Banking Plan on Bio-Floc Fish Farming and Cage Fish Culture

(2022-23 & 2023-24)

NABARD

National Bank for Agriculture and Rural Development
Jharkhand Regional Office, Ranchi

FOREWORD

Jharkhand is a unique state where there is ample growth opportunities in Agriculture and Allied sectors. Agriculture plays a pivotal role in the economy of the State and there is great scope to boost it further through allied activities like goat farming, poultry and fisheries by providing timely bank credit, proper skilling and adequate government support. Timely availability of credit is indispensable for growth of agriculture and allied activities. During the FY 2021-22, the contribution of agriculture credit in the state was ₹8,809 cr out of total priority sector credit of ₹28,072 cr. There is need for banks to further enhance term lending in the agriculture sector so as to enable capital formation at the level of farmers thus resulting in higher assured income on a long term basis.

NABARD in collaboration with Department of Fisheries, GoJ had organised a Regional Advisory Group Meeting on 26 August 2022 on the theme of '**Promotion of Fisheries in Jharkhand - Scope, Implementable Models and Bank Finance'**. As an action point it was decided to assess the district wise scope for financing under the sector, prepare plan to undertake innovative projects like Bio-floc fish farming and cage fish culture and dovetailing the same for subsidy under Pradhan Mantri Matsya Sampada Yojna (PMMSY). Accordingly, district banking plans have been prepared by our District Development Managers (DDMs) in consultation with respective District Fisheries Officers (DFOs). The district-wise banking plans have been compiled at State Level and the State Banking Plan for innovative fisheries activities is being made available to all the banks and SLBC so as to guide them in financing under the sector.

As per the State Banking Plan it is projected that 1,100 units of Cage Fish Culture units and 35o units of Bio-Floc Fish Farming may be financed by the banks during the next 02 years i.e. FY 2022-2024. The total financial outlay of Banking Plan for these innovative fisheries activities stands at ₹136 crore with bank loan component of approx. ₹42 cr.

I am sure that the initiatives and efforts of NABARD captured in this booklet will motivate the bank officials, SLBC and other stakeholders to promote the fisheries activity in the State. I would like to thank the Department of Fisheries, GoJ for providing immense support in preparing the innovative fish farming models. I also extend my thanks to District Fisheries Officials and the LDMs for helping our DDMs in arriving at the district level projections.

(Vinod Kumar Bist)
Chief General Manager

Introduction

Fisheries in Jharkhand is developing at a good pace and is one of the sectors which is attracting rural youths in a huge way. The production of fish in Jharkhand is showing an increasing trend and during FY 2021-22, production of fish in the State was to the tune of 2.57 lakh metric tonnes. Jharkhand is famous for mainly four species viz., Major Carps, Minor Carps, Exotic Carps and Catfishes. They are major carps are the most preferred farm fishes because of their fast growth and higher acceptability to consumers. They constitute 82 per cent of the total fish production of the State. It is followed by Exotic Carps (9%), Catfishes (8%) and Minor Carps (1%). The sector has engaged more than 1.40 lakh fisher persons in 2019-20 of which about 30 per cent are fisherwomen.

Cage aquaculture and Bio-Floc Fish Farming have changed the inland aquaculture scenario of the country, as they have brought new opportunities for optimizing fish production from the reservoirs and lakes, and also developing new skills among fishers and entrepreneurs to enhance their earnings. Both these new techniques of fish farming have revolutionised the fisheries sector. These innovations can help the Govt. to meet objectives of PMMSY i.e. enhancing fish production by an additional 70 lakh tonne by 2024-25, increasing fisheries export earnings to Rs.1, 00, 000 crore by 2024-25 and doubling of incomes of fishers and fish farmers.

