

Original Research Article**Effect of Public Fisheries Extension Service on the Selected Socioeconomic Aspects of the Clients in Two Selected Sub-districts under Barisal District in Bangladesh****ABSTRACT**

Fisheries extension is an education and communication process of delivering knowledge and technical support to the fish farmers, fishermen, and other stakeholders connected with fishing and fish farming system. This study was preceded with the aim of evaluating the effect of public aquaculture extension service on the socioeconomic development of the clients in two selected sub-district namely Barisal Sadar and Babugonj under Barisal district. To achieve its objectives, this study exerted importance on quantitative ^{approach} method. However, this research also considered desk studies to reveal the situation. Data were collected with a well-structured interview schedule for the month of October 01 to October 28, 2015, from 140 randomly selected fish farmers. To find out the effect of public aquaculture extension 140 farmers were divided into two equal sized groups based on their contract with public aquaculture extension service. Findings of chi-square analysis represented that the farmers in contact with public aquaculture extension service, seems to be significantly in better position in terms of usages of communication media, organizational participation, income from fish farming, knowledge in fish farming, and attitude toward natural resource conservation, etc., than their non-contact counterpart. The findings of the regression modeling established the fact that extension contacts have significant impact on income from fish farming, and attitude towards natural resource conservation. Farmers in response to an open question also indicated less frequent extension contact, political interference in selecting group member, lack of input supplies, the absence of regular subsidies, etc. as the main problems with the public fisheries extension service. This study also refers to some concrete recommendations for up scaling public fisheries extension service in Bangladesh.

using face-to-face
Survey Interview.

Keywords: Socioeconomic Effect; Public fisheries extension service; Bangladesh

1. INTRODUCTION

Bangladesh is the largest delta in the world, and eventually knit with a huge number of rivers, canals, ponds, lakes, and other water bodies. The inland water bodies covered 12.4 % of the total land area of the country [1]. So, due to rich heritage and geographic advantages [2], aquaculture is a common occupation for many rural dwellers in the country. Traditionally, people of Bangladesh depend on fish and fish products as a part of their daily food consumption. Unfortunately, depletion of natural resources and excessive use of agrochemicals especially in crop sector, almost demolish indigenous fishes and aquatic resources in the country in an accelerated rate. However, contrasting depletion of aquatic

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relevant source to support.

resources, the population in the country was booming at an alarming rate until the first decade of the 20th century. As a result, fish consumption of mass people depends largely upon the dissemination of modern aquaculture technologies. ✓

Dissemination of modern aquaculture technologies in Bangladesh is comparatively a recent phenomenon compared to crop and livestock sector. Modern aquaculture technologies have started their voyage in late sixties. As a result of enormous demand, aquaculture technologies and innovations spread throughout the country in a remarkable rate in the next few decades. According to FAO, Bangladesh has been in the top five fish cultivation countries for several years and jumped to second position superseding India in 2006. Fish production in the country increased by 53% from the year 2004 to 2014 [3]. ✓ From the year 1999-2000 to the year 2011-2012 annual yearly increment of fish production was 5.61% [4]. As noted by Dr. Golam Hossain, former Director General, Bangladesh Fisheries Research Institute, within a period of 10 years from 2002 to 2012, only tilapia production has increased from 4000 metric tons to 134,000 metric tons [5]. However, despite of this fabulous success in cultured fish production, Bangladesh has so far addressed only a fraction of its production potential [6][7]. Apart from pond culture, other water bodies remain noticeably underutilized. For instance, fish culture in floodplains, rice fields, cages, and oxbow lakes at present accounts for only around 2% of total aquaculture production [8]. ✓

Agricultural Extension, one of the essential pillars for the development, can play a vital role in aquaculture development [9][10]. Reviewing a number of literatures, efforts to define and characterize agricultural extension, [11] conceptualize extension as "a set of functions encompasses: transfer of technology for sustainable agricultural production, transformation and marketing; transferring management to mobilize and organize producers, rural groups, and communities; transferring capacity to educate, build human resources and enhance local capacity." ✓ In general the role of extension is to help people to help themselves through education, so that they can improve their socioeconomic condition [12]. Extension provides a channel through which the problems of the farmers can be identified for research and formulation of aquaculture and fisheries policies for the benefits of the rural communities. Actually, the farmers - who get timely and appropriate information - from the extension actors, can persistently develop their economic status. ✓

