ANNEXURE VII: AQUACULTURE PLAN

7.1 Introduction

Pisciculture in tank command and value chain development is proposed under OIIPCRA project. To promote pisciculture and development of sustainable value chain infrastructure, a management plan will be prepared. Management plan will address all related environmental issues, institutional development and capacity building including monitoring plan for implementation of plan.

7.2 Baseline Assessment

7.2.1 Pisciculture Practice in Tank

Pisciculture in MI tank considered under OIIPCRA is a very common practice. Pisciculture practice in MI tank are governed by district fisheries officer. These tanks are leased out to local PFCS or SHG for pisciculture purpose. Such 277 MI tanks are presently being leased out to PFCS/ SHG. Lease duration in sampled project districts ranges between 1-3 years.

Pisciculture in sampled MI tanks is reported as well. Pisciculture practice is noticed in 9 sampled tanks. In all cases pisciculture practice is done either by local SHG group or PFCS taking lease from fisheries department or from respective gram panchayat. In case water spread area is less than 40 Ha., tanks are leased out by local Gram Panchayat. Jamunasagar MIP has been leased out to Maa Manikeshari PFCS by fisheries department, Dhandamunda MIP and Dandrabahal MIP (Bolangir) has been leased out to individual person. Local fish species are primarily being grown in tank command area and captured either for own consumption or commercial selling purpose. Sampled area wise genetically modified and cultivated fish species are listed down in below table.

Table 1: Majorly cultivated fish species in tank

Sample MIP	Block	Details	Majorly cultivated fish in Pond/ tank
Dhandamunda MIP, Nabarangpur	Chandahandi	Dandamunda, Dhadipani, Chandahandi, Nabarangpur	Rohi, Bhakur, Mirikali, Grass Crap, Sliver Crap
Jallibandha MIP, Ganjam	Ganjam	Ganji (Personal)	Rohi, Bhakur, Mirikali, Mourali, Kalibosh, Gadisa, Kau, Karandi, Pradan (Barami)
Bisipur MIP, Mayurbhanj	Karanjia	Badagaon, Karanjia	Rohi, Bhakur
Khaibandha MIP, Balasore	Nilagiri	Govt. Hatchery, Village-Dignaria, Balasore	Bhakur, Mirkali, Chaina Rohi, Jayanti Rohi, Grass Crap
Khaibandha MIP, Balasore	Nilagiri	Khaibandha, Balasore (Govt. High school teacher)	Kerandi, Rohi, Kantia, Bahal, Silver calf, Glas Calf, Prawn, Bhakur, Mirkali
Dandrabahal MIP, Bolangir	Patnagarh	Maa Samalasori SHG, Baglabandha, Kendumundi, Patnagarh	Rohi, Bhakur, Mirkali, Silver, Silver Carp
Jamunasagar MIP, Kalahandi	Bhawanipatna	Jamunasagar, Bhawanipatna, Kalahandi	Rohi, Bhakur, Mirkali, Bilati Rohi, Grass Crap
Kalimati MIP, Keonjhar	Harichandanpur	Balipokhari, Harichandanpur	Rohu, Bhakura, Mirkali, Grass carp

Issues:

i. Inadequate information on the fisheries resources and the state of the aquatic environment of local people;
ii. Inadequate monitoring, extension and enforcement mechanisms;
iii. Siltation of the tank making most of them non-operational;
iv. Death of fish due to pesticide leaching into tank has been reported by local farmers of Jalibandha MIP;
v. Natural calamities such as unprecedented rain, cyclones and floods, leading to destruction of fish/ aquaculture ponds and systems;

7.2.1.1 Fish Diseases

Fish diseases occur mainly when water become polluted or bacterial/ fungal attack on fish species. Local people can notice water pollution by visual observation of tank water. Colour change, odour or bad smell in water or layer of excess phytoplankton and zooplankton on top of water are few of visual appearance of water pollution. However, testing of tank water was not done by any of the lease holder. Tank location wise commonly occurring fish disease and medicines used to treat fish disease are tabulated below.

Table 2: Sample location wise commonly occuring fish diseses and used medicine

Sampled MIP	Block	Diseases	Used Medicine
Dhandamunda MIP, Nabarangpur	Chandahandi	Gill rot	Bitavir, Gut pro
Jallibandha MIP, Ganjam	Ganjam	Argulus, Gill rot,	Trichlophill
Bisipur MIP, Mayurbhanj	Karanjia	Red Spot, Fin rot	KMnO4, Trichlophill
Khaibandha MIP, Balasore	Nilagiri	Argulus, Fungal/Bacteria	KMnO4, Paracure-BT, CIFAX
Khaibandha MIP, Balasore	Nilagiri	Eye fluke,	Gut pro, Trichlophill
Dandrabahal MIP, Bolangir	Patnagarh	Argulus	Trichlophill
Jamunasagar MIP, Kalahandi	Bhawanipatna	Gill rot, Argulus	KMnO4, Gut pro
Kalimati MIP, Keonjhar	Harichandanpur	Fin rot, Gill rot, Argulus,	KMnO4, Copper, Copper sulphate

Source: Field study conducted by CTRAN Consulting

Issues:

- Water pollution in tank due to excess use of fish feed is reported at Khaibandha MIP, Balasore.
- Fish disease is very common in all this sampled area
- Disease surveillance by fishery department is not happening at desired interval
- People's awareness about disease specific medicine and dose can be termed as very poor

7.3 Objective

Objective of developing aquaculture plan is to promote sustainable pisciculture practices and value chain development. This will increase water productivity hence increase in family income through alternative livelihood.Increase in capture based fresh water pisciculture will reduce dependency on neighbour state for importing fish to meet state demand.

