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Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) - Aquaculture Convergence: An Experience from Tripura, India

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Authors' contributions

This paper is an outcome of collaborative work among all the authors. Author TY designed the study, managed the literature searches, performed the primary survey and wrote the first draft of the manuscript. Author AS guided in formulating conceptual framework and wrote the protocol. Author PP managed the analyses of the study. Authors PB and YJS assisted in preparing the survey schedule. All authors read and approved the final manuscript.

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ABSTRACT

Being purposed at understanding the utilization efficiency of excavated and/or reclaimed ponds as newly created assets under the MGNREGS, the present study was conducted at Dhalai district of Tripura state (India) with the objectives to: i) comprehend the physical performance of pond excavation and reclamation works under MGNREGS; and ii) peruse the nature of harnessing of the created assets at beneficiary level during post work execution phase of the scheme. While the first objective was addressed through utilizing secondary information, the second one was attained

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through administering separate sets of pre-tested structured interview schedule over 92 MGNREGS beneficiaries and 27 functionaries remained responsible for effective implementation of the scheme. Study revealed that the district had executed 16717 no. of works combining both pond excavation and reclamation jobs during 2012-13 to 2016-17, of which the shares of pond excavation and reclamation works were 81.77% and 18.23%, respectively. Despite such good physical performance in work execution, very poor accrual of average annual fish productivity (414.25 kg ha⁻¹) was recorded at the fish ponds of beneficiaries. It lagged by 5.98 times from the state average and 5.74 times from the average of even Dhalai district, where the study was conducted. Although 66.30% of the beneficiaries of MGNREGS had no previous experience of culture fisheries as they became first ever owners of pond, a staggering 67.39% of them didn't receive any knowledge *vis-a-vis* skill enabling training on scientific aquaculture, which led to disappointing extents of their knowledge (34.75%) and adoption (32.85%) of scientific aquaculture. Garrett ranking revealed 'lack of systematic and timely supply of critical inputs from the Fisheries Department' and 'lack of training facilities' to be the two prime perceived constraints of the beneficiary respondents. The two most important suggestions emanated from them were: 'timely provisioning of critical inputs from the Dept. of Fisheries' and 'arranging of more longer duration hands-on training programmes to make those really worthy for the fish farmers'.

Keywords: Dhalai; MGNREGS-aquaculture convergence; pond excavation/reclamation; Tripura.

ABBREVIATIONS

MGNREGA	<i>Mahatma Gandhi National Rural Employment Guarantee Act</i>
MGNREGS	<i>Mahatma Gandhi National Rural Employment Guarantee Scheme</i>
%	<i>Percentage</i>
Kg	<i>Kilogram</i>
Ha	<i>Hectare</i>
PPS	<i>Probability Proportionate to Size Sampling</i>
<i>Vis-a-vis</i>	<i>In Relation to</i>
<i>Viz.</i>	<i>Namely</i>
MT	<i>Metric tone</i>
BPL	<i>Below Poverty Line</i>
ST	<i>Schedule Tribe</i>
SC	<i>Schedule Caste</i>
OBC	<i>Other Backward Classes</i>
GP	<i>Gram Panchayat</i>
VC	<i>Village Council</i>
<i>etc.</i>	<i>Et cetera</i>
<i>no.</i>	<i>Number</i>
MOC	<i>Mustard Oil Cake</i>

1. INTRODUCTION

In view of ensuring social protection, livelihood security, inclusive growth and democratic empowerment of the rural poor, the National Rural Employment Guarantee Act (NREGA) was launched in India on September 7, 2005. Thereafter, it was renamed as 'Mahatma Gandhi National Rural Employment Guarantee Act' (MGNREGA) on October 2, 2009. The said Act

was made operational as 'Mahatma Gandhi National Rural Employment Guarantee Scheme' (MGNREGS) as a classified Centrally Sponsored Scheme. After it was first launched at Anantpur district of Andhra Pradesh, all the rural districts of the country were brought under its umbrella by April 1, 2008 [1]. The Act provided a legal guarantee for 100 days of wage employment in a year to every demanding rural household whose adult members would be agreeable to carry out unskilled manual work [2] and, in the process, to assist them in promoting their livelihood security [3]. Generation of livelihood resource base for the rural poor for enhancing their economic activities and, thus, enabling them to lead a decent life in sustainable manner also constituted the other fundamental purpose of the scheme [2,4]. Works like excavation of ponds/percolation tanks/canal, renovation/de-silting of existing ponds/old canals etc. were very much remained under the scope of permissible works of the scheme to trigger creation of rural infrastructure [5]. It was specifically envisaged that after completion of works under the scheme to create those assets, effective rendering of both fund and technical know-how support were to be obligatorily extended during its post-work execution phase towards improving the livelihoods. And for such things to happen, instilling convergence with the resources of other programmes/schemes available with the *Panchayats* and/or other state line departments was envisaged. For fisheries related sector, it was also exemplified that the state fisheries departments were to arrange for capacity building, supply of livelihood components in the

form of fingerlings, manures, etc. by mobilizing available funds of other on-going schemes [6].

