CHAPTER IX

FISHERIES

Fisheries is an age old practice of human being. In ancient water oriented civilization fishing most probably was the earliest profession of man. Evidences of fisheries in indus valley and adjoining areas of Sind, Punjab and Balochistan have been brought out by carefull study of actual remains of fish and fish hooks found in Mohanjodaro, Harappa, amri, nal, numdra and ropar culture. Fish also occupies an important plakhe in hindu mythodology as Lord Vishnu's first incarnation was "matasyavtar"

In medieval period and British period the stress was laid on the conservation of fish on various water bodies. Fisheries department in joint Punjab was one of the oldest departments of the country. The department was established in 1912 with the appointment of Mr. G.G.L. Howell ICS as Director & Warden of Fisheries. The Punjab Fisheries Act was framed in 1914 under Indian Fisheries Act 1897. Keeping in view the economy expenditure after first World War, the department was merged with Agriculture department in the year 1915 and Mr. Donald ICS Officer was the Director Fisheries in join Punjab. After that Dr. Hamid Khan took over as Warden Fisheries till partition of the country in 1947. Later on in 1966 after reorganization of Punjab State, Haryana Fisheries department came into existence.

Haryana is basically an agricultural state and its land is the most important and scarce resource. Majority of its population is engaged in agriculture and its related work. It is also well known that Haryana is the land of milk. The state covers about 73.3% cultivated area and contributes about 5.6% of the total food grain production in the country.The per capita availability of the land has been decreasing progressively over the years and is likely to decrease further due to the population pressure, urbanization and the industrial expansion.

Inspite of pre-dominent vegetarian population in the state, fisheries has made significant progress in the last two decades. At the time of creation of Haryana in 1966, only 58 hectare of village ponds were under fish culture. The quality fish seed production stood at 1.50 lakh per year and the fish production was 600 metric tones per year. By the end of the year 2003-04; 8760 hectares areas is under fish culture and total fish production was 39130 metric tonnes.

Rivers, canals and drains are the main sources for capture fisheries in Haryana. Although there are 14 rivers and rivulets, yet the Yamuna and Ghaggar rivers are the only potential sources from fisheries point of view. The remaining

rivulets pour water in these two rivers. There are 94 drains in the state which collect the over-flow water from fields and join rivulets and rivers. The state has three main canal systems i.e. Western Jamuna Canal System, Bhakra Canal System and Lift Canal System. It is reported that 55 species of fish are available in these natural water bodies. Fish production from the natural water bodies is declining fast. Fisheries Department, Haryana regulates the fisheries in natural water bodies under Indian Fisheries Act 1897 and Punjab Fisheries Act 1914 and Haryana Fisheries Rule, 1996 framed there under. The present fish production from these waters is 120 Kg. per kilometer per year.

The seed production and distribution in the state has fetched the level of 2470 lakh and more than 39130 metric tonnes fish production has been estimated. The per unit area fish production is estimated at 4204 kg. Per year which ranks second in India.

(a) Fisheries Resources:

The main sources of fisheries development in the state are given as under :-

Sr. No.	Item	Unit	Area
1.	Ponds		
	(i) Perennial	Hectare	8000
	(ii) Seasonal	Hectare	2000
2.	Marshy Land	Hectare	2000
3.	Reservoirs	Hectare	900
4.	Micro Water Shed	Number	160
5.	Underground Saline Water	Km.Sq	28000
6.	Rivers	Km.	5000
7.	Canals	Km.	13800
8.	Drains	Km.	3600
9.	Critically water logged area	Hectare	25000

FISH SPECIES RECORDED FROM UPPER STRETCH OF YAMUNA BETWEEN (HATHINIKUND-PANIPAT)

I. ORDER : CLUPEIFORMES

Sub-order : Clupeoidei
Family : Clupeidae

1. Gadusia chapra (Ham.)

Sub-order : Notopteroidei
Family : Notopteridae

2. Notopterus chitala
3. Notopterus notopterus

II. ORDER : CYPRINIFORMES

Family : Cyprinidae
Sub-Family : Abramidinae

4. Chela bacatila (Ham.)
5. Chela laubuca (Ham.)

Sub-family : Rasborinae

6. Baroilius bola (Ham.)
7. Barilius barila (Ham.)
8. Rasbora daniconius (Ham.)
9. Rarilius bendelisis (Ham.)

Sub-family : Cyprininae

10. Tor putitora (Ham.)
11. Tor tor
12. Puntius sophore (Ham.)
13. Puntius sophore (Ham.)
14. P. ticto (Ham.)
15. P. punjaabensis (Ham.)
16. Catla catla (Ham.)
17. Cirrhhinus mrigala (Ham.)
18. Cirrhinus reba (Ham.)
19. Labeo rohita (Ham.)
20. Labeo calbasu (Ham.)

