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Constraints of Participatory Agroforestry Program to Poverty Alleviation: The Case of the Sal Forests, Bangladesh

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Abstract: The Forest Department of Bangladesh initiated a Participatory Agroforestry Program (PAP) at the denuded Sal forests area for the poor people in order to protect Sal forests resources and to alleviate poverty. This study explores to what extent the PAP has reduced the poverty and which constraints might be responsible for poverty alleviation among the participants. The research made use of Head Count Index (HCI) to determine to what extent poverty had decreased. To understand the main constraints of PAP, this study has focused on macro-meso-micro level analysis techniques. Data were collected through semi-structured questionnaires and face to face interviews within the study area. The results show that the PAP has alleviated poverty at a significant level which improved the situation considerably. As regards the constraints as perceived by the three level analysis frames, bureaucracy, monopoly of the market system, poor road infrastructure and the lack of loan facilities were considered to be the main problems to reduce poverty with this program. Overall it can be concluded that the PAP so far has been quite successful for increasing income as well as alleviating poverty, but the program still can be improved. This means that the PAP might also be of interest for other degraded forests areas as a tool to alleviate poverty, however with some adaptations, such as, improve road infrastructure, reduce bureaucracy, provide loan facility, abolish middleman exploitation, provides more agroforestry training and resolve market monopoly.

Key words: Participatory agroforestry · Sal forests · Head Count Index · Constraints

INTRODUCTION

Forest cover is shrinking worldwide and tropical forests are disappearing alarmingly in particular [1]. On the other hand, out of 1.2 billion poorest people of the world- those living 1US$ per day- two third leaves in the rural areas [2]. Rural poverty is concentrated in many areas of the world's most threatened forest biodiversity [3]. Bangladesh is the most densely populated developing country of the world and mainly poverty is the basic problem of rural area [4] which is widespread and complex. Bangladesh recognizes that forest degradation has social reasons and that combating poverty is a prerequisite for forest resources management [5, 6]. Zashimuddin (2007) stated that about 55 % of the rural population of Bangladesh had inadequate income to pass the poverty line and 38 % of the population was living under the poverty line (according to UN report 2010 it was <40%). Rural poverty and deforestation were interrelated problem in Bangladesh, accelerated by over population, land scarcity and natural disasters [8]. Thirty years ago the forest cover of Bangladesh was approximately 50%, due to overexploitation it has fallen to only 7.7% [9]; but it has even reported a figure of 6-9% [5, 10]. The rapid degradation of the natural forest resource base of the country is therefore further worsening rural poverty.

It is therefore not surprising that in Bangladesh much attention has been focused on the question how to develop sustainable forest resource management programs, combining the protection of forests with a reduction of poverty. These sustainable forest management programs are of special importance for the plain land Sal forests in Bangladesh because these forests face severe deforestation problem due to high population pressure and the intensive use of the forests since the independence of Bangladesh. Therefore, in 1987 the Forest Department (FD) of Bangladesh initiated some management programs, (the PAP was one of them) in an

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attempt to save the already depleted Sal forests area as well as to reduce the poverty of local people. Under this PAP program, the poor household get one hectare (1 ha) of degraded land for agroforestry practices and this program was only for the poorest people (those who are living under the predetermined poverty line of Bangladesh, that is 1 US$ per day). In PAP the decisions are taken within the individual household and such households are also said to be functioning under "non-severability conditions", i.e. the household does not have a separate production and consumption/work functions [11].

It has been stated that the PAP was quite successful for protecting encroachments of Sal forests on the one hand and improving the social status of the participated poor people on the other hand [6]. So, research is needed to analyze the various aspects of this resource management system. The objective of this study is therefore first of all to examine if PAP reduces poverty and if so, to what extent. Furthermore, it will try to gain insight in the related problems faced by the participants in several levels within the PAP program. Consequently, the two main research questions have to be answered: (1) to what extent has the PAP contributed to poverty reduction among the participating members and (2) what are the main constraints for reducing poverty in this program as perceived by the participants?

