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# Participation of Farmers in Resource Management Activities at Selected Haor Areas in Netrokona District

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## ABSTRACT

Resources in *haor* region in Bangladesh are underutilized and need to be managed for better outcomes which may significantly improve the livelihoods of the *haor* people. Thus, the study was undertaken mainly to determine the extent of participation of farmers and identify the factors influencing the farmers' participation in resource management activities. The study was conducted at four unions under Mohanganj upazila (Sub-district), Netrokona district. One hundred farmers were interviewed through personal interview using a pre-tested interview schedule during April, 2019. Participation of farmers in resource management activities was the focus variable and nine selected characteristics of the respondents constituted the explanatory variables. Both descriptive and inferential analyses were used to analyze the collected data. The highest proportion (89 percent) of the respondents belonged to medium and low participation category while only 11 percent of them belonged to high participation category. Building embankment, land preparation for crop cultivation, preparing manures were the activities where most of the farmers participated. Level of education, family size and knowledge on resource management were identified as influential factors that affect the participation of the farmers as confirmed by regression model. Besides, among 13 identified problems, lack of training occupied first position followed by lack of good governance, lack of cold storage where these two problems secured second and third ranked position respectively. Respective authorities such as Department of Agricultural Extension (DAE), Department of Fisheries (DoF), Department of Livestock Services (DLS), NGOs etc. should take initiatives for instance organize training, provide support system, motivation etc. for improving the socioeconomic conditions of the haor farmers.

## Introduction

Haor is one of the common wetlands in Bangladesh rather riverine. Haor refers to bowl-shaped large tectonic depressions. It receives surface runoff water by rivers and canels, and consequently, a haor becomes very extensive water body in the monsoon and dries up mostly in the post-monsoon period. Geographically, most of the haors are situated in seven districts of the North-East Bangladesh (Uddin *et al*., 2018). The districts are: Sunamganj, Kishoreganj, Netrokona, Sylhet, Habiganj, Maulavibazar and Brahmanbaria. About 1.99 million hectares of land having in haor area (Alam *et al*., 2009; CEGIS, 2012; Nowreen *et al*., 2014) whereas 19.37 million people have been living there (CEGIS, 2012).

The Haor region remains a part of Bangladesh where natural shocks, seasonal food insecurity and patterns of socio-economic and political exploitation create conditions of extreme and widespread vulnerability for a significant proportion of the population for long periods of the year. The region is also considered to be highly vulnerable to climate change impacts due to its unique physical setting and hydrology (Halder *et al*., 2019). Changing weather patterns in the region, including a rise in temperatures, reduction in rainfall and occurrence of untimely rainfall, are recognized as having caused negative impacts on agricultural production in terms of both the annual rice harvest and winter vegetable crops, and fisheries, although there is as yet little empirical evidence of a consistent trend for increased flash flooding (Uddin *et al*., 2018). Households are also disproportionately vulnerable to negative climate change impacts.

Haor region remains waterlogged for almost half of the year. This unique ecosystem consists of scattered but densely settled habitats build on raised beds that look like tiny islands inside a large water body. The landmass consists of rivers, canals and flat lands suitable for cultivation only during the dry season when the water drains off. The low-lying areas are flooded by the on rush of water coming from the Himalaya through

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the river system in the month of May that recedes from the month of November. The area suffers from occasional flash floods coming from the Himalayan foothills in the month of April. These wetlands are among the most complex ecosystems in the world (Islam *et al*., 2005; Hossain and Salam, 2007).

A resource is a source or supply from which a benefit is produced and that has some utility. In haor area, mainly water bodies, land, livestock, forestry, labour are the resources that need to be utilized for livelihood improvement of the farmers. Thus, farmers have been involving with different activities for instance fishing, sanctuary, land preparation, manuring, farming, both fruit and vegetable gardening etc. to manage their resources. But how extent their participation to manage their resources is not available in literatures. Several research works have been conducted on flood hazards, and human and agricultural adjustment processes to flood in Bangladesh especially in haor areas (Younus, 2012; Younus and Harvey, 2014). However, few studies conducted on flood coping ability issues in haor and Char areas (Khatun, 2014; Munna, 2009) while flood coping strategy for rural people also studied by Kamruzzaman (2010) and Rafique (2016). Uddin *et al*. (2018) studied on effectiveness of flood coping strategies practiced by the fish farmers. But, to date, no available study found on participation of farmers in resource management activities at Selected Haor Areas in Netrokona District. Thus, the study was undertaken to fulfill the following objectives i. to determine the extent of participation of the farmers in resource management activities; ii. to identify the factors influential the participation of the farmers in resource management activities and iii. to find out the problems faced by the haor people in managing their resources.