21. Labeo dero (Ham.)
22. Labeo dyocheilus (McClland)
23. Labeo gonius (Ham.)
24. Labeo bata (Ham.)
25. Osteobrama cotio cotio (Ham.)
26. Ctenopharyngodon idella (Val.)
27. Hypopthalmichthys molitrix (Val.)
28. Aristichthys nobilis
29. Cyprinus carpiocommunis
30. Cyprinus carpio specularis

Family : Cobitidae

31. Noemacheilus botia (Ham.)

III. ORDER : SILURIFORMES

Family : Bagridae

32. Mystus aor (Ham.)
33. Aorichthys seenghala (Sykes)
34. M. cavasius (Ham.)
35. M. tengara (Ham.)
36. Rita rita (Ham.)

Family : Sisoridae

37. Bagarius bagarius (Ham.)
38. Sisor rhabdophorus (Ham.)

Family : Siluridae

39. Ompak pabda (Ham.)
40. Wallago attu (Schneider)

Family : Schilbeidae

41. Eutropiichthys vacha (Ham.)
42. Silonia silondia (Ham.)

Family : Heteropneustidae

43. Heteropneustes fossilis (Bloch)
44. Clarias batrachus (Linnaeus)

IV ORDER : BELONIFORMS

Family : Bedlonidae

45. Xenentodon canciula (Ham.)

V. ORDER : CHANNIFORMES

Family : channidae

46. Channa marulius (Ham.)
47. C. punctatus (Bloch)
48. C. striatus (Bloch)

VI. ORDER : PERCIFORMES

Family : Nandidae

49. Nandus nandus

Family : Ambassidae

50. Chanda nama (Ham.)
51. Chanda ranga (Ham – Buch)

Family : Anabantidae

52. Colisa fasciata (Schn)

Family : Goboidae

53. Glossogobius giurius (Ham.)

VII. ORDER : MASTACEMBELIFORMES

Family : Mastacembelidae

54. Mastacembelus armatus (Lakhepedae)
55. M. Pancalus (Ham.)

Table : Fish-deversity in upper Yamuna

Endangered species	:	Ompok pabda
Vulnerable species	:	Tor or, T.putitora, L. dero, L. dyocheilus, P.sarana (carps), Bagarius bagarius (catfishes).
Indeterminate species	:	Silonia silondia, Eutropiichthys vacha, Xenentodon cancila.
Rare species	:	Noemacheilus botia Barilius bola B. barila B. benedelisis Rasbora daniconius Gadusia chapra Osteobhrama cotio Sisor rhabdophorus Mystus cavasius Macrognathus aculeatus

(b) Achievements:

Sr. No.	Items	Unit	Achievements		
			1966-67	2002-03	2003-04
1	2	3	4	5	6
1.	Area under Fish Culture	Hectare	58	8096.75	8760.20
2.	Fish Seed Stocked	Lakh	1.5	2040.00	2470.00
3.	Govt. Fish Seed Farms	No.	3	15	15
4.	Private Fish Seed Hatcheries	No.	-	8	8
5.	Fish Production	Tonne	600	35182	39130
6.	Fish Farmers Benefit to	No.	-	7820	8042
7.	Scheduled	No.	-	542	521
8.	Training to Fish Farmers	No.	-	1901	2153
9.	Plan Expenditure	(Rs. Lakh)	3.15	426.86	490.20

(c) Budget

The Government of Haryana has approved an outlay of Rs. 4340 lakh for 10th Five Year Plan (2002-07).

Sr. No.	Item	Units	Achievements	
			2002-03	2003-04
1.	Fish Production	M. Tonne	35.18	39.13
2.	Fish Seed Stocking	Million	204.98	247.06
3.	Plan Outlay	Rs. in Lakh	422.07	490.20

DEVELOPMENT OF FISHERIES

(a) Objectives

The role of fisheries sector in the national economy is, in general, relatively limited. Fisheries sector as compared to other sectors of the national economy, probably comes under the most complex category. The complexity of fisheries sector stems from the interaction between nature, men and technology.

The fisheries sector has been recognized as a powerful income and employment generator as it stimulates growth of a number of subsidiary industries and is a source of low cost animal protein to the people particularly to the economically weaker sections of the society and thereby it is an advantageous

position to ensure national food security. It is also a major source of foreign exchange in several countries including India. Fish culture is an age-old practice in many states of the country. The fish farming activity in the state of Haryana is of recent origin. In the short span of less than three decades, the fish farming in the state has developed to a status of significance. Haryana stands second in the average annual fish production per unit area in the country. The average annual fish production in the state is 4204 Kg. per hectare against a national average of 2260 Kg. The state has also achieved self-sufficiency in seed production of Indian Major Carp and Common Carp. At the time of creation of the state in November 1966, the total water area under fish farming was 58 hectare, which increased to 8760 hectare by the end of March 2004. Likewise fish seed stocking also increased from 1.5 lakh to 2470.6 lakh. The farmers of the districts adjoining to Delhi has evolved a new technique in fish marketing i.e. harvesting the fish at 600 to 700 gm. and to carry in live condition to Delhi fish market, so as to get high price. The total fish production from all resources was 600 metric tonne during the year 1966-67 which increased to 39130 metric tonne in 2003-04 inspite of depletion of fish population in natural water bodies.

