Original Research Article

IMPACT OF HOMESTEAD AGROFORESTRY ON SOCIO-ECONOMIC CONDITION OF THE RESPONDENTS AT KAMALGANJ UPAZILA OF MOULVIBAZAR DISTRICT IN BANGLADESH

ABSTRACT

This study was conducted at Kamalganj Upazila of Moulvibazar District in Bangladesh during January to September 2015 to explore the impact of homestead agroforestry on the socio economic condition of the respondents and to explore their relationships with the selected characteristics of the respondents. Face to face interview was performed with 135 respondents to collect the data with the help of questionnaire. Eight different characteristics of the farmers namely; educations, farm size, homestead size, annual income, annual expenditure, savings, knowledge on homestead agroforestry, socio-economic class of the respondents showed significant positive relationships with the numbers of diversified plant species, while negative relationship of diversified plant species was observed with age and family size. Agro forestry based practices plays a vital role to uplift the socio-economic classes of the respondents. For uses of agroforestry products, annual savings and expenditures the highest decisions comes from females 45% and 41% followed by male 38% and 39% respectively. In other cases also female participation is greater than male respondents. Results conclude that homestead agroforestry is a unique area for maintaining both plant diversity and productivity for farmers' livelihood in the studied area.

1. INTRODUCTION

Bangladesh is mainly agricultural based country and agriculture plays a great role in the national economy of the country. About 15.53% of the GDP comes from agriculture and it creates 45.10% employment opportunity of the country [1]. Like agriculture, another important resources i.e., forest which has important role in ecological balance and socio-economic upliftment of the rural people. Homestead is the most plant diversified ecosystem in Bangladesh. Homestead Agroforestry also plays a vital role in the economy of Bangladesh [2]. Trees and other woody species grown in the homesteads are significant source of food, fodder, fuel wood and timber. Most of the vegetable produced in the country are coming from the homesteads [3]. There are about 25.49 million of homesteads in our country covers about 0.80 million ha of lands [4]. Trees in the homesteads, often called, "homestead forests", play an important role in rural economy as well as national economy of Bangladesh. Homestead farming is getting importance as the way of investing minimum capital but earning maximum income with increased participation of respondents in economic activities. Homestead agroforestry may contribute to uplift the socio-economic condition of the respondents, supply fuel wood, give protection from hazards, provide food and other benefits etc [3]. Majority of the respondents cultivates their homesteads by different fruit and timber species in an unplanned way. So, exploration of existing timber and fruit tree species adaptive with changing climatic condition is needed first to have a clear understanding of the home-gardens. Adaptability of a species and its suitability to a site is indicated by its frequency and growth [5].

The accepted standard according to the experts of environmental science is that a country should have at least 25 percent of its total land area covered with trees or forests [6]. Once covered by dense forests, Bangladesh is now almost devoid of forest land, except in few selected areas of the country [7], in terms of per capita forest land, Bangladesh ranks amongst the lowest in the world, which is about 0.02 ha per person [8]. According to the Forestry Master plan (FMP) total 7,69,000 hectares or 6 percent of the country's land mass have actual tree cover [9].

For this above situation i.e. increased population and deforested condition, agroforestry practices especially in the homestead area will be an appropriate alternate land management option. Agroforestry is the combination of forestry and agriculture with the attributes of productivity, sustainability and adoptability. Agroforestry can provide sound ecological basis for increased crop and animal productivity, more dependable economic returns and greater diversity in social benefits on sustained basis. Homestead agroforestry consisting of an assemblage of plants which includes trees, shrubs, and herbaceous plants, growing in or adjacent to a homestead or home compound, has a long tradition in the study site. These are planted and maintained by members of the household with their products intended primarily for household consumption; they have considerable ornamental value and provide shade to people and animals [10].

2. MATERIAL AND METHODS

The study was conducted at 9 unions of Kamalganj upazila under Moulvibazar district, Bangladesh. To get valid information the researcher made all possible effort to explain the purpose of the study to the respondents. Data were collected from a total of 135 respondents during January to September, 2015.