## Methodology

The study was conducted in four unions named Maghan, Suair, Tatulia, Gaglarjor under Mohanganj upazila of Netrokona district, Bangladesh. These areas are well known as Hoar region in the country and having resources particularly natural resources like water bodies, land, labour etc. The population of this study is farmers of study area. A list of farmers (1003) who belong to small, marginal and landless group was collected from Upazila Agriculture office purposively and denoted as population of the study. Later on, 100 farmers were selected as sample of the study using simple random technique (10% of the population). Sampled farmers were interviewed during April, 2019 for data collection using interview schedule. Before that three FGDs were carried out in preparing interview schedule. While a semi-structured questionnaire was used to conduct FGDs to finalize the interview schedule.

Participation of farmers in resource management activities was the dependent variable and determined by using a 4-point rating scale such as high participation, medium participation, low participation and no participation while scores were assigned to represent the same as 3, 2, 1 and 0 respectively. The possible range of participation score could be 0 to 72 where 0 indicated no participation in resource management activities while a score of 72 indicated high participation. The total score of participation (TSP) was computed by using the following formula (i) and this TSP was employed while making the rank order among twenty four activities considered for resource management. Similar formula was used in the study conducted by Islam *et al*., 2018.

$TSP = T_h \times 3 + T_m \times 2 + T_l \times 1 + T_n \times 0$……………………….(i)

Where, TSP = Total score of participation; $T_h$ = Number of farmers indicating high participation; $T_m$ = Number of farmers indicating medium participation; $T_l$ = Number of farmers indicating low participation; $T_n$ = Number of farmers indicating no participation at all

Both descriptive and inferential statistical (Pearson's Product Moment Correlation Coefficient (r) and linear multiple regressions) analyses were used to analyze the collected data.

## Results

### *Farmers' participation in RMA*

The Table 1 indicates that the total score of participation range from 0 to 72. The observed participation scores ranged from15 to 45 with an average of 29.04 and standard deviation of 5.64. Based on their participation scores the respondents were classified into three categories as shown in Table 1. The highest proportion (63%) of the respondents belonged to Medium participation category and 11% of them belonged to high participation category. Low participation is 26% category. Similar results were found by Maji *et al*. (2015) and Rahman (2010) where they found most of the respondents' participation in activities related to fish farming at low to medium level. ON the other way, Jahan *et al*., 2016 found most of the respondents was took part in homestead vegetable cultivation.

The findings clearly indicated that majority of the respondents had medium (63%) to low (26%) and high (11%) participation in resource management activities. The respondents in the study area kept desire for proper activities resources management practice but they could not perform may be due to lack of knowledge, skill and sufficient information for proper resources management. The key message concludes from the above result is necessary to ensure participation of farmers in activities related that lead to resources management, so that they could get benefits resulted improving their livelihoods. On the other way, participation enhance the farmers interaction even sharing experiences that also lead to utilize their resources properly. The study conducted by the Jahan, (2014) and Islam *et al*. (2018) found the similar results. The extent of participation of haor people in activities related to resources management with their rank order based on total score of participation have been presented in Table 2. There were 24 activities that considered while measuring the extent of participation of the respondents on resources management. The computed total score of the entire dimension have been shown in Table 2. Observed range of total score was 0-206 while possible score was 0-300. It can be mentioned that much difference was observed between the total score of aspects of participation opined by the respondents. The respondents did not feel similar extent of participation for all these twenty four aspects regarding activities related to resources management. Similar finding was also reported by Afroz (2014). In order to make a rank order of the participation of the respondents performed on activities of resources management, the researcher used 24 common activities relevant to participation on resources management. In respect of each need, each farmer was asked to indicate the intensity of need by indicating in favors of any of the four responses as high, medium, low and not at all.

