<80<10<100<000 (Control) mg/kg diet. The Vitamin E deficiency symptoms observed in the fingerlings were poor growth and low conversion efficiency. Low PPV and FCE anaemia as cited and muscular dystrophy.
CIFRI (2000) The ecological investigations indicated low to medium production potentiality of the Thurimoverthy reservoir, the fish yield could be substantially increased by the scientific techniques adopted by CIFRI in this reservoir since 1991. The fish yield increased steadily from 1991 onward and reached an all time record of 49.9 t (213.4 Kg ha⁻¹) in 1996–97. The stocked species formed the major fishery (88.5–96.4%) of the reservoir. C. Catla and C. Carpio stocked at a higher rate were the maximum contributors.

CIFRI (2000) the investigation conducted by CIFRI has shown the yield potential of Markonahalli reservoir at 160 kg ha⁻¹ for FRL area. The fish yield has touched 75 Kg ha⁻¹ in 1993-94 from the earlier level of 5.5 kg ha⁻¹ with stocking support of only Catla and Rohu in 1991. The potential yield can be achieved with sustained stocking @ 400 ha⁻¹ and utilization of the aquatic vegetation by addition of fishes like P. Pulchellus.

CIFRI (2000) investigations calculated the stocking rate at 500 fingerlings ha⁻¹ presuming a yield potential of approx 200 kg ha⁻¹. In 1977-78, 75 800 fingerlings were stocked which resulted in a yield of 15.15t. This along with the residual stock netted out during the year amounted to 22t i.e., 150 Kg ha⁻¹ considering that the total catch from the gulariya reservoir ranged from 0.076 to 8t during 1971-72 to 1976-77, there has been a three fold hike in the production rate after introducing the new management package.

CIFRI (2000) The first yield potential of the bacchro reservoir was calculated as 240 Kg ha⁻¹ @ 1.2% of the primary, production against which an actual yield of 139 kg ha⁻¹(100) was obtained in 1988. Mrigal and Calbasu formed 29.54% and 31.87% of the catch.
respectively. this higher yield obtained in 1988 is the result of the scientific methods as advocated by CIFRI Viz, optimum stocking density and maintenance of rational stocking and harvesting schedule.

CIFRI (2000) studied the productive potential of the yerrakalvo reservoir was estimated at 87 kg ha\(^{-1}\). As a result of the management policy of CIFRI which advocated stocking of major carps, catla and Rohu the impact has been felt on the productivity of the reservoir. The fish yield during 1998-99 has been estimated at 89.5 kg ha\(^{-1}\) during 1994-95. The impact of stocking about 4 lakhs of catla and 2.7 lakhs of Rohu is clearly seen in the enhanced yield of these species, which were not represented earlier in the catch.

CIFRI (2000). Various estimates of the first production potential of the Govindgarh reservoir is estimated at 220.5 kg ha\(^{-1}\) and the actual yield obtained is 59.64 kg ha\(^{-1}\). There is need to increase the stocking rate from the present level to enhance productivity. Moreover, the stocking and harvesting schedule needs to be evolved, allowing the stocked fish to grow for a maximum period of time during non-overflow months.

CIFRI (2000) the kulgarhi is the first reservoir in India where H. molitrix was first introduced on experimental basis. The growth rate registered by recovered silver carp was remarkable. The fastest being 404 mm in 293 days, though on evaluation of growth performance of catla and silver carp it showed silver carp negatively affected growth of catla in the reservoir.

Singh A.K. et al (2000-01) Conducted a project on ecology and fisheries of eastern Uttar Pradesh. The percentage of sand was found to be maximum (93.96%) in Mushakhar reservoir whereas it was
minimum (60-66%) in Sirsi reservoir with higher value of silt (23%) and clay (17%). There was high content of organic carbon (1.54-1.63%) in Khajuri reservoir where as its presence was poor (0.065 to 0.072) in Mushakhar reservoir and moderate in Ahirora (0.45-0.53%, Jirgo (0.42%) and Latifshah (0.45-0.48%). High level of calcium as calcium carbonate (3%) was found in Latifshah. Available phosphorus and sp. conductance varied from 4.53 to 7.8 mg/100 g and 133.0 to 211.0 umhos/cm, respectively.

Bhaumik Utpal et al (2003) conducted study on ecology of three reservoirs and its impact on enhancing fish production. The investigation confirmed that the production enhancements of small reservoirs are possible with proper management through stocking with Quality fish seed.

**River:**

Mukharjee G.N. at al (1983) presented paper on segregation of spawn in the tail pieces, while the shooting nets were in operation, was attempted this year with tail pieces of different mesh sizes. After analyzing the spawn samples in different tail pieces, it was observed that the percentage of desirable spawn varied. The hatching retained in 1/18" 1/20" 1/24 1/28 and 1/32" meshed cloth were estimated at 84.0%, 78.0% 40% 6.0% and 4.0% respectively. It is interesting to note that these figures are, to a great extent, in conformity with the experiments conducted by concentric sieves. About 200 ml (c.1.0 lakh hatchings) of spawn, collected from river Yamuna, was released in recirculatory filtering system pond. The stock was fed with twice the weight of the hatchling till 10th day and thrice the weight for subsequent three months. The feed comprised rice brain and
groundnut, oil cake in the ratio of 1:1. The raised fingerlings will be stocked in Bachchara reservoir.

Gupta R.A. et al. (1983) studied the fish landing from different centres in the middle and lower stretches of river Ganga during this year showed a marginal decline Sadapur and Bhagalpur whereas, Daraganj and Lalgola landings increased. The catches at saidapur were dominated by major carps over catfishes and the average major carp/catfish ratio was estimated at 1.93 over the lot three years with minor fluctuations. The catches at Daraganj were dominated by catfishes. This clearly indicated that the stock abundance in river ganga is dominated by catfishes whereas, in river Yamuna, it is the major carps.

