

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

**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 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<sup>-1</sup>) 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'.

**Key words:** Dhalai, MGNREGS-aquaculture convergence, pond excavation/reclamation, Tripura

**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

45 the scheme [2,4]. Works like excavation of ponds/percolation tanks/canal, renovation/de-silting of  
46 existing ponds/old canals etc. were very much remained under the scope of permissible works of the  
47 scheme to trigger creation of rural infrastructure [5]. It was specifically envisaged that after completion  
48 of works under the scheme to create those assets, effective rendering of both fund and technical  
49 know-how support were to be obligatorily extended during its post-work execution phase towards  
50 improving the livelihoods. And for such things to happen, instilling convergence with the resources of  
51 other programmes/schemes available with the *Panchayats* and/or other state line departments was  
52 envisaged. For fisheries related sector, it was also exemplified that the state fisheries departments  
53 were to arrange for capacity building, supply of livelihood components in the form of fingerlings,  
54 manures, etc. by mobilizing available funds of other on-going schemes [6].

55 Fishery holds a vital place in the socio-economic fabric of the native people of Tripura, which is one  
56 amongst the north-eastern states to cover an area of 10,486 km<sup>2</sup> and support 36,71,032 population  
57 [7]. Fish plays a formidable role in its economic growth along with providing employment opportunities  
58 and food security to the people [8]. Here, fish is regarded as a crucial component of daily diet by its 95  
59 per cent inhabitants [9]. Considering its importance, the state had adopted strategy for both vertical as  
60 well as horizontal expansion of its aquaculture sector [10]. And in order to achieve that, making use of  
61 MGNREGS fund started taking place in the state. While enhancement of productive performances of  
62 the available water bodies through promoting scientific fish culture was assumed to aid in vertical  
63 expansion, the horizontal expansion on the other hand was envisioned to be achieved through  
64 increasing the area under culture fisheries by way of effective convergence between various available  
65 resources out of relevant schemes/programmes. Due emphasis was also given on revitalization of the  
66 existing unproductive water bodies in the form of performing necessary reclamation of those [11]. And  
67 there remained the significance of MGNREGS for the Tripura state.

68 There occurred, commendable execution of works concerning creation as well as reclamation of  
69 ponds by utilizing Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)  
70 fund in the state of Tripura [10] to set the opportune stage for it in raising its aquaculture production by  
71 efficiently harnessing those built up assets in the form of practicing culture fisheries by the beneficiary  
72 pond owning class. And supposedly that might have caused improvement in the quality of life of  
73 those otherwise poor rural gentry through eligibly contribute in ensuring their household nutritional  
74 security and enhancing their income efficiency as well, subject to the condition that steady input,  
75 advisory, training and, technical know-how support are provided to them from the relevant institutional  
76 source(s). It is un-refutable a fact that more there would be the attainment of the said conditionality,  
77 greater would emerge the possibility of real success of MGNREGS-Aquaculture convergence in  
78 accordance with its envisioned purpose. In the face of scant studies on the mannerism through which  
79 MGNREGS could register its influence over those neo-breed of beneficiary aquaculturists in Tripura  
80 during post work execution phase of the scheme, what had been the perceived constraints of those  
81 aquaculturists in appropriately harnessing the created opportunity under the aegis of MGNREGS, and  
82 how can a better synergy be brought about between MGNREGS and aquaculture, thus, formed the  
83 basis of present study, which was carried out with the objectives: i) to comprehend the physical  
84 performance of pond excavation and reclamation works under MGNREGS; and ii) to peruse the  
85 nature of harnessing of the created assets at beneficiary level during post work execution phase of  
86 the scheme.

## 87 **METHODOLOGY**

### 88 **Research Setting**

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

### 95 **Sampling**

96 For collection of primary data, 92 nos. of MGNREGS supported aquaculturists were selected through  
97 probability proportionate to size (PPS) sampling at 10% level of probability. Moreover, 27 no. of  
98 various levels of functionaries relevant to enhancement of the efficiency of productive performance of  
99 the pond niches during post work execution phase of MGNREGS in the areas under investigation like  
100 State Fisheries Department (05 no.), Gram Panchayat/Village Council Institution (10 no.) and Block

101 Development Office (12 no.) were also included. Thus, total number of respondents stood out to be  
102 119.

### 103 **Data Collection**

104 Data was collected from both primary and secondary sources. Primary data was collected through  
105 personal interview of the selected respondents by separately administering pre-tested structured  
106 interview schedules for the beneficiary pond owning respondents and functionaries representing  
107 various institutions. Collection of secondary data, however, was made by utilizing both official report  
108 and web information [12, 13].

