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## Socio-economic impact evaluation of fishery schemes in saraikela and west Singh hum districts of Jharkhand, India-strengthening livelihood opportunity

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### Abstract

Jharkhand is predominantly an agriculture state and fisheries are an integral part of the production system. The study looked at analyse the impact of “Matsya Mitra”, Matsya Awas, seed stocking, and 30 decimal tanks on development of fisheries in the districts of West Singh hum and Saraikela. The study was based on both secondary and primary data. 50 Matsya Mitra belong to Saraikela district while the remaining 54 are from West Singhbhum district. Matsya Mitras are working as change agents providing linkage between the rural communities and the government. Due to Matsya Mitra’s intervention, in West Singhbhum district 152 new potential farmers could be created where as in Saraikela 226 new farmers took up fishery as an activity. 874 lakhs of spawn have been distributed in West Singhbhum district and in Saraikela district 625 lakhs of spawn distributed during 2009-10 which is 4 times increase than the previous year. Under the fishermen housing scheme, over 1080 dwelling units were constructed since 2001-02 to 2009-10 in two study districts for the same number of families which has facilitated fishermen to replace their mud cum thatched houses. Due to having a house, the poor and homeless families from fisherman community are the scheme for stocking reservoirs has come as a boon to the fishermen communities living in surrounding villages. The 30 decimal tank rearing scheme aims at promoting seed rearing. So far 351 beneficiaries are covered under 30 decimal rearing tanks. This scheme is in good demand and helped increasing the seed production. Overall, all the schemes under implementation by Fishery Department, Government of Jharkhand have made significant positive impact on the fisheries sector development in the state. With the removal of some of the constraints and bottlenecks, the sector is poised for qualitative and quantitative of rural livelihood.

**Keywords:** matsya mitra, rural livelihood, rural housing, 30 decimal tank

### 1. Introduction

The global capture fisheries and aquaculture production increased from 122 million ton in 1997 to about 132 million tonnes in 2003. While the inland capture and culture fisheries contributed to 34.2 million ton, the marine capture and culture fisheries contributed to 98.0 million tonnes during 2003. China accounts for over 34 per cent of the world total in terms of quantity. Peru, India, Japan, United States, Chile, Indonesia and Russian Federation are the other major producers. India is one of major fish producing countries in the world with third position in fisheries and second in aquaculture. The sector has high potential for rural development, domestic nutritional security, employment generation, gender mainstreaming as well as export earnings. Indian Fisheries sector has been witnessing a steady growth since First Five Year Plan. The annual fish production rose to over 6.3 million ton during 2004-05 from around 0.75 million ton in 1950-1951. The marine fish production increased from 0.53 million ton in 1950-51 to a maximum of 2.99 million ton in 2002-03 and 2.78 million ton during 2004-05. Fishery is an important economic activity in Jharkhand State for additional employment and income generation. About 80-85% people in the state consume fish and shell fish products. Against the demand of one lakh ton of fish, the state is providing 76,000 tons in 2008-09. The rest demand is met from the states of Andhra Pradesh and West Bengal. Fishery also attracts additional employment opportunities to a large number of people in the form of harvesting, net and boat making, seed production, transportation and sale of fish in whole sale and retail markets. A vivid study was done through various social and statistical machineries to estimate the impact of govt. Schemes on the rising trend of fish production at our target area (Bruger C. Ridler NB, 2014) [6]. Along with the socio- economic study we also studied the

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scientific and technical knowhow transferred to the fish farmers of these target districts through this scheme of govt., like water quality management of culture pond, maintaining of physico-chemical parameters of pond water, feed management to get better FCR(Food Conversion Ratio) etc. to achieve improved production through semi-intensive aquaculture practices, now practiced in these districts insted of primitive extensive culture styles(Munni MA, Fardus Z et.al.,2013 & Bhatnagar A et.al.,2013, G.B. Banerjee UNDP Global Project, Santiniketan) [18, 8, 4]. At last each and every factors and impact of govt. Schemes were analysed comparatively to study pre and post intervention of the schemes to know the pros and cons of the schemes and to estimate the rate of enhancement of fish production due to the application of these schemes (Eval. Study Rpt. of Inland Fisheries, NABARD).

## 2. Objectivity of the study

### Following are the objectives of the study

- To analyze the impact of the promotion of “Matsya Mitra” and “Seed Grower” concept on development of fisheries in the districts of West Singhbhum and Saraikela.
- To examine the impact of housing scheme on welfare of fish farmers and fisherman community.
- To analyze the impact of seed stocking (Fingerlings) in Reservoirs on the socio-economic development of fish farmers and fisherman community.
- To study the impact of 30 decimal seed rearing tank on development of fish farming/farmer in the districts covered under study.

## 3. Study area

The state of Jharkhand is located between 21°89'N to 25° 20'N and 83°39' E to 87° 52'E. It was carved out of the southern part of Bihar state in year 2000. The state has an area of 79,714 km<sup>2</sup>. The state shares its border with Bihar to the north, Uttar Pradesh and Chhattisgarh to the West, Odisha to the south, and West Bengal to the east. Most of the area of state lies on the Chota Nagpur Plateau, which is the source of the Koel, Damodar, Brahmani, Kharkai, and Subarnarekha rivers, whose upper watersheds lie within Jharkhand. The state is drained with the river systems viz. North Koel, Sone, Damodar, Subarnarekha, Sankh, South Koel, Karo etc. Fishery is an important economic activity in Jharkhand State for additional employment and income generation. About 80-85% people in the state consume fish and shell fish products. Against the demand of one lakh ton of fish, the state is providing 76,000 tons in 2008-09.