A comparison of production

Sr. No.	Category	Composite Fish Culture	Biofloc	Cage Culture
1	Fish production in per cubic meter water volume	0.3 – 1 kg	30 - 35 kg	25 -30 kg
2	Fish Stocking density / M3	1 – 2 nos	90 -100 nos	50 – 60 nos

Cage Fish Culture

A. Cage Fish Culture

Introduction

Cage aquaculture involves rearing of fish in cages developed over water reservoirs. A cage is enclosed on all sides with mesh netting made from synthetic material that can resist decomposition under water for a long period of time and is generally small ranging from 1 m^2 to 500 m^2. Cage is an enclosed space to rear organisms in water that maintains free exchange of water with the surrounding water body. They are generally enclosed on all sides, except for leaving an opening at the top for feeding and handling the stock. However, from operational and planning purposes, a cage with the dimensions: 6m (length) x 4m (width) x 4m (height) is considered as a standard unit and a battery comprises 2, 4, 6, 12 or 24 such cages, as per requirement. The cages in a battery are arranged in caterpillar design for better exchange of water thereby facilitating relatively high dissolved oxygen.

A.1 Fish species suggested in cage fish culture

Depending on the compatibility and type of feeding habits of the fishes like Catla, Rohu, Pangasius and Tilapia are recommended for culture in the cage fish culture technology:

A.2 Unit Cost for two models identified for wider coverage of Fish Farmers under Cage Fish Culture

A.2.1 Model 1 (Battery of 4 cages

Each cage dimension - 6m x 4m x 4m (Ix b x h)

Volume - 96 CuM each cage

Sr. No.	Particulars	Nos	Amount (₹)	Unit cost as per PMMSY, * GoI (₹)
A	**Capital cost**			
1	GI Cage including construction of 6m x 4m x 4m, Floating Materials and Other Accessories	4	4,82,100	
	Subtotal of A		4,82,100	
B	**Recurring cost**			
1	Fingerlings - Pangasius / Monosex Tilapia / other suitable species) (Total 16000 nos. @ 4000 seeds in each cage i.e 2.50 Rs. per seed) (600 seeds per kg)	4	40,000	@ 3,00,000 per cage
2	Formulated Floating Feed (15000 Kg.@ 45 Rs./Kg) (size 1mm to 4 mm)	4	6,75,000	
3	Medicine Cost		4000	
4	Miscellaneous Cost		6000	
	Subtotal of B		**6,89,000**	
	Total Cost (A+B)		**12,07,100**	**12,00,000**

** PMMSY : Pradhan Mantri Matsya Sampada Yojana of the GoI*

Income and Expenditure

1	Culture period (Months)	10
2	Stocking Density of Seeds (Nos)	16,000
3	Average Survival rate of seeds (80% survival)	12,800
4	Average annual growth rate of fish (kg) in 1st year	0.75
5	Average annual growth rate of fish (kg) in 2nd year	0.90
5	Fish Production in 1st year (kg)	9600
6	Fish Production from 2nd year onwards (kg)	11,520
7	Farms gate price (Rs/Kg)	110
8	Gross annual income in 1st year	10,56,000
9	Annual recurring cost in 1st year	6,89,000
10	Annual net income in 1st year	3,67,000
11	Annual income from 2nd year onwards	12,67,000
12	Annual recurring cost in 2nd year	6,89,000
13	Annual net income in 2nd year	5,78,200

Model 2 (Battery of 2 cages)

Each cage dimension - 6m x 4m x 4m (Ix b x h)

Volume - 240 CuM each cage

Sr.No.	Particulars	Amount (₹)	Unit cost as per PMMSY, GoI (₹)
A	**Capital cost**		@3,00,000 per cage
1	GI Cage including construction of 6m x 4m x 4m,Floating Materials and Other Accessories	2,41,000	
	Subtotal of A	2,41,000	
B	**Recurring cost**		
1	Fingerlings - Pangasius / Monosex Tilapia / other suitable species) (Total 16,000 nos. @ 4,000 seeds in each cage i.e 2.50 Rs. per seed) (600 seeds per kg)	20,000	
2	Formulated Floating Feed (8000Kg.@ 45 Rs./Kg) (size 1mm to 4 mm)	3,60,000	
3	Medicine Cost	4000	
4	Miscellaneous Cost	6000	
	Subtotal of B	3,90,000	
	Total Cost (A+B)	**6,31,000**	**6,00,000**