Despite limitation of water resources in the state, the department has made notable progress. The main thrust of the department is to bring all available water bodies under fish culture by creating a class of fish farmers through hands on training and providing necessary technical and financial assistance. More than 70% of the village ponds in the state have been brought under fish farming. The main objectives and activities of the Fisheries department are as under:

- To manage and conserve the natural fisheries in rivers, canals, drains and other water bodies.
- To utilize available village ponds and tanks for fish farming.
- To provide technical and financial assistance to fish farmers through Fish Farmers Development Agencies.
- To create a class of trained fish farmers in the state.
- To encourage the production of quality fish seeds of all species.
- To utilize unused waste agricultural land for fish farming.
- To create additional employment opportunity in rural area.

The following schemes are in operation in the state:-

- Scheme of Intensive Fisheries Development Programme
- Scheme of National Fish Seed Programme

- Development of Fisheries in Marshy Area.
- Development of Fisheries in Running Water.
- Centrally sponsored scheme for Fresh water Aquaculture through Fish Farmers Development Agencies.
- Centrally Sponsored Scheme for the Development of Water Logged Area in Aquaculture Estate.
- Centrally Sponsored Scheme for the utilization of Satline Soil and Water for Culture of Prawn/Fish.
- Centrally Sponsored Scheme for Development of Fisheries in Rivers and Reservoirs.
- Centrally Sponsored Scheme on Strenthening of Database and Information Networking for Fisheries Sector
- Centrally Sponsored Scheme for Fisheries Training and Extension (River and Reservoir).
- Centrally Sponsored Scheme for Development of Inland Capture Fisheries.

SCHEME OF INTENSIVE FISHERIES DEVELOPMENT PROGRAMME

An outlay of Rs. 345 lakh for 10th Five year plan had been approved. The scheme aims at maintenance of fish farming in the ponds and targeted to bring 8000 hectares water area under fish culture, which also includes 70 hectare suitable water area in the water sheds created under Kandi project. Achievements under this scheme is tabulated below:

Sr. No.	Item	Units	Achievements	
			2002-03	2003-04
1.	Area under fish culture	Hec.	6031.35	6736.4
2.	Fish Seed Stocking	Lakh	1352.92	1651.71
3.	Fish Production	Tonne	26158.40	30562

SCHEME OF NATIONAL FISH SEED PROGRAMME

Scheme aims at the production of quality fish seed and its distribution to fish farmers. Fish Seed is the most important inputs for the development of the aquaculture. There are 13 Fish Seed Farm in the state and producing about 525 lakh fish seed annually. The department provides technical assistance to beneficiaries to set up units of seed rearing for production of quality fish seed. It is targeted to produce and distribute 2100 lakh fish seed per year against which 2470

lakh seed was stocked in the year 2003-04. The achievements of the scheme are given below:-

Sr. No.	Item	Units	Achievements	
			2002-03	2003-04
1.	Fish Seed Production from Two National Seed Farm	Lakh	115.99	193.95
2.	Fish Seed Production from 11 Govt. Fish Seed Farms	Lakh	247.50	218.04
3.	Fish Seed Production from Privated Hatchery and Seed Production Unit.	Tonne	1688.25	2058.66
			2049.82	2470.65

DEVELOPMENT OF FISHERIES IN MARSHY AREA

The main objective of the scheme is to encourage the farmers to bring the water logged and swamps area under fish farming. Many such areas are not suitable for normal fish farming activities. To develop such area for culture of fin fish/cat fishes, an outlay for the 10th Five Year Plan of Rs. 80 lakh was approved. Achievements under this scheme are given below:

S. No.	Item	Units	Achievements	
			2002-03	2003-04
1.	Area under Fish Culture	Hect.	74.40	93.00
2.	Fish Seed Stocked	Lakh	19.5	19.8
3.	Fish Seed Production	Lakh	11.22	11.24
4.	Fish Production	Tonne	258.9	182.6