Fishery holds a vital place in the socio-economic fabric of the native people of Tripura, which is one amongst the north-eastern states to cover an area of 10,486 km² and support 36,71,032 population [7]. Fish plays a formidable role in its economic growth along with providing employment opportunities and food security to the people [8]. Here, fish is regarded as a crucial component of daily diet by its 95% inhabitants [9]. Considering its importance, the state had adopted strategy for both vertical as well as horizontal expansion of its aquaculture sector [10]. And in order to achieve that, making use of MGNREGS fund started taking place in the state. While enhancement of productive performances of the available water bodies through promoting scientific fish culture was assumed to aid in vertical expansion, the horizontal expansion on the other hand was envisioned to be achieved through increasing the area under culture fisheries by way of effective convergence between various available resources out of relevant schemes/programmes. Due emphasis was also given on revitalization of the existing unproductive water bodies in the form of performing necessary reclamation of those [11]. And there remained the significance of MGNREGS for the Tripura state.

There occurred, commendable execution of works concerning creation as well as reclamation of ponds by utilizing Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) fund in the state of Tripura [10] to set the opportune stage for it in raising its aquaculture production by efficiently harnessing those built up assets in the form of practicing culture fisheries by the beneficiary pond owning class. And supposedly that might have caused improvement in the quality of life of those otherwise poor rural gentry through eligibly contribute in ensuring their household nutritional security and enhancing their income efficiency as well, subject to the condition that steady input, advisory, training and, technical know-how support are provided to them from the relevant institutional source(s). It is un-refutable a fact that more there would be the attainment of the said conditionality, greater would emerge the possibility of real success of MGNREGS-Aquaculture convergence in accordance with its envisioned purpose. In the face of scant studies on the mannerism through which MGNREGS could register its influence over those neo-breed

of beneficiary aquaculturists in Tripura during post work execution phase of the scheme, what had been the perceived constraints of those aquaculturists in appropriately harnessing the created opportunity under the aegis of MGNREGS, and how can a better synergy be brought about between MGNREGS and aquaculture, thus, formed the basis of present study, which was carried out with the objectives: i) to comprehend the physical performance of pond excavation and reclamation works under MGNREGS; and ii) to peruse the nature of harnessing of the created assets at beneficiary level during post work execution phase of the scheme.

2. METHODOLOGY

2.1 Research Setting

The *ex post facto* study was conducted during September, 2018 to January, 2019 in five out of eight existing blocks of the Dhalai district of Tripura wherein, highest number of work relating to excavation/reclamation of water bodies under the aegis of MGNREGS was performed. The blocks were Ambassa, Salema, Durgachowmuhani, Manu and Chawmanu. From each of those selected blocks, two villages were randomly pooled. Thus, altogether 10 villages found selection for the conduct of primary survey.

2.2 Sampling

For collection of primary data, 92 nos. of MGNREGS supported aquaculturists were selected through probability proportionate to size (PPS) sampling at 10% level of probability. Moreover, 27 no. of various levels of functionaries relevant to enhancement of the efficiency of productive performance of the pond niches during post work execution phase of MGNREGS in the areas under investigation like State Fisheries Department (05 no.), Gram Panchayat/Village Council Institution (10 no.) and Block Development Office (12 no.) were also included. Thus, total number of respondents stood out to be 119.

2.3 Data Collection

Data was collected from both primary and secondary sources. Primary data was collected through personal interview of the selected respondents by separately administering pre-tested structured interview schedules for the

beneficiary pond owning respondents and functionaries representing various institutions. Collection of secondary data, however, was made by utilizing both official report and web information [12,13].

2.4 Method of Analysis

Analyses and interpretations of collected data were done in the following manner:

Fish productivity in water bodies of the respondents: The fish productivity was calculated by firstly working out culture period *vis-a-vis* study period wise production performances of fish for each respondent along with the corresponding area as was devoted by them for obtaining that production. Then the mean values of production and area at aggregate level for the entire study period was calculated for each of those respondents as well as all of them as a whole to finally work out the realization of average fish productivity in kg ha^{-1} for the entire tenure of five years of the study-individually and cumulatively as well.

Annual income from MGNREGS supported water bodies and surroundings: Annual income from MGNREGS support was estimated in terms of average annual income accrued through both culture fisheries and pond dyke based small horticulture and/or fringe growing of plantation crops.