7.4 Approach for Aquaculture Plan Preparation

Following broad principles shall be taken care of while promoting pisciculture in MI tank:

- Availability of DSL of minimum 2 meter from normal ground water.
- Water availability during different season;
- Consider only those tanks which can hold water at least for 6 months at a stretch;
- Select native species which are dominant in respective MI tank region;

- Develop water sharing mechanism among different water users of respective MI tank;
- Assess condition of irrigation structure/ water controlling mechanism, leaching of fertilizer and pesticide may occur if regulating structures are dilapidated.
- Develop disease specific mitigation plan in consultation with Department of Fishery, Govt. of Odisha
- Device monitoring and supervision mechanism;
- Involve pani panchayat and SHG operating in surrounding area to maintain social integrity
- Consider water quality of respective MI tank;
- Avoid MI tanks located at Very High Damage Risk Cyclone Zone- B and High Damage Risk Cyclone Zone (Baleswar, Bhadrak, Jajpur, Mayurbhanj, Ganjam, Gajapati, Keonjhar)
- Avoid MI tanks located at declared flood zone (Ganjam, Jajpur, Bhadrak and Baleswar)

7.4.1 Institutional Arrangement

Directorate of Fishery will be nodal person for promotion of pisciculture in MI tank and marketing of product. Directorate of fishery will prepare Aquaculture Plan taking input from all implementing departments associated with apiculture related activities proposed under OIIPCRA. Following stakeholders' departments will be associated for preparing plan and implementation of same.

- Directorate of Fishery, Govt. of Odisha,
- Odisha Pissiculture Development Corporation(OPDC),
- Central Institute of Fresh Water Aquaculture (CIFA),
- College of Fisheries (CoF), OUAT,
- FNGOs,
- Fish federation (FISHFED),
- Central Institute of Fisheries Technologies (CIFT),
- Central Inland fisheries research Institute (CIFRI)
- and other ICAR Institutes like IIWM,

7.5 Mitigation Plan

Following mitigation measures shall be considered while preparing Aquaculture Plan and implemented during project implementation and operation.

Table 3: Mitigation measures to be adopted during pisciculture and related trading

Key Impact	**Mitigation Measures**	**Project Stage**	**Monitoring** Responsibility
Use of powdery vegetarian feed will pollute water if left to suspend in water for too long time. Trash fish shreds are irregular in size and have a high loss rate (about 40%). The feed residue deposited on the pond bottom will cause pollution, resulting in a heightened risk of anoxia and mortality rate.	Use pellet feed of the appropriate size and density. It will significantly reduce loss and environmental pollution caused by the feed residue.	Operation	**Implement**: Beneficiary (weekly) **Supervise**: CIFA/ OPDC(Quarterly) **Monitor**: M&E Cell of DFeO (Quarterly)
High moisture Trash fish feed becomes	Use vegetarian fish feed which has	Operation	**Implement**:

moldy easily. It is vulnerable to bacteria and parasites. The fat of trash fish oxidises and rots easily. Rotten trash fish may cause disease or even death.	a low moisture content and preservation treatment is usually not necessary. As long as it is stored properly there should not be any bacteria or mold problem.		Beneficiary (weekly) **Supervise**: CIFA/ OPDC (Quarterly) **Monitor**: M&E Cell of DFeO (Quarterly)
Water pollution due to excess use of medicine to control fish diseases	Use recommendation dose of prescribed medicine as per instruction	Operation	**Implement**: Beneficiary (weekly) **Supervise**: CIFA/ OPDC(Quarterly) **Monitor**: M&E Cell of DFeO (Quarterly)
Spreading of fish diseases	Use vegetarian fish feed instead of Trash fish feed; regular cleaning of aquatic weed; occasional treatment of water and pond bed to maintain right pH condition	Operation	**Implement**: Beneficiary (Monthly) **Supervise**: CIFA/ OPDC(Quarterly) **Monitor**: M&E Cell of DFeO (Yearly)
	Undertake Disease Surveillance at regular frequency and adopt mitigation measures	Operation	
Reduction in the usage of genetic diversity of the wild fish varieties	Maintain mixed fish culture with suitable species of wild fish and species proposed under OIIPCRA	Operation	**Implement**: Beneficiary (during fingerling) **Supervise**: CIFA/ OPDC(Quarterly) **Monitor**: M&E Cell of DFeO (Half yearly)
Fish mortality of self-replicating species may occur if oxygen circulation is not maintained properly	Provide sufficient surface agitation	Operation	**Implement**: OPDC (Daily) **Supervise**: DFeO(Quarterly) **Monitor**: M&E Cell of DFeO (Half yearly)
Generation of food waste from fish processing unit will give bad odour if not managed in scientific way at regular interval;	Waste material shall be stored in an earmarked location and disposed at a designated place at regular interval. Regular disinfection of surrounding area	Operation	**Implement**: Beneficiary (Daily) **Supervise**:CIFT / CIWA / FISHFED(bi-weekly) **Monitor**: M&E Cell of DFeO (Half Yearly)
Health hazard due to use of formalin during fish processing and unhygienic practice	Use of formalin shall be as per prescribed volume.	Operation	**Implement**: Beneficiary (Daily) **Supervise**:CIFT / CIWA / FISHFED(bi-weekly) **Monitor**: M&E Cell of DFeO (Half Yearly)
Health hazard and spoilage due to unhygienic practice and spoilage due to non-maintenance of suitable	Keep neat and clean of fish transportation vehicle; Regular cleaning and disinfection of	Operation	**Implement**: Beneficiary (Before expiry)

temperature in transportation vehicle	transportation vehicle to maintain hygiene condition; Always maintain required temperature by refrigeration system		**Supervise**:CIFT / CIWA / FISHFED(Quarterly) **Monitor**: M&E Cell of DFeO (Yearly)