Chandra Ravish et al (1989-90) estimated market arrival of hilsa at Allahabad during the period under report was 724.40 kg. at Sadiapur, hilsa landings during the peak months Viz; September, October and November were 4.75 Kg, 369.87 Kg and 66.64 kg, respectively, as against 200.44 kg, 475.00 kg and 189.19 kg during the some months of 1988. In Daraganj, hilsa catch was estimated at 110, 44 kg, 54.25 kg and 164.25 kg during October, November, December and January respectively in 1988-89 while in 89-90 the landing figures were 188.01 kg, 13.50 kg, 3.10 kg and nill during October, November, December and January respectively. Patna centre contributed only 0.03 t of hilsa, in contrast to 0.11 during 1998.89.

Rao Y. Rama, Ravish Chandra et al (1991) explained the factors relating to decline in fishery of river ganga and Yamunna. A total of 970.62 kg of hilsa was estimated to have landed during april 1991 to march 1992 of this 785.98 kg was from Sadipur and 194.64 kg from
daraganj. The fishery of hilsa which maintained a steady trend of revival during 1984-87 showed decline from 1988, but registered sudden rise during 91-92 with a raise of nearly 60% over that of last year. The catch was recorded during all the three peak months of September, October and November and continued till march 92.

Rudrakant Chaudhary, P. Bisen, N.K. Reghuwanshi and S. Bakshi (2004) Inland fisheries has a significant impact on the socio-economic development of poorest segment of the society. The state of Madhya Pradesh has a vast potential for inland fisheries, both culture and capture. The major contribution to the total fish production in the state is from village ponds aquaculture and hence an attempt was made to assess the profitability of pond fish culture in one of the prominent pond fish culture area of the state. For the purpose of present investigation Waraseoni block, from Balaghat district of Madhya Pradesh having maximum number of ponds were selected purposively. The 15 ponds from each size group, i.e. small (upto 1 ha.), medium (1-2 ha.) and large (above-2 ha) were selected randomly. Primary data were collected through survey method. The analysis of data shows that the total cost of pond was Rs. 10,594.55/ha. of which variable and fixed cost accounted for 85 and 15 per cent respectively. The variable, fixed and total cost were inversely related with pond size showing scale economics in pond fish culture. Net returns also showed a similar relationship mainly due to higher cost of production in case of small ponds as compared to medium and large ponds. On an average net return was Rs. 33,611.86 per ha. of pond size. The cost-benefit ratio was 4.17 and it was directly related with ponds size. The study
concluded fish production is profitable in the study area especially for the weaker sections.

Amit Kar and Shiv Kumar (2004)- India ranks second in inland fish production among the major fish producing countries of the world with approximately 10 per cent of the total inland fish production. The paper attempts to examine the potential, identify the constraints and suggest possible solutions with respect to inland fish production in West Bengal. For the purpose a study was conducted on culture fisheries in few blocks of Midnapore district of West Bengal to study the economics of fish cultivation. It was observed that pisciculture general and West Bengal in particular is an economically viable activity to augment the income of the rural people and improve their nutrition. It was found that nearly Rs. 22,227 per hectare can be earned from fishery in the state of West Bengal. The profit level can be increased manifold by modernization of fish farming. However there exist many constraints such as (a) It involves huge investment which is not often feasible by the marginal and small farmers, (b) Risk of failure is very high. Risk is mainly because of capture of fishes from the ponds during night hours by others and poisoning of ponds with bottle of insecticides, (c) Non-availability of good quality of fish fingerlings, (d) Transportation of fingerlings to distant place is difficult, as aeration of the water for fingerlings are done in a traditional way, (e) Pond water is mostly acidic due to acidic soil of the region, (f) Fish farmers have to sell their produce to local middle man at nearly half the rate. The study suggests for provision of adequate credit for fish farmers, establishing marketing co-operative societies, soil and water
conservation facilities and provision of subsidies to marginal and small farmers for augmenting inland fish production.

A.R. Verma (2004) An attempt has been made in this paper to examine the growth and constraints of fish production in India for the period 1980-81 to 2001-02. The secondary data were collected from various sources like Agricultural Statistics at a Glance and Survey of Indian Agriculture, etc. The All-India compound growth rates of marine, inland and total fish production were calculated for the three periods, viz, period I: 1980-81 to 1990-91; period II: 1991-92 to 2001-02 and overall period III: 1980-81 to 2001-02. The growth behaviour was analysed with the help of exponential function $Y = a \cdot b^x$ using least square method. The trend analysis indicates that the marine fish production increased at the rate of 0.7734 million tonnes, 0.3093 million tonnes and 0.8148 million tonnes per year, in period I, II and III respectively. The inland fish production from period I, II and III increased at the rate of 0.6178 million tonnes, 1.4001 million tonnes and 1.0679 million tonnes per year, respectively. The compound annual growth rate of marine fish production indicated that fish production during period I, II and III increased at the rate of 1.85 per cent, 0.50 per cent and 1.67 per cent per annum respectively which was found positive and statistically significant.

