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Causes, impacts and possible remedial strategies of sal forest encroachment in Madhupur national park range

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Abstract: The study was conducted in Madhupur Sal Forest (National Park range) areas during March to May 2010 to know the present situations and factors affecting the encroachment process of Sal forest. Data were collected from 100 respondents by using questionnaire. The study revealed that majority of the respondents belongs to moderate aged and illiterate. Most of the respondents in the study area are related with agriculture (48%). The economic status of the respondents are not well as the annual income of majority peoples (54%) possessed as the below of Tk. 75000. Family size of the respondents lied below 4 (65%). Majority respondent opinioned that the present plant density amounted only 10-20% as compared its past history. The life cycles of tribal peoples are much closed with sal forest. Sixty one percent respondents opined that about 70% encroachment of sal forest is caused by muscle-man. The ordinary peoples are also some what responsible (5-10%) for sal forest encroachment. The sal forest is also encroached due to cultivated crops in sal forest area. Among the cultivated crops, maximum encroachment of sal forest is caused by banana (32%). A total of nine responsible causes were identified for sal forest encroachment. However, majority of the respondents opinioned that negligence of the forest department is the main cause for sal forest encroachment. This encroachment of sal forest can be minimized, if the government is conscious about sal forest. Creating alternate income source for sal forest community also may be regarded as most effective and meaningful approaches for sal forest protection. Anyway**,** Madhupur sal forest was dense and green but now the forest is under encroachment. So this initiative study will focus overall situations of sal forest community and concern authority so that forest encroachment is minimized and the forest get scope to become greener in gradual.
Key words: Sal forest, encroachment, remedial strategy.

Introduction

Bangladesh is a sub-tropical country with 5700 species of higher plant of which 5540 species are grown in forest (Hossian, 1995). At present Bangladesh is enjoying only 1.53 million hectares of forestland of which only 0.93 million ha is under tree coverage. The remaining 60 million ha is the denuded grassland, scrub and encroached lands (Roy, 2004). Of the total area of Bangladesh, agricultural land makes up 65% of its geographic surface, forest lands account for almost 17%, while urban areas are 8% of the area. Water and other land use account for the remaining 10%. The total forestland includes classified and unclassified state lands and homestead forests and tea/rubber gardens.

Of the 2.52 million hectare forest land, Forest Department manages 1.52 million hectare which includes Reserved, Protected and Acquired forest and Mangrove forest on the newly accreted land in estuaries of major rivers. The remaining 0.73 million hectare of land designated as Unclassed State Forest (USF) are under the control of Ministry of Land. Village forests (homestead land) form the most productive tree resource base in the country and accounts for 0.27 million hectare (Official website of Bangladesh Forest Department, 2010). However there are 3 main types of forest in our country. These are: (i) Tropical evergreen and semi-evergreen forest (640,000 hectares) in the eastern districts of Chittagong, Cox's Bazar, Sylhet, and the Chittagong Hill Tracts region (hill forest); (ii) Moist or dry deciduous forest also known as Sal (*Shorea robusta*) forest (122,000 hectares) located mainly in the central plains and the freshwater areas in the northeast region; and (iii) Tidal mangrove forests along the coast (520,000 hectares) the Sundarbans in the southwest of the Khulna and other mangrove patches in the Chittagong, Cox's Bazar and Noakhali coastal belt (Roy, 2004). But now a days, the area under forest coverage is diminishing which could be a great threat to environment. Almost all the sal forest is severely disturbed by human activities like illicit felling, burning and encroachment. Sal forest has a large contribution to the environment, economy and social life of Bangladesh. Sal forest provides economically and environmentally valuable commodities such as timber, fire wood, food, fodder etc. But these valuable resources are encroaching drastically. The historical changes in the ownership of the forests, especially the enactment of the East Pakistan State Acquisition and Tenancy Act in 1950 worked as incentives for indiscriminate felling of trees. The partition of the sub-continent and the transfer of the forests to the Forest Department have also been contributing factor for serious deforestation. But still the sal forest could have been regenerated with proper care as it were. This experiment will be helpful to abate against the sal forest encroachment. Considering the above facts in mind the present study was undertaken – (i) to know the socioeconomic status of the respondents as they are closely related with sal forest, (ii) to study the present situations and its encroachment, (iii) to identify the probable causes of sal forest encroachment, and (iv) to recommend the possible strategies for abating the process of encroachment in the sal forest.

