FARMERS’ AWARENESS REGARDING DEFORESTATION AT JALMA UNION OF BATIAGHATA UPAZILA UNDER KHULNA DISTRICT OF BANGLADESH

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ABSTRACT

Deforestation causes environmental degradation. Awareness of the people might have influence on reduction of deforestation. The main purposes of the study were to determine the farmers’ awareness regarding deforestation and to explore relationship between the selected characteristics of the farmers and their awareness. The study was conducted to only one village namely Raingamari (The project village of Khulna University) of Jalma union under Batiaghata upazila of Khulna district. Data were collected from 53 family heads of the village on their 10 selected characteristics such as age, educational qualification, farming experience, family size, farm size, family income, organizational participation, cosmopolitaness, extension media contact, training exposure. Data were also collected on farmers’ awareness regarding deforestation. Data were collected from the respondents during April to July 2017 through personal interview using a pretested interview schedule. Most of the respondents were highly aware of deforestation. The respondents showed highest level of awareness regarding “deforestation causes greenhouse effect which consequently increase the average temperature of the earth” while they were less aware regarding “deforestation threatens the livelihoods and cultural integrity of people that depend on forest”. Among the 10 selected characteristics of the respondents, educational qualification, organizational participation, extension media contact showed positive significant relationships with their awareness regarding deforestation while only the annual income had the negative significant relationship with their awareness regarding deforestation.

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INTRODUCTION

Forest provides cover to the earth’s land surface and many environmental benefits including a major role in the hydrologic cycle, soil conservation, and prevention of climate change and preservation of biodiversity (Ekhuemelo and Akhe, 2015). Forest resources can provide long-term national economic benefits. At least 145 countries of the world are currently involved in wood production (Anderson, 2006). Deforestation is known as forest decline, forest fragmentation and degradation, loss of forest cover, and land-use conservation. Deforestation is defined as clearing of any area of its natural vegetation cover, which normally leads to decrease in plants population resulting in loss of plant biodiversity (Aliyu et al., 2014). It is also defined as the indiscriminate felling of trees without their replacement (Mustapha et al., 2012). The contemporary world is facing an environmental crisis on account of heavy deforestation. For years, remorseless destruction of forest has been going on and we are unable to comprehend the dimension until recently. However, it is obvious that the area of tropical rainforest is diminishing and the rate of tropical rain forest destruction is escalating worldwide, despite increased environmental activism and awareness (Docena, 2010). According to Becek and Odhii (2008), human activities are globally recognized as the principal cause of deforestation. Several researches dealing with deforestation have been undertaken, focusing on both the microeconomic (Gillis, 1988 and Repetto, 1988) and macroeconomic causes of rapid deforestation in the tropics. However, the relevance of understanding the deforestation systems goes beyond the capability to point out the changes resulting from deforestation; it is necessary to realize its causes and effects on natural resources (Mena, 2001). Scientists generally mention population pressure and rural poverty as a key element in explaining deforestation of Bangladesh. However, other scientists and environmental groups have referred forest shrinkage to economic growth, national policies, and the harvesting of trees for firewood (Salam and Noguchi, 1998). Empirical support for these hypotheses is fundamentally applicable for all forest types of Bangladesh. Deforestation in Bangladesh is obviously a complex issue and, moreover, scanty scientific studies have been carried out to identify its deep causes (Safa, 2004).

