



**GOVERNMENT OF ODISHA
FISHERIES & ARD DEPARTMENT**

No. 3532 / FARD, Dt. 7.3.2020
7FY-0002-2020

From

Shri R. Raghu Prasad, IFS
Commissioner cum Secretary to Government

To

The Director of Fisheries, Odisha, Cuttack

Sub:- Guidelines for Cage Culture in Reservoirs by Private Entrepreneurs/
Companies in partnership with Primary Fishermen Cooperative Societies
(PFCS) and Self Help Groups (SHG) in Odisha.

Sir,

The guidelines for taking up Cage Culture in Reservoirs by Private Entrepreneurs/ Companies in partnership with Primary Fishermen Cooperative Societies (PFCS) and Self Help Groups (SHG) in Odisha is enclosed herewith for kind information and early necessary action. You are requested to take necessary follow up action for promotion of cage culture for increasing the fish production in a sustainable manner.

Yours faithfully

[Signature]
7/3/2020

Commissioner cum Secretary to Government

Memo No. 3533, Dt. 7.3.2020

Copy along with copy of the enclosure forwarded to all Zonal Deputy Directors/ District Fisheries Officers for information and necessary action.

[Signature]
7/3/2020

Addl. Secretary to Government

Memo No. 3534, Dt. 7.3.2020

Copy along with copy of the enclosure forwarded to the MD, FISHFED,
Matsya Sadan, Cuttack Road, Bhubaneswar for information and necessary action.

[Signature]
7/3/2020

Addl. Secretary to Government

Memo No. 3535, Dt. 7.3.2020

Copy along with copy of the enclosure forwarded to the PS to APC-cum-ACS, Odisha for kind information of the APC-cum-ACS.

lh
7/3/2020

Addl. Secretary to Government

Memo No. 3536, Dt. 7.3.2020

Copy along with copy of the enclosure forwarded to the PS to Minister, Fisheries & ARD for kind information of the Hon'ble Minister.

lh
7/3/2020

Addl. Secretary to Government

**Guidelines for taking up Cage Culture in Reservoirs by Private
Entrepreneurs/Companies in partnership with Primary Fisherman
Cooperative Societies (PFCS) and Self Help Groups (SHG) in Odisha**

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Background:

Demand and consumption of freshwater fish such as Indian Major Carps and other varieties is ever increasing in Odisha. During 2018-19, Odisha produced about 5.08 lakh metric tonnes of freshwater fish. However, the state is still importing nearly 40,000 metric tonnes of fish per annum from neighbouring states to meet the existing demand. With an aim of self-sufficiency and increased fish production in the state, as envisioned in the Odisha State Fisheries Policy 2015, Fisheries & ARD Department, Government of Odisha has been successfully promoting fish production in the state through various schemes.

Freshwater aquaculture in Odisha is by and large pond-based. However, there are limitations for growth in pond-based aquaculture, considering the ever increasing and often conflicting cross-sectoral demands for water and land; increasing land prices; huge capital investment required to dig the new ponds and maintain the related infrastructure. Due to requirement of such high capital investment, the state is experiencing a slow growth in addition of new fish tanks. However, Odisha has 138 reservoirs with water spread area of nearly 1.4 lakh hectares, which are under-utilised from fish production perspective. Therefore, it can be used for optimal fish production by adopting advanced fish farming technologies such as cage culture and pen culture.

Provisions under the State Reservoir Fishery Policy Odisha, 2012

The State Reservoir Fishery Policy Odisha, 2012 aims at scientific development and management of vast and valuable reservoir fisheries resources with following specific objectives.