### 109 **Method of Analysis**

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

#### 111 **Fish productivity in water bodies of the respondents**

112 The fish productivity was calculated by firstly working out culture period *vis-a-vis* study period wise  
113 production performances of fish for each respondent along with the corresponding area as was  
114 devoted by them for obtaining that production. Then the mean values of production and area at  
115 aggregate level for the entire study period was calculated for each of those respondents as well as all  
116 of them as a whole to finally work out the realization of average fish productivity in kg ha<sup>-1</sup> for the  
117 entire tenure of five years of the study- individually and cumulatively as well.

#### 118 **Annual income from MGNREGS supported water bodies and surroundings**

119 Annual income from MGNREGS support was estimated in terms of average annual income accrued  
120 through both culture fisheries and pond dyke based small horticulture and/or fringe growing of  
121 plantation crops.

#### 122 **Extent of adoption of scientific aquaculture practices**

123 It was measured by resorting to the scale [14] containing 18 critical activity statements distributed  
124 over six major domains viz., 'pond preparation' (contained four critical activity statements); 'liming'  
125 (contained two critical activity statements); 'manuring and fertilization of the pond' (contained three  
126 critical activity statements); 'stocking' (contained four critical activity statements); 'supplementary  
127 feeding' (contained three critical activity statements); and 'water exchange and quality monitoring'  
128 (contained two critical activity statements). The scale was administered on a three point continuum  
129 ranging between full scale adoption and non-adoption through partial adoption, for which the assigned  
130 scores were 3, 1 and 2 respectively. The summated score value, combining all critical activity  
131 statements, determined a respondent's total adoption score. Maximum and minimum possible score  
132 for a respondent to obtain could be 54 signifying very high level of adoption, and 18 signifying very  
133 poor level of adoption, respectively. On the basis of adoption score, adoption index (in percentage)  
134 was separately computed for each of all the six identified domains in the following manner:

$$135 \text{ Adoption index} = \frac{\text{Mean score obtained in a particular domain}}{\text{Maximum obtainable score in that domain}} \times 100$$

136 Then overall adoption index was calculated in the following manner:

$$137 \text{ Overall adoption index} = \frac{\text{Adoption score obtained combining all domains}}{\text{Maximum obtainable score combining all domains}} \times 100$$

#### 142 **Knowledge about scientific aquaculture practices**

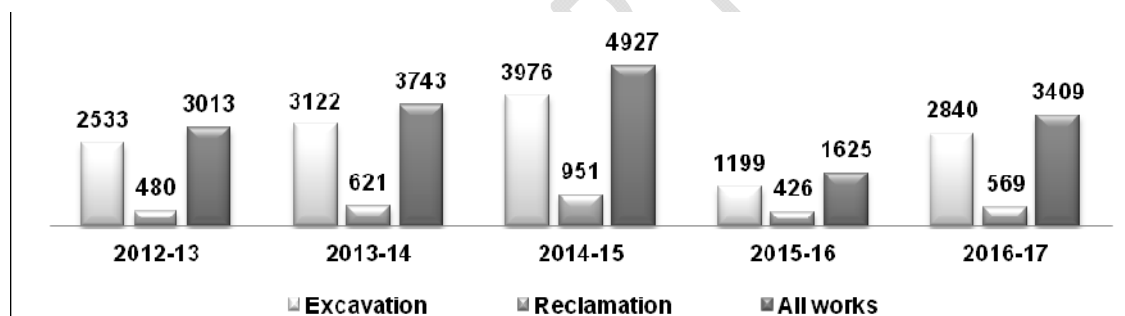
143 Knowledge of respondents was measured in line with the yes/no type knowledge test scale [14]  
144 containing 38 critical activity statements distributed over five major domains viz., 'pond preparation'  
145 (contained six statements); 'liming' (contained six statements); 'fertilization of the pond'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