The rest demand is met from the states of Andhra Pradesh and West Bengal. Fishery also attracts additional employment opportunities to a large number of people in the form of harvesting, net and boat making, seed production, transportation and sale of fish in whole sale and retail markets. It has been felt by the Government of Jharkhand to undertake evaluation of the above schemes in order to know the impact of various interventions on fishery Sector development. It was decided by the State Government to assess the impact of those schemes by independent organizations so that lessons can be learnt for further implementation and policy formulation. The study has been carried out in West Singhbhum (Chaibasa) and Saraikela districts as part of the study (see fig-1).



Fig 1: Study area

## 4. Study methodology

The study has been undertaken in West Singhbhum and Saraikela districts of Jharkhand state. Secondary data for the study have been collected from the Directorate of Fishery, Govt. of Jharkhand and FFDA's of the concerned districts and other agencies involved in development of fishery sector. The socio economic evaluation and impact assessment study has been limited to the above mentioned two districts of Jharkhand. Primary data have been collected from Matsya Mitras, fish farmers, fish farming community, elected representatives of PRIs, Village Level Workers, other associated functionaries and general public to know the impact of different interventions undertaken for fishery development in the district. All the Matsya Mitras, Fish seed Growers and fish farmers in the two study districts assisted under fishery housing & other schemes have been consulted for assessing the impact of those interventions undertaken by Department of Fishery, Govt. of Jharkhand. Following research tools have been used during the course of interaction with the respondents.

- Individual Interview(census)through questionnaire and Opinion Survey
- Focus Group Discussion
- Wealth and livelihood security analysis

Individual interview has been conducted through a pre-tested questionnaire with all categories of respondents i.e. Matsya Mitras, Fish seed Growers, beneficiaries of housing scheme and 30 decimal rearing tank to know their opinion on the benefits accrued to them, implementation process and the overall impact of the schemes in promotion of fishery. Focus Group discussion has been conducted separately with all the stakeholders involved like beneficiaries under each of the scheme, implementing officials and general people on the delivery mechanism of the each of the scheme, benefits to individual beneficiary and fisherman community, overall impact on promotion of fishery, constraints in reaching the benefits to the community and recommendations for future intervention at the policy and implementation level. Wealth and livelihood analysis has been done in order to know about the changes in quality of life with respect to the income, employment and livelihood of the beneficiaries after the implementation of scheme etc. 200 fish farmers, common people, officials etc have been consulted to know about the impact on fish productivity and fishery sector in general due to each of the intervention in the district. 200 to 300

respondents from each study district have been consulted. Wealth and livelihood security analysis of each of the beneficiary have been done to know the change in their quality of life after being involved in fishery activity.

## 5. Data analysis and finding

As per the study objectives and scope of work, this paper analyses four schemes and its impact to the rural economic and live hood of the people.

### 5.1 Matsya mitra

Matsya Mitra is an innovative scheme adopted by Govt. of Jharkhand for the promotion of fishery in the state. Local Educated People having basic knowledge on fishery and community mobilization skill have been identified as matsya mitras for development and promotion of fishery in the state through public ownership and local partnership. They have

been assigned with survey of potential water bodies, fish seed collection, awareness and motivation to fish farmers for the promotion of fishery. The Matsya Mitras are paid an honorarium of Rs.50/- per one hectare of water area in lieu of which they facilitate fish seed production, preventing disease in fishes and other aspects of fish farming through information dissemination among fish farmers and local community. It can be seen from Table 1 that 104 nos. of Matsya Mitras have been selected in the two districts by 2009-10 covering 23 blocks to promote fish production and income generation of the fish farmers. It is clear from the Table -1 that 35 Matsya Mitras belong to Saraikela district while the remaining 54 are from West Singhbhum district. Therefore, it can be said that little more number of Matsya Mitras have been selected for West Singhbhum district than in Saraikela district.

**Table 1:** Matsya mitras in study districts by 2009-10

Sl. No.	District	No. of MMs	Tanks (No)	Water Area (ha)	Average area/tank
1	W. Singh hum	54	7170	1780	0.27 ha
2	Saraikela	35	2385	1643	0.67 ha
Total		104	10055	3423	0.37 ha

**Source:** Directorate of Fishery, Govt. of Jharkhand and field Study

It reveals that on an average one Matsya Mitra takes care of 132 tanks/ponds in West Singhbhum district where as only 45 tanks are looked after by one person in Saraikela district. However, it varies from person to person. The number of tanks covered by Matsya Mitras also varies from 30 to 120 in different areas of the study districts. It can further be seen from the Table that 1780 hectares of water spread area are looked after by Matsya Mitras in West Singhbhum district

where as it is 1511 hectares in Saraikela district. Average area of one tank in West Singhbhum district is 0.27 hectares which is much smaller than Saraikela district (0.67 hectares). The study team interacted with all the Matsya Mitras and visited 30 per cent of the tanks covered by them. The following Table depicts the impact on productivity and income of the fish farmers due to the intervention of matsya mitras. Year 2005-06 has been taken as the base year to analyze the impact.