Bangladesh can utilize the potentials of fisheries sector through strong aquaculture or fisheries extension programs [13]. Unfortunately, Lack of effectiveness of aquaculture extension service is a major challenge of technology transfer in fisheries sector of this country [14]. In fact, effectiveness of extension service largely depends upon the identification of appropriate sector where service is necessary. Actually, farmer's need of extension service may vary with the variation of their socio-economic status. So, improving efficiency of extension is profoundly depending upon identification of its contribution to the socio-economic status of the clients. These might also help us to detect the areas need more concentration, in future extension planning for equilibrium development of the beneficiaries. However, with the aim of exploring socio-economic impact of agricultural extension service this study forward with the following specific objectives:

- To reveal the situation of present public aquaculture extension service. ✓
- To assess socioeconomic status of the selected respondents in terms of selected factors ✓
- To determine the factors affecting socioeconomic impact of public aquaculture extension service in the study area ✓

1.2 CONCEPTUAL FRAMEWORK

Fish is the second most important agricultural crop in Bangladesh which provide sustainable livelihood, employment opportunities, and source of animal protein [6]. Eventually, aquaculture is one of the most important and flourishing industries in Bangladesh. If carefully managed, this sector has the potential to be an important tool in addressing issues such as poverty and food security [15][16]. Lamentably, catch from inland water bodies cannot

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✓ areas/areas? Since this study covered
➤ Locations?

79 supply sufficient quantities of fish to feed the increasing population and thus aquaculture is
80 developing rapidly [17]. However, due to shrinkage cultivable land, as a result of progressive
81 population, the only option left is the intensification of aquaculture in existing ponds rather
82 than digging new ponds. ✓

83 The intensification of aquaculture overwhelmingly depends upon the performance of
84 aquaculture extension service. Aquaculture extension is an educational communication
85 system provides need-based information and knowledge in aquaculture techniques and
86 skills to rural communities with the aim of improving their production, income, and quality of
87 life. As described by FAO¹, "A system which assists people in the fish and the fishing
88 industry, through educational procedures, in improving fishing, fish farming and fish
89 processing methods, increasing production efficiency and income, and improving their
90 socioeconomic conditions".

91 A magnitude of public, private and non-government organizations is catering extension
92 services to the fish farmers in Bangladesh. However, up until now, government extension
93 services are considered as the major force for fisheries sector development. So, overall
94 developments of the fisheries sector through various advanced practices are mostly
95 depending on the efficiency of the fisheries extension services. Aquaculture extension can
96 play pivotal role in the improvement of the socioeconomic status of the clients. According to
97 the study of [13], well trained female fish farmers can significantly increase their fish
98 production than untrained fish farmers. [18] in his study mirrored that aquaculture extension
99 has real potential in the poverty reduction of the fish farmers in Bangladesh. Aquaculture can
100 play a pivotal role at the producer level via higher productivity, income, and better livelihood
101 [19]. In their study in Lagos and Ondo states of Nigeria, [20] claimed that good extension
102 service can enhance production in fish farming. In fact, effective aquaculture extension
103 service can contribute to different socioeconomic aspects of the clients, such as rising
104 income, upgrading social status, increasing knowledge in fish farming, changing attitude
105 towards natural resource management, etc. — ? Please state? ✓

