Seed Mahotsav Scheme for Increasing the Scope of Indigenous Fish Marketing in West Bengal: Perception and Constraint Analysis

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Abstract

Aquaculture is a growing sector with an ability to have a significant impact on the economic development of the country. Out of the total fish production, inland fish production in India contributes 4.930 million metric tonnes, and West Bengal ranks first in the inland fish production in India. Various schemes have been introduced by the Department of Fisheries, West Bengal which have different funding sources,and the recent scheme launched by them is the Seed Mahotsav scheme, which has been started with the objective to conserve indigenous fish species, since there is a growing market demand for them. A study was carried out to review this scheme by studying the beneficiaries' profile and their perception of satisfaction towards this scheme and the constraints faced in the implementation of the Seed Mahotsav scheme. Rank based quotient method revealed that the scarcity of water in the ponds during the summer months was a major constraint in the successful implementation of this scheme. Based on the findings, a model for effective implementation of the Seed Mahotsav scheme has been suggested, and the paper also provides policy implications of the present research.

Keywords: **seed mahotsav, scheme, West Bengal, department of fisheries, beneficiaries, indigenous fishes, aquaculture**

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In India, aquaculture has been a major contributor to the fisheries sector and has grown into an industry of significant impact in several areas of economic development. Presently, the total fish production of the world is 147.45 million metric tonnes. Being home to more than 10% of the global fish biodiversity, Indian fisheries occupy the second position in global fish production, with an annual fish and shellfish production from capture fisheries and aquaculture of about 8 million metric tonnes (Ayyappan, Jena, Gopalakrishnan, & Pandey, 2011).

Out of the total fish production, inland fish production in India contributes 4.930 million metric tonnes, and the state of West Bengal (W.B.) ranks first in this regard among the Indian states. The total fish production of W.B., comprising both inland and marine production, was 15.38 lakh tonnes, whereas the demand was 15.85 lakh tonnes for the year 2010-11. Contribution of fisheries in state domestic product at current price for the year 2009-10 was 3.33% (Department of Fisheries (DoF), Govt. of W.B., 2011). The State Fisheries Department implements different schemes for the well being of the fishers and for the overall fisheries development of the state.

There are various schemes of the Department of Fisheries (DoF), W.B., which have different funding sources like the Central sector schemes (100% Central assistance), Centrally sponsored (75:25 as Central Govt. & State Govt. share), State plan funded, and some schemes are funded through additional Central assistance. One of the major projects under additional Central assistance is the Rashtriya Krishi Vikas Yojana (RKVY). Under the RKVY Project, there are 14 schemes related to fisheries carried out by the DoF, W.B. during the year 2011-12, and the budget estimate for these 14 schemes was ₹ 3,878 lakhs (DoF, Govt. of W.B., 2011). Out of these 14 schemes, one scheme is the Seed Mahotsav scheme. The main objective of the Seed Mahotsav scheme is to conserve indigenous fish species since there

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is a growing market demand for these in West Bengal. One of the important and high valued indigenous fish species is IMC, which has a high market demand. Ayyappan et al. (2011) found that carp culture in India was restricted only to a homestead backyard pond activity in West Bengal and Odisha until the late 1950s, with seeds from riverine sources as the only input, resulting in a low level of production. Though the importance of fish culture as an economically promising enterprise was gradually realized by then, non-availability of quality fish seed, and lack of scientific culture know-how constrained the development of carp farming. In the Seed Mahotsav scheme too, Major Carps (IMC) are distributed in the ratio 60 (IMC): 40 (endangered indigenous fish species). Even though there are few studies related to fish marketing in West Bengal - like Roy (2008) studied fish marketing in Dakshin Dinajpur district of West Bengal and reported that fishers often faced exploitation, there are not many studies on marketing aspects of indigenous and endangered fish. As regards to the fish seed production, it occurs at several concentrations, but the major wholesale markets in Kolkata are Howrah and Seladah.

Objectives of the Study

The present study was carried out with the objective of reviewing the Seed Mahotsav Scheme in West Bengal. Also, the profile of the beneficiaries, their perception of satisfaction towards this scheme, and the constraints faced as regards to this scheme are analyzed in this paper.