Materials and Methods

The study was conducted in Madhupur Sal Forest (National Park) areas during the period March to May, 2010 to know the present situations of Sal forest encroachment and factors affecting the encroachment process of Sal forest. Data were collected from 100 respondents by using the questionnaire. The collected data were also verified based on experiences of prilininary survey conducted in the study area before starting the data collection. After completion of data collection the data of interview schedule were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. MS-Excel and SPSS programme were used to process the collected data obtained through interview schedule. Descriptive analysis such as number percentage, mean, standard deviation and rank order were used as required.

Pearson's product moment Co-efficient of correlation was used to explore the relationship between the concern variable.

Results

Socio-economic status of the respondents: The total respondents of the study area were 100. Among the respondents majority of the respondents belong to moderate aged, which is about 45% (Table 1). The study shows that most of the respondents are S.S.C. Pass. Illiterate and higher educated persons are ranked as 1st and 2nd lowest respondents (Table 1). It also revealed that most of peoples in the study area are related with agriculture (48%), some of the peoples are also engaged in services (Fig.1). In general, the economic status of the respondents is not well as the annual income of majority peoples (54%) possessed below Tk. 75000 (Table 1). As the people in the study area are some what educated, the family size of the respondents lied below 4 (65%). Family size greater than 6 possessed only 8% o the selected respondents.

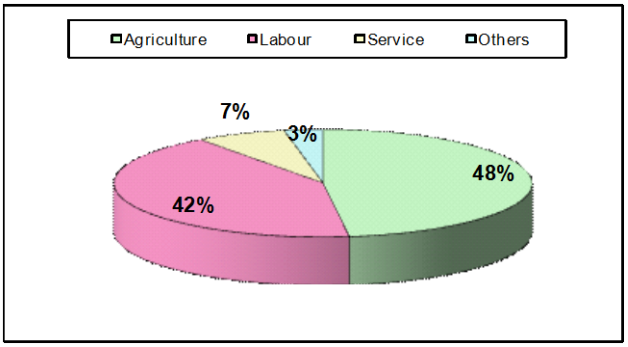

Fig. 1. Occupation of the Madhupur National Park Range community

Table 1. Socioeconomic status of the respondents (N=100)

Characteristics	Frequency	Percent	Mean	Standard Deviation
Age				
Moderate aged (<40)	45	45		
Medium aged (40-50)	39	39	46.32	7.40
Aged >50	16	16		
Education				
Illiterate (0)	2	2		
Can sign only (0.5)	37	37		
SSC pass (5-10)	42	42	6.33	2.31
HSC pass (11-12)	11	11		
Graduate (>12)	8	8		
Annual income (Tk.)				
<75000	54	54		
75000-100000	42	42	80,000	2415.25
>100000	4	4		
Family size				
<4	65	65		
4-6	27	27	4.51	1.60
>6	8	8		

Table 2. Situation of sal forest

Categories	(%)	Mean	Standard Deviation
% Tree in sal forest			
Low (<10)	28.0		
Medium (10-20)	56.0	10.0	7.10
Above (>20)	16.0		
Species richness in sal forest			
Low (<200)	15.0		
Medium (200-220)	29.0	210.0	25.8
High (>220)	56.0		
% Richness of medicinal plant in 10 years ago (scale: 60-100)			
Low <60	6.0		
Medium (60-80)	76.0	71.25	10.73
Above (>80)	18.0		
% Richness of medicinal plant at present (scale: 0-20)			
Low (0-5)	41.0		
Medium (6-10)	32.0	11	8.45
Above (11-20)	27.0		
Attachment of Tribal people with sal forest			
Low <60	17.0		
Medium (60-80)	35.0	55.0	9.38
Above (>80)	48.0		