107 1.3 PUBLIC FISHERIES EXTENSION SERVICES IN BANGLADESH

108 Department of Fisheries (DoF) under the Ministry of Fisheries and Livestock (MOFL) plays
109 the central role in controlling aquaculture in Bangladesh. DoF is headed by a Director
110 General, who is assisted by four Directors (one reserve) and 2 principal scientific officers
111 (equivalent to Director). There are administrative set-ups at division, district and Upazila²
112 (sub-district) levels headed by Deputy Director, District Fisheries Officer and Senior/Upazila
113 Fisheries Officer respectively. Besides these, there are three fish inspection and quality
114 control stations under DoF. Furthermore, DoF is also composed of Marine Fisheries Station,
115 Fisheries Training Academy, Fisheries Training and Extension Centers, and Fish Hatcheries
116 [21]. The main function of DoF encompasses planning, development, extension, and
117 training. DoF executed its mandated activities via six divisional, 64 district, and 497 upazila
118 (sub-district) level officials [22]. Bangladesh Fisheries Research Institute (BFRI), is an
119 autonomous research organization also conducts few extension activities alongside its main
120 function research coordination. The headquarters of the institute is located in Mymensingh³.
121 The institute has 5 stations and 5 sub-stations based on different aquatic ecosystems. BFRI,
122 generally conducted the research works, after all it contributes on national fisheries and
123 aquaculture extension program by various research work on biodiversity conservation,
124 improved sustainable farming technique development, and transfer the technologies to users
125 through training of extension workers, planners, fish farmers, and other relevant persons
126 [23]. Youth Development Training Centers, under the Ministry of Youth, also promote

¹ Please see <http://www.fao.org/docrep/field/003/ac061e/AC061E21.html> ✓

² An administrative unit of Bangladesh. Please see www.slideshare.net/fahim002/administrative for details. Date? ✓

³ A district of Bangladesh.

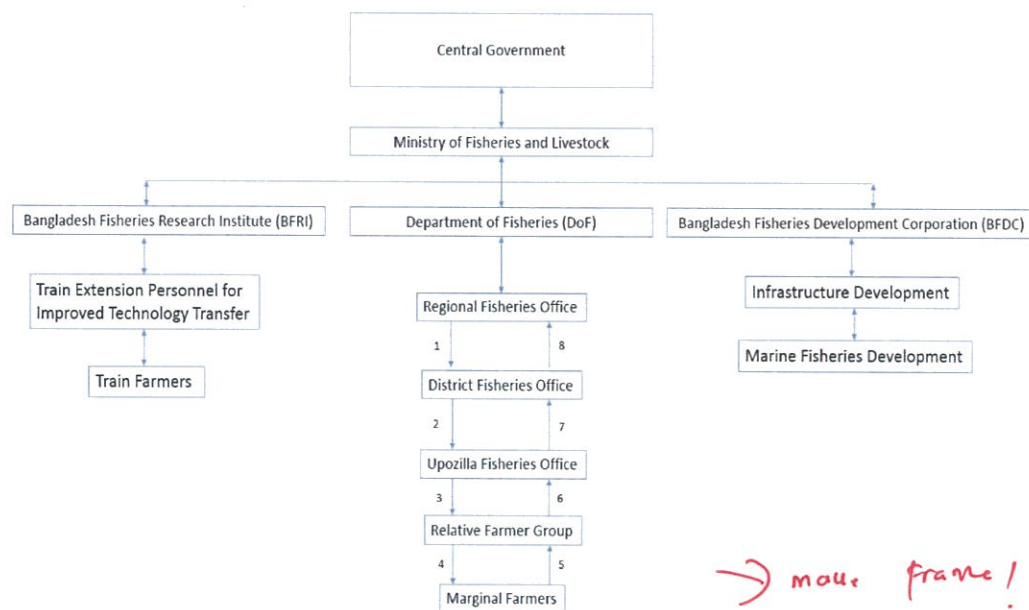
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127 extension and training for unemployed young people and fish farmers in the country.
 128 Universities at the same time play a pivotal role in public fisheries extension service. At
 129 present, there are about 14 universities having fisheries faculty or department, which
 130 produce a good number of fisheries graduates every year. These graduates are catering
 131 technical supports and extension services to the fish farmers all over the country through
 132 both public and private sectors. However, the main organizations related to the aquaculture
 133 sector in Bangladesh are presented in the following Figure along with their major function.