Underlying Concepts of this Study

Defining and Measuring Poverty: In ADB report (2004) mentioned that absolute poverty is the degree of poverty below which the minimum requirements for survival are not being met. In general, absolute poverty means that a person's basic subsistence needs (for food, clothing and shelter) are not being met. So, the poverty of Bangladesh mainly is absolute poverty and the PAP program deals with absolute poverty which later on explain as only poverty. Data on different poverty levels are quite difficult to obtain and inconsistent in quality. To reduce these difficulties Roemer and Gupta (1997) described some economic analysis of poverty for empirical measurement and evaluation of poverty. Furthermore, in poverty analysis aspect consumption data are more reliable than income data but consumption data are difficult to collect and lack of reliability unless robust method are used under strict supervision [14]. Aaberge and Mogstad (2007) in their article pointed out that chronic/absolute poverty should be measured by the permanent income of the poor people and they also compared it to other measurement ways. Therefore, this study focuses on economic poverty frameworks using income distribution to measure poverty among the study population. While, to quantifying poverty a poverty line concept will be needed. The present study follows the poverty line adopted by the local governments based on the minimum cost of the living and the standard one is the UN determine poverty index for Bangladesh. According to UN report (2007) the poverty line income was 1 US$ per day (1 US$ = 70 Taka, approximately at 2009).

A great deal of theory has gone into defining consistent and equitable poverty measures during the last 25 years. Although a large number of methods have been developed, while the Head Count Index are the most accepted by all sciences including economics [13, 14, 17-20]:

Headcount Index (HCI): the most easy and straightforward measure of poverty. In HCI, the proportion of the total population considered to be poor is defined as the fraction of the population whose standard of living (income) is below the poverty line. Often the HCI is denoted by P_0 with the equation: $P_0 = \frac{n}{N} \times 100$, where, n= number of poor household which income below to the poverty line and N= total number of population.

Institutional Factors: PAP program has initiated with the collaboration of local poor people and Government Institution of Bangladesh. The success of this program depends on many associated factors, of them institutional factors were important too. North (1990) has pointed out that institution can mean two different things. First are the rules (legal or customary) for assigning resources, such as the customs and laws affecting land ownership and tenure; transfer and inheritance of assets; or relations between employer and employee, or parent and child. Second are the organizations defending particular interests (e.g. trade union), including the stat's interest in implementing or altering rules (e.g. polices, some aspect of education). This study mainly focuses on North first concept, i.e. factors affecting the relation between poverty alleviation and PAP program. Any types of constraints might be harmful for alleviation poverty in this program and this case study also tries to identify the institutional factors in different levels that have link to the participant's income distribution. This study also adopted Angelsen and Kaimowitz (1998) three levels causes identifying frame to understand the possible constraints in all level and their linkages (Figure 1).

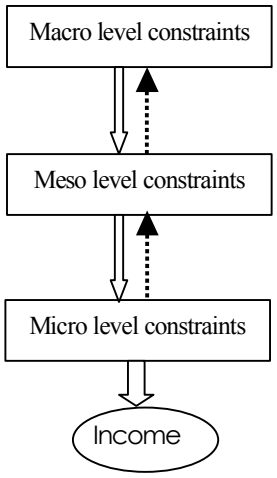

Fig. 1: Three levels of constraints of PAP in Bangladesh

The first level of establishing the linkages is by understanding the constraints at play at macro level, i.e. factors that are related to top level (Govt. level, policy level). The second level (meso) level has some linked to macro level, i.e. middle level constraints (e.g. market syndicate or middle man). These are important factors that influence the income level of the micro level farmers. Finally the micro level constraints has direct link to the income level of the farmer within this program. Participant's socioeconomic factors and other institutional constraints at the lower level (micro) might play a significant variation in this program.

METHODOLOGY

Study Area: This research based on case study analysis, was conducted at the Modhupur Sal forest area at Mymensingh and Tangail districts in between 23°50′ to 24°50′ North latitude and 89°54′ to 60°50′ East longitude with 15m altitude. Recent statistics from the local Sal forests office showed that the total area of the Modhupur Sal forests is about 630001.89 acres (1 ha = 2.47 acre) (Modhupur Forest Office Record 2009). Of them 45565.18 acres tangail Sal forest, 6500 acres are plantation forest and only 8500 acres are natural forest. Other areas were depleted and transformed into rubber gardens and Military exercises purposes. This PAP program was based on Nair (1990) and Dwivedi (1992) agroforestry concept (growing tree in association with crops is consider as agroforestry, it also include crop combination with multilayered woodlot/plantations). So, the focus of this study was the PAP area of Sal forests which is mainly located at the Tangail district of Bangladesh and covers three ranges (Modhupur, Auronkhola and Dhopakhola).

