

Reprint

ISSN 1997-2571 (Web Version)

# Journal of Innovation & Development Strategy (JIDS)

*(J. Innov. Dev. Strategy)*

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**Volume: 10**

**Issue: 1**

**April 2016**

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*J. Innov. Dev. Strategy 10(1): 40-46 (April 2016)*

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MANAGED FISHERIES IN DINAJPUR DISTRICT**

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## FACTORS AFFECTING FISH-FARMERS' ATTITUDE TOWARDS COMMUNITY MANAGED FISHERIES IN DINAJPUR DISTRICT

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Accepted for publication on 28 March 2016

### ABSTRACT

Hasan MF (2016) Factors affecting fish-farmers' attitude towards community managed fisheries in Dinajpur district. *J. Innov. Dev. Strategy*. 10(1), 40-46.

The purposes of the study were to ascertain the attitude of the fish-farmers towards community managed fisheries and to explore the relationship between the selected characteristics of the fish-farmers and their attitude towards community managed fisheries (CMF). Determination of the contribution and the direct and indirect effects of the selected characteristics of the fish-farmers to their attitude towards CMF were other purposes of this study. The study was conducted in three upazilas of Dinajpur district. Data were collected from randomly selected 94 fish-farmers, (20 percent of the population of 470) from 04 April 2015 to 17 May 2015. Eleven selected characteristics (i.e. age, educational qualification, family size, farm size, farming experience, annual family income, training exposure, duration of involvement in CMF, participation in CMF, knowledge of CMF and constraints faced in CMF) of the fish-farmers constituted the independent variables where fish-farmer's attitude towards the CMF was the dependent variable of the study. The attitude of the fish-farmers towards CMF was examined with 5 point Likert scale. The findings revealed that the majority of the fish-farmers (61.7 percent) had 'highly favorable' attitude towards CMF while 20.2 percent and 18.1 percent had 'slightly favorable' and 'moderately favorable' attitude towards CMF, respectively. Among eleven selected characteristics of the respondents 'educational qualification', 'training exposure', 'duration of involvement in CMF', 'participation in CMF' and 'knowledge of CMF' had positive significant relationship with their attitude, while the 'constraints faced in CMF' had negative significant relationship. Fish-farmers' 'constraints faced in CMF' had found the highest predictive power to their attitude towards CMF followed by duration of involvement in CMF and knowledge of CMF.

**Key words:** community managed fisheries, attitude, constraints, knowledge, fish-farmers

### INTRODUCTION

Bangladesh possesses the largest multispecies fisheries ecosystem in the world. Fish and fisheries constitute an integral part of lives and livelihoods of the millions of people in Bangladesh, particularly the poor and marginal fisher-folks. The country have an extensive and huge water resources scattered all over the country in the forms of small ponds, beels (natural depressions), lakes, canals, small and large rivers, and estuaries covering an area of about 4.34 million hectare. The total inland open water resources comprising rivers, floodplains, lakes and reservoirs, and ponds cover an area of 4.05 million hectare. Inland aquaculture and inland open water fisheries are the two dominant sub-sectors, which together accounted for over 81% of the total fish production of the country (Mazid 2002). Due to lack of proper management and over utilization of resources, large population of fish is exploiting and the total fishing ground is depleting overtime. Hence, the management of inland open water fisheries resources has become a crucial issue in recent times. There is a crucial necessity for establishing appropriate management regime for proper utilization and restoration of the depleted resources.

Community managed fisheries (CMF) is an approach for the improvement of inland open-water fisheries through the development of sustainable, community-based institutions and supporting them in undertaking a program of adaptive management of their fisheries resources using technical measures such as stock enhancement of floodplain fisheries, restoration of fisheries habitats and establishment of fish sanctuaries and construction of fish passes. Under the traditional leasing system, the existing fisheries management in Bangladesh allows the rich fishers, water lords, land lords and rich people of the community to harness maximum benefits using the public water bodies, i.e. canals, rivers, closed beels, semi-closed beels, open beels, haors and baors. But with the CMF approach, it would be possible to involve all levels of fishers, fish-farmers and the related stakeholders through ensuring their direct participation in the planning, implementation and benefits sharing process of the water bodies. The approach is participatory, compared to the traditional trickle-down approach. In this approach, all partners are providing their valuable contributions in making a common implementation plan for accomplishing the fisheries activities. With the inception of this approach in managing the huge natural resources, it started to provide benefits to the poor fishers.