134 **Fig. 1. Major public organizations related to aquaculture sector in Bangladesh**
 135 **Source:** Adopted by the authors

138 2. MATERIALS AND METHODS

139 This study was conducted in 8 selected unions under Barisal Sadar and Babugonj upazila in
 140 Barisal district. These two upazilas were selected for their rich heritage in fish production.
 141 For instance, 3280 fishermen reside in the selected upazilas with yearly fish production 8193
 142 metric tons [24]. To reveal the effect of public fisheries extension service on the
 143 socioeconomic development of the clients, this study considered 70 randomly selected

144 farmers from each group of related (RF) and non-related farmers (NF). Here, RF are those
 145 farmers are in continuous contact with public fisheries extension service for at least one year
 146 and NF are farmers who are continuously apart from public fisheries extension service for at
 147 least one year. Initially, a list of RFs was collected from Upazila Fisheries Office of the
 148 selected areas and 70 farmers were randomly selected from a population of 243 farmers. In
 149 case of NFs, an initial list was prepared from the same territory where RFs were selected
 150 and 70 farmers were selected from a list of 248 farmers. It is noteworthy to mention that this
 151 sample size is good enough to fulfill the assumptions of chi-square analysis. As referred by
 152 [25], chi-square required a reasonably large number of items, usually be at least 50. Data
 153 collection was performed in the period from 11 October to 30 October, 2015 using a
 154 structured interview schedule. The interview schedule was finalized following a pretest with
 155 25 similar respondents to remove unnecessary and invalid questions. *ok*
 156 This study evaluated the effect of public fisheries extension service comparing RFs and NFs.
 157 Variables such as age, sex, education, farm size, objectives of fish farming, frequency of
 158 extension contact, *etc.* were considered to describe the general characteristics of the
 159 respondents. Effect of extension service was measured based on use of extension
 160 communication media, organizational participation, income from fish farming, knowledge in
 161 fish farming, and attitude towards natural resource management. To measure the
 162 significance of difference between farmers Chi-square test was employed. The research also
 163 revealed the effect of public fisheries extension contact along with some other selected
 164 predictor variable on income from fish farming, knowledge in fish farming, and attitude
 165 towards natural resource management. The measurement procedures of all the variables
 166 were placed in Appendix 1. This study adopts SPSS 16.0 to perform all the statistical
 167 analyses.

168 3. RESULTS AND DISCUSSIONS

169 3.1 THE SILENT FEATURES OF THE FISH FARMERS

170 The result of the descriptive analysis presented in Table 1 showing that the mean age of
 171 both RFs and NFs are around 40 years and fish farming is heavily dominated by male
 172 farmers (75 %). The majority of public fisheries extension services related farmers objected
 173 their farming for both family consumption and commercial purpose (74.3%) while none of the
 174 NFs run their farm with commercial intentions. In case of education, more than 80% of RFs
 175 achieved primary to secondary level education and none of them are illiterate. However,
 176 among the NFs more than 70% possess illiterate to primary level education. In terms of farm
 177 size, 71.4% of the NFs are homestead based fish farmers, while 51.5 percent of the RFs are
 178 either medium or large farmers. When comes frequency of extension contact 90.6 percent of
 179 the RFs maintain at least one contact in every three months, while only 8.6 percent of NFs
 180 had one contact in the last six months and the rest did not have any contact in last six
 181 months with public fisheries extension service.

182 **Table 1: Descriptive characteristics of the respondents (N= 70+70).**

Variable	Scale	Categories	Frequency		%	
			RF	NF	RF	NF
Age	Ratio	Mean (RF=40.57, NF=39.74), Standard dev. (RF=11.80, NF=12.56), Obs. range (RF=22-68, NF=20-70)				
Gender	Nominal	Male	49	56	70	80
		Female	21	14	30	20
Objective of Fish Farming	Nominal	Commercial	10	0	14.3	0
		Family consumption	8	39	11.4	55.7
		Both	52	31	74.3	44.3
Education	Ordinal	Illiterate	0	26	0	37.1
		Primary	24	22	34.3	31.4

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Fish farm size	Ordinal	Secondary	33	10	47.1	14.3
		HSC or above	13	12	17.1	15.7
		Homestead pond	8	50	11.4	71.4
		Small (up to 0.40 ha)	19	17	27.1	24.3
		Medium (0.401-0.80 ha)	34	03	48.6	4.3
Frequency of extension contact	Ordinal	Large(>0.80 ha)	9	0	12.9	0
		None/ last six months	0	64	0	91.4
		Once/six months	8	6	11.4	8.6
		Once/three months	16	0	22.9	0
		Once/ month	35	0	50	0
		Once/15 days	11	0	15.7	0