Description of the Program: In PAP, the participants were provided 1 ha of degraded forest land from the forest department for ten years of time, without further land for house side because they lived in and around the forest. On the other hand, the participants have to ensure their poverty situation before starting this program. In their 1 ha of land, they have to maintain a plantation techniques with combination of at least 720 trees and annual crops. All the annual/seasonal crops are the sole property of farmers and sharing (45% Participant + 45% FD + 10% Future Fund) condition is applicable for tree resource after 2nd thinning at 7th year (50% tree) and rest of them at final feeling. Before the final harvest of trees, all the tree products like thinning, fuelwood, fodder and other tree parts are also the participants' sole property. Therefore, the PAP income was determined by the total annual crops income together with trees additional parts income during one year (i.e. 2008 to 2009) of time for each household. The participant had received a good amount of money from their 45% share of the final tree feeling (after 10 years) and this income should not include to the PAP income calculation. Because this income would consider as 'stepping out' (accumulation of capital to move into other activities) or 'stepping up' (intensification of existing activities) functions of the economic theory (Cavendish 1999; Dorward and Anderson 2002).

Data Collection: The present study aims to analyze the change in poverty status among the participants after participating in PAP. This necessitates the available of a baseline data. It is found to be mandatory for the participants to show their poverty status before handed the land for PAP. In the previous study of Safa (2004) and Alam *et al*. (2008) also motioned that the participants were poor before started this program. But it does not provide income data of the participants. As a solution of this problem, this study, therefore, consider all participants as living under the poverty line. The poverty line for Bangladesh was 1US$ at that time (now in 2010 it is 1.25US$). With the baseline data and present income obtained through primary data collection, the HCI was calculated using per capita income. This revealed the changes in poverty status of the PAP members. This approach was also complemented by data collection from a control (comparison) group. The control group was comprised of participants who were eligible but did/could not join the PAP due to various reasons. Comparison of poverty status between these two groups should give a clear idea about the effect of PAP program on poverty alleviation of the study area. Primary cross sectional data had been collected from the PAP participants and control

groups through interviews carried out by 4 native speakers (i.e. the researcher and 3 enumerators) during the months of July to September, 2009. The questionnaire consisted out of structured format questions for income data and some open questions for constraints identifying frame. In addition, this study also conducted focus group discussion with the participants for qualitative information and it might be helpful for understanding main problems of PAP program.

Sampling and Questionnaire: The unit of analysis was the households and simple cluster sampling technique was used to identify the PAP participants in the selected area. This study should initially considered 106 PAP households for data collection but finally 99 households (3 region × 33 households in each region= 99) were selected which represents more than 5% households. For the control group, this study had randomly chosen 39 households (13 households from each region) from the three regions and also used same questionnaire for data collection. The structure of the questionnaire and its different aspect is as follows-

Total Income: Total income mainly relates to the income of the PAP program, Agriculture and Livestock, Wage/labor and other income sources (expressed in local currency Taka[1]). All the income was calculated during the one year of time and for the calculation of poverty equation the total income was converted to per capita income. That means total income of a household was divided by the number family member and 365 to express it Taka/Person/day. PAP Income: The main goals of this study was to quantify the PAP income, for this all the seasonal crops cultivated under the tree within one year of time was measured and expressed in taka/year. In addition farmers had collected some firewood, fodder and thinning tree parts and NFTs from tree products, so, this income was also calculated to measure the annual PAP income. Agriculture and Livestock Income: Though the farmers were poor but they have some additional agricultural and livestock incomes which were calculated in yearly basis and express in taka/year. Wage/Labor Income: The participants had engaged/worked in other production areas to earn some additional money which was considered as wage/labor income (taka/year) in this study. Other Income: any other sources of income rather than above mentioned sources were treated as other income category in this equation and express in taka/year (like- making small goods, collecting NFTs from Sal forests, etc).