Population pressure on limited land resource and growing demand of people has posed a serious threat to the fisheries resources in Bangladesh. The role of community fisheries in reducing the pressure on fisheries sector is widely acknowledged and is a well-known program not only in Bangladesh but also in most of the developing countries and this is because of its nature of including rural local people to solve their own problem. The real success in attaining community fisheries resource management and rural development, which are the two main principle components of the community managed fisheries program is banked upon the level of initiative and participation of rural community. Initiative and involvement of people is imperative and influenced by their attitude. Attitude is the readiness to respond to a certain object in a favorable or unfavorable fashion; every attitude has both an intrinsic belief and a behavioral disposition. Ajzen and Fishbein, (1980) defined the attitude construct, as a person's degree of evaluative affect toward a target behavior. Individuals might hold multiple

attitudes about an object, accessing different ones at different points in time (Wilson *et al.* 2000). Attitudes are relatively stable and once adopted, which can provide a long-term effect (Olgyaiova *et al.* 2005).

It is universally accepted fact that the attitude of an individual plays an important role in determining his behavior with respect to particular subject. The success or failure of any set-up technology predominantly depends on the people's attitude towards they aimed at, that is what they felt, knew and thought about their learned contents (Singh *et al.* 2009). Keeping in view, the importance of community managed fisheries imparted to the fish-farmers, a study need to be conducted to assess the attitude of the fish-farmers towards community managed fisheries. In order to address the above issues, the following specific objectives were formulated to give proper direction of the study: i) to determine and describe the attitude of the fish-farmers towards community managed fisheries; ii) to determine and describe some selected characteristics of the fish-farmers are: age, educational qualification, family size, farm size, farming experience, annual family income, training experience, duration of involvement in community managed fisheries, participation in community managed fisheries, knowledge of community managed fisheries and constraints faced in community managed fisheries; iii) to explore the relationship between the selected characteristics of the fish-farmers with their attitude towards community managed fisheries; iv) to determine the contribution of the selected characteristics of the fish-farmers to their attitude towards community managed fisheries; and v) to determine the direct and indirect effects of the selected characteristics of the farmers to their attitude towards community managed fisheries.

## METHODOLOGY

Multistage random sampling technique was used for data collection in the present study. In first stage, Dinajpur district was purposively selected as locale of this study because extensive works of community managed fisheries programs were taken place in this district since last two decades. In second stage Sadar, Biral and Birganj upazila of Dinajpur district was selected randomly. Updated lists of the fish-farmers participated in different community managed fisheries programs of the selected three upazilas were collected from the respective fisheries offices. There were 470 fish-farmers under community managed fisheries (CMF) program in those three upazilas. These fish-farmers constituted the population of the study. Ninety four of the fish-farmers were selected randomly as the sample of the study by taking proportionally 20 percent from the population of each upazila. A reserve list of 10 fish-farmers was made so that data would be collected from those in case any absence of the main sample. The *ex-post facto* research design was followed in this study because of uncontrollable and non-manipulating variables. The *ex-post facto* research being a systematic empirical inquiry where the researcher have no direct control over independent variables (Kerlinger 1973). An interview schedule was prepared for data collection from the fish-farmers of CMF. The questions and statements contained in the schedule were simple, direct and easily understandable by the respondents. The schedule contained both open and closed form questions. The schedule was prepared in Bengali language for clear understanding of the respondents. Prior to final data collection, the completely developed interview schedule was pre-tested among 12 fish-farmers of the selected upazilas. Corrections, alterations and adjustments were done in the schedule on the basis of the pre-test result and this finalized schedule was used for data collection. Data collection was done from 04 April 2015 to 17 May 2015.