Table 1. Categorization of respondents according to their overall participation of farmers in resource management activities

| Categories | Respondents | | Mean | SD |
|---|---|---|---|---|
| | Number | Percentage | | |
| Low participation (up to 25) | 26 | 26 | 29.04 | 5.64 |
| Medium participation (26 to35) | 63 | 63 | | |
| High participation (above 36) | 11 | 11 | | |
| Total | 100 | 100 | | |

Table 2. Rank order of activities performed by the farmers for their resources management

| Selected activities | Extent of participation | | | | Total score | Rank Order |
|---|---|---|---|---|---|---|
| | H (3) | M (2) | L (1) | N (0) | | |
| Involve in building embankment | 10 | 87 | 2 | 1 | 206 | 1 |
| Land preparation for crop cultivation | 22 | 58 | 20 | 0 | 202 | 2 |
| Preparing manures | 7 | 71 | 21 | 1 | 184 | 3 |
| Applying organic manure | 5 | 77 | 14 | 4 | 183 | 4 |
| Vegetables and fruit gardening | 8 | 71 | 16 | 5 | 182 | 5 |
| Management of fish sanctuary | 1 | 66 | 20 | 13 | 168 | 6 |
| Duck farming | 1 | 61 | 36 | 2 | 161 | 7 |
| Managing pest control | 3 | 54 | 40 | 3 | 157 | 8 |
| Managing disease control | 0 | 55 | 40 | 5 | 150 | 9 |
| Crop harvesting | 0 | 44 | 53 | 3 | 141 | 10 |
| Use of farm machineries in the crop field | 0 | 38 | 62 | 0 | 138 | 11 |
| Transport products from field to market | 0 | 36 | 63 | 1 | 135 | 12 |
| Bargaining with authority for leasing | 0 | 32 | 60 | 8 | 124 | 13 |
| Dairy farming | 0 | 17 | 81 | 2 | 115 | 14 |
| Seed storage | 0 | 22 | 70 | 8 | 114 | 15 |
| Irrigation and water management | 0 | 14 | 84 | 2 | 112 | 16 |
| Post-harvest activities | 0 | 13 | 84 | 3 | 110 | 17 |
| Selection and collection of profitable crops varieties | 0 | 9 | 88 | 3 | 106 | 18 |
| Planting sampling around homestead | 0 | 1 | 86 | 13 | 88 | 19 |
| Pit preparation | 0 | 10 | 41 | 49 | 61 | 20 |
| Fish processing | 0 | 5 | 29 | 66 | 39 | 21 |
| Participate in method/result demonstration | 0 | 1 | 16 | 83 | 18 | 22 |
| Training programme | 0 | 1 | 11 | 88 | 13 | 23 |
| Aail management | 0 | 0 | 0 | 100 | 0 | 24 |

Notes: H = High (score: 3), M = Medium (score: 2), L = Low (score 1), N = Not at all (score: 0)

Table 2 revealed that out of twenty fourth aspects, on the basis of computed total score, belongs participation of farmers had highest participation was first ranked in involve in building embankment followed by the land preparation for crop cultivation, preparing manures, applying organic manure, vegetables and fruit gardening, management of fish sanctuary etc. While aail management are lowest participation. Building embankment can protect the area where farmers have been performing their daily activities to get benefits. Particularly this embankment protects the flash flood that tremendously affected in 2017 and people became vulnerable (Hasan, 2018). While it also helps the local transportation for transaction as road. Besides, soil and water conservation can also be well protected using this embankment (Bewke and Sterk, 2002). Most important issue is that high or low participation does not matter while both highest participation and lowest participation are more important for resource management. Whenever the farmers in haor region try to do this work properly by their own effort, they usually achieve highest profit from resource management.

### *Farmers' characteristics and their participation in RMA*

The results of correlation of co-efficient test between the explanatory and focus variables have been shown in Table 3. Result in Table 3 revealed that the level of education, annual family income, organizational participation, extension media contact, social mobility and knowledge on Haor resources management were significantly correlated with their participation. Participation, knowledge on haor resource management and credit accessibility are proportion to each other. If organizational Participation increases people can obtain more knowledge about resources management and also get credit facilities from different organization. The farmers with higher level of education had more participation in resource management activities. Where education enables individuals to attain knowledge and thus increases their power of understanding (Nasrin *et al*., 2019). As a result, educated people can explore more livelihood opportunities. Thus, Participation of farmers in resource management activities was higher among those farmers who had higher education. Similar findings were reported by Afroz (2014) and Zaman (2010). The farmers having higher level of annual income had more participation in resource management activities. Similar findings were reported by Roy (2019).