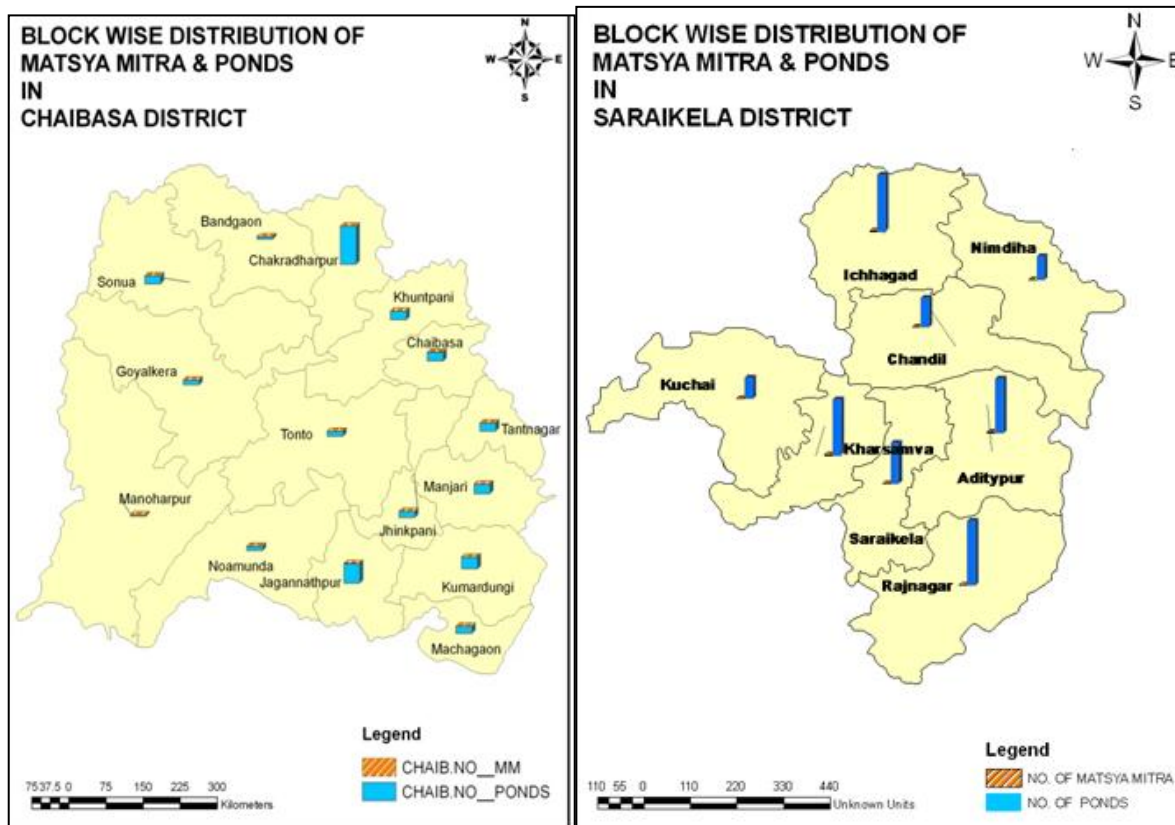
**Table 2:** Impact on productivity and income due to Matsya Mitras

Indicators	Before	After	Increase
<b>West Singhbhum</b>			
Productivity per Acre/Year	80-100 Kg	250-400 kg	3 to 4 times
Income per Acre/Year	Rs.7000-9000/-	Rs22000-35000	3 to 4 times
<b>Saraikela District</b>			
Productivity per Acre/Year	80-100 Kg	300-500 kg	4 to 5 times

**Source:** Field Study

Saraikela district performed comparatively better with respect to productivity and income ranging from 4 to 5 times increase in productivity and similar improvement in income from the same unit of farm in a year. In quantitative terms, little more number of Matsya Mitras have been appointed in West Singhbhum district with more number of tanks in 15 blocks of the district. The response of 100 respondents from each of the study districts have been solicited to know about the services rendered by matsya Mitras in facilitating fish seed production, preventing disease in fishes, schemes of government and follow up measures. Table-3 and 4 captures responses of common people and fish farmers on the effectiveness of these mitras in providing services as well as promotion of fisheries. The majority of the respondents (50-58 per cent) in West Singhbhum district have opined that the matsya mitras have been quite effective in sensitizing the people on basics of fishery, tips for rearing of seedlings, schemes, facilities and

subsidy available by the Government for pisciculture as well as facilitation in the early stages of production. There has been relatively less response (40 per cent) from the farmers that the matsya mitras has helped them to the proper extent in preventing disease of the fishes, harvesting and marketing etc. Remaining 13 to 20 per cent of the respondents are of the opinion that assistance extended by matsya mitras have been negligible during the sensitization phase and disseminating knowledge on Govt. schemes meant for them. 28 per cent of the respondents of West Singhbhum district have opined that though some they have sensitized them in the initial phases but subsequently they have not facilitated them at all during stages of fish rearing. 31 per cent of the respondents of the same district have expressed that matsya mitras have not helped them in production a harvesting of fishes and marketing activities etc. The following map shows mastya mitra distribution in two districts.



Two rounds of workshops have been organized by the study team with the Matsya Mitras to know their opinion on effectiveness of the scheme and bottlenecks experienced by them in the process of promoting fish production. During the course of interaction with the matsya mitras following opinions have been recorded from them which act as bottlenecks in effectively delivering the desired services to the fish farmers. Government has not provided them any kind of transport facility to look into such large number of tanks and ponds. The financial support given by Govt. is very nominal according to them considering the services rendered at their level. Due to less remuneration, they are also de-motivated to work. There is also demand for monthly remuneration them.

Due to lack of periodic training and exposure to other fish producing states like Andhra Pradesh, West Bengal and coastal Orissa, they are unable to know about different varieties of fishes, latest technology and practices on fish production on large scale, prevention of diseases to the fishes, fish processing, marketing, cost and benefit involved on various kind of fish production. Due to limited exposure they are unable to replicate successful cases of pisciculture in their own area. In spite of the concerns and complaints of common people and fish farmers on quality of services rendered by Matsya Mitras, following benefits have been accrued to the fisherman community.