Data Analysis: All the quantitative data collected from the primary and secondary sources was tabulated and entered into the MS-EXCEL software program and Head Count Index was calculated accordingly. For visualizing the three level analyses, all the constraints were fitted into a genetic structure pathway (Figure 2) and their linkage was shown accordingly.

RESULTS

Poverty Situation: The most important measure to determine the poverty among the households in the PAP was the Head Count Index. The HCI, $P_0 = \frac{n}{N}$, based on the data gathered in the interviews, the research found that 36 households of the 99 households interviewed were below the poverty line. This means that 36.36% of the households in the PAP interviewed can be considered as poor under this program. If we considered all the people were poor at the starting time, then the changes of poverty level was 63.63%, i.e. 64% households were living above the poverty level. That means the households living above the poverty line were treated as non-poor. On the other hand, they real poverty situation/change was expressed with the compare of control groups. The result revealed that the differences of poverty level between PAP households and control group was 32.87% (Table 1), that means 33% households improved their poverty situation being engaged in PAP program.

Main Constraints Faced by the Participants: So far, the research has shown that the PAP has improved the situation of the majority of the participant households. This study also tries to identify the main problem as faced by the participants in practicing the PAP program. At the end of the interview every participant was asked to mention the most important constraints they had faced in the PAP. Figure 2 gives an outline of the mentioned problems and their linkage, on the other hand Table 2 gives an overview of main problems and the frequency it was mentioned.

In case of macro level most of the participants mentioned that they have to face bureaucracy problems from the forest department officials at the time of getting their plot/land in bilateral agreements. They have to wait for a long time and go through a long official process to get the land rights and it took up to 5 to 6 months or even more than that time. On the other hand, the local forest department staff said that they tried their best to process

[1]70 Taka ˜ 1 US$ in Bangladesh (during the data collection period at 2009)

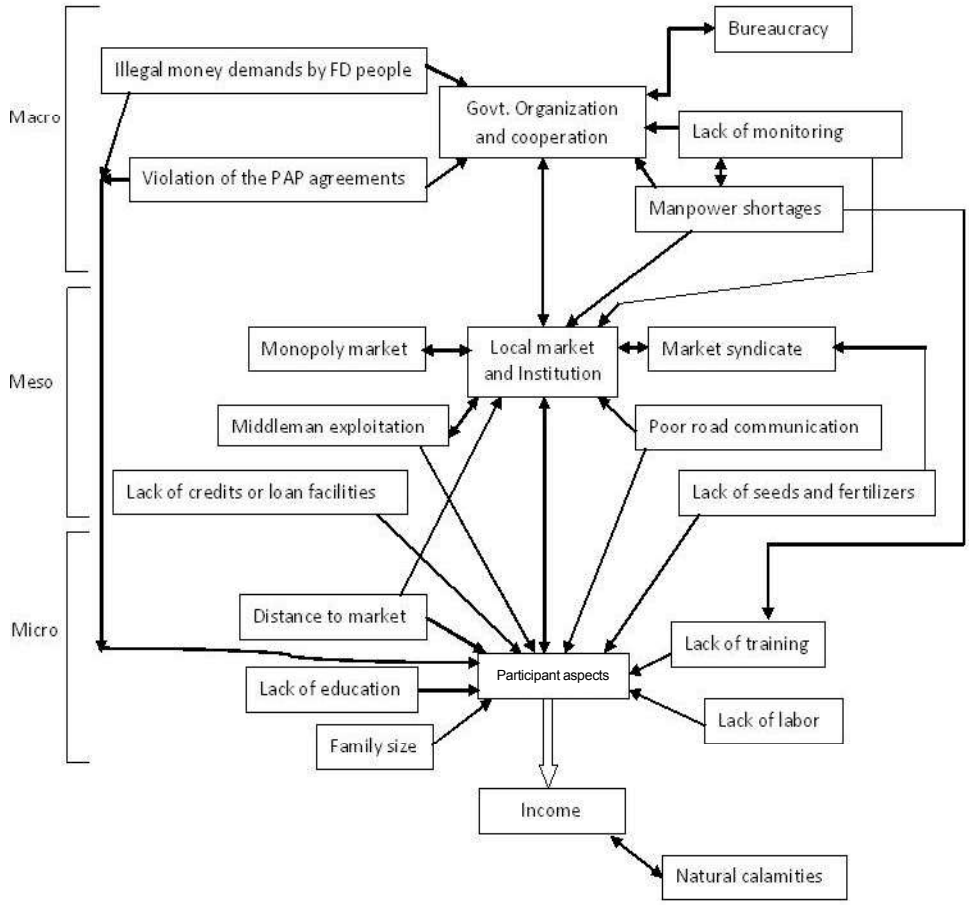

Fig. 2: Genetic structure of the constraints affecting the poverty level of participants