Source: Field study, 2015

3.2 COMPARISON OF RFS AND NFS BASED ON SELECTED SOCIOECONOMIC ASPECTS

Comparison of related farmers (RFs) and non-related farmers (NFs) was observed based on chi-square analysis. The findings presented in Table 2 exhibit that there is a significant difference between RFs and NFs in terms of all the selected socioeconomic aspects, where RFs were found to be in a better position. They have more use of communication media, more organizational participation, better income from fish farming, enhanced knowledge in fish farming, and more positive attitude towards natural resource management.

Table 2. Comparison of RFs and NFs based on selected socioeconomic aspects.

Socio-economic aspects	Category	RF		NF		Row Total	Mean		df	Chi-sq Value
		f	%	f	%		RF	NF		
Use of communication media	Low	9	12.9	42	60	51	9.67	4.84	2	36.10**
	Medium	34	48.6	21	30	55				
	High	27	38.6	7	10	34				
Organizational participation	Low	37	52.9	66	94.3	103	2.11	0.185	1	31.00**
	Medium & High	33	47.1	4	5.7	37				
Income from fish	Low & Medium	9	12.9	43	51.50	52	57.18	20.12	1	35.34**
	High	61	87.1	27	38.6	88				
Knowledge on fish cultivation	Low & Medium	26	37.2	56	80	106	13.70	10.25	1	26.50**
	High	44	62.8	14	20	64				
Attitude towards natural resource management	Low & Medium	23	32.9	64	91.4	87	62.07	48.00	1	53.10**
	High	47	67.1	06	8.6	53				

Note: **significant at 1% level, Cells are merged to keep frequencies more than 5%

Source: Field study, 2015

3.3 DETERMINANTS OF SELECTED ECONOMIC AND PERSONAL CRITERION OF THE CLIENTS

202 Determinants of the selected economic and personal criterion of the clients were measured
 203 using multiple regression analysis following enter method. Data arranged in Table 3
 204 indicates that seven predictor variables, namely the frequency of extension contact, use of
 205 extension communication media, organizational participation, satisfaction with extension
 206 service, gender, income from fish farming, and attitude towards natural resource
 207 management can collectively describe 60.2 percent variation in client's knowledge in fish
 208 farming hence confirmed the acceptability of the model ($F_{7,140}=31.01$, $p<0.000$). Data
 209 presented in the second column of Table 3 further revealed that satisfaction with extension
 210 service is the most important contributor ($\beta=0.329$) followed by income from fish farming
 211 ($\beta=0.242$), attitude towards natural resource management ($\beta=0.212$), and gender ($\beta=0.127$).
 212 Data arranged in the third column of the same table confirmed that total income ($\beta=0.526$) is
 213 the most important determinant of a client's income from fish farming followed by frequency
 214 of extension contact ($\beta=0.267$) and knowledge in fish farming ($\beta=0.162$). Regression results
 215 presented in the third column of Table 3 mirrored that attitude towards natural resource
 216 conservation is heavily influenced by the frequency of extension contact ($\beta=0.307$) followed
 217 by the satisfaction with extension service ($\beta=0.250$), and knowledge in fish farming
 218 ($\beta=0.156$). Echoing our findings [26] in his study in ten selected villages of Gazipur district of
 219 Bangladesh found that extension contact has a positive significant impact on farm income of
 220 the rice farmers. [27] in his study on rice farmers in seven rural provinces of rural China
 221 claimed that farmers' participation in agricultural extension has a trivial positive impact on
 222 retaining the farmer's nutrient management behavior.