- There has been 180 to 300 per cent increase in fish

productivity per acre in a year after introduction of the scheme. This also led to 200 to 400 per cent increase in annual income per fish farmer in a year from one acre of land.

- The private fish farmers who were not practicing fish farming due to lack of information and knowledge in the subject and also scared of loss, they turned to be fish farmers due to orientation by Matsya Mitras.
- Some poor people could supplement their income due to acting as Matsya Mitras in the villages.
- The unused ponds and tanks could be brought under fish farming.

**5.2 Fish seed growers scheme**

The concept of fish seed grower have been adopted in Jharkhand state by the Government to promote entrepreneurship in fishery sector and multiplying fishery activity in the state by these fish seed growers. It can be seen from table-3 that 117 fish seed growers have been identified by Department of Fishery in two study districts to promote entrepreneurship in Fishery sector. 82 Fish Seed Growers have been identified in West Singhbhum whereas 35 seed growers have been chosen from Saraikela district. Seed Growers have been identified in all 8 blocks of Saraikela district and 11 blocks of West Singhbhum district.

**Table 3:** Fish seed growers in Jharkhand state and two study districts by 2009-10

Sl. No	District	No. of seed growers	Spawn distribution In 2008-09 (in lakhs)	Spawn distribution In 2009-10 (in lakhs)
1	West Singh hum	96	200	874
2	Saraikela	35	180	625
Total		117	380	1499

Source: Directorate of Fishery, Govt. of Jharkhand

The respondents have also been interacted with on the follow-up services by the Fishery Department/Matsya Mitra like

replacement in case of death of seedlings and regular extension services by the officials. There has been 32 per cent

of the responses that the seed growers are fully satisfied on follow-up services rendered to them by the extension officers/Matsya Mitra of fishery department whereas according to 36 per cent of the respondents though the follow-up has been inconsistent, though it caters to their need. Remaining 32 per cent of the respondents have reported not to be satisfied at all on the follow-up services.

The fish seed growers have also been contacted by organising the workshop and through Focus Group Discussions as well as individual interviews. The fish seed growers have expressed that following benefits have accrued to the state due to Fish seed Grower concept.

- Due to production of spawns in govt. hatcheries and distribution among farmers by the Government, import of seeds and spawns from other states could be minimised and farmers now get locally grown fish seed at reasonable cost.
- Due to provision of spawn to the farmers, fish production in dry land and hilly areas could be scaled up resulting increase in fish productivity and income.
- There has been availability of fish fry and fingerlings in the market at local level.

Some of the concerns of Fish seed growers are presented below which affect overall fish productivity.

- Due to water scarcity fish productivity could not be

optimised.

- Shallow and small size ponds are not conducive for fish production.
- Non-availability of spawns in desired quantity does not encourage the seed growers to go for fishery activity on massive scale.
- Non-seriousness of the seed growers to pursue fishery as an activity after availing the spawns from Fishery department. Lack of proper extension and follow-up measures in some cases also handicapped fish productivity.

### 5.3 Fisherman housing

Pucca house has been provided by the Jharkhand Government to the homeless BPL families of fisherman community who lives in unhygienic conditions due to lack of a house which also very often leads to susceptibility to diseases and low life expectancy of poor fishermen community. It can be seen from table-4 that 525 houses have been constructed for fisherman community till 2008-09 out of which 400 houses have been constructed in Saraikela district where as only 125 houses have been constructed in West Singhbhum by 2008-09. In below map shows distribution of house to fisher mans in two districts

**Table 4:** Fisherman housing constructed till 2008-09

Sl. No.	District	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	Total
1.	Chaibasa	75	0	0	0	0	0	0	100	175
2.	Saraikala	0	0	0	0	100	100	100	100	400
Total		75	0	0	0	100	100	100	200	575

Source: Directorate of Fishery, Govt. of Jharkhand

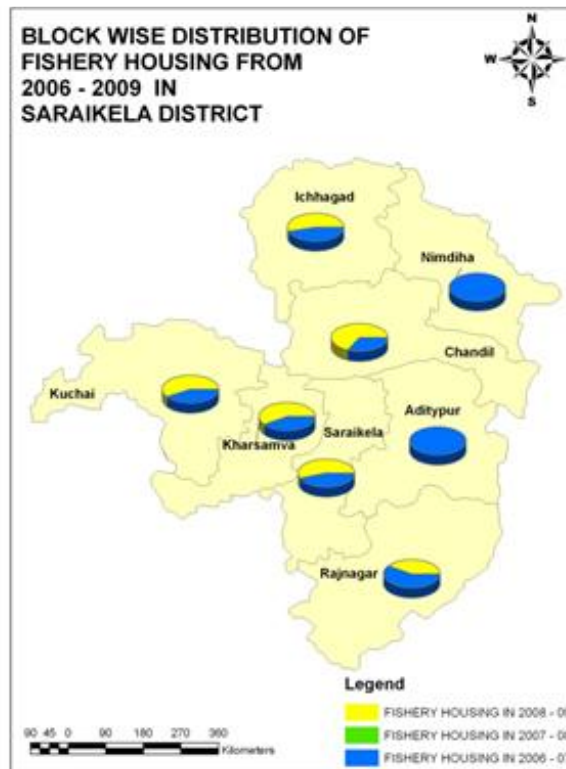
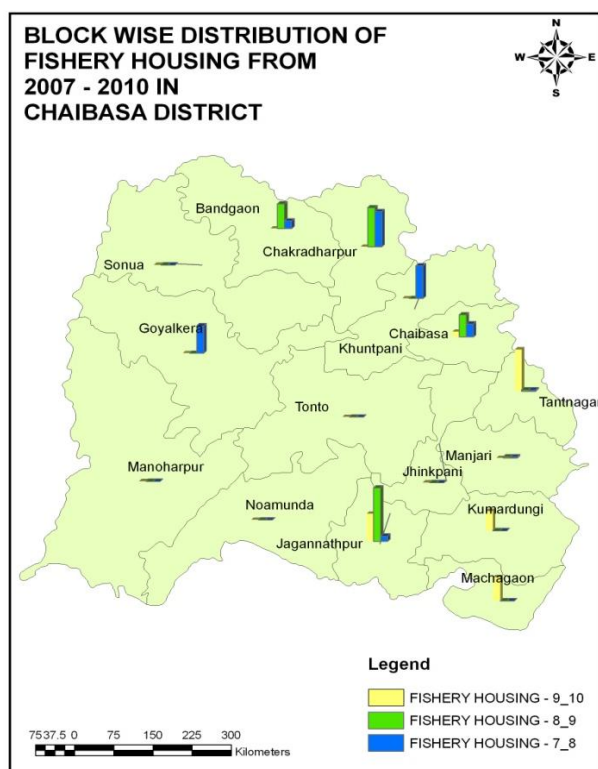


