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Training needs of the freshwater fish growers in Assam, India

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A study was conducted in five rural development blocks of India to investigate the training needs of freshwater fish growers. A total of fifty fish growers having training exposures were interviewed using a structured questionnaire. Independent variables included thirteen socio-economic parameters and dependant variables included seven critical technical areas. Frequency and percentage, mean score, standard deviation (SD), co-efficient of variance (CV) and simple correlation were analyzed. The study revealed that majority of the respondents need trainings on water quality management (80%). Only 16 and 10% respondents expressed training need on fish seed handling and transportation, and fish nutrition and feeding, respectively. Negatively significant correlations were observed between interest and attitude towards fish farming age and education. Individual independent characteristic and training needs of the farmers had negative correlations with education (X_2) ($p<0.01$) and attitude (X_{13}) ($p<0.05$). Positively significant correlation between possession of pond (X_5) and age (X_1) ($p<0.01$), income (X_4) and age (X_1) ($p<0.01$), economic motivation (X_7) and age (X_1) ($p<0.01$), decision-making ability (X_8) and age (X_1) ($p<0.05$), attitude (X_{13}) and education (X_2) ($p<0.05$), income (X_4) and main occupation (X_3)($p<0.05$). The study concluded that before assessing the training needs, the fish growers of the district should be made aware of the latest technologies in aquaculture.

Key words: Assessment, training needs, freshwater fish growers.

INTRODUCTION

The district has a population of 8,22,306 with a density of 451 km^{-2} (Anon, 2009). Almost all the people consume fish in their daily diet. The district has 0.039 million ha water spread area, comprising 0.038 million ha (97.44%) of lentic and 0.001 million ha (2.56%) of lotic waters. This amounts to 10.43% of state's fisheries resources and 0.53% of the inland fisheries resources of the country (ARDB, 2011). Most farm families have water bodies in their homesteads in the form of seasonal ponds, sumps, roadside ditches, etc (NRCP, 2007). From all these resources, the district produces 5,347 tonnes of fish against the biophysical potential of 40,969.25 tonnes per annum (Anon, 2009). The present demand for fish in the district is 9,045.37 tonnes per annum, considering the per capita requirement of fish at 11 kg/person/year as recommended by the World Health Organisation (WHO) for the country. There are number of proven package of practices for fish farming (AAU, 1997), which are also suitable for the agro-ecological situations of the district (Mandal et al., 1981).

Fishes reared in the district under composite culture of carps are *Catla catla* (Catla), *Cirrhinus mrigala* (Mrigal),

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Labeo rohita (Rohu), *Hypopthalmichthys molitrix* (Silver carp), *Ctenopharyngodon idella* (Grass carp) and *Cyprinus carpio* (Common carp). All these species need s lightly alkaline water and pH ranging between 6.5 and 8.0. The soil and water of the district are acidic in reaction, which is the major limiting factor for development of carp aquaculture. As per the recommended package of practices, 2,100 kg/ha of agricultural lime ($CaCO_3$) is needed per year to check acidity. The lime is applied in split doses. Most of them operate aquaculture in old ponds, where production is limited by anaerobic condition due to non removal of silt from the bottom (88%). Ponds (80%) are generally well impounded and do not allow entry of wild water. However, 80% farmers do not take erosion control measures. No farmer applies fertilizers in their ponds regularly. They stock their ponds arbitrarily and do not follow any norms in terms of species composition, fingerlings' size and even stocking period and time. Since, carps require water temperature above 28°C and optimum temperature prevails during the period from mid April to mid September, it is recommended that ponds should be stocked during April to May with stunted yearlings at a density of 5000 numbers/ha preferably in the morning hours. Recommended species composition includes silver carp (20%), catla (15%), rohu (15%), grass carp (10%), mrigal (20%) and common carp (20%). No farmer follows this practice. Carps require concentrated feed at the rate of 1% of the body weight/day for maintenance (Paulraj, 1997). For maximum growth at a declining the requirement of concentrated feed increases to 3 to 4% of the body weight/day and for the highest growth quantity of feed required is equivalent to 6 to 7% of the body weight/day. The recommended practice for feeding is 3 to 5% of the body weight/day with 1:1 mixture of rice bran and mustard oil cake or with formulated feed as per manufacturer's prescription. No farmer supplies sufficient feed in their fishponds. There is a wide gap between recommended practices and farmers practice, which has resulted in lower yield (SREP, 2006). This situation underlines the needs of appropriate measures for building farmers' capacity for scaling up aquaculture to increase fish production and to improve their livelihood.