Extent of adoption of scientific aquaculture practices: It was measured by resorting to the scale [14] containing 18 critical activity statements distributed over six major domains viz., 'pond preparation' (contained four critical activity statements); 'liming' (contained two critical activity statements); 'manuring and fertilization of the pond' (contained three critical activity statements); 'stocking' (contained four critical activity statements); 'supplementary feeding' (contained three critical activity statements); and 'water exchange and quality monitoring' (contained two critical activity statements). The scale was administered on a three point continuum ranging between full scale adoption and non-adoption through partial adoption, for which the assigned scores were 3, 1 and 2 respectively. The summated score value, combining all critical activity statements, determined a respondent's total adoption score. Maximum and minimum possible score for a respondent to obtain could be 54 signifying very high level of adoption, and 18 signifying very poor level of adoption, respectively. On the basis

of adoption score, adoption index (in percentage) was separately computed for each of all the six identified domains in the following manner:

$$\text{Adoption index} = (\text{Mean score obtained in a particular domain} / \text{Maximum obtainable score in that domain}) \times 100$$

Then overall adoption index was calculated in the following manner:

$$\text{Overall adoption index} = (\text{Adoption score obtained combining all domains} / \text{Maximum obtainable score combining all domains}) \times 100$$

Knowledge about scientific aquaculture practices: Knowledge of respondents was measured in line with the yes/no type knowledge test scale [14] containing 38 critical activity statements distributed over five major domains viz., 'pond preparation' (contained six statements); 'liming' (contained six statements); 'fertilization of the pond' (contained eight statements); 'stocking' (contained seven statements); and 'post stocking' (contained eleven statements). Whereas, the affirmative response against a statement was assigned with '1' score value, negative response was assigned with '0' score value. Thus, knowledge score of a given respondent could range between '0' to '38'. The summated score value obtained from each of all the statements determined a respondent's total knowledge score; where zero indicating no knowledge and 38 indicating very high knowledge. On the basis of knowledge score, knowledge index (in percentage) was computed for each of all the five identified domains by using the following formula:

$$\text{Knowledge index} = (\text{Mean score obtained in a particular domain} / \text{Maximum obtainable score in that domain}) \times 100$$

Then, overall knowledge index was calculated in the following manner:

$$\text{Overall knowledge index} = (\text{Knowledge score obtained combining all domains} / \text{Maximum obtainable score combining all domains}) \times 100$$

Training exposure on scientific aquaculture practices: It was quantified in two stages. First, to determine whether or not they were provided with any training, while '1' score values was assigned against affirmative response, '0' score value was assigned against the negative values.

Then, by employing percentage analyses of the affirmative cases, duration of training as well as training areas were summarized for interpretation.

Perceived constraints inhibiting productive performance: Ranking, as an expression of respondents' assigned priority about their feeling against a set of structured statements with respect to perceived constraints to inhibit productive performance of the aquatic niches being owned by the respondents, was done to classify the responses in order of perceived importance. For that purpose, Garrett ranking technique was utilized [15]. Respondents were asked to rank altogether twelve linked statements. The orders of respondents' assigned merit were then converted into ranks by using the following formula:

$$\text{Percentage Position} = \frac{100 (R_{ij} - 0.5)}{N_i}$$

where,

$$R_{ij} = \text{Rank given for } i^{\text{th}} \text{ item by } j^{\text{th}} \text{ individual}$$

$$N_j = \text{Number of items ranked by } j^{\text{th}} \text{ individual}$$

The percentage position of each rank was converted into scores by referring to the Garrett's Table [15]. Subsequently, the scores of individual respondents was added together for each of the constraint statement and divided by the total number of respondents for whom the scores was added. Finally, the mean scores for all constraint statements were arranged in the order of their ranks.

For quantifying the perception of functionaries in matters of addressing the issues by them relating to 'skill training on scientific aquaculture practices', 'conduct of demonstrations/field days', and 'critical input support in timely manner' to enhance productive performance of the pond niches during post work execution phase, percentage analysis was done.

3. RESULTS AND DISCUSSION

3.1 Physical Performance of Pond Excavation and Reclamation Works

In terms of overall physical performance of work execution combining both excavation and reclamation of ponds under the scheme during 2012-13 to 2016-17, the district under study was observed to be the top performer among the

eight constituent districts of the state with 16717 no. of works executed therein and thus it had a share of 18.86% towards the overall 88610 no. of executed works across whole of the state (Table 1). Out of that impressive achievement, the share of works relating to excavation of new ponds and reclamation / de-silting of existing ones was 13670 no. (i.e. 81.77%) and 3047 no. (i.e.18.23%), respectively.

Now, on the issue of year wise performance of excavation / reclamation works in the district, it got revealed that highest number of excavation (3976 no.) and reclamation (951 no.) works were executed during 2014-15. But, there occurred a sharp decline in the performance of works execution therein in the very next year of 2015-16, when the overall figure of executed works sharply dipped down to 1625 no. (Fig. 1). It was also revealing that starting from 2012-13 right up to 2014-15, the physical performance graph of works execution in the district maintained a steady upward growth before substantially dipping down in 2015-16. In 2016-17, however, sizeable incremental growth with respect to executed works could be noticed with the corresponding number of works being 3409 (Excavation works: 2840 no.; reclamation works: 569 no.).

Further to this, the status of Dhalai district with respect to area, production and productivity under culture fisheries for the period between 2012-13 and 2016-17 indicated that the area under culture fisheries underwent a steady progressive growth there. Also in case of both fish production and productivity through culture fisheries, that growing trend could be observed, excepting a minor decline in 2015-16. Overall, thus, the area under culture fisheries in Dhalai shot up to 3879.08 ha in 2016-17 from that of 3767.04 ha in 2012-13 (i.e.2.92% gain); fish production went up to 10054.43 MT in 2016-17 from that of 8226.63 MT in 2012-13 (i.e. 22.22% gain); and fish productivity rose up to 2591.96 kg ha⁻¹ from 2183.84 kg ha⁻¹ (i.e. 18.69% gain) during the same time frame (Table 2).