Income and Expenditure

1	Culture period (Months)	10
2	Stocking Density of Seeds (Nos)	8000
3	Average Survival rate of seeds (80% survival)	6400
4	Average annual growth rate of fish (kg) in 1st year	0.75
5	Average annual growth rate of fish (kg) in 2nd year	0.90
5	Fish Production in 1st year (kg)	4800
6	Fish Production from 2nd year onwards (kg)	5760
7	Farms gate price (Rs/Kg)	110
8	Gross annual income in 1st year	5,28,000
9	Annual recurring cost in 1st year	3,90,000
10	Annual net income in 1st year	1,38,000
11	Annual income from 2nd year onwards	6,33,600
12	Annual recurring cost in 2nd year	3,90,000
13	Annual net income in 2nd year	2,43,600

A.3 Subsidy under PMMSY

Subsidy is available for various items like new cage installation including first year inputs etc. under the centrally sponsored scheme viz Pradhan Mantri Matsya Sampada Yojana (PMMSY). Subsidy @ 60% is available for SC, ST, and women fish farmers while subsidy@ 40% is available for general category fish farmers. Rest of the cost incurred may be contributed by fish farmers as margin money.

A.4 Eligible Borrowers

The following category of borrowers are eligible to avail credit.

- An Individual.
- FPOs / A company.
- A Partnership firm.
- A co-operative society.
- A group of fish farmers.

Training in fish farming will be provided by the State Fisheries Departments to the eligible borrowers and it is essential that the borrower has prior knowledge of cage fish farming before availment of bank loan.

Aerial View of battery of cages

B. BioFloc Fish Farming

Introduction

The Biofloc system is an innovative system where fish can be produced in artificial tanks with high densities. It requires much lesser space than the traditional form of fish farming. It is another best available methods today which is helping fish farmers to attain a wide range of objectives such as high output, low cost, sustainable growth, better income opportunities, less area, less maintenance cost etc. In traditional fish farming methods, fish consumes very little amount of feed supplied to them in the water. The wasted feed degrades and turns into toxic metabolites. It pollutes the water and affects the surrounding environment with the stench it emanates as well. In Biofloc fish farming system, wasted feed as well as fish excreta in the water ecosystem, is converted into the feed which can be consumed by the fish. The combination of microorganism, fungi, algae etc. forms a Biofloc which absorbs inorganic waste and enhances water quality. The problem of water pollution is thus solved in this manner. With biofloc system, probiotics or microbes are used which ably promote specific immunity in species like shrimps and reduces pathogenic bacteria. Additionally, water exchange system and the related operational costs are avoided. Thus, Biofloc fish farming is sustainable and provides maximum productivity

B.1 Fish species suggested in Bio-floc culture

A basic factor in designing a Biofloc system is the species to be cultured. Biofloc system works best with species that are able to derive some nutritional benefits from the direct consumption of floc. Biofloc system is most suitable for species that can tolerate high solids concentration in water and are generally tolerant of poor water quality. Some of the recommended species for Bio-Floc fish farming are Pangasius, Mono Sex Tilapia, Mangur, Singhi, Kawai, Prawn etc.

Biofloc fish farming

B.2 Unit Cost for Biofloc Fish Farming (7 Tanks)

Capital Cost

Sr. No	Component	Unit	Unit Cost (Rs.)	Total (Rs.)
1	Set up of tanks. Tarpaulin (4 meter diameter and 1.5 meter height), capacity of 15,000 litre per tank	7	25,000	1,75,000
2	Shed with accessories fixing Charges (200 Sq.mt)	Square meter	600	1,20,000
3	Water supply bore well (3 HP)	1 unit	1,00,000	1,00,000
4	PVC pipe Fitting for air water flow & nets accessories	LS	1,00,000	1,00,000
5	1 Blower (1 HP) airoxy tube tube (12 Tube) and accessories	LS	30,000	30,000
6	Electrification	LS	10,000	10,000
7	Power generator/ Inverter (2 KVA)	LS	45,000	45,000
8	Weighing balance	LS	10,000	10,000
9	Miscellaneous	LS	20,000	20,000
			Total	**6,00,000**