223 **Table 3. Contribution of selected factors on selected economic and personal aspects**
 224 **of clients (N=140).**

Predictor variables	Criterion variables		
	Knowledge on fish farming	Income from fish cultivation	Attitude toward NRC
Extension contract	-0.019	0.267**	0.307**
Use of communication media	0.137	0.054	0.263**
Organization participation	-0.040	-0.020	-0.048
Satisfaction with service	0.329**	-0.157	0.250**
Gender	0.127*	--	--
Total income	--	0.526**	--
Knowledge in fish farming	--	0.162*	0.156*
Income from fish farming	0.242**	--	0.016
Attitude toward NRC	0.212*	0.123	--
Model specification	$F_{7,140}=31.013$, $P<0.0000$, $R^2=$ 0.610, Adj. $R^2=$ 0.602	$F_{7,140}=46.60$, $P<0.000$, $R^2=$ 0.712, Adj. $R^2=$ 0.697	$F_{6,140}=57.35$, $P<0.000$, $R^2=$ 0.721, Adj. $R^2=$ 0.709

225 **Note:** *significant at 5% level, **significant at 1% level; VIF value for all the predictor variable is <5

226 **Source:** Field study, 2015

227

228 **3.4 PROBLEMS OF PUBLIC FISHERIES EXTENSION SERVICE AND** 229 **PROBABLE SOLUTIONS**

230 Problems and solutions regarding public fisheries extension service were sought via open
231 questions in the interview schedule. As per the opinion of the respondents presented in
232 Table 4 public fisheries extension service is biased to affluent and politically strong clients,
233 lack of contact frequency, lack of input supply, inability to provide standard service,
234 unavailability of extension agents during necessity, etc. The respondents also suggest a
235 package of nine solutions to improve the standard of public fisheries extension service. The
236 major suggestions were providing quality input support to the clients, sufficient client training
237 programs, removal of political biases in group selection, offering timely service, etc.
238 However, the rest of other problems and suggestions can be observed from Table 4.

239 **Table 4. Perceived problems and solutions regarding public fisheries extension**
240 **service by the clients.**

241

Problems	F	Suggestions	F
Extra care for affluent and politically strong clients	35	Quality input support for the clients	93
Lack of contact frequency	34	Sufficient training programs for the clients	31
Lack of input supply	25	Removal of political biasness in group selection	22
Incapable to provide standard service	25	Timely service	14
Unavailability of the extension agents in time	20	Special care for women and young clients	14
Unequal treatment among the clients	14	Selecting true farmers for the groups	13
Failure to encourage women and young clients	13	Good relationship with the clients	11
Insufficient number of field workers	11	Motivation campaign with posters and leaflets	10
Field officials are not cordial enough	10	Helping the real poor clients	11

242 **Note:** F= Frequency; One respondent bear the freedom to mention more than one
243 problems/suggestions ✓

244 **Source:** Field study, 2016

245

246 **3.5 DISCUSSION**

247 Bangladesh, a small country of Southeast Asia, is knit with numerous rivers and water
248 bodies. The county is blessed with abundant aquatic resources. ✓ So, fisheries sector has
249 remarkable potential in the development of the economy of the country. Lamentably, this
250 sector's progress is not up to the mark and at present this country is not capable enough to
251 utilize its full potential. Many reasons can be attributed for this backdrop. However, one of
252 the important of them is absence of well developed fisheries extension service for all sorts of
253 clients. ✓

UNDER PEER REVIEW

254 The findings of this study have confirmed the fact that fish farming is dominated by man,
255 although small-scale homestead fisheries are predominantly a women's business and
256 women also perform many other activities alongside their male counterpart. This study
257 further established the fact that the farmers in contact with public extension service were
258 more educated, possessed a large farm size compared to their non-contact counterpart. So,
259 it can be claimed that public fisheries extension service is male and affluent farmers
260 centered.

261 The farmers are in contact with public fisheries extension service have more use of
262 communication sources, increased participation in organization, enhance knowledge in fish
263 farming, better income from fish farming, and have more positive attitude towards natural
264 resource conservation. Actually, regular participation in public agricultural extension service
265 offer more opportunities in group interaction, receiving information, and share problems with
266 other farmers. Contact farmer also has more scope of receiving need based training. These
267 extra facilities may create a difference among contact and non-contact farmers in terms of
268 selected socioeconomic variables.

269 Frequency of extension contact has significant impact on farmers' income from fish farming
270 and building positive attitudes towards natural resource management. However, public
271 extension didn't have any significant contribution on farmers' knowledge in fish farming. In
272 Bangladesh, many private and non-government organizations cater extension support to the
273 fish farmers. So, farmers not in contact with public service may receive agricultural
274 information from their peers, and/or sources other than public fisheries extension service.