In other way to express that by way of remaining in the same track to eligibly address the already adopted strategy of the state for horizontal expansion of its area under aquaculture, a stage could also be simultaneously set in the district for creation of an enabling environment for the vertical expansion of its fisheries sector by way of all required integration of technology mediated good aquaculture practices.

3.2 Socio-personal Profile of the Beneficiary Respondents

Majority (63.04%) were found to be occupying below poverty line (BPL) category; and majority of them (59.78%) were belonging to old age group category (>45 years). Contextual to caste categories, while large majority (65.22%) was from Scheduled Tribe (ST) community, 27.17% of their counterpart had their belongingness with Scheduled Caste (SC) community, and (5.44%) with Other Backward Community (OBC). Whereas, 45.65% respondents were found to be

comprising of 4-6 family members, 42.39% of their counterparts were having up to 3 members. Majority (51.09%) were having no background of any formal education, 20.65% were found to be up to primary level of education, 16.30% up to middle level (i.e. Class VIII standard), 6.52% up to secondary level (i.e. Class X standard), and 4.34% up to higher secondary level (i.e. Class XII standard). With respect to land holding category, an overwhelming majority (80.43%) were found to be placed under marginal land holding category with their holding size up to 1 ha of land (Table 3).

Table 1. Status of overall physical performance of works during 2012-13 to 2016-17

District	Excavation works (No.)	Reclamation works (No.)	All Works (No.)	Rank
West Tripura	7248(59.45)	4944(40.55)	12192(13.75)	III
Dhalai	13670(81.77)	3047(18.23)	16717(18.86)	I
Gomati	7373(58.97)	5131(41.03)	12504(14.13)	II
Khowai	6928(56.88)	5251(43.11)	12179(13.74)	IV
North Tripura	7619(66.98)	3756(33.02)	11375(12.84)	V
Sepahijala	5696(58.59)	402(41.41)	9722(10.97)	VI
South Tripura	5614(65.07)	3014(34.93)	8628(9.74)	VII
Unokoti	4215(79.63)	1078(20.37)	5293(5.97)	VIII
Total	58363(65.87)	30247(34.13)	88610(100.00)	-

Note: Figure in the parenthesis indicates percentage to all works respective to corresponding district.

Source: Authors' own calculation on the basis of information gathered from the website of Ministry of Rural Development, Government of India pertaining to 2012-13 to 2017-18. Available on http://mgnregaebb4.nic.in/netnrega/writereaddata/citizen_out/wrkstatlink_30_05_1718ALL.html

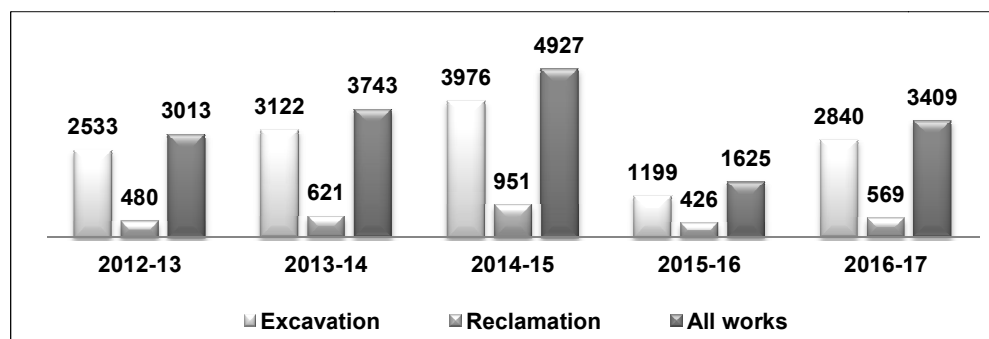


Fig. 1. Year wise physical performance of works on excavation/reclamation of ponds in Dhalai district

Table 2. Year wise area, production and productivity under culture fisheries in Dhalai district

Year	Total area covered by culture fisheries (ha)	Total fish production from culture fisheries (MT)	Av. Annual productivity in culture fisheries (kg ha ⁻¹)
2012-13	3767.04	8226.63	2183.84
2013-14	3811.44	8589.41	2253.59
2014-15	3790.06	9224.76	2433.93
2015-16	3801.29	9177.62	2414.34
2016-17	3879.08	10054.43	2591.96
Overall	19048.91	45272.85	2376.66
Tripura	128190.15	317654.82	2477.99

Table 3. Socio-personal profile of beneficiary respondents (n = 92)