1. To augment fish production from the vast untapped/under tapped reservoir resources through scientific management.
2. To generate gainful rural employment with special reference to fishing communities and economic rehabilitation of displaced persons
3. To introduce systematic management strategies both for conservation and sustained fish production
4. To attract increased investments from private as well co-operative sector
5. To stimulate entrepreneurship for fishery sector with special reference to reservoir fishery
6. To substitute traditional methods by the introduction of advanced technology in operation of reservoir fishery
7. To upgrade skills among fishers engaged in the reservoir operation and organisational strengthening
8. To generate substantial revenue for the State



As per the sub-clause no. 3.1 (i) of the State Reservoir Fishery Policy Odisha 2012, the fishing rights of the Fisheries & ARD Department in most of the reservoirs have been leased out, in order of preference, to the nearest Primary Fishermen Cooperative Societies (PFCS) or Self Help Groups (SHG) at Government fixed lease value. Wherever the existing PFCS / SHG did not show interest in taking the reservoir on lease, such reservoirs have been leased out to private individuals and entrepreneurs through open auction of sealed tenders as per the sub-clause no. 3.2 (i) of the State Reservoir Fishery Policy Odisha 2012.

To increase the fish production and productivity of the reservoirs and thus to improve the livelihoods of local fishers, the Fisheries & ARD Department, Government of Odisha has been stocking the reservoirs with fish fingerlings through PFCS / SHG.

Though fish fingerling stocking program has been reasonably successful, it could not make a big difference in the income levels of fishers and fishery basket of the state. During 2018-19, reservoir fish production through capture fisheries was 37,000 metric tonnes with an average yield of about 181 kg/ha, which is very low compared to its potential.

Therefore, to quickly increase the fish production and productivity over several times and in sustainable manner for optimum utilisation from these reservoirs, it is felt necessary to promote cage culture in reservoirs having a surface area of 1,000 ha or more at Full Reservoir Level- FRL and with an average depth of 10 m, as per the national guidelines for cage culture in inland open water bodies (National Fisheries Development Board - NFDB, GoI, 2016) and as per the sub-clause no. 1.2 (iv) of the State Reservoir Fishery Policy, Odisha-2012. Utilizing a modest fraction (1%) of their surface area, large and medium reservoirs can contribute a substantial quantity of fish to the total inland fish production basket.

Cage Culture is an emerging technology for intensive production of fish and has a huge potential for increasing the fish production of the state. It is often considered as the future of Indian Fisheries. In recent years, efforts are being made to promote cage culture in the reservoirs of Odisha with following objectives:

- 1) To augment fish production from reservoirs in a responsible manner, without affecting the livelihood of the traditional/local fishing communities;
- 2) To achieve self-sufficiency in the fish demand of the state;
- 3) To increase per capita fish protein availability in the state;
- 4) To enhance the income and livelihood security of the fishers depending on reservoirs;
- 5) To Promote entrepreneurship in aqua culture and to create job opportunities;
- 6) To ensure that the growth of aquaculture is:
 - a. Inclusive and sustainable,
 - b. In harmony with principles of ecological integrity and natural resource conservation, and
 - c. Not in conflict with the genuine interests of other users of the water and land resources.



Reservoir cage culture in Odisha: Available resources and potential

Of the 138 reservoirs in Odisha with an MWSA of 1,35,921 Ha, 8 reservoirs (4 large reservoirs and 4 medium reservoirs) have tremendous potential for cage culture. Fisheries & ARD Department, Odisha has leased the fishing rights in these 8 reservoirs with MWSA of 99,427 Ha to 20 PFCS and 2 private entrepreneurs as per State Reservoir Fisheries Policy, Odisha 2012 guidelines (Table 1). In this, 1% of the area i.e, 994.30 ha can be used for the cage culture. This can support installation of a minimum of about 41,425 rectangular cages of 96 cubic meter volume (6m length x 4m width x 4m depth) which in turn can produce conservatively about 1,24,275 metric tonnes additional fish per year at a yield of 3 ton/cage/year or 30 kg fish/cubic meter of cage water volume/year. For further enhancement of the fish production above this conservative estimate, it is necessary to conduct Environmental Impact Assessment (EIA) in concerned reservoir as per the national guidelines. Circular cages can also be installed based on the latest technology available.