The researcher employed adequate care in selecting the variables of the study. Considering personal, economic, social and psychological factors of the rural community, time and resources availability to researcher, reviewing relevant literature and discussing with relevant experts, the researcher selected the variables for the study. Two types of variables were used in this study e.g., independent and dependent variables. Fish-farmers' 'attitude towards community managed fisheries (CMF)' was the dependent variable of the study. A Likert-scale (Likert 1932) consisting of 12 statements was developed for measuring the attitude. Cronbach's alpha coefficient of reliability test was observed as 0.83, which indicates good internal consistency (George and Mallery, 2003). An attitude scale consists of a number of statements which have been carefully selected and edited based on certain specific criteria. The class of all possible statements that can be made about a given psychological object is called as universe. One of the important assumptions made in the development of an attitude scale is that there is a difference in the belief and disbelief system of individuals with favorable/unfavorable attitude towards a psychological object. Following methodology was adopted to develop an attitude scale towards CBF based on Likert's technique. Data were solicited on five-point Likert continuum namely strongly agree, agree, undecided, disagree and strongly disagree with the weights of 4, 3, 2, 1 and 0 for positive statements and 0, 1, 2, 3 and 4 for negative statements. The possible minimum and maximum scores were 0 and 48, respectively, where 0 indicating highly unfavorable attitude and 48 highly favorable attitudes towards CMF. The researcher selected 11 characteristics of the respondents as the independent variables. These were age, educational qualification, family size, farm size, farming experience, annual family income, duration of involvement in CMF, participation in CMF, training exposure, knowledge of CMF and constraints faced in CMF.

The age of a respondent was measured by counting the period of time from his/her birth to the time of interview on the basis of response of the respondent and was expressed in terms of years. Educational qualification of a respondent was measured in terms of classes passed by his/her in formal education system. If a respondent passed the final examination of class V in the school, a score of five was taken for calculating his/her education

score. A respondent who could sign name only was given an education score of 0.5 and a respondent who did not know reading and writing was given an education score of zero. Family size was measured by the total number of members in the family of a respondent. Farm size of a respondent indicates the area of his owned farm which was measured in terms of hectares by using the formula: farm size = A + B + ½ (C +D) + E; where A = homestead land and pond, B = own land under own cultivation, C = land under sharecropping in, D = land under sharecropping out, E = land under leased in. Farming experience of a respondent was measured by counting the period of involvement in farming practices in terms of completed years. Annual family income of a respondent was measured in taka on the basis of total yearly earning of the respondents from fisheries, agricultural and non-agricultural sources. A score of one (1) was assigned for each of '1000' taka of the annual family income of a respondent. Duration of involvement with CMF was determined by total number of years of involvement by the respondents with the community managed fisheries. A score of one (1) was assigned for each year of involvement. Participation in CMF was measured with eight activities by developing a four point rating scale as not at all, low, medium and high participation with the scores of 0, 1, 2 and 3, respectively. Thus participation score could range from 0 to 24, while 0 indicates no participation and 24 indicates very high participation in CMF. Training exposure was determined by total number of days of training received by the respondents in his/her life. A score of one (1) was assigned for each day of received training. For measuring the knowledge of CMF of a respondent, a knowledge scale was developed. For this, each respondent was asked 10 questions covering the different aspects of CMF. Each question had a predetermined assigned score of 2, making a total score of 20. For correct responses to all the 10 questions, a respondent could secure a total score of 20. Otherwise for wrong responses to all the questions he/she could get a score of zero (0). For partial correct responses, scores were assigned accordingly. The sum of total scores for all the 10 questions yielded the knowledge score of a respondent. As many as eight constraints in connection with CMF were included in constraint facing scale in the interview schedule after pre-testing of the schedule. The respondents were asked to give their response as 'not at all', 'low', 'medium' and 'high' for each constraint included in constraint facing scale based on their extent of constraint facing in different CMF and relevant activities with the scores of 0, 1, 2 and 3, respectively. Thus constraints faced in CMF score could range from 0 to 24, while 0 indicates no constraints and 24 indicates very high constraints in CMF.

After completion of field survey, data from all the interview schedules were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. Standard categorization system was followed for the variables with unknown possible score. For the variables with known ranged possible scores, possible range was divided equally as a basis of categorization. For categorization of attitude towards CMF, observed range was divided equally as a basis of categorization. The computer software SPSS (Statistical Package for Social Sciences) was used to analyze the data. Descriptive statistical measures such as frequency, range, mean, percentage distribution and standard deviation were used to describe and interpret the data. For exploring relationships between any two variables Pearson's Product Moment Correlation (r) (Pearson 1895) was used.