Table 3. Relationship between the selected characteristics of the farmers and their participation in RMA

| Selected characteristics | Correlation co-efficient (r) |
|---|---|
| Age | -0.026 |
| Level of education | 0.244* |
| Family size | -0.104 |
| Annual family income | 0.337** |
| Amount of credit received | 0.195 |
| Organizational participation | 0·283** |
| Extension media contact | 0.387** |
| Social mobility | 0.363** |
| Knowledge on haor resources management | 0.396** |

n = 100, ** Significant at 0.01 level of probability, *Significant at 0.05 level of probability

The farmers having more organizational participation would have more participation of in resource management activities while more extension media contact of the farmers increase awareness of participation of farmers in resource management activities. Similar findings were reported by Rahaman (2010). Besides, farmers having more social mobility would have more opportunity to come in contact with others, share ideas exchange views and opinions that may lead to increase realization capacity of participation for the same. It can be interpreted that the farmers having more knowledge on haor resources management they feel more participation in different activities that lead to resources management. The studies conducted by the Uddin *et al*. (2018) ; Halder (2019) also found the similar results.

### *Econometric estimation of factors influencing the participation of farmers in RMA*

The findings of multiple regression analysis (Table 4) indicated that the determinant factors of were level of education, family size, and knowledge on resource management. The $R^2$ value indicated that, three explanatory variables together explained 28.3 percent variance of participation of farmers in resource management activities. The findings of the multiple linear regression analysis indicated that level of education was significant and showed positive trend, it implies that the increasing the level of education enhances the farmers to make them understand about the management of resources they have. The similar results were found in the study conducted by Suvedi *et al*. (2017) and Mardy *et al*. (2018). It can also be explained that farmers' participation in resource management for instance forestry management can be enhanced by providing education (Dolisca *et al*., 2006). Family size is also an important factor of participation of the farmers while findings indicated that family size showed positive and significant inclination. It implies that the participation of farmers in resource management activities increases with the increase of family size. The family has a large size show more interest to participate in the mentioned major issue. Khalkheili and Zamani (2009) found the similar result and revealed that family size influenced the participation in natural resource management like irrigation water. Besides, the findings of the multiple linear regression analysis indicated that knowledge on resource management was significant and showed positive trend. It implies that knowledgeable farmers are likely to participate more because of having clear idea. Besides, Farmers having good knowledge help them to take decision about the appropriate or relevant activities for resource management compared to farmers having poor knowledge. This result consistent with the results found in the study conducted by Nishi *et al*. (2019).

Table 4. A Summary of the linear multiple regression analysis explaining the focus variable

| Explanatory variables | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | T | Sig.B |
| Constant | 19.969 | 4.135 | | 4.763 | .000 |
| Age | -.037 | .049 | -.097 | -.760 | .450 |
| Education | .077 | .179 | .061 | .431 | .046 |
| Family size | .052 | .308 | .021 | .170 | .012 |
| Annual income | 4.545E-7 | .000 | .005 | .047 | .436 |
| Amount of received credit | 5.280E-5 | .000 | .177 | 1.733 | .651 |
| Orgpart | .682 | .508 | .166 | 1.341 | .540 |
| Extension media contact | .396 | .287 | .193 | 1.381 | .640 |
| Social mobility | .254 | .290 | .111 | .876 | .675 |
| Knowledge on haor resources management | .313 | .398 | .112 | .785 | .031 |
| Adjusted $R^2$ = 0.283 F-value = 7.157 | | | | | |

Table 5. Distribution of respondents according to their overall problem

| Categories | Respondents | | Mean | SD |
|---|---|---|---|---|
| | Number | Percentage | | |
| Low problem (up to13) | 0 | 0 | | |
| Medium problem (14-26) | 3 | 3 | 31.80 | 2.454 |
| High problem (above 26) | 97 | 97 | | |
| Total | 100 | 100 | | |