Materials and Methods

The State of West Bengal has 19 districts. Out of these 19 districts, the Nadia district was selected for the study. The fish production of this district was 89,411 tonnes during the year 2010-11, and ranks 5th in total fish production out of 19 districts of W.B. (DoF, Govt. of W.B., 2011). Fish culturable, semi-derelict, and derelict area of this district is 4709.76 ha, 900.13 ha, and 508.23 ha respectively (DoF, W.B, 2011). Under the Seed Mahotsav scheme, 350 beneficiaries were selected in Nadia district by the members of the Panchayat Samiti of respective blocks in 2011-12.

Nadia district has 17 blocks, and the present study was carried out by considering the Haringhata block. Estimated inland water spread area of this block was around 970 ha, whereas the average annual productivity was around 10-12 quintals/acre. Haringhata block has 10 Gram Panchayats. All the beneficiaries of the Seed Mahotsav scheme from Haringhata block were selected to achieve the objectives of the study. Data was collected by using the structured interview schedule. Appropriate parametric/non-parametric statistical tests were used to analyze the results.

Results and Discussion

Information about the Seed Mahotsav scheme was collected through the focused group discussions (FGD) with the Fisheries Extension Officer of Haringhata block of Nadia district, West Bengal. It was reported that the Seed Mahotsav is a scheme where seeds of various endangered indigenous fish species are distributed among the fishers of W.B. on the Wetland day (2nd February) and Fish Farmers' day (10th July). The main objective of the Seed Mahotsav scheme is to conserve indigenous fish species, which are endangered, and also to create awareness among the fishers regarding the culture of indigenous fishes. Seeds of indigenous species like *Anabas testudineus* (Koi), *Heteropneustes fossilis* (Singhi), *Notopterus notopterus* (Folui), *Puntius sarana* (Sarpunti), *Mystus sp.* (Tangra), and Indian Major Carps (IMC) are distributed in the ratio 60 (IMC) : 40 (endangered indigenous fish species). The cost of the seed is ₹ 4/endangered species (size group of seeds is such that 20-50 number of seeds make 1 kg) and ₹ 2/IMC (4-6 inch), where one unit of seed comprises of 100 number of endangered species, with 300 number of IMC valued around ₹ 1000/Unit of seed. Implementing authorities of the Seed Mahotsav scheme are Additional Director of Fisheries (ADF) at the district level and Fishery Extension Officers (FEO) at the block level. Actual beneficiaries under this scheme are selected by the Panchayat Samiti of the respective blocks. The profile of the beneficiaries was studied using a structured interview schedule, and the same is presented in the Table 1.

It is clear from the Table 1 that a majority of beneficiaries were male and belonged to the age group of 31-45 years (54.5%) followed by the respondents who were in the age group of 46-60 years (40.9%). The respondents belonging to the other Backward castes were 27.3%, and the scheduled caste respondents were 18.2%. A total of 72.7% of the beneficiaries had a joint family structure, while 27.3% had nuclear families. The Table 1 also depicts that 45.4% of the beneficiaries were qualified up to primary level followed by the secondary level of education (31.8%). Majority of

Table 1: Profile of the Beneficiaries of the Seed Mahotsav Scheme					
S. No.	**Aspects**	**Percentage**	**S.No.**	**Aspects**	**Percentage**
1	**Age Group**		9	**Size of pond area**	
	18-30 years	0		< 1Acre	81.8
	31-45 years	54.5		1-3 Acre	18.2
	46-60 years	40.9			
	Above 60 years	4.6			
2	**Gender**		10	**Ownership pattern of the pond**	
	Male	95.4		Self-Owned	
	Female	4.6		Leased	90.9
					9.1
3	**Caste**		11	**Types of Fish Culture**	
	Scheduled Tribe	9.1		Traditional	22.7
	Scheduled Caste	18.2		Semi-Intensive	59.1
	Other Backward Caste	27.3		Intensive	4.6
	General	45.4		Modified Extensive	13.6
4	**Family type**		12	**Ownership of Aerators**	
	Joint	72.7		Yes	0
	Nuclear	27.3		No	100
5	**Educational Qualification**		13	**Ownership of Fishing gears**	
	Graduate	18.2		Yes	
	Intermediate	4.6		No	72.7
	Matriculation	31.8			27.3
	Primary	**45.4**			
6	**House type**		14	**Ownership of Nets**	
	Concrete	86.4		Yes	95.4
	Non concrete	13.6		No	4.6
7	**Ownership of Land holding**		15	**Ownership of Pump set**	
	Yes	95.4		Yes	36.4
	No	4.6		No	63.6
8	**Annual Income (in ₹)**		16	**Exposure to Fisheries based television programmes**	
	50,000 - 1 lakh	63.6		Yes	
	1-2 lakh	18.2		No	
	2-3 lakh	13.7			72.7
	3-4 lakh	4.5			27.3
Source: Primary Data					