Linear regression analysis was done to determine the contribution of independent variables to the dependent variable. The predictive power of the multiple regression equation was explained by the help of coefficient of multiple determination (R<sup>2</sup>) that measures the proportion of variability in the dependent variable. The step wise multiple regression analysis was used to determine the amount of variation in dependent variables due to per unit change in independent variables only those variables which contributed significantly in linear regression. But the stepwise regression analysis cannot show separately the direct and indirect influence of the independent variables on the dependent variables. The path analysis can sort out the shortcomings of stepwise regression analysis. Path analysis is a 'standardized partial regression coefficient' and it measures the direct influence of one variable upon another and permits the separation of correlation coefficient into components of direct and indirect effects (Dewey and Lu, 1959). Path analysis was also done through use of standardization partial regression coefficient known as beta weights in order to determination the extent of direct and indirect influence of the independent variables towards dependent variable.

**RESULTS AND DISCUSSION**

**Fish-farmers' attitude towards community managed fisheries (CMF)**

The attitude of an individual plays an important role in determining his behavior with respect to particular subject. The categorical distribution of the fish-farmers according to their attitude towards CMF scores are presented in Table 1.

Table 1. Distribution of fish-farmers according to their attitude towards CMF

Range		Categories	Respondents		Mean	SD
Possible	Observed		Number	Percent		
0-48	21-48	Slightly favorable (below 31)	19	20.2	37.97	7.56
		Moderately favorable (31-39)	17	18.1		
		Highly favorable (above 39)	58	61.7		
		Total	94	100.0		

Results of Table 1 indicated that the highest proportion (61.7 percent) of respondents' had highly favorable attitude, while 20.2 percent and 18.1 percent had slightly favorable and moderately favorable attitude towards the CMF, respectively. As the sample fish-farmers' attitude is somewhat favorable towards CMF, these farmers can be used to motivate the community people for enhance and ensure the success of CMF in their respective community.

### Characteristics of the fish-farmers under community managed fisheries

The eleven selected characteristics are considered to describe fish-farmers' socio-economic profile of the study area. The characteristics profile of the sample fish-farmers are given in Table 2.

Table 2. Characteristics profile of the sample fish-farmers (N = 94)

Characteristics (measurement unit)	Possible range (Observed range)	Respondents			Mean	SD
		Category	No.	%		
Age (year)	Unknown (18-62)	Young (up to 35)	65	69.1	33.89	12.34
		Middle aged (36-50)	15	16.0		
		Old (above 50)	14	14.9		
Educational qualification (year of schooling)	Unknown (0-12)	Illiterate (0)	3	3.2	2.98	3.62
		Can sign name only (0.5)	53	56.4		
		Primary (1-5)	15	16.0		
		Secondary (6-10)	19	20.2		
		Higher secondary and above (above 10)	4	4.3		
Family size (number)	Unknown (2-7)	Small family (1- 4)	53	56.4	4.5	1.52
		Medium family (5-6)	31	33.0		
		Large family (above 6)	10	10.6		
Farm size (hectare)	Unknown (0.021-1.81)	Marginal (0.02-0.2)	47	50.0	0.507	0.520
		Small (0.2-1.0)	29	30.9		
		Medium (1.0-3.0)	18	19.1		
Farming experience (year)	Unknown (1-44)	Medium experience (up to 15)	47	50.0	16.01	11.70
		High experience (15-30)	33	35.1		
		Very high experience (above 30)	14	14.9		
Annual family income (‘000’ Taka)	Unknown (18.00-168.50)	Low income (up to 50)	45	47.9	68.43	39.08
		Medium income (50-100)	30	31.9		
		High income (above 100)	19	20.2		
Training experience (day)	Unknown (0-6)	No training (0)	8	8.5	2.13	1.76
		Low training (1 to 2)	58	61.7		
		Medium training (3 to 4)	15	16.0		
		High training (5 to 6)	13	13.8		
Duration of involvement in CMF (year)	Unknown (2-8)	Low (below 5)	47	50.0	4.95	1.80
		Medium (5 to 6)	26	27.7		
		High (above 6)	21	22.3		
Participation in CMF (score)	0-24 (2-14)	Low participation (below 9)	12	12.8	10.74	3.36
		Medium participation (9-16)	77	81.9		
		High participation (above 16)	5	5.3		
Knowledge of CMF (score)	0-20 (5-20)	Low (below 8)	17	18.1	14.32	4.45
		Medium (8-13)	15	16.0		
		High (above 13)	62	66.0		
Constraints faced in CMF (score)	0-24 (6-21)	Low (below 9)	36	38.3	10.75	3.96
		Medium (9-16)	46	48.9		
		High (Above 16)	12	12.8		