In order to collect relevant information from the respondents a set of preliminary survey questionnaire was used which contained both open and closed form questions. The final questionnaire was prepared on the basis of valid suggestions, logical sequences and comment of the research supervisor.
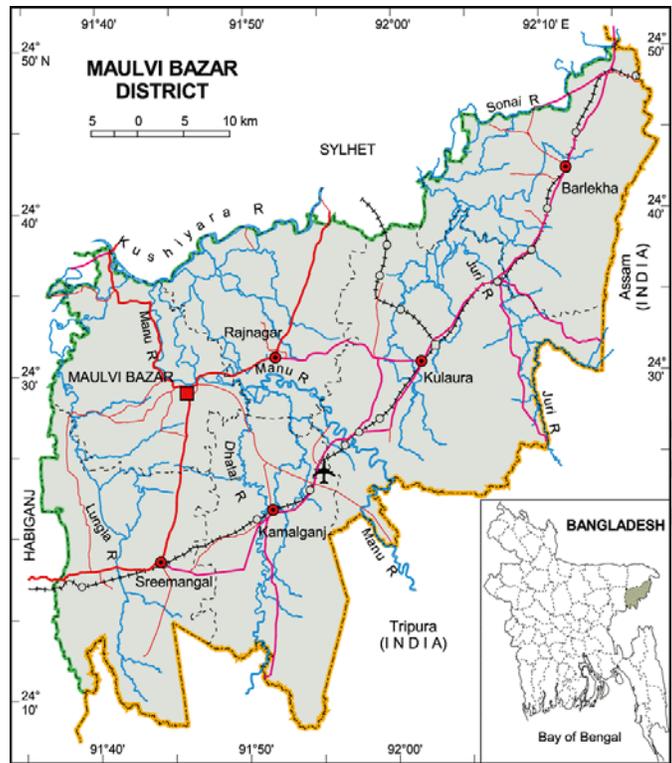
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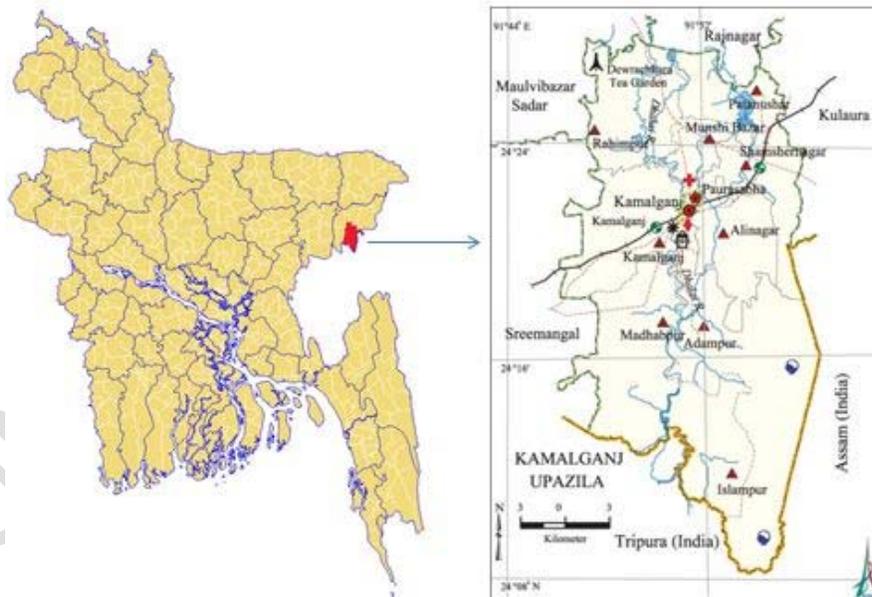
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63   <mark>Plate 1: Map of the study area (Kamalganj upazila of Moulvibazar district) [11]</mark>

64   Data were collected by using the individual questionnaire. Before going to make interview,
65   each respondent was given a brief introduction about the nature and purpose of the study
66   and the researcher assured them that, all information would be kept confidential. The
67   collected data was verified through surveying the villages and personal interview with the
68   sample respondents. Interviews were normally conducted in respondents' house in their

69 leisure time and even in the field when they worked in the field. After the completion of each
70 interview, each questionnaire was checked to be sure that information to each of the items
71 had been properly recorded.