According to the United Nation’s Framework Convention on Climate Change (UNFCCC, 2010), the overwhelming direct cause of deforestation is agriculture; with subsistence farming responsible for 32%, logging 14% and fire wood removal make up 5%. Bangladesh has the worst deforestation rate in the world, which can be attributed to increase in population with high poverty level bulk of the population depend on forests for their energy needs (International Institute of Tropical Agriculture, 2011). In an attempt to reduce the effects of deforestation on livelihoods, farming households were compelled to develop some adaptation strategies, as farming households responds to changing environmental circumstances in a variety of ways. Thus, it is experiential that the survival attitudes caused by deforestation encouraged the development of local people consciousness about environment and its conservation (FAO, 2009). The systems such as agroforestry were more beneficial in comparison to producing only annual food crops or pasture, because agroforestry systems could generate income from tree sales and carbon trading programmes, such as reducing emissions from deforestation and degradation schemes. The Forestry Ministry arrange training programmes for different agroforestry types such as home types, where people plant and tend to trees around the home. Home types are good because different types of plants – trees, shrubs, herbaceous plants – can be grown in or adjacent to a home compound, (Rahman, 2012). In addition, several efforts are being made by both the state and local governments towards reclaiming the various degraded and marginal lands in the various parts of the country. Such efforts are being implemented by the recently established Agency of Bangladesh. These strategies were all aimed at increasing global and national concerns in addressing the issues of deforestation. Therefore, it is clear that deforestation is the main cause of environmental degradation. In this regard, different afforestation and reforestation programme agroforestry programmed are a prime consideration to save the environment.

Considering the points in view the present study was undertaken with a view to study farmers’ awareness regarding deforestation. The specific objectives of the study were to analyze the selected characteristics of the farmers and to determine farmers’ awareness regarding deforestation. In addition, the relationship between the selected characteristics of the farmers and their awareness regarding deforestation was also assessed.
METHODOLOGY

The present study is based on descriptive and diagnostic research design. The present study was based on collection of data by door to door interviewing. It was designed to study the farmer's awareness regarding deforestation in the Raingamari village (The project Village of Khulna University) of Jalma union under Batiaghata upazila of Khulna district. The Raingamari village was selected purposively as the locale of the study. The study area was selected due to its closeness/proximity with researchers dwelling or university. Raingamari is a small village and a number of 53 families live in the village (study area). The heads of the 53 families were considered as the population and sample for the study.

The personal and socio-economic characters of the respondents were treated as independent variables for the study. The characteristics were age, educational qualification, farming experience, family size, farm size, annual income, organizational participation, cosmopolitanness, extension media contact and training exposure. Farmers’ awareness regarding deforestation was considered as dependent variable in this study.

To measure farmers’ awareness regarding deforestation, a number of 6 statements related to harmful effects of deforestation and another 6 statements related to beneficial effect of afforestation. To determine the awareness score of the respondents a five point rating scale such as strongly agree, agree, undecided, disagree and strongly disagree were employed against the 12 statements. A score 5, 4, 3, 2 and 1 was employed against the scales respectively. The awareness score of a respondent was calculated by adding all the scores obtained by a respondent against the twelve (6+6=12) statements. The awareness score of respondents could be ranged from 12-60, where ‘12’ indicate less awareness and 60 indicate high awareness. Based on awareness score, the respondents were classified in to three categories as shown in Table 1. To compare among 12 statements related to harmful effects (6) of deforestation and beneficial effects (6) of afforestation an awareness index (AI) was calculated using following formula:

\[ AI = N_{sag} \times 5 + N_{ag} \times 4 + N_{ud} \times 3 + N_{da} \times 2 + N_{sda} \times 1 \]

Where,
- \( AI \) = Awareness Index
- \( N_{sag} \) = Number of respondents rated the statement related to awareness as strongly agree
- \( N_{ag} \) = Number of respondents rated the statement related to awareness as agree
- \( N_{ud} \) = Number of respondents rated the statement related to awareness as undecided
- \( N_{da} \) = Number of respondents rated the statement related to awareness as disagree
- \( N_{sda} \) = Number of respondents rated the statement related to awareness as strongly disagree

The AI score of the respondents regarding a statement could range from ‘53’ to ‘265’ where ‘53’ indicate less awareness and ‘265’ indicate the high awareness.

