

Intensive Fish Culture

Introduction :



Fish is the cheapest and most easily digestible animal protein and was obtained from natural sources from time immemorial for consumption. However, due to over exploitation and pollution, the availability of fish in natural waters have declined considerably, forcing scientists to adopt various methods to increase its production. Fish farming in controlled or under artificial conditions has become the easier way of increasing the fish production and its availability for consumption. Farmers can easily take up fish culture in village ponds, tanks or any new water body and can improve their financial position substantially. It also creates gainful employment for skilled and unskilled youths. The technology developed for fish culture in which more than one variety of compatible fishes are cultured simultaneously is the most popular mode of fish culture in the country and is known as Composite Fish Culture. This technology enables to get maximum fish production from a pond or a tank through utilization of available fish food organisms in all the natural niches, supplemented by artificial feeding. Any perennial fresh water pond/tank retaining water depth of 1.5- 2.0 metres can be used for fish culture purpose. However, the minimum level should not fall below 1.0 metre. Even seasonal ponds can also be utilised for short duration fish culture.

1.1. Fish species involved in intensive fish culture

Depending on the compatibility and type of feeding habits of the fishes Catla and Rohu have been identified and recommended under intensive fish culture .

Species Feeding habit Feeding zone

Indian Major Carp

Catla	Zoo plankton feeder	Surface feeder
Rohu	Omnivorous	Column feeder

2. Potential : The area under tanks and ponds available for warm fresh water aquaculture is estimated to be 2.85 million ha. In addition 0.78 million ha of swamps, beels, etc. and low lying water logged area not suitable for agriculture as also any agriculture land can be converted into ponds for fish farming. The area of 4.56 lakh ha brought under scientific fish culture is only around 20% of the potential area of tanks and ponds available for development showing immense possibilities for horizontal expansion of composite fish culture.

Out of the total inland fish production around 60% is contributed by the aquaculture sector. The average productivity from ponds at present is to the tune of 2160 kg/ha/year. This shows the tremendous scope for fish culture in the country. The farmers of Andhra Pradesh have shown that through intensification of culture practices and adopting better farm management the production levels can be increased manifold to around 5 tons per Ha per crop and two crops are possible in a year

3. Technical Parameters : Technical parameters of intensive fish culture includes site selection, pond development, pre and post stocking operations, stocking, fertilization , feeding etc. which is given in Annexure I

4. Margin:

The margin money may be considered @ 5, 10 & 15% for small, medium and large farmer respectively and 25% for companies and partnership firms.

5. Subsidy

Subsidy is available for various items like Pond Development, construction of New Ponds, first year inputs etc. under a centrally sponsored subsidy scheme implemented by majority of the State Governments through FFDA's for different categories of farmers. Details may be obtained from concerned Fisheries Departments.

6. Eligible Borrowers

The following category of borrowers are eligible to avail credit.

- a) An Individual.
- b) A company.
- c) A Partnership firm.
- d) A co-operative society.
- e) A group of fish farmers.

f) Producer companies/ organisations / groups

Training in fish farming is being provided by the FFDA's to the eligible borrowers and it is essential that the borrower has prior knowledge of fish farming before availment of bank loan.

7. Financial Outlay :

The details of Capital Cost and Recurring Cost have been indicated in Annexure - II. As per annexure the capital cost for excavation of 1 Ha pond works out to be Rs 3,02,500/- and the recurring cost as Rs 2,88,075/-. However, the cost is indicative and actual assessment of the cost parameters have to be done while submitting the project to the bank.

8. Repayment

Repayment of bank loan is possible in 8-10 years in equated annual instalments with moratorium on repayment of principal for the first year.

9. Financial Analysis:

As per financial analysis shown in Annexure II , the scheme is financially viable.

The financial parameters are as follows

- i). NPW @ 15% - Rs: 6.40 lakh
- ii). BCR @ 15% - 1.19:1
- iii). IRR - 50%

10. Rate of Refinance

NABARD provides refinance assistance for fish culture to commercial banks, cooperative banks and Regional Rural Banks. The rate of refinance is fixed by NABARD from time to time.

11. Rate of interest

Interest rate to be charged to the ultimate borrowers would be as indicated by bank/RBI/NABARD from time to time depending on quantum of loan amount and the agency providing the loan.

12. Security

Security from the ultimate beneficiaries may be obtained as per the guidelines of RBI issued from time to time.