72 The collected data from all the interview schedules were coded, compiled, tabulated and
73 analyzed in accordance with objectives of the study. Local units were converted into
74 standard international units. Qualitative data were converted into quantitative ones by means
75 of suitable scoring. The responses to the questions in the interview schedules were
76 transferred to master sheet to facilitate tabulation for describing the different characteristics
77 and their constraint facing, the respondents were classified into several categories according
78 to requirement. These categories were developed by considering the nature of distribution
79 of data, general understanding prevailing in the social system and possible scoring system.
80 Descriptive analysis such as range, number, percentage, mean, standard deviation and rank
81 order were used whenever possible. Pearson's Product Moment Co-efficient of Correlation
82 (r) was used in order to explore the relationship between the concerned variables using MS
83 Excel and SPSS (Statistical Package for Social Science) software. The computed values of
84 correlation co-efficient (r) were compared against corresponding tabulated values.

85 ## 3. RESULTS AND DISCUSSION

86 ### 3.1 Age
87 Age of the respondents of Kamalganj Upazila of Moulvibazar district was ranged from 25 to
88 80 with an average of 43.66 years and standard deviation of 11.71 (Table 1). Begum (2012)
89 found similar results as average age of the respondents of Gopalpur Upazila of Tangail
90 district which was average of 41.688 years. Age of the respondents ranged from 19-70 years
91 with a standard deviation of 9.936 [12].

92 Table 1: Description of respondents' age group at different unions of the studied area.

Category	Number of respondent	Age Range	Average Age (Years)	Standard Deviation S.D.($\pm$)
Respondents	135	25-80	43.66	11.71

93 ### 3.2 Education
94 In this study 12 percent of respondents had higher level education whereas 23 percent had
95 both of primary and secondary level, 25 percent had college level and 17 percent of them
96 were illiterate (Table 2). Respondents replied that, in their childhood period education
97 facilities were not available as now. That's why the respondents are not able to complete
98 their education.

99 Table 2: Description of respondents' education treated as independent variables at
100 Kamalgonj upazila of Moulvibazar district

Category	Frequency	Percent
Illiterate (0)	23	17
Primary (Class I-V)	31	23
Secondary(Class VI-X)	31	23
College (Class XI-XII)	34	25
Above class XII	16	12
Total	135	100

101 ### 3.3 Occupation
102 Different occupations of the respondents of study area presented in Table 3 shows that
103 service holder ranks highest with 37.8%, business 21.5%, foreign worker 20.7% and laborer
104 14.1% and the lowest was housework (5.9%).

105 Table 3: Description of respondents' occupation treated as independent variables at
106 Kamalganj Upazila of Moulvibazar District.

Category	Frequency	Percent
Service holder	51	37.8

Foreign worker	28	20.7	
Business	29	21.5	
Laborer	19	14.1	
House worker	8	5.9	
Total	135	100	

3.4 Family size

Family size in the study area ranged from 2 to 11 with an average of 4.71 and standard deviation 1.21. Most of the respondents (48.9 percent) had medium families compared to 44.4 percent small families and 6.7 percent large families (Table 4). The average family size of Bangladesh is 5.6, which was higher than the present findings [13].

Table 4: Description of respondents' family size treated as independent variables at Kamalganj Upazila of Moulvibazar District

Category	Frequency	Percent	Range	Mean	S.D. (±)
Small family (up to 4)	60	44.4	2-4		
Medium family (5 to 7)	66	48.9	5-7	4.71	1.21
Large family (8 and above)	9	6.7	8-11		
Total	135	100			

3.5 Farm size

Data presented in table 5 Shows that the highest proportion (65.9%) of the respondents were in small category compared to 28%, and 6.1% were for marginal and medium categories, respectively. The respondents having large farm size contains large homestead area whereas the marginal respondents have small farm size with smaller homestead area. The standard deviation and average farm size was 0.41 with mean 0.70 hectare.

Table 5: Respondents' farm size treated as independent variables at studied area.