DEVELOPMENT OF FISHERIES IN RUNNING WATER

The fish production in the natural water bodies is depleting because of pollution, deforestation, in flow from catchments area containing insecticide and pesticide and excessive abstraction of water for irrigation and other needs. The important fisheries resources of Catla, Kalabans and Singara have depleted to a stage of distinction in the reverine system of the state. To conserve various water bodies in the state as bio-reserve for future, and to create the awareness among the society and for the people participation for protection and conservation of fisheries resources, the state is arranges annual Angling Competition. It is also planned to bring Mahaseer seed from the states of Himachal Pradesh and Maharastra and stock in the deep pools of river Yamuna in the district of

Yamunanagar. This Mahaseer fish is found in river Yamuna up to the boundary of Yamunanagar district. An outlay of Rs. 50 lakh was sanctioned for 10th Five Year Plan. Achievements under this scheme is given below:

Sr. No.	Item	Units	Achievements	
			2002-03	2003-04
1.	No. of Illegal Fishing Case	No.	145	169
2.	No. of License issued	Lakh	3251	4239
3.	Fish Production	Tonne	1842.2	1742

CENTRALLY SPONSORED SHCEME FOR FRESH WATER AQUACULTURE THROUGH FISH FARMERS DEVELOPMENT AGENCIES

It is centrally sponsored and is being implemented in 18 districts of the state except Panchkula. The Government of India provides funds. 75% of expenditure on subsidy and training and 50% expenditure on the purchase of vehicle. The technical and financial help is provided to the farmers for renovation of old water bodies, creation of new water areas, short terms training. During the 10th Five Year Plan 4500 hectare area proposed to be renovated and 450-hectare new water area will be created with a target of 19800 tonne fish production level per year. The total expenditure during the 9th Five Year plan was 979.104 lakh as state share and 204.625 lakh Government of India's share. The provision of Rs. 1500 lakh as state share and Rs. 400 lakh of central share remains for the 10th Five Year Plan. Achievements under this scheme is given below:

Sr. No.	Item	Units	Achievements	
			2002-03	2003-04
1.	Training to Fish Farmers	No.	1084	1028
2.	Area under Fish Culture	Hect.	1854.95	1930.8
3.	Fish Seed Stocked	Lakh	630.20	799.7
4.	Fish Seed Production	Tonne	197.53	206.80
5.	Fish Production	Tonne	6260	6647

CENTRALLY SPONSORED SCHEME FOR THE DEVELOPMENT OF WATER LOGGED AREA IN AQUACULTURE ESTATE:

It is a Centrally sponsored scheme with 75% assistance. The main objective of this scheme to utilize the water logged area into fish farming units for the production of fish. The state has more than 25000 hectare critical water logged areas. Provision of 20% subsidy for the development land and inputs have been

made under the scheme. It is envisaged to provide training to the beneficiaries. It is targeted to bring 1000 hectare water logged area under culture during 10th Five Year Plan. Provision of Rs. 1200 lakh has been kept under the scheme.

CENTRALLY SPONSORED SCHEME FOR PRODUCTIVE UTILIZATION OF INLAND SALINE/ALKALINE WATER FOR AQUACULTURE:

It is also a Centrally sponsored scheme with 75% assistance. The main objective of this scheme is to bring saline / alkaline soil for fish culture. More than 28000 hectare area is saline / alkaline area is available in the state. It is targeted to bring 500 hectare salt affected area into aquaculture units. Subsidy of 20% is provided for the development of area and inputs. There is provision of training under this programme.

CENTRALLY SPONSORED SCHEME FOR INLAND CAPTURE FISHERIES (RESERVOIR/RIVERS)

It is a Centrally sponsored scheme with 75% contribution. The main objective of the scheme is to revive the fisheries in natural water bodies. There is provision for the 20% subsidy for establishing the fish seed production units, purchase of nets/crafts, construction of breeding centres and arranging the awareness camps.

CENTRALLY SPONSORED SCHEME FOR FISHERIES TRAINING AND EXTENSION (RIVER/RESERVOIR)

It is a Centrally sponsored scheme with 80% assistance. The main objective of the scheme is to provide training to departmental officers / officials and fish farmers. Preparation of fisheries manuals and pamphlets, arranging workshops/ seminars etc.

PILOT PROJECTS OF FRESH-WATER PRAWN FISHERIES

Considering the need of the farmers, Fisheries Department, Haryana has been making efforts since 1984 for the introduction of new species in the culture system. Operation Research Project Centre of Central Institute of Fisheries Eduction was set up at Sultanpur, district Gurgaon in this regard. It was found by the Centre that brackish water species and prawn can be cultured in Haryana. This centre was shifted to Government Fish Seed Farm Lahli, Banyani (Rohtak) in the year 1996 where scientists of Central Institute of Fisheries Education are working on new species of fish and prawn for standardizing the technology for the farmers. In the year 1998, scientists of Central Institute of Fisheries Education provided

Technology back to the farmers in Hisar, Sirsa and Yamunanagar districts for freshwater prawn farming. The famer's at village bhamoli, district Yamunanagar, village moth, district Hisar and villages Salamkhera and ban Sudhar Nagar, district Sirsa produced more than 900 kg. Freshwater prawn per hectare in 6 months. It was found that prawn culture in Haryana can be done profitably. Hence, fisheries department submitted 3 proposals to government of india, ministry of agriculture and planning commission for financial assistance. Government of India provided one time 100% central assistance in the year 2001-02 to implement the three pilot projects namely:

(i) Development of Water Logged Area into Aquaculture Estate.