	(56.88)	(43.11)	(13.74)	
North Tripura	7619 (66.98)	3756 (33.02)	11375 (12.84)	V
Sepahijala	5696 (58.59)	4026 (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)	-

198 *Note: Figure in the parenthesis indicates percentage to all works respective to corresponding district.*  
 199 Source: Authors' own calculation on the basis of information gathered from the website of Ministry of  
 200 Rural Development, Government of India pertaining to 2012-13 to 2017-18. Available on [http://](http://mgnregaweb4.nic.in/netnrega/writereaddata/citizen_out/wrkstatlink_30_05_1718ALL.html)  
 201 [mgnregaweb4.nic.in/netnrega/writereaddata/citizen\\_out/wrkstatlink\\_30\\_05\\_1718ALL.html](http://mgnregaweb4.nic.in/netnrega/writereaddata/citizen_out/wrkstatlink_30_05_1718ALL.html).

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



211 Fig: 1 Year Wise Physical Performance of Works on Excavation/Reclamation of Ponds Dhalai district  
 212

213 Further to this, the status of Dhalai district with respect to area, production and productivity under  
 214 culture fisheries for the period between 2012-13 and 2016-17 indicated that the area under culture  
 215 fisheries underwent a steady progressive growth there. Also in case of both fish production and  
 216 productivity through culture fisheries, that growing trend could be observed, excepting a minor decline  
 217 in 2015-16. Overall, thus, the area under culture fisheries in Dhalai shot up to 3879.08 ha in 2016-17  
 218 from that of 3767.04 ha in 2012-13 (i.e. 2.92% gain); fish production went up to 10054.43 MT in 2016-  
 219 17 from that of 8226.63 MT in 2012-13 (i.e. 22.22% gain); and fish productivity rose up to 2591.96 kg  
 220 ha<sup>-1</sup> from 2183.84 kg ha<sup>-1</sup> (i.e. 18.69% gain) during the same time frame (Table 2).

221 **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 <sup>-1</sup> )
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

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

### 227 Socio-personal profile of the beneficiary respondents

228 Majority (63.04%) were found to be occupying below poverty line (BPL) category; and majority of  
 229 them (59.78%) were belonging to old age group category (>45 years). Contextual to caste categories,  
 230 while large majority (65.22%) was from Scheduled Tribe (ST) community, 27.17% of their counterpart  
 231 had their belongingness with Scheduled Caste (SC) community, and (5.44%) with Other Backward  
 232 Community (OBC). Whereas, 45.65% respondents were found to be comprising of 4-6 family  
 233 members, 42.39% of their counterparts were having up to 3 members. Majority (51.09%) were having  
 234 no background of any formal education, 20.65% were found to be up to primary level of education,  
 235 16.30 per cent up to middle level (i.e. Class VIII standard), 6.52% up to secondary level (i.e. Class X  
 236 standard), and 4.34% up to higher secondary level (i.e. Class XII standard). With respect to land  
 237 holding category, an overwhelming majority (80.43%) were found to be placed under marginal land  
 238 holding category with their holding size up to 1 ha of land (Table 3).

239 **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
		Large (>4 ha)	0	0.00
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

Sl. No.	Variables	Categories	Beneficiaries	
			Frequency	Percentage
10.	Material possession status	20.1-30	4	4.35
		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

240 While 10.87% were found to be having their annual family income <math>\leq \text{INR } 1,00,000/-</math>, 21.74% were found  
241 being placed to the income range category between <math>\text{INR } 100000-\text{INR } 200000/-</math>, 26.09% to the income  
242 range category between <math>\text{INR } 200000-\text{INR } 300000/-</math>, 16.30% between <math>\text{INR } 300000-\text{INR } 400000/-</math>, and 17.39%  
243 between <math>\text{INR } 400000-\text{INR } 500000/-</math>. Relative to the respondents' experience in fisheries activities, gross  
244 majority (71.74%) were found to have little experience ( $\leq 5$  years) and 25.00% of them were having  
245 moderate experience (6 to 10 years). While for majority (58.69%) of the respondents, the share of  
246 income from culture fisheries appeared to be ranging between only 1-10%, for 36.96% of their  
247 counterpart that was in the range of 10.1-20%. In terms of status of material possession, majority  
248 (77.17%) were found to be placed in the moderate category. Majority of the respondents were also  
249 found to be at moderate levels in cases of self confidence (69.56%), achievement motivation (65.22%),  
250 and economic motivation (86.96%). Further, relating to information management behavior,  
251 majority (71.74%) was observed to be placed under medium category (Table 3).