Table 1: Estimate of income inequality and poverty for PAP and without PAP households

	Head Count Index (HCI) %	
	HCI (Poor)	1-HCI(Non-poor)
PAP Household	36.36	63.63
Control Group	69.23	30.76
Differences	32.87	

Table 2: Main problems faced by the participants during this program

Rank order	Problems	% of household faced this problem
1	Bureaucracy	92
2	Lack of alternative market facilities or monopoly	87
3	No credit or loan facilities by the GOs or NGOs	86
4	Middle man exploitation during the crop harvesting time	77
5	Market syndicate or market controlling by the few businessman	57
6	Poor road communication	44
7	Lack of healthy seeds or seedlings, pesticide and fertilizers	39
8	Illegal demand by the local Forest Department at the time of bilateral agreements	31

it quickly but due to some official formalities it takes long time. The major part of the participants mentioned that they do not get easy or interest free loan facilities from any Government Organizations (GO) or Non Government Organizations (NGO). It seems that the participant does not have scope to collect interest free loans which is already started under the umbrella of micro credit facilities in Bangladesh. So, the micro credit system or some sort of

easy loaning system may resolve this problem and the participants saw this as something urgently needed. Beside these problems, participants had to suffer for transporting their products to the market due to poor rood communication. The participants whose production area was far away from the market they have faced muddy road systems and excess cost for carrying their products. So, the road infrastructure and transport facility should play a vital role for increasing the overall income of participants. On the other hand, 31% participants had faced illegal money demand by the forest department people to initiate this program which was very unusual issue for this program. So, participants may be disheartened if any of the contractual agreements conditions would be violated because of the negligence of forest department officials.

In meso (mid) level, the PAP program suffers from the market monopoly system like in other parts of Bangladesh. Monopoly is the market condition in which there is no alternative choice to the consumer. That means there is no market competitor or the local people do not have any choice of market freedom. So, the participants do not have any alternative market facilities or the scope to get benefit from the other the market. The participants do not do anything in case of product price fall situation and this was a common phenomenon during the pick cropping season. Many participants claimed that after going to the market they found out that the price of products (like pineapple) falls due to some unreasonable facts or desire of a few powerful businessmen. Some powerful businessmen had controlled the market illegally (called market syndicate locally) and the local Government has no strict monitoring system or even any strict rules for controlling the market. In addition this powerful person had good linkage to the macro level factors in some cases which make the situation more difficult. Most of the farmer complained that the business man has immense power from our (macro level) politician as well. Ultimately the rural poor people were suffering and as their income level relates to this market system, so, the market was an important factor for this PAP program and poverty alleviation strategies. Moreover, there is no post harvest processing industries in that area even in Bangladesh to preserve pineapple, papaya or banana for long time or to export other countries. Furthermore, participants had to face lack of healthy seeds, fertilizer and pesticides availabilities at the right time. Some local business men control this business and created artificial problems for farmer's, so that, they have to buy these materials at high cost.

In micro level constraints, farmers realized that they need training on how to produce quality crops under tree or maximum utilization of their limited resources by effective training facilities. Some farmer mentioned that they do not able to read booklet, training materials or technical parts to improve their farming system due to illiteracy. Finally, it may be said that that every program have some constraints but in case of PAP program, macro and meso level constraints plays very crucial role for income differences and needs to be improved to alleviate the poverty from this area.

DISCUSSION

This research showed so far it alleviated about 63.36% poverty compare to previous situation and 32.87% compare to control farmers of the studied area. The overall poverty for Bangladesh is more than 40% [7, 27] and it includes both the urban and the rural population. In rural areas, the overall poverty is very apparent and accounts for more than 60% of the total population [4, 28]. According to the result of this study, the poverty rate increased 32.87% more than normal situation (by HCI) due to PAP effect.