Table-5 depicts the feedback of beneficiaries on housing scheme in Saraikela district. All the 400 beneficiaries of the district have been consulted and their responses have been captured in Table-5. It is clear from the table 5 that 282 beneficiaries (71 per cent) are satisfied on the quality of

construction of houses given to them while 24 per cent of them have expressed partial satisfaction on quality aspect. The remaining 5 per cent beneficiaries are reported not to be satisfied on the quality aspects. 67 per cent of the beneficiaries have told that they have received timely

payment for construction of house at different stages whereas 99(25 per cent) of them are of the opinion that there are incidences of delayed and deferred payment for which they are not fully satisfied on payment. Remaining 7 per cent of the respondents are reported to have told that they are not satisfied at all about payment against house construction due to delay in payment as well as under payment and partly payment. It can further be seen that 58 per cent of the respondents are of the opinion that they are satisfied due to timely completion of house whereas according to 28 per cent of the beneficiaries construction of house got little delayed. Remaining 55 respondents(14 per cent) are reported to have

expressed that construction of house got delayed inordinately for which they are not satisfied at all with respect to timely completion of house. When interacted on sanitation and hygiene and sanitation aspects due to having a house, 391beneficiaries(98 per cent) are of the opinion that due to having a house their sanitation and hygiene condition have improved considerably for which they are fully satisfied whereas 2 per cent of them have expressed partial satisfaction on this aspect. It was also revealed from the discussion due to having a house their sanitation, hygiene and quality of life of beneficiaries improved to a large extent.

**Table 5:** Feedback of beneficiary on housing scheme in Saraikela district

Aspects of Housing Scheme	Satisfactory	Partly Satisfied	Negligible	Total
Quality of Construction	282(71)	97(24)	21(5)	400
Payment	271(68)	99(25)	30(7)	400
Timely completion	232(58)	113(28)	55(14)	400
Hygiene & Sanitation	391(98)	9(2)	0	400

Source: Field study

Therefore, above analysis of the study concludes the following on housing scheme.

- Quality of construction of house has been good in majority of the cases.
- Though there has been timely payment to the beneficiaries on construction of houses but there are reports of under payment and delayed payment.
- The construction of house got delayed in 42 to 47 per cent of the cases.
- Due to having a house, the poor and homeless families from fisherman community are now leading a life in hygiene condition with dignity.

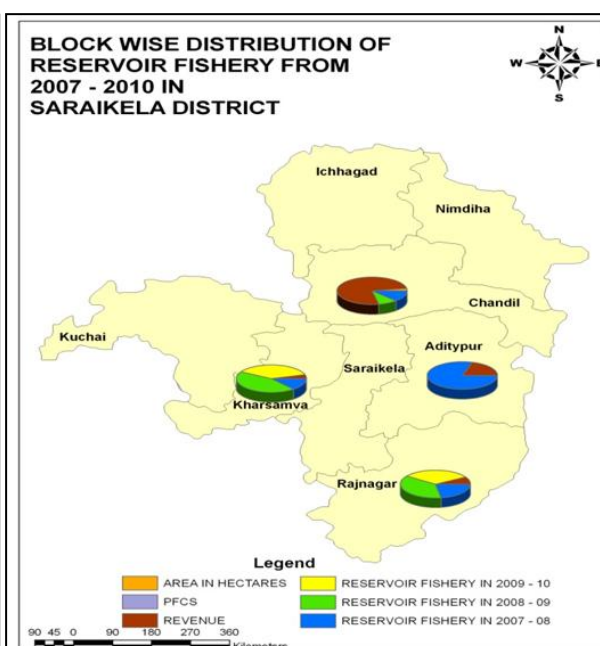
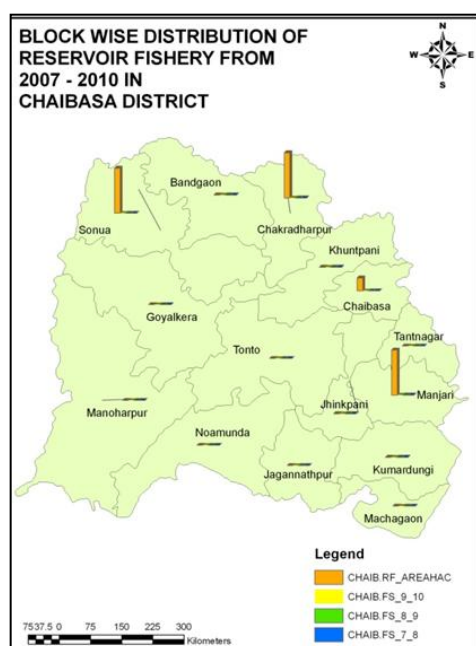
**5.4 Stocking of fingerlings in reservoir**

Table 6 depicts the stocking of fingerlings in reservoirs in two study districts by 2007-08. It can be seen that there has been huge growth rate i.e more than 80 times increase in stocking of fingerlings in the entire state. However, the growth rate in fingerling stocking has not experienced encouraging trend in West Singhbhum district. There has been rather decline in fingerling stocking in the district from 2006-07 onwards due to division of the district. However, Saraikela has experienced more than 15 times increase in stocking of fingerlings in the year 2007-2008 due to assistance from NFDB.