Category	Frequency	Percent	Average farm size (ha)	Mean (ha)	S.D. (±)
Marginal (0.21-0.50 ha)	39	28	0.34		
Small (0.51-1.00 ha)	89	65.9	0.67	0.70	0.41
Medium (>2.00 ha)	7	6.1	1.29		
Total	135	100			

3.6 Homestead size

Average homestead size of the respondent in Kamalganj Upazila of Moulvibazar district was 0.13 hectares with a standard deviation of 0.06. Data presented in table 6 revealed that highest proportions of respondent were in medium category (48%) compared to small, large, Landless and Marginal categories (24%, 18%, 10%) respectively.

Table 6. Respondents' homestead size treated as independent variables at studied area.

Category	Respondent	Percent	Average homestead size (ha)	Mean (ha)	S.D. (±)
Landless and Marginal (Up to 0.02 ha)	14	10	0.01		
Small (0.03 to 0.05 ha)	33	24	0.04	0.13	0.06
Medium(0.06 to 0.09 ha)	65	48	0.08		
Large Above 0.09 ha	23	18	0.39		
Total	135	100			

3.7 Knowledge on homestead agroforestry

128 The computed knowledge on homestead agroforestry scores of the respondent ranged from
129 6 to 20 with the mean 11.89 and standard deviation were 3.96 (Table 7). It was observed
130 that the highest proportion of (61.04%) respondent had medium agroforestry knowledge,
131 27.21 percent had low and 11.75 had high knowledge on agroforestry respectively.

132 Table 7 Description of the respondents' knowledge on homestead agroforestry

Category	Respondent	Percent	Range (Scale score)	Mean	S.D. (±)
Low (Up to 8)	36	27.21	6-8		
Medium (9-16)	79	61.04	9-16	11.89	3.96
High (Above 16)	20	11.75	17-20		
Total	135	100			

133 **3.8 Annual income**

134 Most of the respondents (77.03%) of the study area had higher annual income compared to
135 4.5% and 15.5% had low and medium income respectively with an average of 118.53
136 thousands taka and standard deviation of 84.66 (Table 8). Along with agricultural activities
137 most of the respondents are engaged with different earning sources.

138 Table 8. Description of respondents' annual income treated as independent variables.

Category	Respondent	Percent	Average income/Family (Thousands taka)	Mean (Tk./Family)	S.D. (±)
Low income (Up to 60 thousands)	6	4.5	43.20		
Medium income (61 to 120 thousands)	21	15.5	89.90	118.53	84.66
High income (Above120 thousands)	104	77.03	222.605		

139

140 **3.9 Annual expenditure**

141 Most of the respondents (68.88%) of the study area had medium expenditure according to
142 their annual expenditure compared to 5.9% and 22.96% had low and high expenditure
143 respectively with an average of 111.22 thousands and standard deviation of 79.44(Table 9).

144 Table 9. Description of respondents' expenditure treated as independent variables.

Category	Respondent	Percent	Average expenditure/Family (Thousands taka)	Mean (Tk./Family)	S.D. (±)
Low expenditure (Up to 60 thousands)	8	5.90	52.15		
Medium expenditure (61 to 120 thousands)	93	68.88	186.62	111.22	79.44
High expenditure (Above120 thousands)	31	22.96	94.90		

145

146 **3.10 Savings per year**

147 Most of the respondents (80%) of the study area had low savings according to their annual
148 savings compared to 13.3% and 5.1% had medium and high savings respectively with an
149 average of 136.18 thousands and standard deviation of 90.7 (Table 10).

150 Table 10. Description of respondents' savings treated as independent variables of the study

Category	Respondent	Percent	Average savings/Family (Thousands taka)	Mean (Tk./Family)	S.D. (±)
Low saving (Up to 60 thousands)	108	80	25.48		
Medium saving (61 to 120 thousands)	18	13.3	79.38	136.18	90.7
High saving (Above120 thousands)	7	5.1	303.70		

151 **3.11 Socio-economic class of the respondents**
152 Data presented in Table 11 indicates that majority (85%) of the respondents had medium
153 socio economic class where 8 percent had low and 7 percent had high class with an average
154 of 17.1 having standard deviation of 4.36. Based on annual income and expenditure most of
155 the respondents are belongs from medium socio-economic class. Agro forestry based
156 practices plays a vital role to uplift their socio-economic class.