them (86.4%) had concrete houses and 95.4% of the respondents possessed agricultural land holdings. As far as the income of the beneficiaries was concerned, 63.6% of the respondents had an annual income in the range ₹ 50, 000 - 1 lakh. A total of 18.2% of the respondents had an income in the range of ₹ 1-2 lakhs, while only 4.5% of the respondents had an income level in the range ₹ 3-4 lakhs. Most of the beneficiaries owned/leased ponds with an area <1 acre (81.8%), and 18.2% owned/leased ponds with an area of 1-3 acres. With regards to the ownership, 90.9% had their own ponds, and 9.1% had ponds on lease. Semi-intensive fish culture was most common and was practiced by 59.1% of the beneficiaries followed by traditional fish cultural practices carried out by 22.7% of the beneficiaries. Fishing gears and nets were owned by many beneficiaries, but pump sets and aerators were owned by few. Majority of the beneficiaries, that is 72.7%, had an exposure to fisheries-agri based television programmes.

Table 2: Beneficiaries' Perception about the Seed Mahotsav Scheme	
Parameters	**Average Scores**
Usefulness	4.18
Social Acceptance	4.18
Sustainability	3.95
Timeliness	3.90
Implementation	3.72
Uniform Distribution	3.54
Adequacy of funds	3.13
Extension Linkage	3.00
Relative Advantage	2.54
Monitoring	1.86
Overall Satisfaction	3.40
Source: Primary Data	

The beneficiaries of the Seed Mahotsav scheme reported that average fish production of their ponds was 7 quintals/year. Average fish sold in the local markets was reported to be 4.1 quintals/year. Beneficiaries' perception of satisfaction towards this scheme was studied on parameters namely Usefulness, Social Acceptance, Sustainability, Timeliness, Implementation, Uniform Distribution, Adequacy of Funds, Extension Linkages, Relative Advantage, and Monitoring of the Scheme. A 5- point Likert Scale - with points *Extremely Satisfied, Quite Satisfied, Moderately Satisfied, Slightly Satisfied,* and *Not at all Satisfied* - was used with scores 5, 4, 3, 2, and 1 respectively. The responses of the beneficiaries were recorded as per this scale, and they were asked to rate their perception with regards to the mentioned parameters on this scale. The results are presented in the Table 2.

It is clear from the Table 2 that with regards to Usefulness, Social Acceptance, Sustainability, and Timeliness, maximum beneficiaries of the scheme reported that they were extremely or quite satisfied. Further enquiry revealed that the beneficiaries received seeds free of cost and well in time. With regard to the parameters - Sustainability and Implementation of the Scheme, the beneficiaries were quite satisfied, which can be ascertained by the scores of these parameters, that is 3.95 and 3.72 respectively. With regards to the Adequacy of funds and Uniform distribution, the beneficiaries were moderately satisfied, and the scores were 3.13 and 3.54 respectively. However, the beneficiaries reported low satisfaction score (1.86) with the Monitoring of the scheme. Other parameters like Adequacy of funds, Uniform distribution of seeds, Implementation of the Scheme by respective officials, and also for Extension Linkages, the beneficiaries reported moderate satisfaction. Information related to extension services and technical support was highlighted by Sujeet, Sharma, & Ananthan (2006) for developing marketing. In a similar way, this is necessary to be implemented for the Seed Mahotsav Scheme also.

The average score was found to be 3.40 ± 0.8, and the range was between 1.86 to 4.1, suggesting that the beneficiaries were satisfied with some parameters and were dissatisfied with some. An inventory of the constraints as reported by the beneficiaries was prepared. After this, they were asked to rank these constraints in order of their perception of the most common constraint followed by the next. This was calculated as per the rank based quotient (RBQ) method propounded by Sabarathnam and Vennila (1996), and the same is presented in the Table 3. Mohanty, Mishra, Ghosh, & Patil (2011) also used the RBQ method to perform the constraint analysis of participatory agri-aquaculture in watersheds through preferential ranking technique, and delineated as many as nine constraints with RBQ values.

$$\text{Rank Based Quotient (RBQ)} = \Sigma\ [F_i\,(n+1) - i\,]\ \ /\,(N \times n) \times 100$$

Where,

$\boldsymbol{F_i}$ = Number of beneficiaries giving the particular point at ith rank,

i = ith rank,

N = Total number of beneficiaries,

n = Number of constraints.