**Table 6:** Fingerling (No. in lakhs) stocking in Reservoirs

Sl. No.	District	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
1.	W. Singhbhum	0	0	11.05	12.6	10.08	10	7
2.	Sareikala	0	0	0	0	0	6	93
Jharkhand		3.97	4.38	37	70	75	97.7	332.2

Source: Directorate of Fishery, Govt. of Jharkhand



100 fish farmers in each of the study districts have been consulted to know their responses on fingerling production in the reservoirs. It captures the responses given by fish farmers on stocking of fingerlings in reservoirs in West Singhbhum district. It can be seen from the table that 43 per cent of the respondents have told that the growth of fingerlings in to fishes has been quite satisfactory where as in 31 per cent of the cases it has been of average scale. 26 fish farmers (26 per cent) have also reported that growth of fingerlings have been quite negligible. 32 per cent of the respondents have told that the fingerlings have survived to a large extent where as in 36 per cent of the cases the fingerlings could survive in reservoirs to some extent. Survival of fingerlings have been negligible according to 32 per cent of the respondents. The fish farmers have also been interacted with on productivity aspects due to stocking of fingerlings in reservoirs. It is clear from the table that 46 per cent of the respondents reported in favour of large scale fish productivity i.e. on an average 4 to 6 quintals per annum from one acre of water area due to stocking of fingerlings in reservoirs whereas 35 per cent of them have opined on average productivity i.e. 2 to 3 quintals of fish productivity per annum from one acre of water area due to stocking of fingerlings in reservoirs. According to 29 per cent of the respondents, the fish productivity has been quite negligible i.e. 1 to 2 quintals per annum from one acre of water area in spite of stocking of fingerlings in reservoirs. The following maps show the distribution of reservoir in two districts.

The analysis concludes at the following due to fingerling

stocking in reservoirs.

- In majority of the cases growth, productivity and survival of fingerlings have been quite satisfactory. However, there are reports of less growth and survival due to faulty management of tanks and lack of care by the fish farmers.
- Stocking of fingerlings in reservoirs resulted intensification of fishery activity which ultimately led better quality of life of poor fisherman community. Due to better productivity and higher income they bought new boats, fishing nets etc which further helped them in improving the fishery activity. The fisherman community now have better access to better houses, hygiene, schooling for their children and other basic services. However, still there are some poor fisherman whose income and employment pattern needs to be diversified for leading a better quality of life.

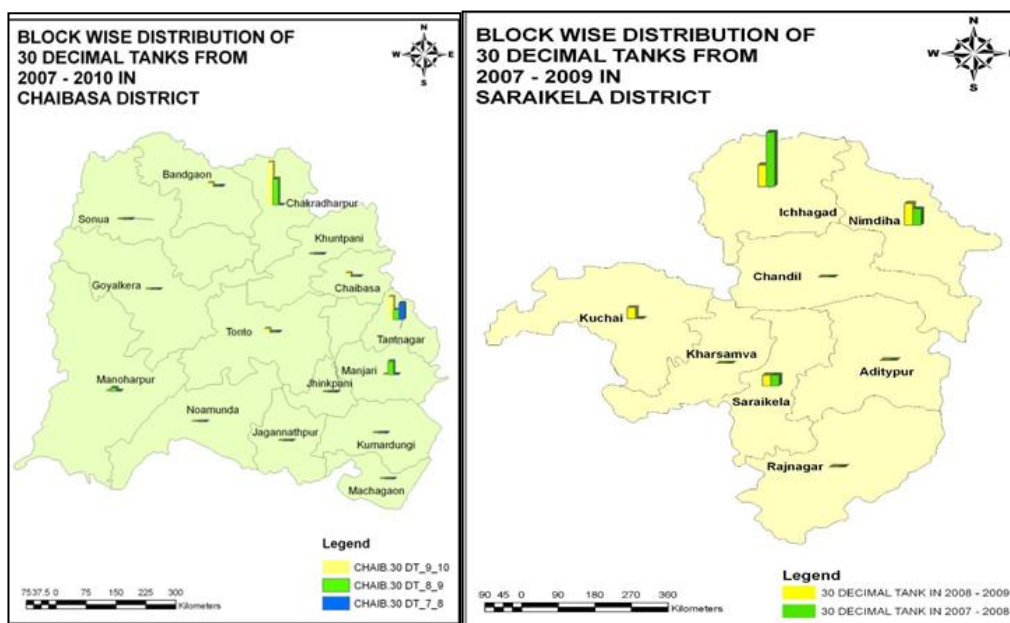
**5.5 30 Decimal rearing tanks and revenue collection**

30 decimal tank has been provided to a fisherman of ST/SC community at free of cost having own land. The size of the tank has been 130 feet length and 100 feet of width with depth of 5ft. The tank has been constructed under the financial support of Fishery Department to the beneficiary @ Rs.50, 000/- per tank which has been revised to Rs.55, 000/- per tank. The tank has been given to increase the no. of seed growers and productivity of fishery. It was the beneficiary in whose name work order has been issued for construction of farm pond under the technical guidance of department people.