Input Cost of One Crop

Sr. No	Component	Nos.	Cost (₹)	Total (₹)
1	Seed cost (Including transport) @1,500 seed per tank	10,500	Rs. 3.50/ Per pc	36,750
2	Feed cost (Including transport)	LS	LS	1,05,000
3	Probiotics, molasses & raw salt etc.	LS	@1000/- per tank	7,000
4	Miscellaneous			1250
	Total			**1,50,000**
	Total (Capital cost+Input cost)			**7,50,000**

Income and Expenditure

1	Rearing period (Months)	10
2	Average Weight (kg)	0.75
3	Surival@80% survival	8400
4	Total Production (kg)	6300
5	Farms gate price (Rs/kg)	110
6	Gross annual income in 1st year	6,30,000
7	Annual recurring cost in 1st year	1,50,000
8	Annual net income in 1st year	4,80,000

Subsidy under PMMSY

Subsidy @ 60% is available for SC, ST, and Women Fish Farmers while subsidy@ 40% is available for General category Fish Farmers. Rest of the cost incurred will be provided by fish farmers as margin money.

Eligible Borrowers

The following category of borrowers are eligible to avail credit.

- An Individual.
- FPOs / A company.
- A Partnership firm.
- A co-operative society.
- A group of fish farmers.

Aerial view of BioFloc Fish Farming unit

Annexure 1

District-Wise Physical and Financial Projections for Cage Fish culture

(Amount in ₹ lakh)

Sr. No.	District	Cage Fish Culture different models					
		Model	No of units	Total Fin. Outlay	Govt Subsidy*	Margin Money@ 10%	Bank Credit
1	Bokaro	Model 1 (1 battery of 2 cage	40	252.40	144.00	25.24	83.16
		Model 2 (1 battery of 4 cage	45	543.20	324.00	54.32	164.88
2	Chatra	Model 1 (1 battery of 2 cage	12	75.72	43.20	7.57	24.95
		Model 2 (1 battery of 4 cage	5	60.36	36.00	6.04	18.32
3	Deoghar	Model 2 (1 battery of 4 cage	15	181.07	108.00	18.11	54.96
4	Jamtara	Model 2 (1 battery of 4 cage	8	96.57	57.60	9.66	29.31
5	Dhanbad	Model 1 (1 battery of 2 cage	5	31.55	18.00	3.16	10.40
		Model 2 (1 battery of 4 cage	5	60.36	36.00	6.04	18.32
6	Dumka	Model 1 (1 battery of 2 cage	4	25.24	14.40	2.52	8.32
		Model 2 (1 battery of 4 cage	6	72.43	43.20	7.24	21.98
7	East Singhbhum		--	--	--	--	--
8	Saraikela-kharsawan	Model 1 (1 battery of 2 cage	30	189.30	108.00	18.93	62.37
		Model 2 (1 battery of 4 cage	25	301.78	180.00	30.18	91.60
9	Garhwa	Model 1 (1 battery of 2 cage	40	252.40	144.00	25.24	83.16
10	Giridih	Model 1 (1 battery of 2 cage	10	63.10	36.00	6.31	20.79
11	Godda	Model 2 (1 battery of 4 cage	12	144.85	86.40	14.49	43.97
12	Gumla	Model 1 (1 battery of 2 cage	8	50.48	28.80	5.05	16.63