Table 3: Constraints Faced by the Beneficiaries of the Seed Mahotsav Scheme		
Constraints	**RBQ value**	**Rank**
Scarcity of water during summer as seeds were provided during the summer months.	99.5	1
Lack of coordination with the DoF staff.	89.1	2
Lack of extension activities for raising farmers' awareness on culture of indigenous endangered species and their importance.	83.6	3
Lack of knowledge regarding the artificial breeding of indigenous fishes.	73.2	4
Transportation problem.	62.7	5
Poor seed quality.	52.3	6
Stunted growth.	36.8	7
Propagation of Bivalves & gas formation in pond bottom.	21.4	8
High input costs.	10.9	9
Infestation of bacterial diseases & surfacing of fishes.	5.5	10
Source: Primary Data		

Constraints faced by the beneficiaries of the Seed Mahotsav scheme are presented in the Table 3. It is clear from the Table 3 that scarcity of water during the summer was a major constraint. Seeds of fishes under this scheme were distributed during the summer months (March-April), so scarcity of water was a problem as the ponds had scarce water in them due to the scorching summer heat. However, problems due to lack of coordination with officials and less monitoring of this scheme resulted in higher discontent among the beneficiaries. The problem of disease outbreak was ranked last.

Non parametric test was used to test the hypothesis that there was an agreement among the beneficiaries with regards to the ranking of the constraints. For this, Kendall's coefficient of concordance *'W'* was calculated as two measures of the relation among several rankings of *'N'* individuals were being considered. In this study, the association among the beneficiaries by using the Kendall's coefficient of concordance *'W'*, which expresses the degree of association among the beneficiaries was calculated. It was reported by Siegel and Castellan Jr. (1988) that such a measure may be particularly useful in studies of interjudge or intertest reliability. The degree of agreement between the *'k'* judges is reflected by the degree of variation among the *'N'* sums of ranks. *'W'*, the coefficient of concordance, is a function of that variance. For computing *'W'*, the following formula given by Siegel and Castellan Jr. (1988) was used.

$$W = \frac{\sum_{i=1}^{n} (\acute{R}1 - R)^2}{N\,(N^2 - 1)/12}$$

Where,

W = The degree of association among beneficiaries in ranking the constraints,

R_i = Average of the ranks assigned to the constraint,

R = The average (or grand mean) of the ranks assigned across all constraints,

N = Number of constraints being ranked,

k = Number of beneficiaries

$N\,(N^2-1)\,/12$ = Maximum possible sum of the squared deviations, i.e. the numerator which would occur if there were perfect agreement among the k beneficiaries.

The value of *'W'* can be between 0 to +1. We found that *'W'* was 0.62, which expresses the degree of agreement between the beneficiaries in ranking the constraints. With this value, it can be interpreted that the beneficiaries were applying the same standard in ranking the constraints. To confirm this, we tested the significance of *'W'* using test of large samples as given by Siegel and Castellan (1988). $X^2 = k\,(N-1)\,W = 118.8$. Referring to statistical table, we found that $X^2 \geq 118.8$, with $df = 9$ has probability of occurrence under H_o of $p < 0.001$. With this, we can conclude with considerable confidence that the agreement between the beneficiaries was higher than it would be by chance, had their

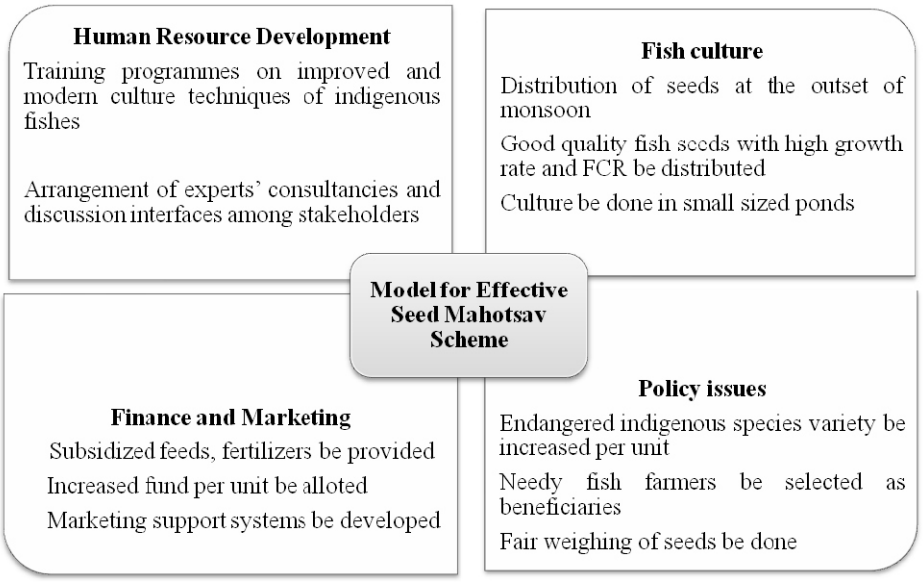
ranking been random or independent. The very low probability under H_o associated with the observed value of *'W'* enables us to reject the null hypothesis that the beneficiaries' rankings are unrelated to each other, and conclude that there was good consensus among the beneficiaries concerning the parameters which affect the viability and implementation of the Seed Mahotsav scheme. Based on the results, the policy implications are discussed in the next section followed by the model for increasing the efficiency of the Seed Mahotsav scheme, as depicted in the Figure 1.