157 Table 11. Description of respondents' socio-economic classes of the respondents

Category	Percent	Range (Scale score)	Mean	S.D. (±)
Low condition (Up to 12)	8	8-12		
Medium condition (13-20)	85	13-20	17.1	4.36
High condition (Above 20)	7	21-23		
Total	100			

158 **3.12 Medicinal uses of plants**
159 Respondents of the studied area opinioned that some of the plants like neem, arjun, basok
160 grown in their homestead area for different medicinal purposes. Different plant parts are
161 used for different medicinal uses.

162 Table 12: Uses of some medicinal plants by the respondents.

Name of the plant	Used plant parts	Uses
Neem *(Azadirachta Indica)*	Leaf, oil, seed	Skin problem, liver tonic, blood purifier
Arjun *(Terminalia arjuna)*	Bark	Heart tonic
Thankuni *(Centella asiatica)*	Whole plant	Memory booster, blood purifier
Basok *(Justicia adhatoda)*	Leaf	Cough remover
Tulsi *(Ocimum tenuiflorum)*	Leaf, flower	Good for heart, blood, lung, cough and flue cure, prevent tuberculosis
Lemon *(Citrus limon)*	Fruit, leaf	Reduce cholesterol, blood purifier, anti-vomiting
Pudina *(Mentha spicata)*	Leaf	increase digestion, prevent tuberculosis
Kalomegh *(Andrographis paniculata)*	Leaf mainly, root	Heal the liver, reduce hokeworm
Ginger *(Zingiber officinale)*	Rhizome, leaf	Reduces nausea, sickness and vomiting
Sajna *(Moringa oleifera)*	Fruit, leaf	Control blood pressure, prevent stroke
Nishinda *(Vitex trifolia)*	Leaf, root	Liver tonic
Nayantara (*Catharanthus roseus)*	Leaf	Blood purifier, anti-cancer

Name of the plant	Used plant parts	Uses
Bael (Aegle marmelos)	Fruit, leaf	Reduce diarrhoea, balance body temperature
Cucumber (Cucumis sativus)	Fruit	Good for heart
Papaya (Carica papaya)	Fruit	Cure ulcer, prevent cancer
Horitoki (Terminalia chebula)	Seed	Cure liver and stomach disease

163 **3.13 Plants having multiple uses**
164 Plants having multiple uses as perceived by the respondents were given in Table 13.
165 According to the respondent's opinion jackfruit, coconut, olive, ipil-ipil and acasia are widely
166 used as multiple purpose tree than other trees grown in homestead agroforestry system.

167 Table 13. Some plants having multiple uses found in the study area

Name of plants	Scientific name	Uses
Jackfruit	Artocarpus heterophyllus	Fruit, fodder, fuel, wood, shade
Mangium	Acacia mangium	Fodder, wood, shade, N-fixation
Olive	Olea europaea	Fruit, medicine, shade, fuel, wood
Akashmoni	Acacia auriculiformis	Fuel, wood, N-fixation
Mango	Mangifera indica	Fruit, shade, fuel, wood, fodder
Wood apple	Aegle marmelos	Fruit, shade, fuel, wood
Banana	Musa sp.	Fruit, vegetable, fodder
Chapalish	Artocarpus chama	Wood, fuel, shade
Papaya	Carica papaya	Fruit, vegetable, medicine
Ipil ipil	Leucaena leucocephala	Fodder, timber, shade, N-fixation

168 **3.14 Gender participation in decision making**
169 The percentage of male and female on decision making in various activities such as tree
170 plantation, housing, family planning, schooling, savings and expenditure, participation in
171 training program, uses of agroforestry product presented in Table 14. In case of tree
172 plantation and housing, respondents opined that 47% and 44% decisions come from the
173 male, 30% and 32% from both male and female and rest 23% and 24% decisions comes
174 from female. For family planning both male and female decide in 59% cases. For uses of
175 agroforestry product, savings and expenditures the highest decisions comes from females
176 45% and 41% followed by male 38% and 39% respectively.