## 252 Fish productivity in water bodies of the respondents

253 **Table 4:** Comparison of fish productivity

Tripura	Average annual fish productivity from culture fisheries ( $\text{kg ha}^{-1}$ )*			
	Dhalai	Ponds of MGNREGS beneficiary respondents	From state average	From district average
2477.99	2376.66	414.25	5.98 times	5.74 times

254 \*Average annual fish productivity was worked out by combining corresponding data between  
255 2012-13 and 2016-17

256 The worked out five years' aggregate level average fish productivity of the beneficiary respondents  
257 between 2012-13 and 2016-17 gave rise to the development of a genuine concern. In sharp contrast  
258 to the state average ( $2477.99 \text{ kg ha}^{-1}$ ) as well as the average of Dhalai district ( $2376.66 \text{ kg ha}^{-1}$ ),  
259 where the study was conducted, it was noted that the accrual of average fish productivity by the  
260 beneficiary respondents from their water bodies was too low. And with the level of respondents' fish  
261 productivity being only  $414.25 \text{ kg ha}^{-1}$  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).

## 262 Annual income from MGNREGS supported water bodies and pond surroundings

263 **Table 5:** Annual Income from MGNREGS supported water bodies and pond surroundings

Annual income from water bodies ( $\text{INR}$ )	Frequency	Percentage	Average annual income ( $\text{INR}$ )
$\leq 500$	10	10.87	
501-1000	21	22.83	
1001-1500	29	31.52	1157

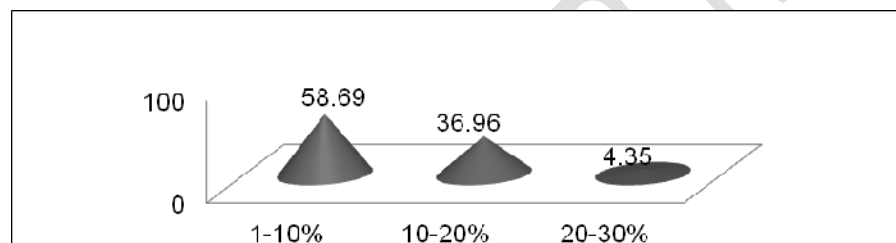
Annual income from water bodies (₹)	Frequency	Percentage	Average annual income (₹)
1501-2000	12	13.04	
2001-2500	13	14.13	
>2500	7	7.61	
Annual income from Pond surroundings (₹)	Frequency	Percentage	Average annual income (₹)
≤ 500	18	19.57	
501-1000	28	30.43	
1001-1500	32	34.78	703
1501-2000	8	8.70	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

264 Owing to very poor average annual fish productivity in their scheme supported water bodies (Table 4),  
265 the accrual of average annual income there from through practicing culture fisheries had also  
266 remained at extremely poor level. Side by side, their average annual income from the pond  
267 surroundings by performing small horticulture and/or fringe plantation crops was also at almost  
268 negligible levels. Whereas, ₹1157/- was figured out to be the average annual income of the  
269 respondents from pond based culture fisheries, it was still lower with only ₹703/- from pond  
270 surrounding based miscellaneous small production activities (Table 5).

#### 271 **Share of fisheries to annual family income**

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

275



276

277

Fig. 2. Share of Culture Fisheries to Annual Income of the Respondents

#### 278 **Extent of adoption of scientific aquaculture practices**

279 **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

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



289 extent of adoption was as less as 18.48% only. As the resultant effect, the overall adoption index for  
 290 the entire respondents remained to be only 32.85%. (Table 6).