Policy Implications

In this scheme, the distribution of fish seeds is done in the summer season (April-May), even when the scheme mentions that the seeds should be distributed on 10th July (Fish Farmers' Day) and on 2nd February (Wetland Day). However, as the distribution of fish seeds is done in the summer season (April-May), at that time, the ponds have scarce water, which results in the decrease in fish production due to fish mortality. It would be better if the seeds are distributed as soon as the first showers of monsoon arrive, so that the problem of scarcity of water will not be present, which will be congenial for fish culture. This step should be taken as a policy decision by the Fisheries Department, Government of West Bengal, and it needs to be ensured that the same is implemented strictly. The distribution of the seeds at the correct time will not incur any financial liability, but will have quite a positive impact on fish production.

At present, the selection of the beneficiaries is done by the Panchayat Samiti of the respective blocks. However, there were few reports of grievances with reference to the fairness in beneficiary selection, which may result in conflicting situations in the long run. To reduce this, frequent checks should be carried out by the Department of Fisheries, which will result in smooth running of the scheme. In addition, it should be ensured that women headed households with single earning women members are not left out. The Seed Mahotsav scheme has positive implications with reference to the socioeconomic status, livelihood, and employment generation opportunities. At present, the scheme is implemented in few districts, but there is a need to scale it up so that more number of beneficiaries can be benefited. With this scheme, an important policy implication is that it can facilitate the development of new markets, especially for indigenous fishes and can increase the market for IMC. As reported by Thomas (2012), there is a need to develop successful marketing strategies to suit new requirements. The scheme will certainly fulfil the objective of conserving indigenous fish species in the long run, resulting in biodiversity restoration. However, at present, indigenous fish seeds are procured from wild catch, so care has to be taken to ensure the sustainability of the wild stock. In a state like West Bengal, (where the demand for fish is still ahead of production), this scheme will be helpful to

Figure 1: Model for Effective Implementation of the Seed Mahotsav Scheme



Source: Primary Data

mitigate the present requirement of indigenous fishes to some extent and on the basis of its extent of success, the Department of Fisheries, Government of West Bengal may implement this scheme on a wider scale.

Conclusion

It is clear from the study that the objective with which the Seed Mahotsav scheme has been started is a very noble one. Even though it is a recently launched scheme, the beneficiaries were satisfied with the scheme. There are some constraints like scarcity of water, lack of coordination among the beneficiaries of the scheme and the respective officials, which can be addressed by the policy makers and implementers. It is a new scheme, so there is an opportunity to carry out improvements at this stage. There were a few districts where this scheme had been implemented during the time of data collection. Gradually, the number of districts can be increased. The suggested model for the 'Effective Implementation of the Seed Mahotsav Scheme' has been developed in view of the constraints faced by the beneficiaries and their perception of satisfaction. This model is backed by field work and research findings, and thus can be useful to the implementers, policy makers as well as the beneficiaries for getting an insight into the different aspects of this scheme, which may, in turn, develop an effective interface for the successful implementation and usage of this scheme. There is a growing market demand for indigenous fishes in West Bengal. Hence, schemes like the Seed Mahotsav scheme should be popularized.

Scope for Future Research

The present study has revealed that there is immense scope for future research in this field. The issues related to sustainability of the scheme, developing marketing systems and decision support systems for the scheme, women's involvement in the scheme, and stock enhancement are major areas on which further research can be done.

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