Table 3. Encroachment of sal forest

Categories	(%)	Mean	Standard Deviation
Authority			
Local people	60	30	5.47
NGO	10		
Government	15		
Others	15		
Sal forest destroy by ordinary people			
Low (<5)	31	8.15	5.35
Medium (5-10)	59		
Above (>10)	10		
Sal forest destroy by Mussels men			
Low (<60)	10	57.45	5.98
Medium (60-70)	29		
Above (>70)	61		

Present status of Sal forest: Majority respondent opinioned that the present plant density amounted only 10-20% as compared its past history (Table 2). Although still there in a highest plant species (>220 SPP). In Madhupur forest area, medicinal plant plays a great role in the socio-economic, health as well as environmental sector. The previous richness (76%) of medicinal plant was within 60-80% as opinioned by majority respondents. But it is noted and also remarkable that the richness of medicinal plants at present is only 6-10% (Table 2).

Community in Sal forest area: The life cycles of Tribal peoples are much closed with sal forest. About 80% tribal people lives in the sal forest as stated the respondents (48%). Although the tribal people were very closest with sal forest, the encroachment is done greatly by the local people. According to the opinion of 61% respondents, about 70% encroachment of sal forest is occurred by muscle-man. The ordinary peoples are also some what responsible (5-10%) for sal forest encroachment as stated by 59% respondents in the study area (Table 3).

Table 4. Probable reasons of sal forest encroachment

Sl. No.	Types of reasons	Respondents (%)	Ranking
1	Negligence of the forest Dept. staff	21	1st
2	Poverty in the locality	7	6th
3	Brick Kiln of the surrounding area	13	4th
4	Less patriotism of the community	5	8th
5	Saw mill of the surrounding area	11	5th
6	Mussels men aggressiveness	17	2nd
7	High population growth rate	6	7th
8	Wood lot Garden (Social forestry programme)	14	3rd
9	NGO's activities	6	7th

Table 5. Protection of sal forest

Categories	(%)	Mean	Standard Deviation
Sal forest protection by Government (Scale: 60-100)			
Low <60	3.0	50.0	10.28
Medium (60-80)	42.0		
Above (>80)	55.0		
Sal forest protection by local people (Scale: 0-25)			
Low <15	45.0	10.0	8.33
Medium (15-20)	29.0		
Above (>20)	26.0		
Sal forest protection by soil management			
Low <60	51.0	50.0	10.52
Medium (60-80)	34.0		
Above (>80)	15.0		
Techniques for protection of Sal forest			
Creating alternate income source rather than forest	70.0		
Sound political attitude	20.0		
Improvement of education, health care facilities and communication system in the study area	10.0		

Competition with other crops: Now the sal forest is encroached by cultivated crops in sal forest area. Among the cultivated crops, maximum encroachment of sal forest is occurred by banana (32%), whereas 7% encroachment is occurred due to lemon cultivation (Fig. 2). Fig. 2 also viewed the others crops which are responsible for sal forest encroachment.

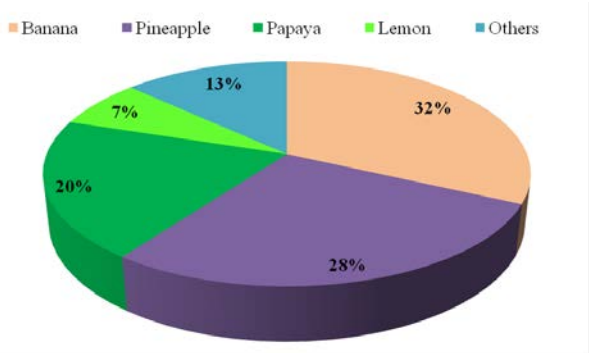

Fig. 2. Pie graph showing the major crops invading the sal forest

Causes of sal forest encroachment: In the study area 10 responsible causes were identified for sal forest encroachment. Among the identified causes, majority of the respondents opinioned that negligence of the forest department staff is the main cause for sal forest encroachment. Muscle man aggressiveness and wood lot garden (social forestry) ranked as 2nd and 3rd highest responsible causes for sal forest encroachment. Where as NGOs activities in the sal forest area and less patriotism of the sal forest community ranked as 7th and 8th for sal forest encroachment based on the opinion of the respondents in the study area (Table 4).