Sl. no.	Variables	Categories	Beneficiaries	
			Frequency	Percentage
1.	Economic well being status	BPL	58	63.04
		APL	34	36.96
2.	Age	Young (18 ≤ 35 years)	12	13.04
		Middle (>35 to 45 years)	25	27.17
		Old (> 45 years)	55	59.78
3.	Caste	General Caste	2	2.17
		Other Backward Community	5	5.44
		Scheduled Tribe	60	65.22
		Scheduled Caste	25	27.17
4.	Size of family	Up to 3 members	39	42.39
		4-6 members	42	45.65
		7-9 members	9	9.78
		>9 members	3	3.26
5.	Level of education	No formal education	47	51.09
		Up to Primary	19	20.65
		Up to Middle school	15	16.30
		Up to Secondary	6	6.52
		Up to Higher Secondary	4	4.35
		Graduate	1	1.09
6.	Land holding Size	Marginal (up to 1 ha)	74	80.43
		Small (1-2 ha)	14	15.22
		Medium (2-4 ha)	4	4.35
7.	Annual family income (≠/ year)	≤ ≠1,00,000	10	10.87
		> ≠1,00,000 ≤ ≠2,00,000	20	21.74
		> ≠2,00,000 ≤ ≠3,00,000	24	26.09
		> ≠3,00,000 ≤ ≠4,00,000	15	16.30
		> ≠4,00,000 ≤ ≠5,00,000	16	17.39
		> ≠ 5,00,000	7	7.61
8.	Experience in fish culture activities (yr)	Little experience (≤ 5 yr)	66	71.74
		Moderate experience (6-10 yr)	23	25.00
		Good experience (11-15 yr)	2	2.17
		Very good experience (>16yr)	1	1.09
9.	Share of fisheries to total income (%)	1-10	54	58.69
		10.1- 20	34	36.96
		20.1-30	4	4.35
10.	Material possession status	Low (<14.51)	12	13.05
		Moderate (14.51 to 22.32)	71	77.17
		High (>22.32)	9	9.78
11.	Self confidence	High	27	29.35
		Moderate	64	69.56
		Very little	1	1.09
12.	Achievement motivation	Low (<13.94)	9	9.78
		Medium (13.94 to 19.34)	60	65.22
		High (>19.34)	23	25.00
13.	Economic motivation	Low (<8.08)	0	0.00
		Medium (8.08 to 11.12)	80	86.96
		High (>11.12)	12	13.04
14.	Information management behavior	Low (<30.02)	16	17.40
		Medium (30.02 to 38.74)	66	71.74
		High (>38.74)	10	10.86

While 10.87% were found to be having their annual family income \leq ₹1,00,000/-, 21.74% were found being placed to the income range category between ₹100000-₹200000/-, 26.09% to the income range category between ₹200000-₹300000/-, 16.30% between ₹300000-₹400000/-, and 17.39% between ₹400000-₹500000/-. Relative to the respondents' experience in fisheries activities, gross majority (71.74%) were found to have little experience (\leq 5 years) and 25.00% of them were having moderate experience (6 to 10 years). While for majority (58.69%) of the respondents, the share of income from culture fisheries appeared to be ranging between only 1-10%, for 36.96% of their counterpart that was in the range of 10.1-20%. In terms of status of material possession, majority (77.17%) were found to be placed in the moderate category. Majority of the respondents were also found to be at moderate levels in cases of self confidence (69.56%), achievement motivation (65.22%), and economic motivation (86.96%). Further, relating to information management behavior, majority (71.74%) was observed to be placed under medium category (Table 3).

3.3 Fish Productivity in Water Bodies of the Respondents

The worked out five years' aggregate level average fish productivity of the beneficiary respondents between 2012-13 and 2016-17 gave rise to the development of a genuine concern. In sharp contrast to the state average (2477.99 kg ha⁻¹) as well as the average of Dhalai district (2376.66 kg ha⁻¹), where the study was conducted, it was noted that the accrual of average fish productivity by the beneficiary respondents from their water bodies was too low. And with the level of respondents' fish productivity being only 414.25 kg ha⁻¹ during that reference period, it lagged behind by 5.98 times from the state average and 5.74 times from that of Dhalai district i.e. the locale of the study (Table 4).

3.4 Annual Income from MGNREGS Supported Water Bodies and Pond Surroundings

Owing to very poor average annual fish productivity in their scheme supported water bodies (Table 4), the accrual of average annual income there from through practicing culture fisheries had also remained at extremely poor

level. Side by side, their average annual income from the pond surroundings by performing small horticulture and/or fringe plantation crops was also at almost negligible levels. Whereas, ₹1157/- was figured out to be the average annual income of the respondents from pond based culture fisheries, it was still lower with only ₹703/- from pond surrounding based miscellaneous small production activities (Table 5).

3.5 Share of Fisheries to Annual Family Income

It was revealed that for 58.69% of the respondents, share of their income from culture fisheries ranging between \leq 10%; for 36.96%, it was lying between >10-20%; and only in case of 4.35%, their share of income from fisheries had been lying in the range of > 20-30%. (Fig. 2).