For better understanding, the AI score was converted to percentage using following formula.

\[ \% \text{ AI} = \frac{\text{Observed AI score}}{\text{Possible AI score}} \times 100 \]

RESULTS

Selected characteristics of the farmers

The selected characteristics of the farmers are described in this section and a summary profile of these characteristics is presented in Table 2. Data presented in Table 2 indicate that majority (51%) of the respondents was middle aged as compared to 41.50% young aged and 7.50% being old aged. Highest proportion (32.10%) of the respondents had secondary level of education followed by primary (22.60%) & illiterate (20.80%). Only a few (13.20% and 11.30%) of the respondents having higher secondary and above higher secondary level of education, respectively. Similar findings were observed by Bene (2006) regarding education. Data computed in Majority of the respondents (50.90%) had low farming experience followed by medium experienced (30.20%) and had high experienced (18.90%). Islam et al. (1998) found similar result on farming experience. Majority (56.60%) of the respondents had medium sized family compared to small sized
(30.20%) and larger sized (13.20%) family. The average family size (5.08) of the study area is higher than that of national average (4.4; BBS, 2013). It means that the people in the study area are not conscious about their family size and population growth.

Table 1. Categories of respondent farmers based on their awareness score

| Categories       | Score(s) |
|------------------|----------|
| Low awareness    | ≤20      |
| Medium awareness | 21-40    |
| High awareness   | 41-60    |

Table 2. Selected characteristics of the respondents

| Characteristics       | Range       | Category                          | Respondents (N=53) | Mean   | Std. Dev. |
|-----------------------|-------------|-----------------------------------|--------------------|--------|-----------|
|                       |             |                                   | Number             |        |           |
| Age (year)            | 25-60       | Young (up to 35)                  | 22                 | 41.50  | 7.50      |
|                       |             | Middle age (36-50)                | 27                 | 51     |
|                       |             | Old (above 50)                    | 4                  | 7.50   |
|                       | 0-14        | Illiterate (0)                    | 11                 | 20.80  |           |
|                       |             | Primary level (1-5)               | 12                 | 22.60  |           |
|                       |             | Secondary level (6-10)            | 17                 | 32.10  |           |
|                       |             | Higher secondary (11-12)          | 7                  | 13.20  |           |
|                       |             | Above higher secondary (above 12) | 6                  | 11.30  |           |
| Farming experience (year) | 5-30       | Low (up to 10)                    | 27                 | 50.90  | 13.20     |
|                       |             | Medium (11-20)                    | 16                 | 30.20  |           |
|                       |             | High (above 20)                   | 10                 | 18.90  |           |
| Family size (number)  | 3-9         | Small (1-4)                       | 16                 | 30.20  | 13.20     |
|                       |             | Medium (5-6)                      | 30                 | 56.60  | 21.49     |
|                       |             | Large (above 6)                   | 7                  | 13.20  | 4.96      |
| Farm size (hectare)   | 0.16-5.02   | Landless (<0.02)                  | 0                  | 0      |           |
|                       |             | Marginal (0.02-0.20)              | 3                  | 5.70   | 1.13      |
|                       |             | Small (0.21-1.0)                  | 25                 | 47.20  |           |
|                       |             | Medium (1.01-3.0)                 | 20                 | 37.70  |           |
|                       |             | Large (above 3.0)                 | 5                  | 9.40   |           |
| Annual income (thousands) | 35-350    | Low (up to 50)                    | 18                 | 34     | 1.08      |
|                       |             | Medium (51-100)                   | 28                 | 52.80  | 0.90      |
|                       |             | High (above 100)                  | 7                  | 13.20  |           |
| Organizational participation (score) | 0-3     | No participation (0)              | 17                 | 32     |           |
|                       |             | Low (1-2)                         | 34                 | 64.20  |           |
|                       |             | Medium (3-4)                      | 2                  | 3.80   |           |
|                       |             | High (above 4)                    | 0                  | 1.80   |           |
| Cosmopoliteness (score) | 0-12      | No (0)                            | 2                  | 3.80   |           |
|                       |             | Low (1-5)                         | 32                 | 60.40  |           |
|                       |             | Medium (6-10)                     | 17                 | 32     |           |
|                       |             | High (above 10)                   | 2                  | 3.80   |           |
| Extension media contact (score) | 8-50     | Low (1-20)                        | 30                 | 56.60  |           |
|                       |             | Medium (21-40)                    | 20                 | 37.70  |           |
|                       |             | High (above 40)                   | 3                  | 5.70   |           |
| Training exposure     | 0-2         | No (0)                            | 38                 | 71.70  |           |
|                       |             | Low (1)                           | 13                 | 24.50  |           |
|                       |             | Medium (2)                        | 2                  | 3.80   |           |
|                       |             | High (above 3)                    | 0                  | 0      |           |