177 Table 14. Gender participation in decision making at Kamalganj Upazila.

Item	Decision maker (%)		
	Male	Female	Both male and female
Tree plantation	47	23	30
Housing	44	24	32
Family planning	21	20	59
Schooling	35	31	27
Saving and expenditure	39	41	20
Participation in training program	1.1	5.1	0.0
Uses of agroforestry product	38	45	17

178 **4. CONCLUSION**
179 The positive significant relationship was found with socio-economic condition of the
180 respondents and the diversity of plant species which indicates the positive impact of
181 agroforestry in socio-economic condition of the respondents. Agroforestry practices ensure
182 direct or indirect income for the respondents with less labor and investment. Gender balance
183 is maintained for decision making in the family and in some cases female respondents play

184 vital role. Some medicinal plants are grown in homestead areas which are used for different
185 medicinal purpose.

REFERENCES

187 1. Bangladesh Economic Review (BER). 2016. Ministry of Finance, The People's Republic
188   of Bangladesh, Bangladesh Secretariat. Dhaka-1000.
189 2. Foysal, A. M., Hossain, M. L., Rubaiyat, A., Hasan, M. B. 2013. Economics of
190   homestead forestry and their management activities at Fatickchari Upazila of Chittagong
191   district, Bangladesh. Agriculture, Forestry and Fisheries. 2(4): 161-176.
192 3. Begum, M. Haque, M.A. Karim, M.R. Akter M. and Wadud, M.A., 2013. Study on
193   homestead Agroforestry and plant diversity in Gopalpur upazila of Tangail district. ofor.
194   Environ. 7 (1): 135-138.
195 4. BBS (Bangladesh Bureau of Statistics). 2010. Statistical Yearbook of Bangladesh.
196   Minist. Plan. Govt. People's Repub. Bangladesh, Dhaka.
197 5. Dutta, A.K. and M.S. Iftekhar. 2004. Tree species survival in the homestead forests of
198   salt affected areas: A perception analysis for Bangladesh. Advances in Biological
199   Research. 4 (3): pp. 309-313.
200 6. Huda, N. and M.K. Roy. 1999. State of the Forest. In: Chowdhury Q. I. (ed.) Bangladesh
201   State of Environment report 1999. Forum of Environmental Journalists of Bangladesh
202   (FEJB) Dhaka. pp. 95-100.
203 7. Giri, C. and S. Shrestha. 1996. Land covers mapping and monitoring from AVHRR data
204   in Bangladesh. International Journal of Remote Sensing. 14: 2749-2759.
205 8. UNEP, 2002. Bangladesh: State of the Environment 2001. United Nations Environment
206   Programme, Regional Resources Center for Asia and the Pacific (UNEP RRC. AP),
207   Pathumthani, 12120, Thailand. pp. 5-121.
208 9. Huda, N. and M. K. Roy. 2001. State of the Forest. In: Chowdhury Q. I. (ed.) Bangladesh
209   State of Environment report 2000. Forum of Environmental Journalists of Bangladesh
210   (FEJB) Dhaka. pp. 247-254.
211 10. Ahmed, M.F.U. and S.M.L. Rahman. 2004. Profile and use of multi-species tree crops in
212   the homesteads of Gazipur district, central Bangladesh. Journal of Sustainable
213   Agriculture. 24: 81-93.
214 11. Singha, S., M. S. Uddin, S. C. Banik and M. A. Kasem. 2018. Homestead Agroforestry
215   Systems Practiced at Kamalganj Upazila of Moulvibazar District in Bangladesh. Asian
216   Journal of Research in Agriculture and Forestry. 2(2): pp. 1-8.
217 12. Begum M. 2012. Study on Homestead Agroforestry and Plant Diversity in Gopalpur
218   Upazila of Tangail District. MS thesis Department of Agroforestry, Bangladesh
219   agricultural university, Mymensingh. pp. 79.
220 13. Anonymous. 2005. Working paper for 3rd National Project Steering Committee Meeting.
221   3PFS, DAE, Dhaka.

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