Similarly, Roger *et al.* (2005) mentioned that agroforestry programs do contribute significantly to household total income towards reduces poverty. In another report of Awono *et al*. (2002) and Gockowski *et al*, (1997) revealed that agroforestry program should significantly increases the household total income. Pandey (2007) mentioned that agroforestry with *Acacia* based system would successfully increases 33 % internal rate of return (IRR) at 12 % annual discount rate compare to traditional monoculture crop production systems in India; such systems also increases the nutritional and economic security of the poor people toward reduction of poverty [33]. In a case study at the Sal forests area of Bangladesh, Safa (2004) mentioned that participatory forestry programs should successfully increases the livelihood situation among the participants but there was no poverty calculation to present the exact figure. The poverty analysis of the participants showed that the total income level of the participants varied considerably among them. Indeed, the overall poverty situation of this area was improved and hence it indicated that the strong effect of PAP that also proved the successfulness of this program.

In another research at the Sal forests region of Bangladesh, Salam and Noguchi (2005) mentioned that participatory forestry program requires an appreciation,

effective support and active participation of the participants that ensure high economic return. The accomplishment and replication of participatory forestry program depends on higher and assured personal economic returns [35]. So, the success of PAP should depend on its economic output (i.e. income). In southern Africa the integrated management of tree and crops approaches should improve the income and livelihood status of the poor people [36]. The economic output, i.e. the income of the participant has varied due many factors [5, 34]. Indeed, this study tries to identify the associated constraints that might make the income differences among the participants.

The Forest Department and local participants were the responsible elements to initiate this program and their cooperation was the myth of this program. Regarding the constraint of this program, the setters mentioned eight most important problems. The top most constraint was the bureaucracy that has created by the forest department. Muhammaed *et al*. (2005) said that proper adoption of this program concept and professional attitude of the forest officials might reduce the bureaucracy problem of this program. While Shiva (1993) mentioned that the forest department officials need to change monoculture of their mind to a broader appreciation of forestry purposes and to progress for any participatory program. That means the forest department officials had to change their negative attitude and to be cooperative with the poor people for successfulness of this participatory program.Hence, to establish participatory forestry program and involving poor people to the forest related activities, the concern policy and policy implemented personnel must be accepted and supported by the local people [38, 39, 40].

Other major problems of this program were: the market system, road infrastructure and loan facilities. These problems need the local government interference immediately.

It should be noted here that the only market of this area was controlled by the middleman and the local government do not have any strict control over them. So, strict market resolution and regular monitoring by the local government could improve this worst situation. Moreover, the road infrastructure of this area needs to be improved and regular maintenance by the concern authority with the help of the participants. Any sorts of microcredit facilities for the participant had directly impact their income level of this program (according to the linear model). In case of farmers training and education status, it is necessary to arrange some training program for the poor farmer from the forest department. While, adult learning or night schooling facility may try to reduce the education level of the farmer and some part of Bangladesh this system make sense. Finally, the success of this program to alleviate poverty might be a paradigm for any kind of participatory forestry program in Bangladesh though it has some critics especially in the ecological point of view.

CONCLUSION

In conclusion, Participatory agroforestry Program in Bangladesh can be an effective strategy for an income generation activities as well as alleviating poverty for the rural poor people. According to the poverty equation, this program alleviated poverty at a significant rate: 64% and compare to control it was 33.33%. Therefore, the present poverty situation of the participant was better than the previous situation, indicating that the participation of rural poor rehabilitating the forest has positive poverty reduction impact on the society. This suggests that there would be social benefits from replicating the PAP in other degraded forest area of Bangladesh. However, this was a cross-sectional study and poverty calculation based only on the present year (2008-2009) data of the participants, so, another longitudinal study will be helpful to conclude overall poverty situation in this region. Regarding the institutional constraints of this program, the study summarized that the following points are the main constraints for poverty alleviation: bureaucracy, market monopoly, no loan facilities and poor road communication system. Finally, it would be desirable to make some modifications of this program like to reduce the bureaucracy and implies simple agreements procedure to involve participants in this program. Modification should also include for ensuring agroforestry training, supplying training manual, ensure loan facilities and better road infrastructure to the participants. Hence, the local government needs to control the market system strictly so that the participants get the actual price of their products. So, the people oriented programs like those described here could be a key factor for alleviating poverty and success in Bangladesh. Further it can also encourage other countries that faces similar poverty situation, to follow Bangladesh in this regard.