Table 1: Reservoirs having high potential for cage culture in Odisha

Sl. No.	Name of reservoir and district	No. of PFCS	Area leased out for fishing MWSA (Ha)	Area available for cage culture (Ha) @ 1% of MWSA	Minimum No. of rectangular cages that can be installed (6 m X 4 m X 4 m)	Minimum Fish Production Potential @ 3 ton/cage (30 kg/m ³)
1	Hirakud in Sambalpur, Jharsuguda & Bargarh	10	37,781	377.80	15,741	47,223
2	Rengali in Dhenkanal & Deogarh	5	31,183	311.80	12,991	38,973
3	Balimela in Malkanagiri	1	16,059	160.60	6,691	20,073
4	Indravati in Kalahandi	1	6,957	69.60	2,900	8,700
5	Upper Kolab in Koraput	1	3,500	35.00	1,458	4,374
6	Salandi in Kendujhar	1	1,947	19.50	812	2,436
7	Jambhira in Mayurbhanj	1 Pvt	1,000	10.00	416	1,248
8	Hariharjor in Sambalpur & Sonepur	1 + 1 Pvt	1,000	10.00	416	1,248
	TOTAL	20 PFCS + 2 Pvt	99,427	994.30 Ha	41,425 Rectangular Cages	1,24,275 Metric Ton

Status of reservoir cage culture in Odisha

Fisheries & ARD Department, Government of Odisha has been promoting cage culture in reservoirs since 2015 through centrally sponsored (National Mission for Protein Supplements - NMPS, Rashtriya Krishi Vikas Yojana - RKVY) and state plan schemes.

In total, 322 cages (26 batteries) have been installed in 13 reservoirs by the Directorate of Fisheries, Odisha under NMPS (during 2015-16), RKVY (during 2017-18) and State Plan scheme (during 2017-18 and 2018-19) with a total budget of Rs. 8.21 Crores. Among this, 212 cages are Chinese modular cages with a volume capacity of 96 cubic meter (6m length x 4m width x 4m depth) costing Rs. 2 lakh / cage and 110 cages are CIFRI model G.I. cages (5m length x 5m width x 5m depth) costing Rs. 1 lakh/cage. Out of 322 installed rectangular cage, 58 cages are leased out to private entrepreneurs, 166 cages are leased out to PFCS; 98 cages are defunct & unutilised. Another 24 nos. of rectangular cages will also be installed under Blue Revolution scheme during 2019-20.

In addition to the above, 2 nos. of circular cages (16m diameter X 5m depth) costing Rs. 11 lakhs/cage were installed in the year 2018-19 and has been handed over to the PFCS in Hirakud.

Under NMPS, the PFCS beneficiaries were provided with 100% financial assistance for cage infrastructure and one-time revolving fund to cover 100% operational cost (Rs. 1.50 Lakh / cage) for first crop. Further, under State Plan scheme, the cages were installed by the Directorate of Fisheries and leased out to the beneficiaries for a period of 5 years and input assistance is given to 140 nos. of operational cages at the rate of 50% of the unit cost i.e., Rs. 75,000 /cage.

Fish farming is under progress in 224 cages across the state and they produced about 560 metric tons of fish at a rate of 2.50 metric tons / cage / year during 2018-19. Pangasius is the major species grown in most of the cages. Indian major carps (catla and rohu), barb (Puntius gonionotus), tilapia, anabas and chital are also tried by the farmers in a few cages.

Though cage culture is yet to make its impact on the state fish production figures but, looking at its fast pace of development over the past 6-7 years, it is going to offer a greater potential as a commercial entities unleashing a better future in the coming years.

Lessons from the reservoir stocking and cage culture in Odisha so far

The programme of reservoir stocking in the state has been fairly successful by substantially increasing the fish production and productivity (by 3 times) from 62 kg/Ha/year during 2008-09 to a level of 181 kg/ha/year during 2018-19. During 2019-20, 46 small reservoirs are stocked with fish fingerlings raised in captive pen nurseries, which are managed by local PFCS. PFCS were provided with in-house practical training on pen nursery management and reservoir co-management in which national and international experts from ICAR-CIFRI (Central Inland Fisheries Research Institute, Barrackpore, West Bengal) and WorldFish attended as master trainers. However, PFCS are yet to get habituated to the stocking programme with their own revolving funds. They heavily depend on Government for stocking activities.