METHODOLOGY

This study was conducted in Assam, India. Five rural development blocks having population of different tribes were purposively selected for the study. A multi-stage sampling design was used to select the respondents using random sampling technique. A total of fifty (50) farmers having training exposure were selected purposefully. The survey was conducted over a period of nine months during 2011. Data were collected using a semi structured questionnaire. Thirteen (13) independent variables were selected to investigate the socio-economic characteristics of the farmers. The independent variables were age (X_1), education (X_2), main occupation (X_3), annual income (X_4), possession of pond area (X_5), localiteness-cosmopoliteness (X_6), economic motivation (X_7), decision making ability (X_8), scientific orientation (X_9), interest (X_{10}), information seeking behaviour (X_{11}), knowledge (X_{12}) and attitude (X_{13}). A total of seven critical technical areas of training, namely; (i) integrated livestock and fish farming, (ii) water quality management, (iii) fish nutrition and feeding, (iv) integrated rice-fish farming, (v) seed handling and transportation, (vi) pen culture in open water, and (vii) fish disease diagnosis and prevention, were selected based on the observations recorded during the number of village transects made across the district before this study. The test schedules were developed to determine the training needs of the farmers. Weight of the technical areas of the training was decided by judge's rating and extent of need was measured as most essential (ME), essential (E), slightly essential (SE) and not essential (NE) with assigned scores of 3, 2, 1 and 0, respectively. Final scores were attained by multiplying the weights of an area with the corresponding extent of need score. Various descriptive and inferential statistical methods were employed to analyze the data following Panse and Sukhatme (1985).

The main statistical techniques and tools used were (1) frequency and percentage analysis, (2) mean score, (3) standard deviation (SD), (4) co-efficient of variance (CV), and (5) simple correlation.

RESULTS

Findings on socio-economic characteristics are summarized in Table 1. Majority (76%) of the respondents belonged to middle age category (29 to 58 years) followed by old (>58 years) which is 22% and young (<29 years) which is 2%. Most of the farmers (92%) belonged to high category of educational status, that is, above high school standard. Only 8% of the respondents belonged to medium education level, that is, between primary and high school standard. Only 18% of the respondents were fully engaged in fish farming. Others took fish farming as subsidiary occupation, while 48% of the respondents had agriculture as major occupation, and 30% had other business. Negligible section of respondents (4%) had government job as major occupation with fish farming as subsidiary occupation. Data on annual income revealed that 56% of the respondents had middle level of annual income (INR 150000 to 250000) followed by high category (24%) and low category (20%) with annual income of more than INR 250000 and less than INR 150000, respectively. Amongst the respondents, 54% had medium level possession of ponds (0.5 to 1.00 ha) followed by 38% low level of possession of ponds (<0.5 ha) and 4% high (> 1.00 ha). All the respondents belonged to medium level (52%) and low level (48%) of localiteness-cosmopoliteness. Economic motivation of the respondents showed that 90% were in medium level and 10% were in low level category. None of the respondents had high level decision-making ability. While majority (84%) of the respondents was in medium level, 16% were in low level in terms of decision making ability. Analysis of data on scientific orientation revealed mean score of 22.420, standard deviation (SD) of 1.907 and co-efficient of variation (CV) of 8.51% indicating quite homogeneity amongst the respondents, while 68% of the respondents

Table 1. Socio-economic characteristics of the fish growers.