(ii) Utilization of Saline soil for Fish/Prawn Culture.

(iii) Freshwater Prawn Farming.

Brief description of these Pilot Projects are given below :

I. Pilot Project For Development of Water Logged Area into Aquaculture Estate:

Government of India, Ministry of Agriculture provided 100% financial assistance to State Government amounting to Rs. 36.78 lakh for the development of 15 hectare water logged area for aquaculture during the year 2001-02. The project is being implemented since 2002-03 for the development of fresh-water prawn culture. Department provided 100% assistance to farmer amounting to Rs. 2.30 lakh per hectare (Rs. 2.00 lakh on development of area and Rs. 30,000/- for input). Since it was a new technology the identification of sites were made by the scientists of MPEDA, soil and water analysis were made by CIFE, Sub-Centre, Lahli, CIFA Sub-Centre, Ludhiana and ARTI, Hisar. The beneficiaries were selected by a committee headed by Hon'ble Minister for Fisheries Haryana. The rates of prawn seed and feed were got approved by the high powered purchase committee under the chairmanship of Hon'ble Chief Minister, Haryana. The seed and feed was procured from Andhra Pradesh and Tamil Nadu. All the selected beneficiaries were provided short term training and sent for study tour to Andhra Pradesh. Department brought 18.7 hectare water under freshwater prawn culture by provided to benefit to 20 farmers of district Gurgaon, Hisar, Rohtak, Jhajjar and Sirsa districts. Progress made under this Project is given below :-

(i) Area of implementation- Hisar, Rohtak, Gurgaon and Jhajjar districts.

(ii) Funds available Rs. 36.78 lakh.

Number of beneficiaries	Area covered (in hectare)	Prawn Seed Stocked (in Lakhs)		Prawn Production (in Kg.)	
19	18.7	02-03	03-04	02-03	03-04
		3.21	4.26	60	2333

The general biology of prawns is Characterised by high fecundity, fast rate of growth, continuous breeding and short span of life. Therefore, the nature of the fishery is some what like that of an annual crop, the success or failure of which is largely determined by the strength of recruits from the successive spawning. Harvesting of prawn crop in Haryana is done in the month of November. The fresh water prawn fishery in the state is at present of minor character. However, the beneficiaries are well aware of the prawn importance on the sophisticated dinning table and they are very keen to bring more area under prawn fishery.

II. Plot Project for Utilization of Saline Soil / Water for Fish / Prawn Culture

Government of India, Ministry of Agriculture provided 100% financial assistance to State Government amounting to Rs. 49.00 lakhs for the Development of 20 hectare saline soil/water for fish / prawn during the year 2001-02. The project is being implemented since 2002-03 for the development of fresh water prawn culture. Department is to provide 100% assistance to farmer amounting to Rs. 2.30 lakhs per hectare (Rs. 2.00 lakhs on development of area and Rs. 30,000/- for input). Since it was a new technology the identification of sites were made by the scientists of MPEDA, soil and water analysis were made by Central Institute of Fisheries Education, Sub-Centre, Lahli, CIFA Sub-Centre, Ludhaina and ARTI, Hisar. The beneficiaries were selected by a committee headed by Hon'ble Minister for Fisheries Haryana. The rates of prawn seed and feed were got approved by the high powered purchase committee under the chairmanship of Hon'ble Chief Minister, Haryana. The seed and feed was procured from Andhra Pradesh and Tamil Nadu. All the selected beneficiaries were provided short term training and sent for study tour to Andhra Pradesh. Department brought 23.2 hectare water under freshwater prawn culture by provided to benefit to 25 farmers of Gurgaon, Hisar, Rohtak, Jhajjar and Sirsa districts. Progress made under this Project is given below:-

(i) Area of implementation – Distt. Hisar, Rohtak, Gurgaon and Sirsa.

(ii) Funds available Rs. 49.00 lakhs.

The following table reveals the success story of the project.