3.6 Extent of Adoption of Scientific Aquaculture Practices

No doubt, in the face of extremely poor average fish productivity in the ponds of beneficiary respondents (Table 4), integration of scientific technologies was a gross necessity for the post work execution phase of MGNREGS. But, quite deplorably it was noticed that for none of the six major domains of activities relevant to scientific aquaculture, their respective adoption index could touch even 50% mark (Table 6). In cases of domains like 'pond preparation' and 'manuring and fertilization of the pond', the corresponding levels of adoption were 44.02% and 40.22%, respectively. And in terms of adoption index of other major activity domains like 'stocking', 'supplementary feeding' and 'liming', their respective adoption index had remained restricted to 29.62%, 27.90% and 27.72%. Shockingly still, in case of activity domain pertaining to 'water exchange and quality monitoring', the extent of adoption was as less as 18.48% only. As the resultant effect, the overall adoption index for the entire respondents remained to be only 32.85%. (Table 6).

3.7 Knowledge of Pond Owning Beneficiaries on Scientific Aquaculture

Conceptually, adoption is a decision to make full use of an innovation [16]. This adoption process gets stimulated through the interaction of many factors. And from fisheries sector, already there exists ample evidences that when the knowledge

of fishermen is more, adoption of scientific fish culture is also more [17,18,19]. Thus, up-scaled knowledge in regard to innovative technologies is regarded as a vital causal factor behind promotion of scientific aquaculture practices. But for the extant study, worked out overall knowledge index (only 34.75%) of the respondents reflected an untidy picture. And the reason behind manifestation of such poor knowledge level was due to pitiable status of each of the entire individual domain-wise knowledge index for the neo-class of pond owning populace under study. Out of the five domains, while for 'stocking' the knowledge index was 37.89%, it was 37.09% for 'fertilization of the pond', 36.56% for 'post stocking', 30.61% for

'liming' and only 28.80% for 'pond preparation' (Table 7).

3.8 Training Exposure on Scientific Aquaculture Practices

In the process of looking at the reason behind such scruffy scenario of adoption and knowledge levels of the beneficiary pond owners concerning scientific aquaculture practices, it was revealed that as high as 66.30% of the respondents became first ever pond owner only upon receipt of support from MGNREGS and, therefore, didn't have any previous experience as to how to manage the ponds in efficient manner to ensure good fish harvest (Table 8). And there lied the

Table 4. Comparison of fish productivity

Tripura	Average annual fish productivity from culture fisheries (kg ha ⁻¹)*			
	Dhalai	Ponds of MGNREGS beneficiary respondents	Shortfall	
			From state average	From district average
2477.99	2376.66	414.25	5.98 times	5.74 times

*Average annual fish productivity was worked out by combining corresponding data between 2012-13 and 2016-17

Table 5. Annual Income from MGNREGS supported water bodies and pond surroundings

Annual income from water bodies (₹)	Frequency	Percentage	Average annual income (₹)
≤ 500	10	10.87	1157
501-1000	21	22.83	
1001-1500	29	31.52	
1501-2000	12	13.04	
2001-2500	13	14.13	
>2500	7	7.61	
Annual income from Pond surroundings (₹)	Frequency	Percentage	Average annual income (₹)
≤ 500	18	19.57	703
501-1000	28	30.43	
1001-1500	32	34.78	
1501-2000	8	8.70	
2001-2500	3	3.26	
>2500	3	3.26	

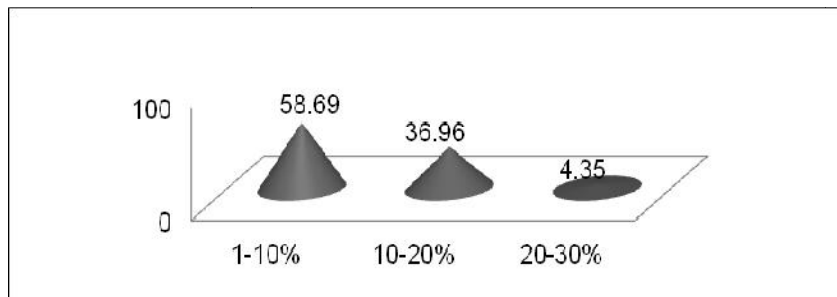


Fig. 2. Share of culture fisheries to annual income of the respondents

essentiality of knowledge and specifically skill empowerment to them through proper capacity development for facilitating adoption of scientific practices [5].

But unfortunately, it transpired that a larger proportion (67.39%) of those new classes of pond owners didn't ever receive any training exposure. Among the remaining 32.61%, who were privileged in undergoing training, 30.00% were found to have the exposure of mere one day training in the domain name of 'scientific aquaculture practices' (Table 9). Now, in the backdrop of the assertion that proper longer duration training of farmers and exposing them to improved technologies would increase the level of adoption [20], it became obvious to raise quite a logical doubt as to whether that category of single day training was having any efficacy on the development of understanding of those trainees either in terms of their proper knowledge enhancement or in upgrading their skills to any level of significance or not.