Annexure I

Technical parameters that needs to be considered for intensive Fish Culture project are as follows :

1. Selection of Pond: The main criteria to be kept in mind while selecting the ponds that the soil should be water retentive with adequate supply of water and the pond is not in a flood prone area. Derelict, semi derelict or swampy ponds can be renovated for fish culture by dewatering, desilting, repair of the embankments and provision of inlet and outlet. The pond may be owned by the individual or taken on lease in which case the lease period should be more or coterminous with the repayment period. The eligible items of pond development are as follows:

i)	Desilting of existing ponds
ii)	Deepening of shallow ponds.
iii)	Excavation of new ponds.
iv)	Impoundment of marginal areas of water bodies.
v)	Construction / repairs of Embankments.
vi)	Construction of Inlets / Outlets.
vii)	Any other item like civil structures, watchmen huts, water supply arrangements / electricity supply arrangements etc. depending on requirements of the project based on its size etc.

2. Pond Management:

Pond Management plays a very important role in fish farming before and after the stocking of fish seed. Various measures that are required to be undertaken in pre and post stocking practices are tabulated below

A) Pre stocking:

In case of new ponds, pre stocking operations starts with liming and filling of the pond with water. However, the first step for existing pond requiring development deals with clearing the pond of unwanted weeds and fish either by manual, mechanical or chemical means. Different methods are employed for this.

- i) Removal of weeds by Manual/Mechanical or through Chemical means.
- ii) Removal of unwanted and predatory fishes and other animals by repeated netting or using mahua oil cake @ 2500 kg/ha metre or by sun drying the pond bed.

Liming - The tanks which are acidic in nature are less productive than alkaline ponds. Lime is used to bring the pH to the desired level. In addition lime also has the following effects -

- Increases the pH.
- Acts as buffer and avoids fluctuations of pH.
- It increases the resistance of soil to parasites.
- Its toxic effect kills the parasites; and

- It hastens organic decomposition.

The normal doses of the lime desired ranges from 200 to 250 Kg/ha. However, the actual dose has to be calculated based on pH of the soil and water as follows :

Soil pH	Lime (kg/ha)
4.5-5.0	2,000
5.1-6.5	1,000
6.6-7.5	500
7.6-8.5	200
8.6-9.5	Nil

The pond is required to be filled with rain water or water from other sources after liming in case it is a new pond.

iv) Fertilisation :

Fertilisation of the pond is an important means of intensifying fish culture by increasing the natural productivity of the pond. The fertilisation schedule has to be prepared after studying the quality of the pond soil. A combination of both Organic and Inorganic fertilisers may be used for best results. The fertiliser programme has to be suitably modified depending on the growth of the fish, available food reserve in the pond, physico chemical conditions of the pond and climatic conditions.

a) Organic	:	Organic manure to be applied after a gap of 3 days from the date of liming.
b) Inorganic	:	Cowdung @ 5000 kg/ha or any other organic manure in equivalent manurial value
	:	Inorganic fertilisation to be undertaken after 15 days of organic manuring. Requirement of nitrogenous and phosphate fertilisers would vary as per the nature of the soil fertility indicated below.
	:	However any one of the nitrogen and phosphate fertilisers could be used as per given rate.

Inorganic Fertiliser Application (kg/ha/month)

Soil fertility status	Ammonium sulphate	Urea
1. Nitrogen (mg/100 g soil)	70	30
i) High (51-75)	90	40

ii) Medium (26-50)	140	60
iii) Low (upto 25)		
2. Phosphorus (mg/100 gm soil)	Single super phosphate	Triple super Phosphate
i) High (7-12)	40	15
ii) Medium (4-6)	50	20
iii) Low (upto 3)	70	30

B) STOCKING:

The pond will be ready for stocking after 15 days of application of fertilisers. Fish fingerlings of 250 gm weight (approx) should be used for stocking @ 6250 nos. per hectare.