SD = Standard Deviation

Table 6 Problem faced by the farmers while managing their resources

| Problems | Extent of problems (n = 100) | | | | TPS | Rank order |
|---|---|---|---|---|---|---|
| | H(3) | M(2) | L(1) | N(0) | | |
| Lack of training | 76 | 24 | 0 | 0 | 276 | 1 |
| Lack of good governance | 67 | 30 | 3 | 0 | 264 | 2 |
| Lack of cold storage | 60 | 30 | 10 | 0 | 250 | 3 |
| Poor knowledge on resources management | 48 | 52 | 0 | 0 | 248 | 4 |
| Scarcity of storage facilities | 49 | 48 | 3 | 0 | 246 | 5 |
| Sudden flood | 45 | 55 | 0 | 0 | 245 | 6 |
| Pest and disease outbreaks | 45 | 54 | 1 | 0 | 244 | 7 |
| Poor access to haor | 34 | 64 | 0 | 0 | 232 | 8 |
| Lack of livelihoods capitals | 30 | 70 | 0 | 0 | 230 | 9 |
| Poor credit facilities | 29 | 68 | 3 | 0 | 226 | 10 |
| Lack of farm machineries | 30 | 65 | 5 | 0 | 225 | 11 |
| Poor transports/vehicles facilities | 27 | 70 | 3 | 0 | 224 | 12 |
| Labour crisis | 15 | 65 | 20 | 0 | 195 | 13 |

Notes: H = High (score: 3), M = Medium (score: 2), L = Low (score 1), N = Not at all (score: 0) TPS = Total problem score

### *Problems faced by the farmers in managing their resources*

Thirteen problems in connection with resources management were included in problems confrontation scale. The total score of problems faced by the farmers on activities in resources management range from 0 to 39. The observed problem scores ranged from 24 to 38 with an average of 31.80 and standard deviation of 2.454. Based on their problem scores the respondents were classified into three categories as shown in Table 5. Data presented in the Table 5 show that 3 percent of the respondents had faced medium problem and 97 percent of them had faced high problem on resources management. The similar results found in study conducted by the Uddin *et al.* (2019). In order to measure the problems faced by the farmers in resource management activities, the researcher used 13 common problem items relevant to resources management. In respect of each item, each farmer was asked to indicate the intensity of problem by indicating in favour of any of the four responses as high, medium, low and no problem at all. The total problem score (TPS) for each of the items was computed by using the following formula:

$$TPS = P_h \times 3 + P_m \times 2 + P_l \times 1 + P_n \times 0$$

Where, TPS = Total problem score ; $P_h$ = Number of farmers indicating high problem ; $P_m$ = Number of farmers indicating medium problem ; $P_l$ = Number of farmers indicating low problem ; $P_n$ = Number of farmers indicating no problem at all. Thus, problems were ranked out and placed in the Table 6 according to the total scores where as it ranges from 0 to 300.

It indicates that lack of training occupied first position and seems to be most severe problem on activities related to resources management in that area. On the other hand most of the respondents are faced with lack of good governance, lack of cold storage ranked second and third position. There were also different problems associated with activities related to resources management, such as poor knowledge on resources management, scarcity of storage facilities, sudden flood, pest and disease outbreaks, poor access to haor, lack of livelihoods capitals, poor credit facilities, lack of farm machineries, poor transports/vehicles facilities, labour crisis. These identified problems seem the barrier of utilizing the resources available in the study areas resulted in poor livelihoods of the farmers. During discussion with the farmers they opened that the practice of activities of resources management could be increased if the extension activities along with government supports in the study area increased. In addition, capacity of the farmers could also be strengthened by the respective authority like DAE, DOF, DLS etc. to minimize their problems and utilize their resource properly as well (Hasan, 2018).

## Conclusion

Effective participation of farmers in resource management activities can be a good indicator of sustainable haor development. Although the findings of the study indicated that most of the farmers belonged to low to medium participation. So, it can be concluded that the participation of the farmers in resource management activities was not up to the mark. Therefore, it is necessary to pay more attention to get more farmers' involvement in activities of resource management by providing better access to resources as well as information and thereby helping the farmers to better realize the long-term benefit of sustainably managing the natural resources for their livelihood. Besides, farmers' participation in resource management activities was found to be influenced by the level of education, family size and knowledge of resource management. Thus, the policy makers should get priority the above factors while taking policy in this regard. The findings of the study also concluded that lack of training and good governance may be the main reasons not having higher level of participation of the farmers in resource management activities. Concerned authorities such as Department of Agricultural Extension (DAE), Department of Fisheries (DoF), Department of Livestock Services (DLS), NGOs etc. should emphasize and take initiatives for instance training, motivation, support service etc. to increase the farmers' participation for improving their socioeconomic conditions.

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## Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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