Again, in case of 23.33% of those privileged few recipients of so called training were detected to have the exposure of merely two days (Table 9), once again on an apparently high sounding domain of 'composite fish farming', which for all practical reasons cannot be made a purposeful one with respect to either knowledge empowerment in composite fish farming techniques or inculcating bits and pieces of

various critical skill sets for successfully translating those under their back home situations. Only 46.67% of the recipients of so called training were found to have undergone week long exposure which at least made some sense.

3.9 Perceived Constraints of Beneficiary Respondents of the Scheme

In terms of ranking positions of various constraints of the beneficiary respondents as perceived to be inhibiting the productive performance in their aquatic endowments (Table 10), 'lack of systematic and timely supply of critical inputs' emerged as the most important one (percentage position:13.38). And up to next three ranks in decreasing order those were 'lack of training' (percentage position: 12.00), 'difficulty to properly understand complex nature of information generally provided by experts' (percentage position: 11.24), and 'inadequate knowledge and skill about scientific fishery management' (percentage position: 9.53). In the face of already transpired fact that being severely impaired with almost negligible economic return from the aquatic niches they had been in possession by way of getting the benefit of MGNREGS and mostly were not in a position to supplement their family income from that newly created asset to any significant extent as the fall out (Table 5 & Fig. 2), such judgmental views of

Table 6. Extent of adoption of scientific aquaculture practices

Sl. no	Domains	Maximum obtainable Score	Obtained score	Adoption index (%)
1.	Pond Preparation	368	162	44.02
2.	Liming	184	51	27.72
3.	Manuring and Fertilization of the Pond	276	111	40.22
4.	Stocking	368	109	29.62
5.	Supplementary Feeding	276	77	27.90
6.	Water Exchange and Quality Monitoring	184	34	18.48
Overall		1656	544	32.85

Table 7. Knowledge of pond owning beneficiaries on scientific aquaculture

Sl. No.	Domains	Maximum obtainable score	Obtained score	Adoption index (%)
1.	Pond Preparation	552	159	28.80
2.	Liming	552	169	30.61
3.	Fertilization of the Pond	736	273	37.09
4.	Stocking	644	244	37.89
5.	Post Stocking	1012	370	36.56
Overall		3496	1215	34.75

the beneficiary pond owning respondents of the scheme on their constraints, thus, found to have association with their objective status in terms of very poor average fish productivity from the scheme supported fish culture ponds (Table 4) perceivably due to the combined effect of unsatisfactory levels of knowledge *vis-a-vis* adoption of scientific aquaculture practices as well as extreme inadequacy in arranging knowledge and skill enabling training for them through institutional arrangements (Tables 6, 7 &

8). Therefore, it appeared to be a call of the hour for the authorities responsible for effective convergence of MGNREGS with that of aquaculture during the post work execution phase of the scheme for strategic hand holding not only in terms of training but also in the matter of systematic and timely supply of critical inputs to the beneficiaries so as to enable them in excelling the productive performances of their newly endowed aquatic niches.

Table 8. Pond ownership status of respondents before and after MGNREGS intervention

No. of respondents	Owned pond prior to MGNREGS intervention		Became owner only after MGNREGS intervention	
	Number	Percentage	Number	Percentage
92	31	33.70	61	66.30

Table 9. Training exposure on scientific aquaculture practices

Training exposure	Frequency	Percentage
Attended training programme	30	32.61
Area of training		
• Integrated fish Farming (7 days)	14	46.67
• Composite fish farming(2)	07	23.33
• Scientific Aquaculture Practices(1)	09	30.00
Attended training more than once	11	36.67
Not attended any training programme	62	67.39

Table 10. Garrett ranking of perceived constraints inhibiting productive performance

Sl. No.	Factors	Total score	Average Rank	Percentage	
1	Difficulty in regular supervision due to farness of pond from home	2640	28.70	X	4.83
2	Business/service/agriculture/wage earning being main occupation cannot concentrate seriously on fishery	2426	26.37	XI	4.44
3	Rearing livestock as component of integrated farming not feasible	3728	40.52	IX	6.82
4	Lack of systematic and timely supply of critical inputs	7315	79.51	I	13.38
5	Non-conduct of demonstration/exposure visits	3978	43.24	VIII	7.28
6	Lack of training	6558	71.28	II	12.00
7	Difficulty to properly understand complex nature of information generally provided by experts	6142	66.76	III	11.24
8	Inadequate knowledge and skill about scientific fishery management	5208	56.61	IV	9.53
9	Dearth of synchronized technical advice and guidance on effective pond niche utilization from a single institutional source	4989	54.23	V	9.13
10	No mechanism to ensure availability of good quality fish seeds and feeds from retail outlets	4837	52.58	VI	8.85
11	Substantial fish mortality caused by disease frequently inflicts economic loss	4522	49.15	VII	8.27
12	High cost of fish culture	2310	25.11	XII	4.23

Table 11. Suggestions of respondents for increased productivity in their pond niches (n=92)