Source: Field Survey, 2017
The data presented in Table 2 indicated that highest proportion (47.20%) of the respondents had small farm holdings compared to medium (37.70%), large (9.40%) and marginal (5.70%) farm holdings. Hamid (1995) found similar result on farm size. Majority (52.80%) of the respondents belonged to medium income group as compared to low (34%) and high (13.20%) income groups. Zaidi et al. (2011) found similar results on respondents' family income.

Majority (64.20%) of the respondents had low organizational participation as compared to no participation (32%) and medium (3.80%). The findings of the present study have harmony with the findings of Hamid (1997) and Hossain (1999) regarding organizational participation of the respondents. Majority (60.40%) of the respondents had low cosmopolitanism as compared to medium (32%) and no cosmopolitanism. Only a few (3.80%) had high cosmopolitanism. Khan and Hamid (1995) found similar results related to cosmopolitanism of the respondents. Data presented in Table 2 also indicate that majority (56.60%) of the respondents had low extension media contact while 37.70% of them had medium and 5.70% had high extension media contact. Miah and Rahman (1995), Hanif (2000), Hossain (1999) also found similar result about extension media contact of the respondents. Majority (71.70%) of the respondents had no training exposure. However, about one-fourth (24.50%) of the respondents had low training and a very few (3.80%) had medium training exposure. World Bank (WB, 2006) reported that only 4% of farmers were properly trained on environmental degradation.

 Farmers' Awareness regarding Deforestation

The awareness regarding deforestation scores of the farmers varied from 39 to 58 being mean and standard deviation of 49.42 and 4.50 respectively. The respondents were classified into three categories based on their awareness scores. The categories and distribution of the farmers are shown in Table 3.

| Categories           | Score | Respondents (N=53) | Mean | Standard Deviation | Min. | Max. |
|----------------------|-------|--------------------|------|--------------------|------|------|
|                      |       | Number             | Percentage |                   |      |      |
| Low awareness        | ≤ 20  | 0                  | 0    |                   |      |      |
| Medium awareness     | 21-40 | 2                  | 3.8  | 49.42              | 39   | 58   |
| Higher awareness     | 41-60 | 51                 | 96.2 | 4.50               |      |      |
| Total                |       | 53                 | 100  |                    |      |      |

Source: Field Survey, 2017

Data contained in Table 3 indicate that most (96.20%) of the respondents had high awareness while 3.80% respondents had medium awareness regarding deforestation. It means that all most all of the respondents of the study area are highly aware regarding deforestation (the environment). Mustafha et al. (2012) and Hanif (2000) almost found similar types of result in this regard. Mustapha et al. (2012) observed in their study that most (86.7%) of the respondents had more adaptation to deforestation while 13.3% had less adaptation to deforestation. The adaptations of the respondents indicate their awareness. Hanif (2000) in his study indicated that among the Farmers Field School (FFS) farmers, 100% had high awareness on environmental pollution due to use of pesticide. In case of Non-FFS farmers, 66.67% had poor awareness, while 30% had medium and 3.33% had high awareness on environmental pollution due to use of pesticides. Deforestation is considered one of the oldest problems of the world, and it is as old as the agricultural revolution 10,000 to 12,000 years ago (Mena, 2001). People have always needed land for their own uses and have consequently cleared natural vegetation. Nowadays, global deforestation is understood to be one of the key problems of climate change (Gorte and Sheikh, 2010). Moreover, the economic value of natural resources, such as forests, has been shown to be the major cause of deforestation in developing countries.
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(Munasinghe, 1993). About 50% of the original forest covering our globe has been cleared in the last 40 years (FAO, 1995 and WWF, 1998) and in developing countries about 1.5 billion people rely on firewood for cooking and heating (Tucker, 1999).