REFERENCES

1. Matthews, E., 2001. Understanding the Forest Resources Assessment 2000. WRI Forest Briefing no. 1. Washington.

2. IFAD, 2001. Rural Poverty Report 2001. The challenge of Ending Rural Poverty. Oxford University Press: New Yourk, NY.
3. McNelly, J. and S. Scherr, 2003. Ecoagriculture: Strategies to Feed the World and Conserve Wild Biodiversity, Island Press: Washington, D.C.
4. Rahim, M.A. *et al.*, 2007. Significance of multilayered agroforestry system, shared basis of social forestry and sustainable forest policy and management reducing significantly the poverty level in Bangladesh. In International Conference on Poverty Reduction and Forest, RCOFTC, Bangkok, Thailand.
5. Alam, M., Y. Furukawa, S.K. Sarker and R. Ahmed, 2008. Sustainability of Sal (*Shorea robusta*) forest in Bangladesh: past, present and future actions. Intl. Forestry Rev., 10(1): 29-37.
6. Safa, M.S., 2004. The effect of participatory forest management on the livelihood of the participants in a rehabilitation program of degraded forest in Bangladesh. Small-scale Forest Economics, management and Policy, 3(2): 223-238.
7. Zashimuddin, M., 2007. Community forestry for poverty reduction in Bangladesh. In: Proceedings of the regional workshop on forest for poverty reduction. http://www.fao. org/ docrep/ 007/ ad511e/ ad511e0g.htm. Accessed 24 November 2009.
8. Ahamed, F.U., 1993. Respondents to environmental degradation: Some implications of a social forestry project in Bangladesh. M. Phil. Dissertation, Cambridge University, Cambridge.
9. Roy, M.K., 2005. Nishorgo Support Project: Designing a Co-management Model for the Protected Area of Bangladesh. Forest Department, Ministry of Environment and Forest, Bangladesh.
10. Muhammed, N., M. Koike and M. Sajjaduzzaman, 2005. A study on land tenure complexities of Sal (*Shorea robusta*) forests in Bangladesh. Intl. J. Agric. Biol., 78(2): 318-320.
11. Sills, E.O., S. Lele, T.P. Homes and S.K. Pattanayak, 2003. Non Timber Forest Products in the Rural Household Economy. http://www.cised.org/wp-content/uploads/non-timber-2003-r-54.pdf. Accessed 15 May 2009.
12. ADB, 2004. Poverty definition, measurement and analysis. http://www.adb.org/Documents/ Handbooks/Analysis-Processes/appendix01.pdf. Accessed 22 November 2009.
13. Roemer, M. and M.K. Gupta, 1997. Does economic growth reduce poverty? Harvard Institute for International Development, Technical paper supported by USDA. http://www3.interscience.wiley. com/journal/110568888/abstract. Accessed 06 May 2009.
14. World Bank, 2006. Understanding poverty and measuring poverty. http://www.worldbank.org/ poverty/. Accessed 02 November 2009.
15. Aaberge, R. and M. Mogstad, 2007. On the definition and measurement of chronic poverty. Discussion paper on IZA, Bonn Germany, IZA DP No, 2659: 1-18.
16. UN report on Human poverty index in Bangladesh, 2007-08. http://bdoza.wordpress.com/2007/12/19/ human-poverty-in-bangladesh-in-un-report-2007-08/. Accessed on 02 May 2009.
17. Ahmed, F., 2004. Practices of Poverty Measurement and Poverty Profile of Bangladesh. ERD Working Paper No. 54, Asian Development Bank. http://www.adb.org/Media/Articles/2004/5187_ban gladesh_monitoring poverty_reduction_programs/. Accessed 21 November 2009.
18. Foster Greer Thorbecke, 2005. Measures of poverty, Poverty Manual, JH Revision. http://siteresources. worldbank.org/PGLP/Resources/povertymanual. Last accessed 10 May 2010.
19. Hussain, M., Z. Hussain and M. Ashfaq, 2006. Impact of Small Scale Irrigation Schemes on Poverty Alleviation in Marginal Areas of Punjab, Pakistan International Research J. Finance and Econom., 6: 193-200.
20. Poverty Manual, J.H. Revision, 2005. Measures of Poverty, Chapter 4 pp 69-218. http://siteresources. worldbank.org/ PGLP/Resources/ Pmch1. pdf. Last accessed 25 November 2009.
21. North, D., 1990. Institutions, institutional change and economic performance. http://www.cambridge.org/ uk/ catalogue/catalogue.asp?isbn=0521397340. Accessed 25 November 2009.
22. Angelsen, A. and D. Kaimowitz, 1999. Rethinking the causes of deforestation: Lessons from economic models. The World Bank Res. Observer, 14(1): 73-98.
23. Nair, P.K., 1990. An introduction to Agroforestry, Kluwer Academic Publisher publication, UK.
24. Dwivedi, A.P., 1992. Agroforestry principles and practices. Oxford and IBH publishing company, New Delhi, India.