**Table 7:** 30 Decimal Rearing Tank in two study districts (In no.)

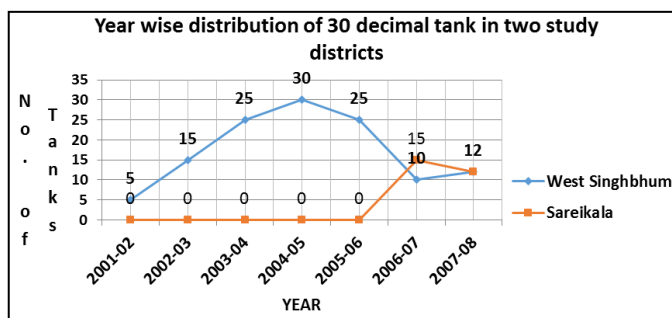
Sl. No.	District	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	Total
1	West Singhbhum	5	15	25	30	25	10	12	122
2	Sareikala	0	0	0	0	0	15	12	27
Jharkhand		66	186	206	271	235	255	345	

Source: Directorate of Fishery, Govt. of Jharkhand



It can be seen from graph1 that in West Singhbhum district, the no. of 30 decimal tank has increased steadily increasing @ 80 per cent simple growth rate per annum where as it started declining from 2005-06 onwards due to division of district. In Saraikela district 15 and 12 nos. of 30 decimal tanks have

been to beneficiaries. 122 tanks have been provided to beneficiaries in West Singhbhum district till 2007-08 whereas 27 tanks have been provided in Saraikela district. It is clear from above table two study districts have achieved 100 per cent of its target in fish rearing tank in the year 2008-09.



**Fig 1:** Year wise distribution of 30 decimal tanks in study districts

The 30 decimal tank has increased the fish seed production, income and employment to seed growers and less dependence on outside state in availing fish seeds and fingerlings. It also diversified the rural non-farm sector. Due to the tank, in more than 30 per cent of the cases the adjoining lands could be irrigated which also led to increase in agriculture productivity. Revenue collection is considered to be pre-requisite in intensifying activities in fishery sector. Jharkhand state also experienced positive trend in revenue collection so far as fishery activity is concerned.

Therefore, following conclusions can be arrived from the above analysis.

- West Singhbhum district has performed better than Saraikela district in revenue collection with respect to the target fixed for the respective district. This has been possible due to seriousness of Matsya Mitras and officials associated in the district for revenue collection.
- Revenue collection in the state has increased at a simple growth rate of more than 15 per cent in last three years and growth rate of Saraikela district has been more than that of state growth (21 per cent) in spite of comparatively less achievement.

## 6. Conclusion and Recommendation

After several rounds of field visit, intensive interaction and series of discussion with the fish farmers, matsya mitras, seed growing entrepreneurs, fishery department officials, common people and other stakeholders following recommendation have been suggested for further modification at policy level in the fishery sector. The recommendations may help in promotion of fishery and socio-economic development of fisherman community in long run in the two study districts.

### Matsya mitra

- The concept of matsya mitras may be revisited in terms of motivation and empowering the volunteers across cross functions in the development of fishery sector. This ultimately shall strengthen the mechanism of popularizing the concept and create strong network of natural, physical and human capital, to enhance locally sustainable livelihood system through fishery sector interventions.
- The high performing matsya mitras as an incentive may be exposed to demonstrative training across successful model within and outside the state. The DFOs may develop mechanism to follow up the implementation of best models in their own area.
- The existing mechanism of fishery promotion by the Matsya Mitras can be scaled up which may help in realizing the Jharkhand state objective of self-reliance in fish production.

- The extension officers and matsya mitras may be empowered for technical service delivery mechanisms through regular exposure to TOT models pertaining to local fishery development environment and they need to be well equipped to deliver tangible output in fish production.
- TOT may include methods of bringing about innovative socio-economic and technical solutions like water management, land disputes, weed management, marketing, locally adoptable market regulatory system and value addition etc.

### Seed growers

As according to secondary data, it is evident that, with the existing network of seed growers, DOF to a great extent is able to establish an effective supply chain management of spawn distribution.

- Therefore DOF may develop mechanisms, to reduce mortality of spawns in transit with provision to supplement oxygen enroute.
- DOF may consider promoting more numbers of hatcheries driven by clusters of seed growers.
- Each cluster may further be facilitated with brood stock management nursery.
- Marketing mechanism of Fingerlings/Fry by within cluster driven approach may be regulated by DOF'S extension services, followed by indirect supervision of Directorate itself in terms of performance by cluster.
- The seed growers may be educated on water management undertaking need based demand driven approach and capital cost sharing.
- To this effect, extension service mechanisms should facilitate financial linkages to the beneficiaries, who may be called as partners ultimately, instead of continuing to remain as beneficiaries.
- Local SHGs may be exposed to fish feed manufacturing, marketing, low cost aeration and organic pesticides/herbicides production, which shall ultimately facilitate low cost feed & disease management mechanisms for seed growers/farmers.
- Before the distribution of spawns departmental functionaries and matsya mitras at the field level should visit the seed rearing tanks and assess the feasibility of seed rearing. On the basis of their report, spawns should be distributed among the seed growers.
- The field level functionaries of fishery department and matsya mitras should also visit the seed rearing tanks regularly after the spawn distribution in order to facilitate survival and proper growth of spawns, appropriate tank management practices and manuring etc. The seed growers may be insured in case of natural calamity which damages the pond and ultimately affect productivity. Part of the premium portion may be borne by Fishery Department along with the beneficiaries. The issue may be taken up by the Fishery Department with Insurance companies.