291 **Knowledge of pond owning beneficiaries on scientific aquaculture**

292 **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

293 Conceptually, adoption is a decision to make full use of an innovation [16]. This adoption process gets  
 294 stimulated through the interaction of many factors. And from fisheries sector, already there exists  
 295 ample evidences that when the knowledge of fishermen is more, adoption of scientific fish culture is  
 296 also more [17, 18, 19]. Thus, up-scaled knowledge in regard to innovative technologies is regarded as  
 297 a vital causal factor behind promotion of scientific aquaculture practices. But for the extant study,  
 298 worked out overall knowledge index (only 34.75%) of the respondents reflected an untidy picture. And  
 299 the reason behind manifestation of such poor knowledge level was due to pitiable status of each of  
 300 the entire individual domain-wise knowledge index for the neo-class of pond owning populace under  
 301 study. Out of the five domains, while for 'stocking' the knowledge index was 37.89%, it was 37.09%  
 302 for 'fertilization of the pond', 36.56% for 'post stocking', 30.61% for 'liming' and only 28.80% for 'pond  
 303 preparation' (Table 7).

304 **Training exposure on scientific aquaculture practices**

305 In the process of looking at the reason behind such scruffy scenario of adoption and knowledge levels  
 306 of the beneficiary pond owners concerning scientific aquaculture practices, it was revealed that as  
 307 high as 66.30% of the respondents became first ever pond owner only upon receipt of support from  
 308 MGNREGS and, therefore, didn't have any previous experience as to how to manage the ponds in  
 309 efficient manner to ensure good fish harvest (Table 8). And there lied the essentiality of knowledge  
 310 and specifically skill empowerment to them through proper capacity development for facilitating  
 311 adoption of scientific practices [5].

312 **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

313  
 314 But unfortunately, it transpired that a larger proportion (67.39%) of those new classes of pond owners  
 315 didn't ever receive any training exposure. Among the remaining 32.61%, who were privileged in  
 316 undergoing training, 30.00% were found to have the exposure of mere one day training in the domain  
 317 name of 'scientific aquaculture practices' (Table 9). Now, in the backdrop of the assertion that proper  
 318 longer duration training of farmers and exposing them to improved technologies would increase the  
 319 level of adoption [20], it became obvious to raise quite a logical doubt as to whether that category of  
 320 single day training was having any efficacy on the development of understanding of those trainees  
 321 either in terms of their proper knowledge enhancement or in upgrading their skills to any level of  
 322 significance or not.

323 **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
-------------------------------------	----	-------

324 Again, in case of 23.33% of those privileged few recipients of so called training were detected to have  
325 the exposure of merely two days (Table 9), once again on an apparently high sounding domain of  
326 'composite fish farming', which for all practical reasons cannot be made a purposeful one with respect  
327 to either knowledge empowerment in composite fish farming techniques or inculcating bits and pieces  
328 of various critical skill sets for successfully translating those under their back home situations. Only  
329 46.67% of the recipients of so called training were found to have undergone week long exposure  
330 which at least made some sense.

### 331 Perceived constraints of beneficiary respondents of the scheme

332 **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

333 In terms of ranking positions of various constraints of the beneficiary respondents as perceived to be  
334 inhibiting the productive performance in their aquatic endowments (Table 10), 'lack of systematic and  
335 timely supply of critical inputs' emerged as the most important one (percentage position:13.38). And  
336 up to next three ranks in decreasing order those were 'lack of training' (percentage position: 12.00),  
337 'difficulty to properly understand complex nature of information generally provided by experts'  
338 (percentage position: 11.24), and 'inadequate knowledge and skill about scientific fishery  
339 management' (percentage position: 9.53). In the face of already transpired fact that being severely  
340 impaired with almost negligible economic return from the aquatic niches they had been in possession  
341 by way of getting the benefit of MGNREGS and mostly were not in a position to supplement their  
342 family income from that newly created asset to any significant extent as the fall out (Table 5 & Fig. 2),  
343 such judgmental views of the beneficiary pond owning respondents of the scheme on their  
344 constraints, thus, found to have association with their objective status in terms of very poor average  
345 fish productivity from the scheme supported fish culture ponds (Table 4) perceivably due to the  
346 combined effect of unsatisfactory levels of knowledge *vis-a-vis* adoption of scientific aquaculture  
347 practices as well as extreme inadequacy in arranging knowledge and skill enabling training for them  
348 through institutional arrangements (Tables 6, 7 & 8). Therefore, it appeared to be a call of the hour for  
349 the authorities responsible for effective convergence of MGNREGS with that of aquaculture during the  
350 post work execution phase of the scheme for strategic hand holding not only in terms of training but  
351 also in the matter of systematic and timely supply of critical inputs to the beneficiaries so as to enable  
352 them in excelling the productive performances of their newly endowed aquatic niches.