However, the sector is beset with problems like improper storage, preservation and prompt disposal or transport services. This is particularly acute during the monsoon, when up to 30 per cent of the catch would be lost. Therefore, strengthening of post-harvest infrastructure such as storage facilities, ice plants, cold chains, roads and transportation, etc. as well as effective marketing system in...
identified areas are the key requirement for the development of this sector. Most fishing harbours in the country are not properly maintained, due to lack of management and inadequate revenue collections. After the harbours are commissioned, the responsibility of maintenance and management is vested with the user agencies. The study suggests that there is a need to improve the accessibility of poor fish farmers to institutions dealing with inputs like fertilizers, supplementary feeds, fingerings, and credit. The operation of fish farmers development agencies in different states/districts for the last two decades did not make much dent on improving fish production.

S.B. Naahatkar, H.O. Sharma and R.F. Ahirwar (2004) In this paper an attempt was made to focus on the present scenario and existing potential of fisheries production in different agro-climatic zones of the state of Madhya Pradesh and to project the potential of fish production on the basis of average productivity of the pond fish culture in country. For the purpose information on area under water bodies and fish production for different districts of the state were collected from Department of Fisheries, Government of Madhya Pradesh for the year 2003-04. The time series data for the state as a whole on fish production were collected for the period of 1961-62 to 2003-04 to work out the growth rates of fish production in the state at different points of time. The results of the study indicated that the overall growth of fisheries sector in the State was high at about 7.97 per cent. The total fish production in the state in 2003-04 was about 51 thousand tonnes, and water bodies (ponds) and tanks were the major source of fisheries production in the State. This accounts for 93 per cent of the total fish production in the State. However, the average
productivity was much below (1139 kg/ha/yr) as compared to national average of 2200 kg/ha/yr under ponds culture, thus revealing that the production of fish can be doubled with existing water resource through increasing productivity. It is observed that the productivity of fish and size of water bodies were inversely related which reveals that with increase in the size of water ponds productivity of inland fisheries per unit of area decreases. At present fish production and future potential exists for the agro climatic zone having high rainfall. In rural areas the highest productivity of fish was noted for water bodies possessed by rural institutions like the Gram Panchayat. Among the different agro climatic zones, Bundelkhand zone was having highest productivity, which was at per with natural productivity. The productivity of rural ponds and water bodies were found to be higher than productivity of irrigation tanks. For exploitation of existing potential of fish production in the State, the efforts are needed for proper management of water resources, supply of quantity seed, strengthening existing Chainese hatcheries and establishment of new hatcheries for fish seed production in the potential area; regulation of fishing efforts, strict informers of closed season and rejuvenation of endangered fish species through stocking programme, etc.

Mahesh Singh and Mangal Prasad (2004) The study focuses on the constraints of fish production in Utter Pradesh. Utter Pradesh rank fourth in fish production in India. It has vast water reservoirs in the form of rivers, lakes and made reservoirs and ponds. The utilization of compound water resource is 2.3 lakhs ha. which is only about 54 percent. The fish production can be doubled if the water resources are utilized to the maximum extent. The total fish production at present
from all water resources is 2.25 lakh tonnes in the state. It is evident from the study that absence of modernized hatcheries, unorganized marketing, poor infrastructural facilities and networking, improper marketing channels, poor cold chain maintenance facilities, inadequate transporting facilities, old leasing policy of reservoirs and multiple ownership reservoirs are the major constraints hampering the production and productivity of fish in the state.

Some of the measures suggested including proper extension education regarding fish production like agriculture and horticulture, co-ordination between researchers, line departments, concerting conserving industries and farmers, prioritising research and development areas in Uttar Pradesh, where is aquaculture in the most important area requiring immediate attention in state. The priority areas in the order of merit are fresh water gaint prawan, fresh water pearl and mussel culture, aire weathering fish culture, meagur integrated fish culture and saline water fish culture. At the same time industrial, agriculture and domestic pollutions should be controlled to protect and safeguard precious fish germplasms in Ganga, Jamuna, Gomti and other rivers system of the state.

D. Bharti, Ashwani Kumar, L.S. Gangwar and Dilip Jain (2004) The paper attempts to highlight the importance of fishery sector in India, in view of its infrastructure, production and export performance in the last four decades and it suggested measures for improvement. The study is the best on secondary sources of data. The country has witnessed tremendous growth performance in fishery sector in total fish production and fishery export earning. In India total fish production increased from a mere 7.52 lakh tonnes in 1950-51 to
56.56 lakh tonnes in 2000-01. Export of fish and fish products has increased considerably to an all time high both in volume and value in 2000-01 to reach at 5.03 lakh tonnes and Rs. 6,367 crores respectively. In 2000-01, the share of fishery export in the country's total export and agricultural export earning were 3.09 per cent and 23.30 per cent respectively. India's share in world export of fishery sector has been recorded at 2.5 per cent in 1998. Thus, fishery in India has emerged as a giant industry, which has tremendous potential for growth, income and employment. For policy measures the following aspects are considered as the critical areas that need special attention. They are investment in mass education and training build awareness, knowledge, skill and attitude of all people involved in aquaculture activity; improving information flow and alleviating poverty; improving environment sustainability and integrating aquaculture into rural development; strengthening institutional support for education, training, extension service involving government, private sector and NGO's; applying innovations in aquaculture improving culture-based fisheries and enhancement; aquatic health management to reduce losses; improving nutrition in aquaculture; applying genetics and biotechnology aspects in aquaculture; promoting market development and trade tactics of value added hygienic products; reducing trade barriers and supporting strong regional and inter-regional co-operation.

S.K. Srivastava (2004) The paper attempts to examine the temporal production (since 1950-51) and export of fish along with recent contribution of different states and Union Territories to national fish production. Besides the use of descriptive statistics, trend coefficient were also estimated to analyze the annual growth in fishery
production from 1980-91 to 2001-02 and export from 1990-91 to 2002-03. The trend analysis indicated that marine as well as inland fish production in India is significantly grooving over time, though, it is not fully exploited. Comparatively higher growth of inland fish production indicates that fish culture is being considered as promising income and employment generating vocation in India. A significant increase in the marine export form 1990-91 onwards reflects competence in the world market which is quite favorable for the country in generating income and foreign exchange as well.