25. Cavendish, W., 1999. Poverty, inequality and environmental resources:quantitative analysis of rural households. Centre for the Study of African Economies (CSAE) paper series 93.
26. Dorward, A. and S. Anderson, 2002. Understanding Small Stock as Livelihood Assets: Indicators for Facilitating Technology Development and Dissemination." Unpublished Report on Review and Planning Workshop. Imperial College at Wye UK.
27. FAO, 2005. Global Forest Resources Assessment. http://www.fao.org/forestry/fra/fra2005/en/.Last accessed 12 May 2010.
28. BBS, 2006. Bangladesh Bureau of Statistics, Dhaka, Bangladesh. http://www.bbs.gov.bd. Accessed 12 August 2009.
29. Roger, R.B.L., *et al*., 2005. Agroforestry tree products (AFTPs): Targeting poverty reduction and enhanced livelihood. J. Agric. Sustainability, 3(1): 1-23.
30. Awono, A., O. Ndoye, K. Schreckenberg, H. Tabuna, F. Isseri and L. Temple, 2002. Production and marketing of Safou (*Dacryodes edulis*) in Cameroon and internationally: Market Development Issue. Forest, Trees and Livelihoods, 12: 125-147.
31. Gockowski, J., D. Baker and J. Tonye, 1997. Characterization and diagnosis of agricultural systems in the alternatives to slash and burn forest margins benchmark of southern Cameroon. Report to ASB Program, IITA, Ibadan, Nigeria.
32. Pandey, D.N., 2007. Multifunctional agroforestry systems in India. Current Sci., 92(4): 455-463.
33. Milne, G., *et al.,* 2006. Unlocking opportunities for forest depended people in India, Agriculture and Rural Development Sector Unit, South Asia Region, the World Bank/Oxford University Press, New Delhi, India.
34. Salam, M.A. and T. Noguchi, 2005. On sustainable development of social forestry in Bangladesh: Experience from Sal (*Shorea robusta*) forests. Environment, Development and Sustainability, 7: 209-227.
35. Jain, S.K. and P. Singh, 2000. Economics analysis of industrial agroforestry: Poplar (*Populus deltoids)* in Uttar Pradesh (India). Agroforestry System, 49: 255-273.
36. Barany, M., A.L. Hammett, R.R.B. Leakey and K.M. Moore, 2003. Income generating opportunities for smallholders affected by HIV/AIDS: Linking agro-ecological changes and non-timber forest products markets. J. Management Studies, 39: 26-39.
37. Shiva, V., 1993. Monoculture of the mind. Zed Books, pp: 184.
38. Hunt, S.M., W.J. Jackson and K.B. Sheresthra, 1996. Income generation through community forestry in Nepal. http://www.fao.org/forestry/docrep/ wfcxi/publi/. Accessed 06 May 2009.
39. Jackson, W.J. and A.W. Ingles, 1995. Developing rural communities and conservation the biodiversity of Nepal's forest through community forestry. http://www.fao.org/forestry/docrep/wfcxi/ publi/. Accessed 12 October 2009.
40. Bruce, J.W. and S.E. Migot-Adholla, 1994. Searching for land tenure security in Africa. Dubuque, Iowa USA. Kendall/Hunt publication.