Variable	Frequency	Percentage	Mean	SD	CV
Age (X1)					
Young (up to 28)	38	76			
Middle aged (29-58)	11	22	2.2	0.452	20.53
Old (above 58)	1	2			
Education (X2)					
Low	-	-			
Medium	4	8	2.92	0.274	9.39
High	46	92			
Main occupation (X3)					
Aquaculture	9	18			
Agriculture	24	48	2.2	0.782	35.57
Business	15	30			
Govt. service	2	4			
Annual income (X4)					
Low (< 1.50 Lakh)	10	20			
Medium (1.50 - 2.50 Lakh)	28	56	2.04	0.669	32.79
High > 2.50 Lakh)	12	24			
Pond area (X5)					
Low	19	38			
Medium	27	54	1.7	0.614	36.14
High	4	8			
Localiteness-cosmopoliteness (X6)					
Low	24	48			
Medium	26	52	12.52	2.493	19.91
High	-	-			
Economic motivation (X7)					
Low	-	-			
Medium	45	90	21.8	2.491	11.43
High	5	10			
Decision making ability (X8)					
Low	8	16			
Medium	42	84	22.22	3.61	16.25
High	-	-			
Scientific orientation (X9)					
Low	-	-			
Medium	3	6	22.42	1.907	8.51
High	47	94			
Interest (X10)					
Low	-	-			
Medium	16	32	14.74	1.736	11.78
High	34	68			
Information seeking behaviour (X11)					
Low	38	76	11.4	1.948	17.09

Table 1. Contd.

Medium	12	24			
High	-	-			
Knowledge (X12)					
Low	-	-			
Medium	17	34	17.98	1.744	9.7
High	33	66			
Attitude (X13)					
Less favourable	12	24			
Favourable	38	76	26	3.264	12.27
More favourable	-	-			

Table 2. Frequency and percentage distribution of respondents in different response categories against water quality management (N = 50).

Area of training	Distribution of respondents				Mean	SD
	ME (3)	E (2)	SE (1)	NE (0)		
Integrated livestock and fish farming	0 (0.00)	2 (4.00)	4 (8.00)	44 (88.00)	0.160	0.46773
Water quality management	40 (80.00)	4 (8.00)	3 (6.00)	3 (6.00)	2.620	0.85452
Fish nutrition and feeding	5 (10.00)	3 (6.00)	2 (4.00)	40 (80.00)	0.460	0.99406
Integrated rice-fish farming	2 (4.00)	6 (12.00)	5 (10.00)	37 (74.00)	0.460	0.86213
Seed handling and transportation	8 (16.00)	12 (24.00)	10 (20.00)	20 (40.00)	1.160	1.13137
Pen culture	0 (0.00)	0 (0.00)	0 (0.00)	50 (100.00)	0.000	0.00000
Fish disease diagnosis and prevention	0 (0.00)	0 (0.00)	0 (0.00)	50 (100.00)	0.000	0.00000

Data in parentheses are percentage of frequencies.

exhibited a medium level and 32% respondents exhibited high level in respect of interest. None of the respondents exhibited high level of information seeking behaviour. The study revealed that 66% of the respondents exhibited high level of knowledge on the existing practice followed by 34% in the medium level. As high as 94% respondents had favourable attitude, while 6% of the respondents were found to be more favourable.

The study revealed that the farmers in the district operate aquaculture in an easy going manner and they lack the entrepreneurial approach. Training needs as expressed by the farmers are summarized in Table 2. The farmers of Assam normally keep livestock at their homestead. Since feed is the major input in fish aquaculture and it can be replaced by recycling livestock wastes, they were asked whether training on integrated livestock fish farming is essential for them. Most of the farmers (88%) opined that such training is not essential for them. The farmers (80%) were aware of the effect of water quality on fish production and opted for training on water quality management. However, 80% farmers were not cautious about fish nutrition and feed. Only 10% farmers felt it most essential. Agriculture, especially rice cultivation is the major farm operation in the state. The rice ecosystem offers tremendous scope for integration of fish culture in rice field. The farmers (74%), however, did not express concurrence to the need; only 2% farmers felt the requirement of training in this area. Farmers were not aware of the impact of mishandling and wrong transportation of fish seed on growth of fish in grow out ponds. Only 16% farmers felt the training on fish seed handling and transportation most essential, while 24% felt essential, 20% felt slightly essential and 40% felt not essential. There is a vast area of non-impounded water bodies suitable for fish farming using pen or enclosure. The farmers were asked about training requirement on pen culture. No requirement of training on fish disease diagnosis and prevention was also opined by the farmers.