It was found that more than three-fifth (69.1 percent) of respondents are under young aged category. Highest proportion (56.4 percent) of respondents can sign their name only. Majority of the respondents (56.4 percent) fell under the small family size category compared to 33.0 percent medium and 10.6 percent large family size categories. Half (50 percent) of the respondents are under marginal firm sized category and medium farming experience (up to 15 years of experience). About 47.9 percent of the respondents had low annual family income. Around 61.7 percent had low training experience (experience of 1 to 2 days). Half of respondents under low duration of involvement in CMF (below 5 years). The largest proportion (81.9 percent) of the respondents had medium participation in CMF. More than three-fifth (66 percent) of the respondents fell in the high knowledge of CMF category. The highest proportion (48.9 percent) of the respondents faced medium constraints in CMF.

**Relationships between fish-farmers' attitude and their selected characteristics**

Pearson's Product Moment Correlation Coefficient was estimated to measure the relationships between fish-farmers' attitude towards CMF and their eleven selected characteristics and the results are given in Table 3.

Table 3. Relationships between the dependent and independent variables

Dependent variable	Independent variable	Correlation coefficient (r)
Attitude towards CMF	Age	-0.070
	Educational qualification	0.260*
	Family size	0.142
	Farm size	0.138
	Farming experience	-0.076
	Annual family income	0.120
	Training experience	0.468**
	Duration of involvement in CMF	0.756**
	Participation in CMF	0.352**
	Knowledge of CMF	0.794**
	Constraints faced in CMF	-0.900**

\* Significant at 0.05 level of probability, \*\* Significant at 0.01 level of probability

Results of Table 3 indicate that among the eleven characteristics of the fish-farmers, five namely, educational qualification, training experience, duration of involvement in CMF, participation in CMF and knowledge of CMF had positively significant relationship with their attitude towards CMF. On the other hand, constraints faced in CMF had negatively significant relationship with their attitude towards CMF. And the rest of the characteristics namely age, family size, farm size, farming experience and annual family income of the respondents had no significant relationship with their attitude towards CMF.

**Contribution of selected characteristics to fish-farmers' attitude towards CMF**

Linear multiple regression analysis was done with the six variables showed significant relationship in correlation analysis namely, educational qualification, training experience, duration of involvement in CMF, participation in CMF, knowledge of CMF and constraints faced in CMF. The findings of the linear regression analysis are presented in Table 4.

Table 4. Linear regression coefficients of the selected characteristics (dependent variable = fish-farmers' attitude towards CMF)

Selected characteristics	Regression coefficient (Standardized coefficient)	Significant level
Educational qualification	0.035	0.401
Training exposure	0.043	0.344
Duration of involvement in CMF	0.298**	0.000
Participation in CMF	0.013	0.785
Knowledge of CMF	0.195**	0.009
Constraints faced in CMF	-0.515**	0.000
$R^2 = 0.869,$		$F \text{ value} = 103.99$
		$P = 0.000$

\*\* Significant at 0.01 level of probability

The regression coefficients of three characteristics of the fish-farmers namely, duration of involvement in CMF, knowledge of CMF and constraints faced in CMF were significant indicating their significant contribution to fish-farmers' attitude towards CMF. The remaining characteristics had no significant contribution to the fish-farmers' attitude towards CMF. The  $R^2$  value indicated that 86.9 percent of the total variation in fish-farmers' attitude towards CMF was explained by the six variables included in the regression analysis. It was also found high interrelationships among some characteristics of the fish-farmers through correlation analysis. Hence, there may have the possibility of multicollinearity problem and to ascertain the proper contributions of the characteristics, multiple regression analysis (reduced linear regression) was run with these three significant variables to determine the predictive power to the dependent variable and the findings are presented in Table 5.

Table 5. Reduced linear regression coefficients of the three selected characteristics (dependent variable = fish-farmers' attitude towards CMF)

Characteristics	Regression coefficient (Standardized coefficient)	Significant level
Duration of involvement in CMF	0.307**	0.000
Knowledge of CMF	0.173*	0.011
Constraints faced in CMF	-0.561**	0.000
$R^2 = 0.870,$		$F \text{ value} = 207.87,$
		$P = 0.000$

\* Significant at 0.05 level of probability, \*\* Significant at 0.01 level of probability

Table 5 indicates that, all of the variables have significant contribution to fish-farmers' attitude towards CMF and the combined predictive power is 87 percent indicated that duration of involvement in CMF, knowledge of CMF and constraints faced in CMF explained 87.0 percent variation to fish-farmers' attitude towards CMF. Hence, whatever variation was in the fish-farmers' attitude towards CMF; it was mainly due to the contribution of these three characteristics. The unique contribution of each of the above mentioned three characteristics was determined by taking the changes in  $R^2$  value occurred for enter of a particular variable in the stepwise regression model. Individual contribution of three variables has been presented in Table 6.