### Fisherman housing

- Extension officers may ensure time specific construction of fishermen houses, facilitated by timely payments reciprocating performance,
- Though, secondary information about coverage of house construction are quite alluring, but some of the houses remains to be occupied by the beneficiaries, due to



incompletion. Restoring timely welfare objectives is therefore very important, so that the same transcends a positive impact across the targeted community instead of being left on the sweet will of the beneficiary.

- Beneficiaries may be encouraged for rendering free manual labor for house construction. Wherever possible contribution in the form of material and finance may supplement to the house construction for a need based bigger house which will ultimately ensure ownership by the beneficiary. Water and Sanitation project can be converged to add value based hygienic living.
- Beneficiaries may be guided to procure quality construction material. However, the material procurement mechanisms can be developed through local societies ensuring cost savings & adding value to constructions on cluster basis. Majority of the construction materials may be standardized and time to time quality measurement may be ensured by the departmental authorities.
- Work order for the house may be jointly issued in the name of husband and wife. While selection of beneficiaries for house construction widow, destitute and other under-privileged households from the fisherman community should be given preference.

#### **Stocking of fingerlings in reservoirs**

- The Knowledge linked rearing of fingerlings may be taken up with utmost priority by the fish farmers to maximize fish productivity across reservoirs.
- The fish farmers may be oriented by the fishery department officials and matsya mitras to look into feeding, preventing diseases during fingerling grow out, so that target PFCS, receives quality material besides scaling up independent & demonstrative in situ fingerlings cage culture technology. .
- The fish farmers may be advised not to harvest and sell the fingerlings before maturing. Further, PFCS institutional mechanisms should be considered to be strengthened in terms of revenue collection on daily catch, accounting & deposits followed by self- review in regular intervals
- Working/revolving capital may be provided to the fisherman through credit from banks and other institutional sources to take care of feeding, diseases control and tank management aspects. Soft loan may be provided to the fish farmers and fisherman SHGs in the initial stages so that they can repay it soon after the production and selling of their produces. Fishery Department, Govt. of Jharkhand may take up the issue with all lead banks of the state.
- Another major impact of the scheme I studied that, farmers became aware to stock fingerlings and yearlings to cut culture period and cost of production. Stocking of fingerlings improved survival rate and it helped to get better FCR. FCR improved from 1:2 to 1:1.4 due to stocking of fingerlings and use of high protein feed.
- Another allied aquaculture business immersed as most alluring and profit making business due to intervention of the schemes i.e. Feeling the demand of fingerlings and yearlings some farmers started rearing spawn/fry in nursery tanks to grow it up to fingerling stage. Cost of spawn/fry is 10 paisa per piece. 50% survival recorded. Then the cost comes to 20Paisa per piece. Rearing and feeding cost comes to Rs.1.50 and total cost of production comes to Rs.1.70 and it is sold at a price of

Rs.5.00 to Rs.12.00 per piece.

- Stocking of fingerlings is also very beneficial. Within 6 months one fingerling attains table size i.e. (1 to 1.5 Kg.) and fetches good market demand and value.
- Before intervention of this scheme the culture period was one year or more and now it is reduced to 6 months and two crops per annum and percapita income doubled within 10 years.

#### **30 Decimal rearing tank**

- Proper beneficiary may be selected for 30 decimal rearing tanks. It has been observed during the field study that after availing the tank some of the beneficiaries are not perusing fishery as an activity with due seriousness. The potential, motivation and interest of the beneficiary should be of primary concern, which may be scrutinized at time of initial screening before giving rearing tank to the beneficiary.
- Before the sanction of rearing tank to a particular beneficiary, viability of water availability may be tested by the technical staffs and matsya mitras for the proposed site or otherwise option of water management, cost sharing and conservation systems may be thoroughly discussed followed by formulation of yearly action plan. It has been come across during the field study that many tanks do not have captive water in which investment has been made. Sanction of rearing tanks should be based on test reports.
- Timely payment to the beneficiaries may be followed in case of excavating and developing rearing tank. The extension officers and matsya mitras may visit to the worksite regularly and ensure timely release the instalments on the basis of progress of work.
- Preference should be given by the department to complete the tanks given to the selected beneficiaries. Delay in completing the existing tanks de-motivates the beneficiaries which further affect fish production at later stages. There should be periodic review at regular intervals at the district level to expedite completing the construction of tanks in time.
- Beneficiaries may be encouraged for rendering free manual labour for tank excavation. Wherever possible contribution in the form of material and finance may supplement to the tank construction for a quality tank which will ultimately ensure ownership by the beneficiary.
- The bunds of tanks should adequately compacted and turfed with grass in order to ensure durability. The beneficiaries and supervising staffs at the field level may be oriented properly with few basic Water harvesting tips in this aspect.
- The beneficiaries and supervising staffs of the fishery department at the field level may be guided properly to look into the post-construction tank management aspects so that it becomes conducive to fish farming in long run. The district level officials may also be advised to monitor this regularly through periodic field visits. GIS based online monitoring system may be developed for regular monitoring & surveillance system

#### **Revenue collection**

- Locally adoptable technology, sustaining productivity across cross cutting fishery development activities may be introduced with appropriate monitoring mechanisms,

so that increment in revenue generation by the department is achieved.

- Revenue collection system may be associated with token incentives in case reservoir fisheries. Matsya mitras can be incentivized in order to overcome bad debts and/or undue delay in payments by cooperatives/societies.

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