No. of beneficiaries	Area covered (in hect.)	Prawn Seed Stocked (in Lakhs)		Prawn Production (in Kg.)	
25	23.2	03-04	04-05	03-04	04-05
		4.21	6.62	2821	3282

III- Pilot Project for Fresh Water Prawn Farming

Government of India, Ministry of Agriculture provided one time grant to the State Government by raising the State Plan Ceiling amounting to Rs. 275.00 lakh for during the 2001-02 for fresh water prawn farming. The project was initiated in the 12 districts of the state i.e. Yamunanagar, Karnal, Sonipat, Faridabad, Gurgaon, Jhajjar, Rohtak, Bhiwani, Fatehabad, Sirsa, Hisar and Jind. The site selection was made by the officers of MPEDA. The beneficiaries were identified by a team of officers head by Additional Deputy Commissioner of concerned district. The rate of prawn seed and feed were approved by high powered purchase committee under the Chairmanship of Hon'ble Chief Minister of Haryana State. The training to beneficiaries and study tour in Andhra Pradesh was arranged by the department. It was envisaged in the project to bring 100 hectare water area under freshwater prawn farming by the end of 2005-06. Department brought 70.06 hectare water area under fresh water prawn farming by the end of September, 2004. Total expenditure upto 30.09.2004 is Rs. 125.42 lakh and 74 beneficiaries were covered under the project. Progress made under this Project is given below:-

i) Area of implementation – Yamunanagar, Karnal, Sonipat, Faridabad, Bhiwani, Jind, Sirsa, Fatehabad, Hisar, Rohtak, Gurgaon and Jhajjar districts.

ii) Funds available Rs. 275.00 lakh.

The following figures speak about the progress of the project.

No. of beneficiaries	Area covered (in hect.)	Prawn Seed Stocked (in Lakhs)	Prawn Production (in Kg.)
		03-04	03-04
74	70.06	15.89	13205

(3) TECHNOLOGIES IN OPERATION

*	Pond Fish Farming	*	Integrated Fish Farming
*	Fish Seed Production	*	Fresh Water Prawn Culture

(a) Pond Fish Farming

Fish farming is an age old activity and in practice from ancient times. The concept of composite fish culture was developed by ICAR in late seventies under a coordinated composite fish culture project. This comprises the culture of 3 indigenous species of fish viz. rohu, catla and mrigal and 3 exotic fish i.e. silver carp, grass carp and common carp, keeping in view their different food habit and habitat. This practice has been very well accepted by the farmers of Haryana as its cultural practices are analogous to agriculture. The successful fish culture requires ploughing of pond, addition of manure, stocking of fish seed, eradication of unwanted aquatic plants and animals, watering the pond; harvesting the crop and marketing of the produce. The fish culture technologies and economics are simple and understandable to the fish farmers. To produce one kilogram fish, the requirements are:-

- one cubic meter water
- three number fish seed
- one kilogram manure and 100 gm inorganic fertilizer
- one kilogram supplementary feed
- and one year time

Cost of production of fish is Rs. 15/Kg and the sale price on an average is Rs. 30/- per Kg. A net profit of Rs. 60,000 per hectare per year is obtained. The pond fish culture practice is being adopted by farmers in all the districts of the state. There are 4922 fish culture units having an area of more than 8760 hectares in the state. Out of these 3082 ponds with 6584.44 hectare water area are village panchayats ponds. The ownership of these ponds vested with the panchayats. Panchayat leases out their ponds to the farmer’s for fish farming. These village ponds are generally visited by cattle for drinking water. The cattle refuse dung and urine in the pond. The organic waste released by the cattle are recycled into manure and help in the production of plankton which is basic food for fish. Thus all the village fish culture ponds in Haryana are the good example of fish cum cattle farming. With the passage of time, the farmers have modified the technologies as per the need. Generally rohu, catla, mrigal and common carp are

used for culture. The stocking density is kept at 25000 fish seed per hectare. Farmers have adopted the technique of multiple harvesting, which give better returns. The Government provides 20% subsidy to general category while 25% to scheduled caste fish farmers for excavation of new pond / renovation of old pond and fisheries inputs.

(b) **Integrated Fish Farming**

Fisheries Department provides technical and financial assistance for integrated fish farming. The integrated fish farming practices utilize the waste from different components of the system viz. livestock, poultry, duckery, piggery and agriculture byproducts for fish production. 40-50 kg of organic wastes are converted into one kg of fish, while the pond silt is utilized as fertilizers for the fodder crops, which in turn is used to raise livestock. The system of integrated farming is very wide.