Sal forest is the major portion (%) of the Bangladesh forest. Hence its management is necessary. So some option regarding sal forest protections were included in survey programme and the study revealed that it is possible to protect sal forest from encroachment by Government local people and also soil maintenance (Table 5). It is shown in Table 5 that 80% encroachment of sal forest can be minimized, if the government is conscious for sal forest. In this aspect local people can play role maximum 10%. Majority of the respondents (5%) also stated that soil management is also a factor to protect sal forest in time.

In the study 3 alternate measures were suggested by respondents to protect sal forest were most of the respondents suggest that creating alternate income source for sal forest community will be regarded as most effective and meaningful approaches for sal forest protection.

Correlation study between dependent variable (sal forest encroachment) as affected by various factor: In the present study some correlations were made among dependant variable (sal forest encroachment) as affect by various factors such as Age, Education, Family size, Occupation, % Tree in sal forest, Species richness in sal forest, % Richness of medicinal plant in 10 years ago, % Richness of medicinal plant at present, Attachment of Tribal people with sal forest, Sal forest destroy by ordinary people, Sal forest destroy by Mussels men, Sal forest protection by Government, Sal forest protection by local people and Sal forest protection by soil management. The findings are shown in (Table 6). It was shown that most of the relationships were significant as 1% and 5% level of probability. Two relationships such as Species richness in sal forest and Sal forest protection by Government are nonsignificant. The correlation study also stated the most of the factors except education, % Richness of medicinal plant in 10 years ago, Attachment of Tribal people with sal forest, Sal forest destroy by ordinary people, Sal forest protection by Government, Sal forest protection by local people and Sal forest protection by soil management are positively correlate with sal forest encroachment.

Table 6. Correlation between sal forest encroachment and independent variable

Independent variable	R value	Level of significance
Age	0.2347	**
Education	-0.3411	**
Family size	0.1957	*
% Trees in sal forest	0.21346	**
Species richness in sal forest	0.04298	NS
% Richness of medicinal plant in 10 years ago	-0.2634	**
% Richness of medicinal plant at present	0.2197	**
Attachment of Tribal people with sal forest	-0.1793	*
Sal forest destroy by ordinary people	-0.2434	**
Sal forest destroy by Mussels men	0.3423	**
Sal forest protection by Government	-0.0162	NS
Sal forest protection by local people	-0.1816	*

Discussion

Continuous study on the sal forest has been focused the most widely accepted mean of sal forest conservation supported by national and international researchers **(**Hales, 1989; Sekhar, 2003; Walpole *et al*., 2001**).** Study findings revealed that the respondents in the study area varied with age, education occupation, annual income and family size (Table 1 and Fig.1). Sal forest might be a good recreational and ecological part of Bangladesh. From economic aspect it can be termed a major source of national income in view of recreational place with green vegetation. But the present condition of sal forest is not so good. Hence it is the time to take step for increasing the species richness in view of reducing the sal forest encroachment. These finding corroborate with the opinion of He *et al*. (2008**)** who stated that green species with their landscapes, flora and fauna as well as their cultural element form attractions for tourists. Role of sal forest community in respect of sal forest encroachment is major view stated in Table 3. Problems identified and factors affecting sal forest encroachment were focused in Tables

4&5. Encroachment of protective area is a common phenomenon in Bangladesh as supported by Nath and Alauddin (2006) and Okaka (2007)**.** Bangladesh is amazingly green but at the same time it is a forest poor country (Gain, 2006). Regarding the above statement of essentialities of sal forest management some alternate measures were suggested by respondents which may aware the concern authority so that the judicial and effective protective measures can be taken in time and our forest will become more greener. Table 6 revealed the relative effectiveness factors for encroachment of sal forest where it is cleared that most of the factors are man made and play significant role for sal forest encroachment. So negative options for sal forest encroachment is highly prohibited based on essentialities of forest for our existence, for our environment and also for national economy.

Madhupur sal forest was dense and green but now the forest is under encroachment. So this initiative study will focus overall situations of sal forest community and concern authority so that forest encroachment is minimized and the forest get scope to become greener in gradual.

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