Brahm Prakash and Dinesh Kumar Sharma (2004) An attempt is made to study the trends in production, consumption and international trade in fisheries in India. The study also deals with the Impact of World Trade Organisation (WTO) on the trade of fisheries. The paper is based on the secondary data. The share of India in global fish production has increased gradually from 2.6 per cent in 1960s to 4.5 per cent in 2001-02. fisheries sector contributes 1.4 per cent to the grass domestic product of the country whereas earnings though export of fisheries produced touched a level of Rs. 6,443 crores. India has the distinction of being sixth largest produced of fish in the world and second largest producer of inland fish. In has recorded and average annual growth rate of 4.58 per cent during last two decades of eighties and mine ties. Production of marine and inland fish recorded 435 and 1, 334 per cent increase during paste five decades while total production of fish in the country has recorded 696 per cent during the period. Gujrat, Kerala, Maharashtra, Tamil Nadu, Andhra Pradesh, West Bengal, Karnataka and Orissa are the major marine fish producing states contributing about 93 per cent of total fish basket of the country.
Fish production in India recorded a compound growth rate of 6.69 per cent during 1960-61 and 5.7 per cent during 1970-71. Annual growth rate of fish production increased to 16.66 per cent per annum during 1989-90. Per capita consumption of fish in India is about 9kg/year for fish eating population. The share of marine products in agricultural export which was a meager as 1.76 per cent during 1960-61 increased to 25.79 per cent during 1994-95 which was later reduced to 16 per cent during 1996-97. Unit value realization of marine export has increased from Rs. 64.6 to 152.7 during 1990-91 and 1998-99. Share of fisheries sector to agricultural outlay which was 1.74 per cent during First Five Year Plan increased to 5.49 per cent during Eight Five year Plan. The important of all fish and fish products except live fish is freely allowed. The import of live fish is restricted and allowed against import license issued by DGFT only. The restriction continues even after removal of quantitative restrictions on import form April 2001. A basic customs duty of 35 per cent and 4 per cent special Additional Duty are levied on all the fish products. Fish product imports, however attract a counter veiling duty of 16 per cent. There is no WTO tariff binding for fishes, crustaceans, molluscs and other aquatic invertebrates. However duties for fats and oils of fishes are bound at 100 per cent. Duty for several prepared or preserved fish and food preparations based on these products is at 55 per cent. The study suggested strategies for enhancing production and export of fisheries products.
2 Marketing Aspects:

Sen, D. et.al. (1987) suggested improved input supply and marketing arrangement, in addition to others, for improvement in fish production in our country.

Datta, K.K. (1988) studied the role of middle man marine fish marketing process. The study revealed that 90 per cent of fishing units were compelled to sell their catch exclusively to traders to whom they were already indebted. It was also observed that there was wide variation between the landing prices and the final consumer price particularly in the case of quality fish.

Kumar, et.al. (1989) observed in his study of marketing that fishes were either (a) sold at pond site itself at the rate varying between Rs. 12.00-16.00 per kg or (b) was taken to the nearest local market and sold at rates varying between Rs. 14.00-18.00 per kg. If the scale of production was quite large, a group of fishermen came in contract with the fish at the contract rate varying between Rs, 10.00-12.00 per kg with the condition that the entire catch would be handed over to the fisherman on payment. The harvesting operation was conducted by those fishermen at their own cost. The fisherman might either (a) sold the fish in the local market at the rate varying between Rs. 14.00-18.00 per kg or (b) sold to retailer who in turn might sold the fish to the consumers. Many a times if the catch was heavy these fishermen might transport fish though railway to the distance consuming terminal points were the fish was auctioned at the rate varying between Rs. 15.00-20.00 per kg to the wholesaler. The wholesaler in turn would pass it on to the retailer at the rate varying between Rs. 20.00-2500 per kg. Fish was sold to the consumers by
these retailers at the rate ranging between Rs.25 to Rs. 30 per kg. Thus the fish farmer were getting relatively a lower price through local sale and organisations of cooperative marketing and elimination of middlemen may enable fish farmers to get better price through large-scale transportation of fish in the distant consuming markets.

Ali, M.H. (1990) concluded that a long chain of middlemen exploited the fishermen in many ways, due to which fishermen were economically weak and the majority of them lived below the poverty line. Fish catches seasonally species specific and required different nets, which fishermen generally did not possess.

Katcha; Pradeep and Chandra, R. (1990) conducted study on "Fish marketing efficiency of Allahabad fish market.". The study indicated that all the marketing system consisted of supply and demand sides, which determined the prices. In riverine fish marketing systems, fishermen constituted the supply side and wholesaler-cum commission agents and retailers formed the buyer or the demand side to establish wholesale price. The fish market was observed to possess the characteristics or perfectly competitive market, as the prices of important of or selected species of fish were closely related due to their high degree of substitution.