Statement	No.of responses	Overall rank
Timely provisioning of critical inputs like fish seed & feed, quick lime, MOC, fish health medicine etc.	92(100.00)	I
Arranging of more no. of longer duration hands-on training to make those really worthy.	86(93.47)	II
Ensuring regular monitoring and technical know-how support from the block level fisheries expert.	73(79.34)	III
Remaining unbiased while distributing fisheries inputs.	71(77.17)	IV
Provisioning of greater institutional financing for scientific fish farming.	60(65.21)	V

Note: Figure in the parenthesis indicates percentage in respect of total respondents

Table 12. Functionaries' views on dealing with productive performance enhancement related issues (n=27)

Issues	Category of functionary					
	Fishery officer (N ₁ = 5)		G.P./V.C. personnel ¹ (N ₂ = 10)		Block level executing personnel of MGNREGS (N ₃ = 12)	
	Addressed	Not addressed	Addressed	Not addressed	Addressed	Not addressed
Skill training on scientific aquaculture practices	05 (100.00)	0 (0.00)	0 (0.00)	10 (100.00)	8 (66.67)	4(33.33)
Conduct of field days/ demonstrations	05 (100.00)	0 (0.00)	10 (100.00)	0 (0.00)	9 (75.00)	3(25.00)
Critical input support in timely manner	05 (100.00)	0 (0.00)	10 (100.00)	0 (0.00)	12 (100.00)	0(0.00)

G.P. = Gram Panchayat; V.C. = Village Council Note: Figure in the parenthesis indicates percentage to respective total

3.10 Suggestions of Pond Owning MGNREGS Beneficiaries

In view of their perceived constraints, the beneficiary respondents also offered suggestions as to how improvement of the productive performances of their pond niches might be brought about.

In accordance with the ranking position of those suggestions, 'timely provisioning of critical inputs like fish seed & feed, quick lime, MOC, fish health medicine etc.' assumed to be the most important suggestion with cent percent of the respondents endorsing the same. In a descending manner, the next two order suggestions were: 'Arranging of more number of longer duration hands-on training to make those really worthy' (endorsed by: 93.47%), and 'Ensuring regular monitoring and technical know-how support from the block level fisheries expert' (endorsed by: 79.34%).

3.11 Functionaries' Conflicting Views against Beneficiaries' Perception

With regard to the perception of functionaries in matters of addressing some major issues by them for enhancement of productive performance of the beneficiaries' pond niches during post work execution phase, while in cases of both 'skill training on scientific aquaculture practices' and 'conduct of demonstrations/field days', each one of the respondents from the sub-categories of Fishery Officers and *Gram Panchayat/Village Council* personnel were expressive of addressing that issue, 66.67% and 75.00% of their counterpart representing Block level executing personnel of MGNREGS, on the contrary, kept conformity with the earlier and later issue, respectively (Table 12). In case of the issue on 'critical input support in timely manner', the same was remained to be the responsibility of the State Fisheries Department in accordance with the set Operational Guidelines of the scheme in the matter of convergence framework [6].

But here in this case, irrespective of their institutional belongingness, each one of the respondents was indicative that the specific issue was addressed (Table 12), which, in fact, was a thorough departure from the perception of respondents of the scheme. Rather, 'lack of systematic and timely supply of critical inputs' had been their prime expressed constraint to

cause deterrence in productive performance of their pond based economic activities (Table 10) and therefore univocally (100.00% endorsement) suggested for 'timely provisioning of critical inputs like fish seed & feed, quick lime, MOC, fish health medicine etc.' for ensuring increased productivity in their scheme supported water bodies (Table 11). On the issue like 'skill training on scientific aquaculture practices' also the perception of the respondents grossly varied from the expressed views of the Fisheries Officers. Rather, for the beneficiary respondents, 'lack of training facilities' emerged out to be the second most important inhibiting factor towards improving the productive performance of their pond based economic activities (Table 10) and accordingly 93.47% of them were suggestive of 'arranging of more number of longer duration hands-on training to make those really worthy' (Table 11).

4. CONCLUSION

Though the opportune stage has been created through commendable execution of works relating to excavation and reclamation of water bodies in the district, much is still to be done if the issue of convergence of MGNREGS with aquaculture sector of the district is to meaningfully address during the post work execution phase, so that the beneficiary pond owning class, characterized by very high intensity of disadvantageous communities, is truly enabled to efficiently harness those built up assets as a genuine livelihood means for them to improve the quality of their lives.

5. RECOMMENDATION

Contextual to the quite noticeable insufficiency in the knowledge and adoption levels of the pond owning beneficiaries of the scheme in the matter of scientific aquaculture practices coupled with extreme dearth of providing systematic knowledge and skill enabling training to them, and lack of systematic and timely supply of critical inputs, it is being strongly advocated to take up strategic interventions in devotedly organizing *in situ* demonstrations and tailor made longer duration skill enabling trainings on relevant domains of good practices alongside rendering regular expert advisory/know-how support and timely providing of critical inputs like fish seed & feed, quick lime, MOC, fish health medicine etc. as per the fitment of requirements of the target populace.

CONSENT

The first author being the student worker and all the remaining authors being the members of her Advisory Committee, it is being consented jointly in favour of publishing of the paper.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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