275 This study used non-parametric statistics for evaluating the effect of public fisheries
276 extension service. However, parametric test may be more effective to reveal the situation
277 precisely. Nonetheless, public fisheries extension has countrywide network and a numerous
278 socio-economic aspects are influenced by this service. Unfortunately, this study
279 encompasses limitation both in terms of geographical coverage and consideration of
280 selected number of socioeconomic aspects.

281 4. CONCLUSION

282 Agricultural extension is a crucial pillar for sustainable agricultural development. The
283 information arranged in this study established the logic that agricultural extension has
284 enormous potential for the development of rural residents, especially marginal and small
285 farmers. Although, many public organizations are catering extension service for the fish
286 farmers, lamentably there is no specialized organization for delivering quality fisheries
287 extension service to the farmers. The present extension service is gender biased, and
288 predominantly centered to the medium and large farmers. Farmers connected with the public
289 fisheries extension service seem to be better in terms of all the selected socioeconomic
290 dimensions compared to their not-connected counterpart. Most importantly the connected
291 farmers have more income from fish farming, more knowledge in fish farming, and more
292 favorable attitudes towards natural resource management. This study find out that fish
293 farmers extension contact can significantly contribute to clients' income from fish production,
294 as well as the development of positive attitude towards natural resource management. The
295 clients face a magnitude of problems with public fisheries extension service, such as ill-timed
296 supply of information, less frequency of extension contact, and limited opportunity of
297 receiving fish farming related training. As a way of solving the aforesaid problems, they
298 suggested an increasing frequency of extension contact, increasing number of extension
299 workers, creation of opportunity for fish farming related training for the clients, and politically
300 unbiased selection of true fish farmers during group formation.

302 5. RECOMMENDATIONS

303 Based on the findings, this research proposed the following recommendations:

- 304 > Similar to many other extension services, fisheries extension service
305 seemed to be gender bias, although a major section of rural women is involved in
306 fish farming activities in different ways. So, special programs centering rural women

3 Sender roles?
Perhaps the authors could argue with existing literature

① Discussions should be reflect the previous literature!

② Any new knowledge?

ctn'd - Even though the authors has mentioned source 26 & 27 in the analysis.

Yes!

I didn't find any in the literature part! Please put some!

Please consistent with the word whether Socioeconomic or Socio-economic

are essential for improving fish production and reducing gender gap in the fisheries sector. ✓ → Parties could be involved?

➤ Large and medium farmers are normally more in contact with public fisheries extension service, leaving homestead based and marginal farmers away, although these groups need more extension support due to intensive management of the small farm. So, the creation of space in public extension service, for homestead based and marginal fish farmers are necessary. ✓

➤ Ensuring satisfactory income and conservation of natural resource is necessary for sustainable development of the fisheries sector in Bangladesh. This study established the fact that the increasing frequency of extension contact can improve farmers' income from fish and develop positive attitudes of farmers in natural resource conservation. So, increasing frequency of public extension contact via different communication media is crucial for sustainable development of the fisheries sector in Bangladesh. ✓ ok -

✓ ① please add recommendations in terms of planning & policy perspectives? ✓

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396 Appendix-1

397 Table . Measurement of the variables of the study

Variables	Measurement
Age	Year
Sex	Nominal (Male=1, Female=0)
Educational status	Year of schooling completed
Farm size	Categories based on farm size
Mode of fish farming	Nominal (Family consumption=1, Commercial=2, Both=3)
Contract with extension service	Frequency of contract/six month

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Economic status	'000' Tk/year
Production	Kg/Year
Usage of communication media	4 point rating Scale (Frequent use 3..... 0 don't use)
Membership in the organization	Years and membership status
Annual income	'000' Taka/Year
Knowledge on fish farming	Score
Satisfaction on PFES	7 point Likert scale (Very satisfied 6.....0 Dissatisfied)
Attitude toward natural resource conservation	7 point Likert scale (Strongly agree 6.....0 Strongly disagree)
398	Note: 78 Tk= 1 USD
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