Khan, et. al. (1993) studied the marketing of fish in Kashmir. The authors found out four types of marketing channels: Fishermen - Consumer; Fishermen - local agent- trader- consumer; Fishermen-local agent-trader-retailer-consumer; Fishermen-local agent - trader - wholesaler - retailer. Two different species, namely, scizothorex and carp were selected for this study.
The study revealed that fisherman received the maximum remuneration as determined by sale price per kg of fish (Rs. 2.5 to 22) in various size fishes of two selected species in channel-I. In channel-II on an average, total marketing costs and margins ranged from 38.39 to 73.33 per cent in Schizothorex compared to 41.70 to 62.50 per cent in carp fish to prevailing consumer's price. The total marketing costs and margins accounted for 45.24 to 80 per cent and 50 to 70 per cent on prevailing consumer's price in Schizothorex and carp fishes, respectively, in channels-III In channel-IV, the total marketing costs and margins together ranged between 47.73 to 80 per cent in Schizothorex and 53.37 to 71.88 per cent in carp, respectively, at prevailing consumer's prices. It was concluded that, in general, the marketing margins were higher than fisherman's share in consumer's rupee increased with the increase in the size of fish, however, it was relatively high in Schizothorex in comparison to carp under all marketing channels.

Shrivastava, et al (1994) estimated the engle function for fishing and non-fishing households separately for food items and non-food items. In overall, income elasticity of expenditure for fishing huseholds was 4 and for non-fishing household .3. It is mainly because the fish farmers are belonging to lower income class characterized by a high population in family compare to non-fish farmers. This is absolutely according to theory of consumption. Further, it was also noted that elasticity for food items were of lower magnidude (.39 for fishing and .28 for non fishing) compare to non food items (.42 for fishing and .58 for non fishing households.)
Chauhan S.K. (1995) conducted a study in Gobind Sagar reservoir of Himanchal Pradesh mainly to examine the marketing margins, price-spread and marketing efficiency in the reservoirs fisheries of Himanchal Pradesh. Finding of the study reveals that fishes were sold grade wise at the fisherman level, the grade 'A' included Rohu, Catla and Singhara whereas remaining species were included in 'B' grade. The reservoir was given on lease by the state fisheries department to the fisherman for fishing under cooperative umbrella and the grade wise fish prices were settled during February-March every year. The winter prices were observed to be higher that summer season for both the grades in all the year under study because of comparatively less demand. The per cent change in fish prices over 1989-90 to 1995-96 was higher in winter that summer for both the grades. On an average the fishermen could earn substantial amount of income. The break-even fish catch was only 56.68 per cent of the actual fish catch, showing that fishing in the reservoir was viable activity.

The fish catch was marketed through the following channels.

Channel-I Fisherman - Cooperative Society - Fisheries Department - Fish Federation - Local Consumers

Channel-II Fisherman - Cooperative Society - Fisheries Department - Fish Federation - Retailer - Consumers

Channel-III Fisherman - Cooperative Society - Fisheries Department - Fish Federation - Commission agent - Retailer - Consumers

Channel-IV Fisherman - Cooperative Society - Fisheries Department - Fish Federation - Contractors/Wholesaler - Retailer - Consumers
7 per cent, 23 per cent, 53 per cent and 17 per cent of the total fish catch was marketed through channel-I, channel-II, channel-III and channel-IV respectively.

Results for the first three channels shows that fisherman's share in consumer's rupee during summer season declined from 50.75 per cent in channel-I to 41.29 per cent in channel-III. the corresponding figures for winter marketing were 52.77 and 43.12 per cent respectively. In absolute terms there was no change in the per unit price realized by the fisherman. Per unit marketing costs were also higher in channel-III due to more number of intermediaries.

**Pradeep K.Katiha, et. al. (1998)** the fish marketing institutions in inland fisheries are very few, and their performance has rarely been appraised and compared with the other marketing agencies. The present study concentrates on one such institution in the state of Himanchal Pradesh, Namely. 'The Gobind Sagar Fisheries Cooperative Marketing and Supply Federation Ltd; Bilaspur', constituted in 1976 under the revised reservoir fishery policy to procure and market the fish catch from Gobind Sagar or Bhakra Dam to different fish markets in the country. The major objectives of the paper are to study fish marketing channels; evaluate the prices spread for various marketing channels at different markets and seasons; compare the performance of marketing institution (Cooperative marketing federation) with other non institutional market functionaries (contractors) : and appraise their marketing efficiency.

Out of the fish catch of Gobind Sagar procured only by the institution under study, 65 per cent was disposed off by the federation itself, and the remaining 35 percent was handed over to the contractors.
Most of the catch was sold either at Bilaspur and Una fish markets in Himachal Pradesh or at Delhi market outside the state. For local disposal, two marketing channels observed were Fishermen Federation-Consumer, and Fishermen-Federation-Contractor-Consumer. For Delhi market, both the functionaries disposed off catch to the wholesaler-cum-commission agent. Further, it reached the consumers through retailer's. Since the fish procurement prices have been fixed in advance for summer and winter by the government, the fluctuations in consumer prices had no direct bearing on the price received by the fishermen. It indirectly influenced fixation of future prices. As an exception, the prices received by the federation were much lower in all markets for both seasons than those by the non-institutional market functionaries (contractors), due to the much better condition of the disposed fish catch of the latter. The contractors earned higher margins incurring lower cost than the co-operative federation for the same marketing operations, indicating much better operational efficiency and performance for them. The marketing efficiency indicated higher values for the channel involving more market intermediaries (including contractors). For co-operative federation, inefficient resource management resulted in lower returns at higher costs, thereby diminishing its net returns and marketing efficiency. Based on the appraisal of working and organizational setup of the federation, measures have been suggested to improve upon the functioning and efficiency of this fish marketing institution.