### 353 Suggestions of pond owning MGNREGS beneficiaries

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

356 **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

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

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

#### 364 **Functionaries' conflicting views against beneficiaries' perception**

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

375 **Table 12:** Functionaries' views on dealing with productive performance enhancement related issues  
 376 (n=27)

Issues	Category of functionary					
	Fishery officer (N <sub>1</sub> = 5)		G.P./V.C. personnel <sup>1</sup> (N <sub>2</sub> = 10)		Block level executing personnel of MGNREGS (N <sub>3</sub> = 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)

377 1. G.P. = Gram Panchayat; V.C. = Village Council

378 *Note: Figure in the parenthesis indicates percentage to respective total*

379 But here in this case, irrespective of their institutional belongingness, each one of the respondents  
 380 was indicative that the specific issue was addressed (Table 12), which, in fact, was a thorough  
 381 departure from the perception of respondents of the scheme. Rather, 'lack of systematic and timely  
 382 supply of critical inputs' had been their prime expressed constraint to cause deterrence in productive  
 383 performance of their pond based economic activities (Table 10) and therefore univocally (100.00%  
 384 endorsement) suggested for 'timely provisioning of critical inputs like fish seed & feed, quick lime,

385 MOC, fish health medicine etc.’ for ensuring increased productivity in their scheme supported water  
386 bodies (Table 11). On the issue like ‘skill training on scientific aquaculture practices’ also the  
387 perception of the respondents grossly varied from the expressed views of the Fisheries Officers.  
388 Rather, for the beneficiary respondents, ‘lack of training facilities’ emerged out to be the second most  
389 important inhibiting factor towards improving the productive performance of their pond based  
390 economic activities (Table 10) and accordingly 93.47% of them were suggestive of ‘arranging of more  
391 number of longer duration hands-on training to make those really worthy’ (Table 11).

## 392 CONCLUSION

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

## 399 RECOMMENDATION

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

## 408 COMPETING INTEREST

409 No competing interests do exist.

## 410 CONSENT

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

## 413 ETHICAL APPROVAL

414 Not Applicable

## 415 REFERENCES

- 416 1. Koyu, B., Sarkar, A., Singh, R., Singh, R.J. (2017). Is MGNREGA a myth for Arunachal Pradesh?  
417 Field evidence. *Economic Affairs*. 62(2): 313-319.
- 418 2. Ministry of Rural Development, Govt. of India, (2008). National Rural Employment Guarantee Act  
419 (2005): Operational Guidelines (3<sup>rd</sup> Edn.). Department of Rural Development, Govt. of India. New  
420 Delhi. 1- 4.  
421 Available: [https://nrega.nic.in/Nrega\\_guidelinesEng.pdf](https://nrega.nic.in/Nrega_guidelinesEng.pdf) (Accessed 12 March 2018).
- 422 3. Mondal, S. (2013). *Text Book of Agricultural Extension with Global Innovations*. Kalyani  
423 Publishers, New Delhi. 203-207.
- 424 4. Koyu, B. (2015). An evaluative study on the impact of MGNREGA in Arunachal Pradesh. M.Sc.  
425 (Agri.) Thesis. Submitted to School of Social Sciences, College of Post-Graduate Studies,  
426 Central Agricultural University, Umiam, Meghalaya, India. 39-40.
- 427 5. Ijardar, RS. (2017). Influence of MGNREGA on Aquaculture: A case study in West Tripura.  
428 M.F.Sc. Thesis submitted to Department of Extension and Social Sciences, College of Fisheries,  
429 Central Agricultural University (Imphal), Lembucherra, Tripura, India.1-4.
- 430 6. Ministry of Rural Development, Govt. of India. (2013). Mahatma Gandhi National Rural  
431 Employment Guarantee Act (2005): Operational Guidelines (4<sup>th</sup> Edn.). Department of Rural  
432 Development, Govt. of India, New Delhi. 181-223.
- 433 7. Census of India. (2011). Provisional Population Totals: Figures at a Glance. Ministry of Home  
434 Affairs, Government of India, New Delhi.  
435 [http://censusindia.gov.in/2011-prov-results/prov\\_data\\_products\\_tripura.html](http://censusindia.gov.in/2011-prov-results/prov_data_products_tripura.html).
- 436 8. Saha, B., Pandit, A. (2014). Fish farming practices of Tripura: A socio – economic perspective.  
437 *J. Inland Fish. Soc. India*. 46(2): 41-47.