Bangladesh is a developing country having 14.4 million hectares of total geographic area (Islam, 2005). Of them, 13.36 million hectares are land surface, and 0.94 million hectares are rivers and other inland water bodies (BBS, 2001). The country has only 17.08% (2.52 million ha) of total forest land (GOB, 2010). A few decades ago, Bangladesh was rich in forest resources but a rapid population growth, land conversion into different commercial activities, increased consumption of energy and wood and maximum utilization of natural resources have led to a rapid degradation of forest resources (Alam et al., 2008). The tropical moist deciduous Sal forests are a leading example of such degradation (Ali et.al, 2006), due to highly increasing population that have sequentially brought exploitation of the forest at a significant rate, nearly close to destruction (Alam et al., 2008; Safa, 2004).

Comparison among 12-statements related to farmers’ awareness regarding deforestation

Comparison among 12-statements related to farmers’ awareness regarding deforestation was done based on awareness index. The statements were ranked based on awareness index which is shown in Table 4. Data presented in Table 4 indicate that among 12 statements related to awareness of deforestation, the respondents showed highest level of awareness about “deforestation causes greenhouse effect which consequently increase the average temperature of the earth (AI = 242, ranked = 01) while it was least about “deforestation threatens the livelihoods and cultural integrity of people that depend on forest” (AI = 183, ranked = 12).

Table 4. Rank order of the statements related to the farmers’ awareness regarding deforestation in the study area based on awareness index

| Sl. No. | Statements                                                                 | Awareness Index (AI) | Rank order |
|--------|------------------------------------------------------------------------------|----------------------|------------|
| 1.     | Deforestation causes greenhouse effect to increase the average temperature of the earth | 242                  | 1st        |
| 2.     | Deforestation causes soil erosion and also reduce soil fertility             | 237                  | 3rd        |
| 3.     | Deforestation decreases the general biodiversity.                           | 216                  | 7th        |
| 4.     | Deforestation helps in spreading disease.                                    | 184                  | 6th        |
| 5.     | Deforestation increases the likelihood of natural hazards- storm, floods and extreme fluctuations in weather. | 223                  |            |
| 6.     | Deforestation threatens the livelihoods and cultural integrity of people that depend on forest. | 183                  | 12th       |
| 7.     | Afforestation is useful to protect the wild life.                           | 233                  | 4th        |
| 8.     | Planting of trees simply restores & maintains ecological balance of all systems in the environment. | 213                  | 9th        |
| 9.     | Trees bring soils together which prevents erosion.                          | 231                  | 5th        |
| 10.    | Afforestation increases food & fodder production.                           | 240                  | 2nd        |
| 11.    | Afforestation helps in avoiding desertification.                            | 204                  | 10th       |
| 12.    | Afforestation helps in preventing further global warming and reversing the effects of global warming. | 215                  | 8th        |

Source: Field Survey, 2017
Table 5. Relationship between the selected characteristics of the farmers and their awareness regarding deforestation

| Independent variable | Dependent variable | Correlation coefficient |
|----------------------|--------------------|------------------------|
| Age                  | Farmers awareness regarding deforestation | -0.147 NS |
| Educational qualification |                       | 0.382* |
| Farming Experience   |                       | 0.094 NS |
| Family Size          |                       | -0.178 NS |
| Farm Size            |                       | 0.015 NS |
| Annual income        |                       | -0.502** |
| Organizational participation |                   | 0.483** |
| Cosmopoliteness      |                       | 0.208 NS |
| Extension media contact |                   | 0.357** |
| Training exposure    |                       | 0.187 NS |