**J.P. Singh and Y.K. Pandey* (2004)** An attempt is made in the paper to assess the marketing margins, price spreads in different marketing channels, problems in fish farming and its marketing and
also to suggest suitable policy implications. In order to fulfill the above objectives a sample of 40 farmers were collected separately from two blocks, i.e.; Chandausi and Sambhal of Moradabad district of western Uttar Pradesh. Primary data were collected directly from the sample farmers using a restructured schedule and questionnaires pertaining to the year 1999-2000. In both the blocks three marketing channels were identified: (i) producer-consumer, (ii) producer-pehkar-consumer, (iii) producer-commission agent-retailer-consumer. In Chandausi block, total marketing cost and margin together accounted for 5.25 per cent of consumer price in channel I and the producer share, therefore accounted for 94.75 per cent. In channel II, marketing cost and marketing margin together accounted for 33.30 per cent of consumer price; and hence the producer's share in consumer rupee was estimated at 66.70 per cent. In channel III, marketing costs and market margin together accounted for 32.41 per cent of the consumer rupee; and hence, the producer's share in consumer rupee was estimated at 67.59 per cent. In Sambhal block, the results obtained were almost similar to Chandausi block with regard to three different above-stated channels. With regard to analysis of constraints of fish farming, mixed response to a set of problems was sought from the fish farmers. In both the blocks no definite trend was observed with regard to the response to various problems on different sizes of pond. Nevertheless, risking of enterprise, lease-problem and poaching problems were invariably encountered on all farm sizes with great magnitude.

R.B. Singh and Anurag Saxena (2004) An attempt is made in the paper to study the economics of inland fish breeding farms of major Indian carps in the coastal district of Uttar Pradesh with the
objective of evaluating the productivity and resource use efficiency. A total of 50 farmers were selected from six districts of Bundelkhand region of Uttar Pradesh using multistage stratified random sampling technique and the study pertained to the year 2000-01. An appropriate number of intermediaries were also selected. The sample farmers were further classified into two groups, viz; small (<1 ha.) and large (> 1 ha.) Secondary data were collected from various published sources. Cobb-Douglas production function analysis revealed that the water spread area on large farms and proportionate cost of breeders on small farms exhibited negatively significant production elasticity since the increase of these resources decreased the gross returns, their use may be curtailed. But human labour and manure and feeds showed positively significant elasticity in both the size groups with a one per cent increase in these input the increase in the gross returns was by 1.25 per cent and by 0.97 per cent in respect of human labour and by 1.12 per cent and by 0.54 per cent in respect of manure and feeds on small and large farms respectively. Increasing returns to scale operated on small farms while constant return to scale existed on large farms. The marginal value product to opportunity cost ratios suggest that more profits can be obtained by increasing the small farm size. It also suggested that the resource use by way of expenditure on breeders on both size groups may be curtailed. In 1976, under revised fisheries policy, a marketing co-operative federation was set up at Baruwa Sagar reservoir to remunerate the fisher's catch through better fish procurement prices and efficient fish marketing. The federation paid remunerative prices and made immediate payments for the fisher's catch, but on marketing front it failed to yield the desirable results. It
incurred heavy losses due to inefficient marketing and infrastructure management, the organisational structures and working, particularly the disposal of fish catch in local and terminal markets were highly questionable. As an exception, in a longer marketing channel involving non-institutional marketing efficiency agency, the contractor had better performance and efficiency than smaller channel with institutional marketing agency, namely, the co-operative federation. The study clearly indicates that fish marketing process was highly inefficient and at a low ebb based on one appraisal of working and organisational set-up of federation.

Nirmal Kumar, S.N. Singh, D.P. Malik and Dalip Kumar* (2004) A study was undertaken in Haryana state with the following objectives: (i) to analyse price spread, marketing costs and margins in various marketing channels, (ii) to calculate marketing costs and margins in various marketing channels, (iii) to study different marketing patterns of fish. The relevant information was collected from 60 fish farmers and 30 wholesalers and 30 retailers through personal interviews from the selected Hisar and Gurgoan districts. Tabular analysis was done for estimation of price spread, marketing pattern, marketing costs and margins. The marketing efficiency of different marketing channels was estimated by Shepherd's formula. The results of the study reveal that the channel I was (lie main marketing channel of fish in Hisar and Gurgaon district) The producer got 60.67 and 59.80 per cent share in the consumer's rupee in channel I whereas the producer's share in consumer's rupee was 85.33 and 87.14 per cent in channel II in Hisar and Gurgoan districts, respectively. This was because in channel II there was no market intermediary and the
produce was sold directly to the consumers from the producers. The highest expenses in channel I were added by the wholesaler's margin and retailer's margin, which were 10.12 and 10.75 percent in Hisar district while in Gurgaon district these were 10.35 and 12.05 percent, respectively. The marketing efficiency of Hisar and Gurgaon district for the channel II (5.81 and 6.78) was higher than in channel I. Therefore, the channel II was more efficient due to its lower marketing cost, but marketing of fish through this channel was disposed of on a limited scale due to lower demand, the major portion was sold to the wholesalers through channel I at Delhi market followed by direct sale to the consumers. The maximum produce was sold during the months of October, December (peak season). There, is a need to develop proper marketing financing, storage facilities and seed availability in the state to popularize fish farming on a large scale and increase income and employment of the rural masses.