Analysis of simple correlations amongst the independent variables was done and results are presented in Tables 3 and 4. Table 4 revealed positively significant correlation between possession of pond (X_5) and age (X_1) (r=0.3676, p<0.01), income (X_4) and age (X_1) (r=0.3782, p<0.01), economic motivation (X_7) and age (X_1) (r=0.3990, p<0.01), decision-making ability (X_8) and age (X_1) (r=0.3479, p<0.05), attitude (X_{13}) and education (X_2) (r=0.2829, p<0.05), income (X_4) and main occupation (X_3) (r=0.3354, p<0.05). Table 3 revealed positively significant correlations between economic motivation and income (X_4) (r=0.6909, p<0.01), decision-making ability (X_8) and income (X_4) (r=0.6018, p<0.01), information seeking behaviour (X_{11}) and income

Table 3. Correlations amongst the independent variables.

Variable	Age (X_1)	Education (X_2)	Main occupation (X_3)	Annual income (X_4)	Pond size/area (X_5)	Localiteness-cosmopoliteness (X_6)	Economic motivation (X_7)	Decision-making ability (X_8)	Scientific orientation (X_9)	Interest (X_{10})	Information seeking behaviour (X_{11})	Knowledge (X_{12})	Attitude (X_{13})
Age (X_1)	**1**	**-0.5275****	**-0.0577**	**0.3782****	**0.3676****	**0.1051**	**0.3990****	**0.3479***	**-0.0284**	**0.1718**	**0.0232**	**0.057**	**-0.1523**
Education (X_2)	-0.5275**	1	0.0761	-0.0935	-0.1454	-0.0275	-0.0837	-0.1881	-0.0125	-0.1304	0.0994	-0.0888	0.2829*
Main occupation (X_3)	-0.0577	0.0761	1	0.3354*	-0.1273	-0.1695	0.0838	0.0058	-0.0711	-0.2314	0.174	0.1675	0.1598
Annual Income (X_4)	0.3782**	-0.0935	0.3354*	1	0.2284	-0.0984	0.6909**	0.6048**	0.0506	0.1498	0.4573*	0.2107	-0.0299
Pond size/area (X_5)	0.3676**	-0.1454	-0.1273	0.2284	1	0.2105	0.2	0.1316	0.0749	0.0976	0.1193	0.1467	0.0204
Localiteness-cosmopoliteness (X_6)	0.1051	-0.0275	-0.1695	-0.0984	0.2105	1	-0.0947	-0.1853	0.2279	0.013	-0.2706	-0.129	-0.1043
Economic motivation (X_7)	0.3990**	-0.0837	0.0838	0.6909**	0.2	-0.0947	1	0.5769**	-0.0894	0.1907	0.1977	0.1212	-0.2159
Decision-making ability (X_8)	0.3479*	-0.1881	0.0058	0.6048**	0.1316	-0.1853	0.5769**	1	-0.1175	0.2699	0.4341**	0.1174	-0.2401
Scientific orientation (X_9)	-0.0284	-0.0125	-0.0711	0.0506	0.0749	0.2279	-0.0894	-0.1175	1	-0.0835	-0.1945	-0.0956	0.1653
Interest (X_{10})	0.1718	-0.1304	-0.2314	0.1498	0.0976	0.013	0.1907	0.2699	-0.0835	1	0.0072	0.0589	-0.3393*
Information seeking behaviour (X_{11})	0.0232	0.0994	0.174	0.4573**	0.1193	-0.2706	0.1977	0.4341**	-0.1945	0.0072	1	0.3268*	0.0321
Knowledge (X_{12})	0.057	-0.0888	0.1675	0.2107	0.1467	-0.129	0.1212	0.1174	-0.0956	0.0589	0.3268*	1	0.1743
Attitude (X_{13})	-0.1523	0.2829*	0.1598	-0.0299	0.0204	-0.1043	-0.2159	-0.2401	0.1653	-0.3393*	0.0321	0.1743	1

**Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

(X_4) ($r=0.4573$, $p<0.01$), economic motivation (X_7) and decision-making ability (X_8) ($r=0.5769$, $p<0.01$), knowledge (X_{12}) and information seeking behaviour (X_{11}) ($r=0.3268$, $p<0.05$).

Negatively significant correlations were observed between interest and attitude towards fish farming (r=(-) 0.3393, $p<0.05$), age and education (r=(-) 0.5275, $p<0.01$). Individual independent characteristic and training needs of the farmers had negative correlations with education (X_2) at $p<0.01$ level (r=(-) 0.4247) and attitude (X_{13}) at $p<0.05$ level (r=(-) 0.2863). Table 4 revealed the details of correlation amongst the independent variables and pond management practices.

DISCUSSION

Training is a planned process to modify attitude, knowledge or skill behavior through a learning experience to achieve effective performance in an activity or range of activities and education is an activities which aim at developing the knowledge, skills, and moral values (Smith, 1992). Both training and education are essential for building capacity in man which is the key for human resource development (HRD). UNDP (1995) defined capacity as the ability of actors (individuals, groups, organisations, institutions, and countries) to perform specified functions (or pursue specified objectives) effectively, efficiently and sustainably. Capacity building is the efforts made by the actors themselves to achieve or strengthen their ability to perform the functions in question. Capacity can be built through a wide range of activities undertaken by the various actor involved, and is not a restrictive or prescriptive term. It may involve activities the actors organise themselves, or activities organised by others in which they participate. HRD is defined as 'the process of increasing the capacity of the human resources through development. It is thus a process of adding value to individuals, teams or an organization as a human system' (McGlagan, 1989). Training need analysis refers to the learning needs of individuals to enable them to reach the required standard of performance in their current or future jobs. Wilson (1999) suggested that the conventional and simpler methods such as interviews, questionnaires, observations, and focus groups to gather information for HRD needs analysis. Skill and training needs are a special category of needs that can be identified through a formal training needs analysis or a skills audit, or through more informal means. Training needs analyses and skills audits are usually done within formal organisations, corporations or highly structured workplaces that have clearly defined tasks and outputs. Wilson (1999) described that they are not easy to apply to community- based organisations and voluntary groups involved in integrated

Table 4. Correlations amongst independent variables and training needs.

Variable	Training need
Age (X_1)	0.2781
Education (X_2)	-0.4247**
Main occupation (X_3)	-0.0930
Income (X_4)	0.0540
Operational holding (X_5)	0.0879
Localiteness-cosmopoliteness (X_6)	0.1885
Economic motivation (X_7)	0.0381
Decision-making ability (X_8)	0.2215
Scientific orientation (X_9)	0.1095
Interest (X_{10})	-0.0306
Information seeking behaviour (X_{11})	-0.1369
Knowledge (X_{12})	-0.0325
Attitude (X_{13})	-0.2863*

**Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

natural resource management (INRM) planning where there is considerable flexibility in people's roles and contributions, and where the details of groups and tasks may vary considerably from region to region and community to community and therefore the method suggested by Wilson (1999) was followed.