Source: Field Survey, 2017
NS= Non-significant, *Correlation highly significant at 5% level of probability

Relationship between the selected characteristics of the farmers and their awareness regarding deforestation

Out of ten selected characteristics of the respondent farmers, educational qualification, organizational participation, extension media contact showed positive significant relationships with their awareness regarding deforestation while only annual income showed negative significant relationship. It means that the higher is the educational qualification, organizational participation and extension media contact, the higher is the awareness of the farmers regarding deforestation. On the other hand, the higher is the annual income; the lower is the awareness of the farmer's regarding deforestation. Similar results were also found by Shrestha (2010) and Islam (2009) regarding educational qualification and organizational participation. The findings of the studies conducted by Hamid (1997), Hanif (2000), Hossain (1999), Miah and Rahman (1995), Sarker (1999) have harmony with the present study regarding extension media contact. The findings of Parveen (1995) were also similar regarding annual income.

DISCUSSION

Every year, about 13 million hectares of forest are converted to other land uses (FAO, 2010), leading to biodiversity losses, soil erosion, and massive carbon dioxide (CO2) emissions. At the same time, demand for timber products is rapidly increasing, especially in the developing world. FAO (2009) projection mentioned an annual worldwide increase of 1.5% of saw wood consumption, 3.3% of wood-based panels and 3% of paper for the 2005-2020, period. Agricultural expansion is the major cause of deforestation. Indeed about 70% of the total deforestation in the 1990s was credited to agricultural expansion (Eleri et al., 2012). Over the years, sustainable management of forest resources has been of primary concern due to its potentials impact on biological diversity and importance in maintaining global ecological function as cited by (Adefila and Madaki, 2014). There are different ways of adapting to deforestation in agriculture among which include; crop diversification, mixed crop-livestock farming systems, use of alternative sources of energy, domestication of medicinal plants, conservative agriculture, using different crop varieties, changing planting and harvesting dates, and mixing less productive, drought resistant varieties and high-yield water sensitive crops are among the important adaptation options that farmers uses.
In spite of its importance, the natural tropical forest continued to diminish rapidly in the Asian continent, thus leading to dwindling sustainable forest management. “Deforestation has reached an alarming rate in recent years. If no changes occur, Bangladesh will have no forest left,” (Rahman, 2012). “There are many good policies in Bangladesh but they are not being carried out. They need to be strengthened and better enforced.” To combat the emerging environmental problems many nations across the globe have been involved in afforestation and reforestation on the already deforested and un-utilized lands. In Bangladesh, a programme like this should prioritize its agroforestry policies, (Rahman, 2012). “The most effective way to reduce deforestation is through agroforestry. It could bring ‘win-win’ solutions to meet both environment and development objectives”.

BFD is responsible for administering 65% of state forest land (about 1.46 million ha). The balance comes under local District Commissioners. Excluding parks and sanctuaries, but including the better quality natural forest (medium to good density) plus bamboo areas and plantations gives a figure of 835,000 ha of reasonable quality forest vegetation on state forest land. This equals 5.8% of Bangladesh’s total area. The area included in the present protected area network is 116,700 ha, equal to 5.2% of state forest land or less than 1% of Bangladesh’s total area (APFSOS, 1998).

CONCLUSION

Most of the respondents are highly aware of deforestation. The respondents showed highest level of awareness regarding “deforestation causes greenhouse effect which consequently increase the average temperature of the earth” while less aware regarding “deforestation threatens the livelihoods and cultural integrity of people that depend on forest”. Among the selected characteristics of the respondents, educational qualification, organizational participation, extension media contact showed positive significant relationships with their awareness regarding while only the annual income had the negative significant relationship with their awareness regarding deforestation. Finally we can say that farmers in the study area quite aware of the risks associated with deforestation and its effects on the environment.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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