Sr. No.	District	Cage Fish Culture different models					
		Model	No of units	Total Fin. Outlay	Govt Subsidy*	Margin Money@ 10%	Bank Credit
13	Khunti	Model 1 (1 battery of 2 cage	8	50.48	28.80	5.05	16.63
14	Hazaribagh	Model 1 (1 battery of 2 cage	20	126.20	72.00	12.62	41.58
		Model 2 (1 battery of 4 cage	295	3560.95	2124.00	356.09	1080.85
15	Koderma	Model 1 (1 battery of 2 cage	6	37.86	21.60	3.79	12.47
		Model 2 (1 battery of 4 cage	9	108.64	64.80	10.86	32.98
16	Lohardaga	Model 1 (1 battery of 2 cage	10	63.10	36.00	6.31	20.79
17	Latehar	Model 1 (1 battery of 2 cage	10	63.10	36.00	6.31	20.79
18	Palamau	Model 1 (1 battery of 2 cage	6	37.86	21.60	3.79	12.47
		Model 2 (1 battery of 4 cage	5	60.36	36.00	6.04	18.32
19	Ramgarh	Model 1 (1 battery of 2 cage	105	662.55	378.00	66.26	218.30
		Model 2 (1 battery of 4 cage	60	724.26	432.00	72.43	219.83
20	Ranchi	Model 1 (1 battery of 2 cage	40	252.40	144.00	25.24	83.16
		Model 2 (1 battery of 4 cage	200	2414.20	1440.00	241.42	732.78
21	Sahibganj	Model 1 (1 battery of 2 cage	10	63.10	36.00	6.31	20.79
22	Pakur	Model 1 (1 battery of 2 cage	10	63.10	36.00	6.31	20.79
23	Simdega	Model 1 (1 battery of 2 cage	10	63.10	36.00	6.31	20.79
24	West Singhbhum	Model 1 (1 battery of 2 cage	18	113.58	64.80	11.36	37.42
		Model 2 (1 battery of 4 cage	8	96.57	57.60	9.66	29.31
Total			**1100**	**10962.18**	**6472.80**	**1096.22**	**3393.16**

*Subsidy arrived @ 60%for SC/ST/Women

$Model Size - (6m x 4m x 4m)/cage

Model 1 - 1 battery of 2 cages

Model 2 – 1 Battery of 4 cages

Annexure 2

Bank-wise Physical and Financial Projections for Cage Fish Culture- Bank Finance

(Amount in ₹ lakh)

Sr.No.	Name of Bank	Cage Fish Culture (2 cage unit)				
		Model 1- No. of units	TFO	Govt Subsidy	Margin	Bank Loan
1	JRGB	68	429.08	244.80	42.91	141.37
2	JStCB	32	201.92	115.20	20.19	66.53
3	SBI	64	403.84	230.40	40.38	133.06
4	BoI	56	353.36	201.60	35.34	116.42
5	Union Bank of India	42	265.02	151.20	26.50	87.32
6	Indian Bank	28	176.68	100.80	17.67	58.21
7	Canara Bank	32	201.92	115.20	20.19	66.53
8	Punjab National Bank	29	182.99	104.40	18.30	60.29
9	Bank of Baroda	12	75.72	43.20	7.57	24.95
10	Dhanbad DCCB	5	31.55	18.00	3.16	10.40
11	UCO Bank	10	63.10	36.00	6.31	20.79
12	Central Bank of India	24	151.44	86.40	15.14	49.90
	Total	**402**	**2536.62**	**1447.20**	**253.66**	**835.76**

(Amount in ₹ lakh)

Sr. No.	Name of Bank	Cage Fish Culture (4 cage unit)				
		Model 2- No. of units	TFO	Govt Subsidy	Margin	Bank Loan
1	JRGB	119	1436.45	856.80	143.64	436.00
2	JStCB	37	446.63	266.40	44.66	135.56
3	SBI	102	1231.24	734.40	123.12	373.72
4	BoI	96	1158.82	691.20	115.88	351.73
5	Union Bank of India	85	1026.04	612.00	102.60	311.43
6	Indian Bank	44	531.12	316.80	53.11	161.21
7	Canara Bank	62	748.40	446.40	74.84	227.16
8	Punjab National Bank	35	422.49	252.00	42.25	128.24
9	Bank of Baroda	42	506.98	302.40	50.70	153.88
10	Dhanbad DCCB	5	60.36	36.00	6.04	18.32
11	UCO Bank	27	325.92	194.40	32.59	98.93
12	Central Bank of India	44	531.12	316.80	53.11	161.21
	Total	**698**	**8425.56**	**5025.60**	**842.56**	**2557.40**