Species combination (ratio)

Species	2-species
Catla	500
Rohu	5750

C)POST STOCKING:

a) Supplementary feeding:

Fishes need much more food than what is available naturally in the pond. Fishes can be fed with a mixture of bran and oilcake in equal quantities daily. The feed should be placed on a bamboo tray and lowered to the pond bottom or it can be broad casted at the corners. After some time the fishes will get used to this type of feeding and aggregate at the same place at particular time. The average requirement of feed rate is as under:

Feed	%	Kgs
Rice bran	80	9600
Ground Nut Oil Cake	10	1200
Cotton Seed Cake	10	1200
Total	100	12000

b) Manuring:

i) Organic manuring may be done in monthly instalments @ 1000 kg/ha.

ii) Inorganic fertilisation may be done at monthly intervals alternating with organic manuring. However, the monthly rate of fertilisation will depend on pond productivity and the growth of

the fishes. It should be ensured that excess fertilisation does not take place which may result in eutrophication.

c) Harvesting:

Harvesting is generally done at the end of 6 months, when the fishes attain average weight of 1 to 1.25 kg. A production of 5-6 tons/ha can be obtained in a year. However, for the purpose of working out economics' a production level of 5 tons/ha/year may be considered. Harvesting is done by partial dewatering and repeated netting. In some cases complete dewatering of ponds is also resorted to.

Annexure II
Intensive carp culture of Catla and Rohu in 1 Ha Water Spread Area

A	Capital Cost	Amount Rs			
S.No	Particulars	Units	Quantum	Rate	Total
1	Site clearance		LS	4000	4000
2	Construction of pond including digging, bund construction and compaction and consolidation	Hrs	50	1500	75000
3	Diesel Pump Set	5HP	1	60000	60000
4	Inlet/outlet sluices			L/S	5000
5	Store Room/ Office Room	Sq ft	500	300	150000
6	Nets and other implements			L/S	5000
7	Miscellaneous			L/S	3500
	Total "A"				302500
B	Operational cost for one crop (6 months)				
1	Drying, desilting ,plouging and watering	LS	LS	LS	10000
2	Lime	Kgs	500	5	2500
3	Single Super Phosphate	Kgs	250	5	1250
4	Urea	Kgs	125	5	625
5	Poultry Litter	Tons	5	1000	5000
6	Fish Seed 200-250 gms weight Catla (750)and Rohu(5500) @Rs 15 each	Nos	6250	10	62500

7	Fish Feed Oil cake , Rice bran & Cotton Seed Cake @ 80% 10% and 10% ratio (9600kgs of Rice bran, 1200 kgs of Oil cake & 1200 kgs of Cotton Sedd Cake @ Rs 8/- ,Rs 22/- and Rs12/- per kg respectively)	Kgs	12000	13.6	163200
8	Watch and ward, feeding	6	1	3500	21000
9	Harvesting charges per kg		7000	1	7000
10	Miscell	LS	LS		15000
	Total "B"				288075
	Total A +B				590575

C	Production Norms		
1	Survival(%)	80	5000 nos
2	Average weight at harvest (gms)	1000	
3	Total production (Kg)	5000	
4	Farm gate price (Rs.)	70	
5	Number of Crops per annum	2	
6	Income during 1st year	350000	
7	Income from 2 crops from II yr onwards	700000	

Financial analysis of Intensive Carp culture 1 Ha Model

Years	1	2- 8	9	10
Capital Cost	3.03	0.00	0.6*	0.00
Recur ring Cost	2.88	5.76	5.76	5.76
Total Cost	5.91	5.76	6.36	5.76
Gross Benefit	3.75	7.50	7.50	7.50
Net Benefit (B-C)	-2.16	1.74	1.14	1.74

Present Worth of Costs @ 15%	33.28
Present Worth of Benefit @ t 15%	39.67
Net Present Worth (PW Benefit - PW Cost)	6.40

Benefit Cost Ratio (PW of Benefit / PW of Costs)	1.19 :1
Internal Rate of Return	80%

Repayment schedule Intensive carp culture 1 Ha model

Particulars	Amt in Rs lakh
Total financial Outlay	5.91
Margin @ 15%	0.89
Rate of interest	12%
Financial Assistance	5.02

Year	Net Income	Interest	Principal	Total outgo	Bank loan O/s	Net Surplus	DSCR
1	0.87	0.60	0.00	0.60	5.02		1.44
2	1.74	0.60	0.56	1.16	4.46	0.58	1.50
3	1.74	0.54	0.56	1.09	3.90	0.65	1.59
4	1.74	0.47	0.56	1.03	3.35	0.71	1.70
5	1.74	0.40	0.56	0.96	2.79	0.78	1.81
6	1.74	0.33	0.56	0.89	2.23	0.85	1.95
7	1.74	0.27	0.56	0.83	1.67	0.91	2.11
8	1.74	0.20	0.56	0.76	1.12	0.98	2.29
9	1.14	0.13	0.56	0.69	0.56	0.45	1.65
10	1.74	0.07	0.56	0.62	0.00	1.12	2.79

Average DSCR

1.88