Abhey Singh Godara, Ram Singh and Satya Pal. Sharma (2004) The paper attempts to identify the different marketing channels of fisheries and in study the marketing costs, marketing margins and the price spread in various channels of marketing of fisheries in Hisar district of Haryana in the year 1993-94. The study is based on the primary data collected from all 50 fish producing farmers, 10 wholesalers and 15 retailers at Hisar district engaged in the marketing of fish. Tabular analysis was employed for estimating marketing costs, marketing margins, price spread and marketing patterns of fisheries. The marketing efficiency of different marketing channels was estimated by Shepherd's formula.
The study of marketing patterns revealed that a majority of the fish farmers sold their produce at Delhi wholesale market followed by direct sale, to consumers. Total marketing cost was calculated at Rs. 402.81 per quintal in which market commission and transportation accounted for nearly two-third of the total cost. Other major cost items included packing, spoilage and cold storage. The study further revealed that in the first marketing channel of producer-wholesaler-retailer-consumer, the producer's share in consumer's rupee was 57.30 per cent as compared to 83.30 per cent in channel II of producer-consumer. Similarly, the consumer price decreased from Rs. 3,650 pr quintal in channel I to Rs. 3,337 per quintal in channel II. The market efficiency also improved in channel II as compared to channel I. the major problems identified by the fish producers are dependence on wholesalers, small number of buyers, lack of cold storage facilities, non-availability of local market and lack of knowledge about price. It is suggested that infrastructure such as storage, processing, packing and transportation need to be developed for improvement in the performance of fish marketing in Haryana State.

A.M. Mishra, S.K. Gupta, A. Shrivastava and P.K. Mishra (2004) An attempt has been made in this paper to analyse the marketing of fish in Madhya Pradesh and Chhattisgarh. The study is based on primary data collected from the fish farmers of six districts, viz; Raipur, Bilaspur, Rewa, Balaghat, Sarguja and Dhar located in different regions of the two states. A sample of 180 fish farmers, 30 each from the six selected districts was selected for the purpose. The data were analysed with the help of averages and percentage method. Of the selected 180 beneficiary households as high as 143 reported that
fishery was their main occupation. Among the selected beneficiaries only one had owned pond (tank). The total number of tanks leased out to 179 beneficiaries were 127 indicating that a tank was shared by a number of beneficiaries. The input value per hectare was the highest on medium farms and lowest on marginal farms. The total production of fish on the selected farms was 2,437.44 quintals or 13.54 quintals per farm and 10.55 quintals per hectare of which about 93.51 per cent or 2,279.37 quintals was marketed. There are four ways of marketing of fish, i.e. local market, door-to-door sale, sale to the wholesalers and contract sale. It was observed that the largest share was of wholesalers, followed by contractors and quantity marketed in the local markets. On marginal and small farms the contractors were the most important buyers. On semi-medium farms wholesalers and on mediums farms contractors were the sole buyers. Only landless and marginal farmers sold their produce by going door-to-door of the customers. Site difficulties, marketing problems, pond-water problems, fish disease, lack of technical guidance and lack of cold storage and marketing facilities are the problems identified by the fish farmers for improving the marketing of fish it is recommended that for storage, transportation and marketing, fish farmers co-operatives be established and encouraged. Some kind of processing of fish like canning should be undertaken so that fish farmers would get remunerative and assured prices.

Bhag Chandra Jain and Hulas Pathak (2004) A study was conducted in Dharsiwa block of Raipur district in Chhattisgarh during the year 2003-04 to investigate and analyse the research findings involving production costs and return estimates, marketing costs and
margins, producer's share in consumer's price and benefit-cost ration in production and marketing of fish. In all 15 fish producers were selected purposively in the vicinity of Dharsiwa block. It was found that seed cost constituted the highest operational expenditure at 33.86 per cent of the total cost of Rs. 47256 per hectare of fish farm. The share of the total variable cost was 78.82 per cent. The average net income, per fish farm was estimated to be Rs. 33,244 per hectare with an average productivity of 23 quitals per hectare. The producer's share in consumer's rupee was determined to be 77.44 per cent. The relatively low marketing cost incurred by the producers was on account of the shortened length of marketing channel. It was felt that with proper fisheries management, technical and financial support, conducive policy environment, efficient marketing, enhanced market infrastructure, availability of good quality cost effective seeds, credit and support subsidy particularly, for creation of ponds and tank structures and strengthened extension support, the productivity of fisheries could be increased. Based on the findings of study it is concluded that there is a great need of promoting growth and development of fisheries sector in the state Chhattisgarh.

J.P. Mishra, K.K. Singh and Ajab Singh (2004) The paper aims to analyse the prospects and profitability of fisheries in Eastern Uttar Pradesh. For the purpose, multistage random sampling was applied for selection of district, village, and fish producers. An appropriate number of intermediaries were also selected from the prevailing fish market, i.e; Faizabad fish mandi study the marketing practices of fishes. Faizabad district enjoying higher acreage under inland fisheries was purposively selected. A list of all the fish growing
of the selected district was prepared and five village falling in the vicinity of the selected marked were selected for the study. A list of all fish producers of the selected villages was prepared and 25 percent fish producers were randomly selected for the detailed study. The study revealed that per hectare annual expenditure in raising fish worked out of Rs. 33,602 and per hectare fish production was recorded at 3,200 kg. On an average, selling price was Rs. 35 per kg and gross and net income obtained were Rs. 1,12,000 and Rs. 68,398 per hectare. It was observed that farmers were earning Rs. 6,538 per month from 1 ha. of fish pond. channel 1 (producer-consumer) was found to be the most efficient of marketing of fish. The study concluded that (farmers of eastern Uttar Pradesh can uplift their standard of living by adopting fisheries enterprise in their business planning. This study sheds light on the fact that the fisheries enterprise can be lucrative and prospective enterprise for the farmers of Eastern Uttar Pradesh.