Since the reservoir fish production through stocking program is culture based capture fisheries and non-fed system, the reservoir fish productivity depends mainly on stocking density and primary productivity of the reservoir waters. In a reservoir, poor productivity (Oligotrophic) is always been a limiting factor for which less stocking is done in spite of availability of vast expanse of open water area. But somewhere in the same realm, the reservoir also leaves a great scope of harnessing its good potential taking the productivity to its optimum height. Therefore, the technique of intensive farming systems such as cage culture and pen culture is the need of the hour for ramping up the fish production.

Cage culture is a capital and technology intensive process involving unanticipated risk in the business. So far, the PFCS have been relying high on Government financial assistance for cage culture operations and faced several challenges in backward and forward linkages in the value chain. PFCS faced lot of difficulties in marketing the fish at profitable prices and many times making a distressed sell of their catch. Whenever financial assistances from Government side were discontinued, the PFCS often failed to continue with the cage culture activities thus bringing the programme to a grinding halt. However, a few private entrepreneurs who have taken the cages on lease basis have been successfully culturing fish without demanding any financial assistance from Government.

Need to attract private investment in cage culture and share the benefit with local fishers

Since the primary goal of in reservoir fisheries to increase the fish production in environmentally sustainable way and to improve the socio-economic conditions of the dependent people including local fishers and displaced persons who are in fact one of the weakest section of our society, a balanced approach should be adopted while promoting cage culture. This could be a big game changer for the community and regional development, bringing all the parties to a single platform thereby increasing an interactive participation in the program and avoiding any creation of conflicts.

Lessons learnt from cage culture activities in the state so far has opened up a whole new perspective where it highlights the need of an active participation by a promoter/private entrepreneur making it a commercial entity and opening up prospect for job creation and other allied activities for local fishers and youths. Interested private entrepreneurs should be encouraged to scale up cage farming with integrated approach, i.e. by developing a host of ancillary activities like seed rearing, feed manufacturing, post-harvest processing & marketing, etc. in the vicinity of cage culture site.

Engaging local people including the fishers and PFCS at cage culture site as well as in other need based ancillary activities with overall supervision of FISHFED and Directorate of Fisheries can create an enabling and accommodative situation for both the local fishers and the private entrepreneurs. With this backdrop, Fisheries and ARD Department, giving due consideration to the interest of the PFCS/SHG, intends to allow cage culture in the demarcated zones of the selected reservoirs by the private entrepreneur /company on 'Install and Operate Basis' through an Expression of Interest (Eoi). The following guidelines should be implemented for this purpose:

Guidelines for taking up Reservoir cage culture by Private Entrepreneurs/Companies in partnership with PFCS/ SHG:

A. Modalities for allowing private entrepreneurs / companies to take up reservoir cage culture in partnership with PFCS/ SHGs

1. Directorate of Fisheries shall identify and demarcate suitable zones for cage culture inside the leased fishing area of PFCS/SHG and fix the maximum surface area of the cage and annual fish production limit in each cage culture zone as per the technical criteria given in the guidelines for cage culture issued by Ministry of Fisheries, Animal Husbandry and Dairying and National Fisheries Development Board and considering the relevant provisions under the State Fisheries Policy Odisha, 2012.
2. The Directorate of Fisheries shall invite 'Expression of Interest' and Detailed Project Report (DPR) from private entrepreneurs / companies for taking up cage culture on 'Install-Operate basis'.
3. A Memorandum of Understanding (MoU) will be signed between the Director of Fisheries and the selected private entrepreneur / company.
4. All the costs towards establishment of cage infrastructure and fish farming should be arranged by the entrepreneur as per the business plan included in the DPR.
5. Out of the Bid amount, 50% shall be allocated to the concerned PFCS/SHG, 20% shall be placed with the FISHFED and 30% shall be retained by the Directorate. Any changes in the sharing pattern will be subject to approval by Government in F&ARD Department.
6. Agreement for cage culture shall be signed for a period of 5 years initially and may be renewed for another 5 years with the approval of the Director of Fisheries.
7. If the PFCS / SHG want to directly take up the cage culture with their own resources or through financial support from the Government under various schemes, then the Directorate of Fisheries shall allow the PFCS / SHG to take up the cage culture by paying Government determined lease value.