- 438 9. Debnath, B., Biradar, RS., Pandey, SK., Krishnan, M., Shyam, S., Salim, SS. (2013). Present  
439 status and prospects of fisheries resources, fish seed and fish availability in Tripura. *Journal of*  
440 *Fisheries, Economics and Development*. 14 (1): 30-41.
- 441 10. Ijardar, RS., Sarkar, A., Upadhyay, AD., Biswas, P., Singh, YJ. (2017) Performance of  
442 MGNREGS - Aquaculture convergence: A study in Tripura, India. *International Journal of Stress*  
443 *and Management*. 8(4): 574-580.
- 444 11. Directorate of Fisheries, Govt. of Tripura, (2014). Mandate of the Department. Web location:  
445 <http://fisheries.tripura.gov.in/mandate.htm> (Accessed 26 April 2018).
- 446 12. Ministry of Rural Development. (2018). The MGNREGA: Status of Work Completion (State:  
447 Tripura). Government of India, New Delhi. Available: [http://mgnregaweb4.nic.in/  
448 netnrega/writereaddata/citizen\\_out/wrkstatlink\\_30\\_05\\_1718ALL.html](http://mgnregaweb4.nic.in/netnrega/writereaddata/citizen_out/wrkstatlink_30_05_1718ALL.html) (Accessed 20 March 2019).
- 449 13. Directorate of Fisheries, Govt. of Tripura (2018). District and year wise status of area and  
450 production under culture fisheries in Tripura. 1-2.
- 451 14. Saha, B., Singh, NN., Pandey, DK. (2010). Knowledge and Adoption of Improved Practices of  
452 Carp Production at Tripura in India: Intramural Project Report, Central Agricultural University,  
453 Imphal. 25-26.
- 454 15. Garrett, HE., Woodworth, RS. (1969). *Statistics in Psychology and Education*. Vakils, Fetter and  
455 Simons Pvt. Ltd. Bombay. 329.
- 456 16. Rogers, EM. (1983). *Diffusion of Innovations*. (3<sup>rd</sup> Edn.). The Free Press, New York. 21-22.
- 457 17. Haque, A. (1981). Study of some factors related to the adoption of recommended species of fish  
458 in composite fish culture. Doctoral thesis, BCKV, Mohanpur, India. 69-73.
- 459 18. Talukdar, PK., Sontaki, BS. (2005). Correlates of Adoption of Composite Fish Culture Practices  
460 by Fish Farmers of Assam, India. *The Journal of - Agricultural-Science*. 1(1): 12-18.
- 461 19. Goswami, B., Mukhopadhyay, SB., Dana, SS. (2015). A study on Factors Influencing the  
462 Adoption Behaviour of Fish Farmers with Special Reference to Scientific Fish Culture in West  
463 Bengal, India. *International Journal of Bio-resource and Stress Management*. 3(3): 362-367.
- 464 20. Singh, AK., Singh GP., Singh, B. (2002). Correlates of Farmers' knowledge of improved chickpea  
465 production technology. *Indian Journal of Extension Education*. 38 (3&4): 162-167.

466 **ABBREVIATIONS**

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

467

468

469

470

471

472