S.K. Singh and Akhilesh (2004) The paper attempts to study the cost of cultivation of fish per hectare and marketing partner of he fisheries in Pandah block of Ballia district of Uttar Pradesh. The study is based on the data collected from 30 fish farmers spread over in 11 villages of the sample block. The study revealed the total cost per hectare in fish rearing on an average was found to be Rs. 38,015 which included fixed and variable cost. The total variable costs alone accounted for more than three-fourth of the total cost in fish production on the sample farmers which includes expenditure on lime, manures fish seed, fish feed, water charges, labour charges etc. The expenditures on fish feed and feed seed were found to be Rs. 8,619 and 8,402 per hectare, respectively, which were highest. The per hectare
fish production on sample farmers amounted to 21 quintals. The gross net return worked out at Rs. 79,800 and Rs. 41,785 on an average per hectare. The two marketing channels were in practice in marketing of fish in the study area. In the first channel, producers were found to sell their produce at pond to consumer directly which is 25 per cent of the total produce and the rest 75 per cent produce was being sold to retailer at Sidhari local market. The per quintal marketing cost worked out to Rs. 260 which include transportation, Loading and unloading, taulai and tahbajari, etc. The producer's share in consumer rupee was found to be 93.5 per cent. As regards the problems of marketing and production of fish it was noted that the fish farmers lacked proper supply of qualitative inputs lack of transportation and marketing facilities and non-availability of water in the cultivation of fish. The study concluded that there is need for the good quality of inputs, transportation, water availability and proper marketing facilities which would help in enhancing the area, production and productivity of fish in the study area.

3. Constraints Aspects:

Research studies related to constraint aspect of inland fish production are listed below.

Murshad, S.M. (1972) revealed that as regards to that biological and environmental hazards, it is important to note that through initially unwanted predatory fishes or animals or weeds can be removed but they may reappear. This causes a serious biological hazard. Another serious problem as indicated by the author is in regard to algal blooms occurring in the ponds, which create supersaturation in

(44)
oxygen levels during day and oxygen depletion during day and oxygen depletion during night. This sometimes leads to mass mortality.

Randhir, Tripathi and Baruna (1979) reported that lack of facility for soil and water analysis for application of chemical fertilizer is an important problem in composite fish culture.

Gupta, G.S. (1982) concluded that non-availability of good quality fingerlings on time and in adequate quantity, poor guidance with regards to the method of cultivation, on-availability of adequate and timely bank finance and poor infrastructure are the major problems faced by the fish farmers in the country.

Haque, A. and Ray, G.L. (1983) reported that scarcity of seed of exotic carps, lack of information about the technology of composite fish culture, lack of pure seed of indigenous carps, non-availability of credit for fish culture, lack of contact with competed fishery extension personnel, lack of facility for soil and water testing, poisoning of fish ponds, high price of Mahua cake, disease of fish and poaching of fish are the ten main constraints perceived by the farmers.

Rahman, M.L. and Ali, M.H. (1986) in their study on credit and marketing aspects of pond fisheries in the district of Bangladesh pointed out the basic constraints faced by the pond owners. Those were poor credit and technical assistance, non-availability of good quality fries and lack of technical knowledge.

Kumar, Virendra et. al. (1989) in their study of economic aspects of fish farming in Sultanpur district of U.P. reported the major constraints of fish farming as: low price of fish, non-availability of
fingerlings, inadequacy of institutional credit, risky nature of enterprise and lack of training and extension facilities.

**Bengura, A.A. and Colem MB. (1991)** reported major constraints as: inadequate extension personnel, low staff morale, inadequate labour for pond construction, poor knowledge base, poor pond management and lack of tradition in fish farming.

**Saharan, B.S. and Rishi, K.K. (1992)** from a study in Haryana reported that the most significant constraints in development of aquaculture in the state was the food habit and religious belief of the peoples. Beside this there several other socio-economical constraints like ignorance about the inputs and outputs of aquaculture, absence of farmers traditionally involved in aquaculture, wrong nations about the use of stagnant and sewage water for aquaculture and defective system of ownership and lease of ponds, etc.

**Siddiqui, A.Q. and Pandey, B.N. (1992)** found form a study carried out in Bihar that spread of disease, flood and inadequacy of water caused heavy loss to the fishermen in this area. Non cooperation from the fishery department and banks and inadequate knowledge of modern aquaculture techniques are some of the constraints of fish production in the area.

**B.N. Tripathi (2004)** the objectives of the study are (i) to examine the present status of the community fish farming practice (ii) to study the farmers' attitude, (iii) to estimate the development of fallow, unproductive, marginally productive lands for generating employment, (iv) to estimate the economic benefits and (v) to identify the problems faced by fish farmers and suggest policy measure. Chaka, Jasara and Meja, blocks one from each tehsil of Karchana, Bara, Meja.
of Jamunapar region in Allahabad district were selected purposively for the study. A set of 64 small fish farmers (having above 1 ha, pond) were selected as respondent from 46 village of 8 clusters of three selected blocks. Most of the small ponds were seasonal and medium deep and canal fed whereas large ponds were perennial, deep and ground water and canal fed. A majority of the small fish farmers collected seed from the local hatchery whereas large fish farmers collected seed which are supplied from Howrah, west Bengal. Both small and large fish farmer stocked their ponds with fry and fingerling stage of Indian major carp (Catt, Rohu and Mrignal) with different stocking density and used feed below the recommended rate. It was observed that the stocking size and stocking density plays an important role in the success of fish fanning. The major problems revealed by the fish farmers were non-availability of credit, lack of knowledge, erratic supply of quality seed, high cost of inputs, low and fluctuating price at farm gate, poaching, lack of suitable organised market, etc. The need is emphasised to provide better credit, supply of good quality seed, marketing through organised sector and control of poaching and poisoning in order to increase fish production.

Hypothesis: The following hypothesis are formulated and tested in this study.

Hypothesis: The cost of production per kg. of inland fish is likely to be higher in case of small farmer as compared to large and medium farmers.