The system provides meal, milk, eggs, fruits, vegetables, mushroom, fodder and grains in addition to fish. It utilizes the pond dykes which otherwise remain unutilized for the production of additional food and income to the farmer. The possible integrated farming systems are given below:

a)	Fish cum Agriculture System	b) Fish Animal System
	Fish cum Paddy Culture	Fish cum Dairy Farming
	Fish cum Water Chestnut	Fish cum Pig Farming
	Fish cum Pappaya Cultivation	Fish cum Rabbit Farming
	Fish cum Mulberry Cultivation	Fish cum Poultry Farming
	Fish cum Mushroom Cultivation	Fish cum Duck Farming

(i) Fish cum Dairy Farming

Fish-cum-Dairy farming is considered as an excellent innovation for the use of organic wastes. Use of cow/buffalow manure in fish farming is a commonly prevailing practice. On an average, one cow/buffalo excretes 12000 Kg. of dung and 8000 litre urine per year. The cattle faeces and urine are beneficial to the filter-feeding and ominvorous fishes. On an average, 3-4 cows/buffaloes can provide sufficient manure to fertilize one hectare pond. In this system, farmer gets milk, fish and calf as well, which increases revenue and reduces input costs. The system gives at net profit of Rs. 1,12,000/- per year from one hectare land.

(ii) Fish cum Piggery Farming

The pig dung as an organic manure for fish culture has certain advantages over cattle manure. The waste produced by 20-30 pigs in equivalent to one tonne of Ammonium Sulphate applied to the soil. The pigs are fed largely on kitchen waste, aquatic plants and crop byproducts. At present, fish-pig integration is practiced in all the developing countries. Several exotic breeds of pigs have been introduced in the country to augment pork.

Fish seed Production

Quality fish seed is the pre-requisite for successful farming. The department is using the techniques hypophysation for the production of fish seed culturable varieties. The breeding season of common carp fish in Haryana is February-March every year where as the breeding season of other species is monsoon season. Brood stock of required fish maintained and sex-wise segregatation is made two months before. The pairing is made and injected with calculated dose of pituitary gland or ovapraim, ovatide injected to male and female fish. Within the 6-8 hours the injection eggs from female and sperm from male released in the water. The fertilization is external. Normally one kg. fish releases about one lakh eggs. Hatchling are known as spawn. The spawn is reared in the nursery pond. After 15 days, the spawn attains the size of 25 mm and ready for stocking in the pond. More than 50 lakh fry can be produced per hectare fish farm in both the seasons in a year. The income of from sale of fish seed in Rs.3.25 lakh approximate per year @ Rs. 6000 per lakh fry. Fisheries department provides technical and financial assistance for setting up of eco-type hatchery for fish speed rearing units.

(d) Fresh Water Prawn Farming

There are more than 100 species of freshwater prawn found in the world. There are more than 25 species are found in India. Out of these 10 species are important from commercial point of view. Out of them macro brachium rosenbergii is the main species which is used in culture practices. This is also known as giant prawn. This can be cultured in both freshwater as well as brackish water. It is fast growing animal and farmers can culture profitably. It contains 20-22% animal protein and has less cholesterol. It has essential amino-acids and minerals which is very importment for human beings. In culture practices, the freshwater prawn has two stages i.e. nursery pond and growout pond. The ponds are prepared by using manure and fertilizer. The stocking density in nursery pond is kept at 2.00-2.50 lakh per hectare. Feed is provided 5 times @ 8-10 gm per kg body weight at initial stage subsequently it is reduced. Check trays are used to

regulate the feeding. Prawn crop becomes ready for sale within 7-8 months. The expenditure about 1.50 lakh per hectare and income Rs.2.50 lakh is the economics of frawn crop. Thus net income is Rs.1.00 lakh per hectare in 8 months of ensured.

Technical Assistance

Help in getting village ponds on lease for fish farming.

Help for loan for construction of fish culture unit.

Arranging training and refresher.

Soil and water analysis of pond sites.

Preparation of plan and estimates of Ponds.

Supply of quality seed and feed.

Checking of fish growth.

Checking of fish diseases.

Help in fish harvesting.

Help in fish transportation and marketing.

(b) Financial Assistance

Item	Unit	Unit Cost (Rs.)	Subsidy (Rs.)	Bank Loan or Self Finance (Rs.)
1. Renovation of old Pond	(hect.)	60,000	12,000 (Gen) 15,000 (SC)	48,000 (Gen) 45,000(SC)
2. Excavation of New Pond	(hect.)	2,00,000	40,000 (Gen) 50,000 (SC)	1,60,000 (Gen) 1,50,000 (SC)
3. Fisheries Input	(hect.)	30,000	6,000 (Gen.) 75,00 (SC)	24,000 (Gen.) 22,500 (SC)
4. Integrated Fish Farming	(unit)	80,000	16,000 (Gen) 20,000 (SC)	64,000 (Gen) 60,000 (SC)
5. Purchase of Aerator	(unit)	50,000	12,500	37,500

B. Fish Culture in Saline Soil and Water				
1. Construction of Pond	(hect.)	2,50,000	50,000	2,00,000
2. Inputs	(hect.)	1,00,000	20,000	80,000
C. Fish Culture in Water Logged Areas				
1. Renovation of Water Logged areas	(hect.)	1,25,000	25,000	1,00,000
2. Inputs	(hect.)	75,000	15,000	60,000
D. Fresh Water Prawn Culture				
1. Construction of new Pond	(hect.)	2,43,500	1,21,750	1,21,750
2. Inputs	(hect.)	1,15,400	57,700	57,700