B. Guidelines to PFCS / SHG and FISHFED for utilising the financial proceedings (bid amount) from cage culture by private entrepreneurs / companies

1. PFCS shall open a separate bank account under this scheme and it shall be operated under the joint signatory of District Fisheries Officer and President/ Secretary of the PFCS.
2. PFCS /SHG shall utilise their share of the bid amount (50% of the total bid amount) for following activities
 - a. Stocking of fish fingerlings and prawn juveniles in the reservoirs as per the stocking density and species composition suggested by the Directorate of Fisheries.

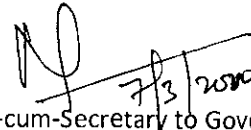


- b. Undertake pen nursery for captive production of fish fingerlings in suitable locations along the peripheries of the reservoir.
 - c. Undertake pen culture of fish for grow-out production of table size fish in suitable locations along the peripheries of the reservoir.
 - d. Procure fishing boats, gears (nets) and other accessories for fishing activities.
 - e. Any other activities for increasing the fish production in the reservoirs with approval of Director of Fisheries.
3. FISHFED shall utilise their share of the bid amount (20% of the total bid amount) for following activities
 - a. Utilise 5% for covering administrative expenditures.
 - b. The remaining 15% shall be used for following purposes
 - i. Provide training and conduct exposure visits to the concerned reservoir PFCS / SHG members in sustainable reservoir fisheries resources management.
 - ii. Undertake environmental monitoring and environmental impact assessment (EIA) studies through suitable local universities or national institutions such as ICAR-CIFRI. Standard protocol suggested under the national guidelines for cage culture in inland waters should be followed.
 - iii. Develop fishing jetties and other transportation infrastructure in the reservoir.
 - iv. Develop cold chain facilities near reservoir for the use of PFCS / SHG and private entrepreneurs / companies.
 - c. FISHFED shall submit an action plan along with the budget to the Director of Fisheries for his/her approval for implementation and financial utilisation.
4. Directorate of Fisheries shall utilise their share of the bid amount (30% of the total bid amount) for following activities
 - a. Utilise 5% for covering administrative expenditures.
 - b. The remaining 25% shall be used for following purposes
 - i. Provide training and conduct exposure visits to farmers
 - ii. Capacity building of staff at various levels
 - iii. Undertake various infrastructure projects for development of fisheries in the State
 - iv. Undertake various schemes for increasing production and productivity in fisheries and for enhancing the livelihoods of fishermen.
 - c. Director of Fisheries shall submit an action plan along with the budget to the FARD Department for approval of the plan.

C. Environmental Precautions and Assessment

The following measures need to be adopted for cage culture projects:

1. Major environmental threats from cage aquaculture include the release of excessive nutrient that accumulate in water and sediments. With the aim of protecting aquaculture operations from detriment of excessive nutrient load in water and sediments and also to protect the environment from the harmful effects of cage culture (Eutrophication and chemical/pharmaceutical inputs), an Environmental Impact Assessment (EIA) will be carried out by FISHFED. This should be done/facilitated by competent authorities/organisations, following a standard procedure.
2. It will be mandatory for the cage culture operators to record the water quality parameters like Dissolved Oxygen, pH, CO₂ and Total Alkalinity, inside and outside the cages from the day-one of its operation, keeping in view the need for long-term environmental health of the water body.
3. It will be mandatory for the cage culture operators to collect data on the trophic status in and around the cages as well as the areas away from the cages periodically and should be reported to the District Fisheries Officer, FISHFED and the Directorate of Fisheries to assess any implications caused due to nutrient loading. Studies on other chemical and physical parameters of water and sediments should also be undertaken as per the future perceptible risk.

Handwritten signature and date: 7/3/2020

Commissioner-cum-Secretary to Government

F & ARD Department