Table 6. Stepwise multiple regression analysis showing contribution of the selected characteristics to 'attitude towards CMF'

Variables entered	Multiple R squared	$R^2$ change	Variance explained (percent)	Significant level
Constraints faced in CMF	0.808	0.808	80.8	0.000
Duration of involvement in CMF	0.861	0.053	5.3	0.000
Knowledge of CMF	0.870	0.009	0.9	0.000

Table 6 indicates that the constraints faced in CMF had the highest contribution of 80.8 percent to the total explained variance of 87.0 percent. Among the remaining variables duration of involvement in CMF contributed 5.3 percent and knowledge of CMF contributed 0.9 percent to the explained variance.

#### Direct and indirect effects of selected characteristics to attitude towards CMF

Path analysis was done to measure the direct and indirect effects of selected three characteristics that were entered into the stepwise regression analysis model to the fish-farmers' attitude towards CMF. The path coefficient of three selected independent variables with respect to fish-farmers' attitude towards CMF have been presented in Table 7.

Table 7. Path coefficients showing the direct and indirect effects of selected characteristics on the attitude towards CMF

Characteristics	Direct effect	Total indirect effect	Characteristics through which substantial indirect effects are channeled	
			Value	Characteristics
Duration of involvement in CMF	0.307	0.449	0.0263	Knowledge of CMF
			0.4227	Constraints faced in CMF
Knowledge of CMF	0.173	0.621	0.0165	Constraints faced in CMF
			0.6045	Duration of involvement in CMF
Constraints faced in CMF	-0.561	-0.339	-0.1027	Duration of involvement in CMF
			-0.2363	Knowledge of CMF

Table 7 reveals that out of three variables, duration of involvement in CMF had highest positive direct effect (0.307) while knowledge on CMF had a positive direct effect of 0.173 and constraints faced in CMF had a negative direct effect of -0.561 on fish-farmers' attitude towards CMF. On the other hand, total indirect effects of the selected independent variables ranged from 0.4227 in constraints faced in CMF for duration of involvement in CMF to -0.2363 in knowledge of CMF for constraints faced in CMF.

#### CONCLUSION

Highest proportion of the fish-farmers had highly favorable attitude towards the community managed fisheries. This shows the clear mind setup of fish-farmers towards the community managed fisheries. The attitude of fish-farmers can be more favorable if they are equipped with the knowledge on fisheries resources conservation, proper selection of appropriate technologies and financial assistance to gain more return with minimum risk. The fish-farmers with highly favorable attitude should be used to motivate other community members for implementation of community managed fisheries more effectively and forming favorable attitude of other community members. High educational orientation and training exposure might improve fish-farmers' attitude towards community managed fisheries. Long term and intensive participation in community managed fisheries also improves the attitude towards the same. Again, duration of involvement, knowledge of community managed fisheries and constraints faced in community managed fisheries are the important contributing factors for attitude formation towards community managed fisheries. This is important considering both direct and indirect effects of these three characteristics in attitude formation. Initiatives for increase more participation, improvement to increase knowledge and measures to reduce constraints in community managed fisheries need to be ensured for brining favorable attitude towards community managed fisheries. The constraints faced in community managed fisheries showed most predictive power is formation of attitude towards community managed fisheries. Thus measures need to be taken to minimize the constraints in community managed fisheries. Different rural and agricultural development agencies need to strengthen the support services for the fish-farmers and arrange different non-formal educational activities for the fish-farmers regarding management

and utilization of community managed fisheries. Frequently broadcasting of different programs related to community managed fisheries in different mass communication media like radio, television etc. highlighting the burning issue of fisheries resources degradation should be accomplished. Publication of different posters, leaflets, folders and dispatch them among the beneficiaries expressing the benefits of conservation and efficient utilization of fisheries resources should also be undertaken. Proper identification of fish-farmers' constraints through regular visit to their managed fisheries and community and suggesting appropriate solutions on-time should be ensured.

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