Annexure 3

District-Wise Physical and Financial Potential for Bio-Floc Fish Farming

(Amount in ₹ lakh)

Sr. No.	District	BioFloc Fish Farming					
		Model	No of units	Total Financial Outlay	Govt Subsidy	Margin Money@ 10%	Bank Credit
1	Bokaro	Model -7 tanks	12	90.00	54.00	9.00	27.00
2	Chatra	Model -7 tanks	2	15.00	9.00	1.50	4.50
3	Deoghar	Model -7 tanks	4	30.00	18.00	3.00	9.00
4	Jamtara	Model -7 tanks	2	15.00	9.00	1.50	4.50
5	Dhanbad	Model -7 tanks	5	37.50	22.50	3.75	11.25
6	Dumka	Model -7 tanks	4	30.00	18.00	3.00	9.00
7	East Singhbhum	Model -7 tanks	10	75.00	45.00	7.50	22.50
8	Saraikela-kharsawan	Model -7 tanks	20	150.00	90.00	15.00	45.00
9	Garhwa	Model -7 tanks	10	75.00	45.00	7.50	22.50
10	Giridih	Model -7 tanks	5	37.50	22.50	3.75	11.25
11	Godda	Model -7 tanks	3	22.50	13.50	2.25	6.75
12	Gumla	Model -7 tanks	7	52.50	31.50	5.25	15.75
13	Khunti	Model -7 tanks	0	0.00	0.00	0.00	0.00
14	Hazaribagh	Model -7 tanks	120	900.00	540.00	90.00	270.00
15	Koderma	Model -7 tanks	4	30.00	18.00	3.00	9.00
16	Lohardaga	Model -7 tanks	0	0.00	0.00	0.00	0.00
17	Latehar	Model -7 tanks	0	0.00	0.00	0.00	0.00
18	Palamau	Model -7 tanks	3	22.50	13.50	2.25	6.75
19	Ramgarh	Model -7 tanks	0	0.00	0.00	0.00	0.00
20	Ranchi	Model -7 tanks	100	750.00	450.00	75.00	225.00
21	Sahibganj	Model -7 tanks	13	97.50	58.50	9.75	29.25
22	Pakur	Model -7 tanks	13	97.50	58.50	9.75	29.25
23	Simdega	Model -7 tanks	13	97.50	58.50	9.75	29.25
24	West Singhbhum	Model -7 tanks	0	0.00	0.00	0.00	0.00
Total			**350**	**2625.00**	**1575.00**	**262.50**	**787.50**

* Subsidy arrived @ 60%for SC/ST/Women

$ Size per BioFloc tank - (4m diameter x 1.5 m height)

Annexure 4

Bank-wise Physical and Financial Potential for Bio-floc Fish Farming- Bank Finance

(Amount in ₹ lakh)

Sr. No.	Name of Bank	Bio-Floc Fish Farming				
		No. of unit	TFO	Govt Subsidy	Margin	Bank Loan
1	JRGB	92	690.00	414.00	69.00	207.00
2	JStCB	24	180.00	108.00	18.00	54.00
3	SBI	72	540.00	324.00	54.00	162.00
4	BoI	62	465.00	279.00	46.50	139.50
5	Union Bank of India	32	240.00	144.00	24.00	72.00
6	Indian Bank	14	105.00	63.00	10.50	31.50
7	Canara Bank	19	142.50	85.50	14.25	42.75
8	Punjab National Bank	20	150.00	90.00	15.00	45.00
9	Bank of Baroda	10	75.00	45.00	7.50	22.50
10	Dhanbad DCCB	5	37.50	22.50	3.75	11.25
	Total	**350**	**2625.00**	**1575.00**	**262.50**	**787.50**

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