E. Fish Harvesting				
1. Purchase of Nets/Craft	(unit)	15,000	3000	12,000
F. Fish Seed Production				
1. Construction of Fish Seed hatchery (Capacity 10 Millions)	(each)	8,00,000	80,000	7,20,000
2. Construction of Fish Seed Rearing unit	(hect.)	2,00,000	40,000	1,60,000
3. Inputs	(hect.)	30,000	6000	24,000
G. Setting up Ornamental Fish Hatchery (5-10 Million Capacity)	(unit)	15,00,000	1,50,000	13,50,000
H. Fish Feed Units				
Small units with capacity of 1.2 ton/day	(unit)	5,00,000	1,00,000	4,00,000
I. Training Stipend				
1. 10 days training	Stipend Rs. 100/- per day and Rs. 100/- lump-sum travel expenses.			

2. 5 days Refresher Course	Stipend Rs. 40/- per day with actual travel expense.
3. 3 days special course for Prawn culture	Stipend Rs. 75/- per day with actual travel expense.

Documents required for Subsidy

- Application form with 3 passport sized photos.
- Resolution of panchayat and receipt of in case of leased ponds.
- Revenue record of land and Aksh Zira.
- Agreement deed on stamp paper between farmer and agency/department.
- Affidavit on stamp by the farmers.
- Agreement deed between farmer and panchayat.
- Training Certificate.

Activity Calendars

- Calendar of activities for fish farming in Haryana State.
- Calendar of activities for fish seed production at Government Fish Seed Farm.
- Calendar of activities for fresh water prawn culture in Haryana State.

Calendar of Activities for Fish Farming in Haryana State.

January	July
1. Processing of cases for Subsidy. 2. Training of Fish Farmers. 3. Maintenance of Seed Farms. 4. Segregation of Common Carp brood Stocks at the farms.. 5. Harvesting & Marketing of old fish stock.	1. Breeding of Indian & Exotic Carp Fish. 2. Preparation of Ponds for stocking of Fish Seed. 3. Production & Distribution of Indian & Exotic Carp Fish Seed to the Fish Farmers. 4. Adopting culture practices as per technical advice.

	5. Eradication of aquatic insects and weeds from ponds.
February	**August**
1. Processing of cases for subsidy. 2. Training of Fish Farmers. 3. Preparation of ponds stocking of Common Carp Fish Seed. 4. Breeding of Common Carp Spawn in nursery ponds. . 5. Harvesting & Marketing of old fish stock.	1. Production & Distribution of Indian & Exotic Carp Fish seed to Fish Farmers. 2. Trial netting. 3. Adopting culture practices as per technical advice..
March	**September**
1. Common Carp Fish Breeding. 2. Production & distribution of Common Carp Fish seed to farmers. 3. Submission of documents for subsidy. 4. Harvesting & Marketing of old fish stock.	1. Trail netting. 2. Training to beneficiaries. 3. Testing of Soil & Water Samples. 4. Stocking of Indian & Exotic Carp fish seed. 5. Adopting culture practices as per technical advice.
April	**October**
1. Identification of sites & beneficiaries. 2. Inviting tenders for purchase of Indian & Exotic Carp fish seed. 3. Submission of loan cases to banks 4. Training to the beneficiaries. 5. Production & distribution of	1. Identification of sites & beneficiaries. 2. Training to beneficiaries. 3. Adopting culture practices as per technical advice. 4. Trail netting. 5. Selective Harvesting &

Common Carp Fish seed to farmers. 6. Harvesting & Marketing of old fish stock. 7. Testing of Soil & water samples.	Marketing of Fish.
May	**November**
1. Excavation of new ponds. 2. Renovation of old ponds. 3. Leasing of village ponds. 4. Identification of sites & beneficiaries. 5. Training to beneficiaries. 6. Finalization of rates for Indian & Exotic Carp Fish seed.	1. Leasing of village ponds. 2. Preparation of plan & estimates of new ponds. 3. Submission of loan cases to banks, 4. Inspection of works of newly excavated ponds. 5. Trial netting. 6. Selective harvesting & marketing of fish.
June	**December**
1. Excavation of new ponds. 2. Renovation of old ponds. 3. Inspection of works of new ponds construction. 4. Leasing of new ponds 5. Training to beneficiaries 6. Maintenance work of fish seed farm.	1. Leasing of village ponds. 2. Training to beneficiaries. 3. Testing of Soil & water samples. 4. Trail netting. 5. Selective harvesting & marketing of fish.