Scientific and technological revolution (STR) is characterized by deep interconnection and interaction of processes and fundamental changes in all the areas of science, technology and production, with science playing the leading role as the productive force (Marinko, 1989). Science and technology constitute the means of enhancing men's strength and the potentiality of his hands and brain. Drawing on the actor oriented perspectives in rural sociology (Long and Long, 1992), it was advocated that success of adoption of a technology at higher level are not merely a function of the technology, nor of the research and extension methodology, but result from a complex conjunction of people and events with outcomes. The present study revealed an apathetic approach of the farmers towards their works. Their decision making ability is negatively correlated with their educational qualification. Moreover, interest and attitude are negatively correlated. According to Wilkening (1953), adoption of a specific practice is not the result of a single decision to act but series of action and meaningful decisions. Rogers (2003) explains that the adoption decision and its timing depend on decision maker's perception and inherent characteristics, with innovators at one extreme and laggards at the other.

The farmers of the study area in general live under uncertain, harsh social and environmental conditions with heterogeneity in terms of social, economic and psychological characters. People are basically small holders (80.12%) and 75.25% people live below the poverty line (Anon, 2009). Gini co-efficient of the district is 0.488 (AHDR, 2003). They operate their farms with little access to land, water, extension service and credit. Farming in the district itself is fraught with the uncertainties of floods, drought and anthropo-political conflicts. The fish farmers are normally repelled to high input farming technologies owing to (1) adoption does not sustain due to high cost involved; (2) low access of the household to technology extension and credit; and (3) vulnerability of the households to risk involved such as floods, drought and societal problems (Lightfoot et al., 1992).

Farmers in the same environment with same livelihood resource base have different objectives and livelihood strategies and therefore respond differently to a given technological areas. Only 18% of the respondents have adopted fish farming as major occupation, the rest 82% were engaged in agriculture, other business and government jobs. Biot et al. (1995) suggested that 'different behaviour is as much a function of different opportunities and constraints as of different perception'. Even within the farm households, the ability to make decision on resource use and technology adoption varies according to age, gender and other category and actual decision can depend on a complex bargaining process amongst the members (Ellis, 1993; Jackson, 1995; Biot et al., 1995). Beyond the household group processes and ability to harness them can play a crucial role in adoption decision (Chamala and Mortiss, 1990; Frank and Chamala, 1992; Pretty and Shah, 1994).

While Wozniak (1984) opined that education increases ones' ability to receive, decode and understand information relevant to making innovative decisions; Clay et al. (1998) found that education is an insignificant determinant of adoption decision. In this study, it was hypothesized that high level of institutional education increases the probability of interest on and adopting a new technology. But the results revealed that individual independent characteristic and training needs of the farmers had negative correlations with education level and attitude (X_{13}).

Au and Enderwick (2000) explained that six beliefs, namely, compatibility, enhanced value, perceived benefits, adaptive experiences, perceived difficulties and suppliers' commitments, affect the cognitive process that determines the farmers' attitude towards technology adoption. This study revealed positive correlation with main occupation, education, scientific orientation, information seeking behaviour, knowledge and possession of ponds. This study suggests a change in farmers' attitude for development of aquaculture in the district.

Fisheries have been a caste based activity in Assam. Flood plain lakes, which were once unmanaged natural water bodies, were the main source of fish. Historically, there have been three distinct groups of people involved in fisheries activity: (1) those who catch fish for their own daily consumption; (2) those belonging to the fisher community and (3) the rural fisher entrepreneurs (leaseholders). Ordinary people usually used to catch fish daily for food, while fishers were full-time operators. Aquaculture is comparatively a new sector of food production and it is undergoing continuous change in Assam. During the last 20 years, it has been mastering a driving force that has propelled aquaculture to the forefront. However, pond productivity is limited to 2800 kg/ha in Goalpara, Assam; although, much higher yields (5000 kg/ha) have been recorded by Luu et al. (2003) in China and Vietnam. Biophysical potential of aquaculture in Assam reveals that same production could be achieved if new technology/practices are adopted. For which farmers should be substantially trained on the latest technological innovations in aquaculture for a paradigm shift from the current perception on aquaculture as a poverty alleviation programme to a prestigious income generating enterprise. Before analysing the training needs, farmers must be made aware of the technologies through frequent awareness camps on recent advances on aquaculture technologies.

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