Synergizing Sustainable Solutions: Exploring the Nexus of Food Security and Social Forestry in Bangladesh

S. M. Kamran Ashraf[1*], Kazi Kamrul Islam[1] and Saleha Khatun Ripta[2]

[1]Department of Agroforestry, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh.

[2]Department of Soil Science, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh.

***Correspondence Author**

DOI: https://dx.doi.org/10.47772/IJRISS.2024.803022S

Received: 27 March 2024; Revised: 06 April 2024; Accepted: 11 April 2024; Published: 10 May 2024

ABSTRACT

Social forestry is centered on managing forests with a focus on the well-being of nearby communities, aiming to elevate impoverished populations by offering employment opportunities and addressing basic needs such as food, fodder, fuel, furniture, and resources. Through these efforts, social forestry not only fosters self-reliance among disadvantaged groups but also contributes to broader developmental goals. In our study, we aimed to evaluate the effectiveness of social forestry in improving the lives of rural poor individuals. We conducted a review using secondary data, selecting articles based on specific criteria and analyzing information from 16 chosen articles. Our investigation revealed that factors such as income, household size, education, staple food costs, and the gender of the household head significantly influence household food security, and social forestry initiatives can lead to considerable benefits. Our findings indicate that individuals without land are particularly engaged in social forestry projects, resulting in increased income levels, with some experiencing earnings exceeding $666. This approach also supports shifting cultivators, enhancing their livelihoods and expanding forested areas in the region. Furthermore, the adoption of agroforestry within social forestry plots has led to a notable shift, with approximately 64% of people transitioning to agroforestry practices, thereby augmenting rural women's incomes by up to $300. Overall, social forestry has contributed to a 31% increase in forested areas in Bangladesh. However, challenges such as confusion and high interest rates deter farmers from participating in social forestry initiatives. Addressing these issues could significantly enhance the popularity and income-generating potential of social forestry for rural communities.

Keywords: Social Forestry, Livelihood, Food security, Agroforestry, Women participation

INTRODUCTION

Since its independence in 1971, Bangladesh has undergone significant transformation, emerging from a devastating nine-month war that left its economy in shambles, devoid of infrastructure. Initially labeled as a struggling nation, it has transitioned from primarily agrarian roots towards industrialization, now recognized as an emerging economy. Efforts from the government, NGOs, donor agencies, and foreign nations aim to cultivate an inviting investment climate, implementing new economic policies, incentives, and privatization initiatives. Despite notable advancements in living standards post-1971, widespread poverty persists in both

urban and rural areas, necessitating further action. Over the past decade, GDP growth rates have consistently exceeded 5%, driven by developments in microcredit and garment industries. Notably, the provisional GDP growth for the fiscal year 2015 surpassed previous estimates, indicating ongoing economic expansion (Bangladesh: Economy, 2024). According to BBS (2023), the GDP of Bangladesh's agriculture, forestry, and fishing sector stands at 4,941,583 million Taka, with a slight decrease in its sectoral share of GDP at current prices from 11.66 to 11.38.

Bangladesh's agricultural sector operates on a seasonal cycle, revolving around three rice varieties: aus, aman, and boro. During the pre-harvest period of aman rice, known as the lean season (September-November), rural households often face unemployment and income insufficiency. The non-farm sector, closely linked to agriculture, fails to absorb the surplus rural workforce, mainly comprising agricultural laborers and small-scale farmers. This economic lull during the lean season sometimes escalates into food scarcity, locally termed Monga, particularly affecting the greater Rangpur region. Despite progress since the 1990s, poverty reduction remains a formidable challenge for Bangladesh. While significant strides have been made, a considerable portion of the population, around one-third, still resides below the poverty line (Ferdousi, and Dehai, 2014).

Community forestry or social forestry (hereafter referred to collectively as SF) initiatives have emerged as innovative approaches to forest management, empowering local stakeholders and facilitating the incorporation of diverse local practices while supporting local livelihoods (Moeliono, et al., 2017). These programs gained prominence in the late 1970s amid growing concerns about escalating deforestation rates, prompting a reevaluation of state control over forest resources and its effectiveness in sustainable forest management. Social or community forestry emerged as a viable alternative to address issues of forest management (Gilmour, 2016) and conflicts over forest resources (Purnomo and Anand, 2014). Over time, concepts of democracy and justice, alongside neoliberal ideologies (McCarthy, 2005), and mounting evidence supporting the efficacy of traditional practices in conservation efforts have shaped the evolution of community forestry and social forestry programs in various countries (Moeliono, et al., 2017).

In Bangladesh, there exists a notable disparity in living standards among its populace, with rural residents bearing the brunt of poverty. Furthermore, poverty manifests differently in rural areas, presenting unique challenges (Imam, et al., 2018). In this review, our aim was to assess the impact of social forestry in rural areas. Specifically, we sought to determine whether social forestry genuinely enhances the economic situation of impoverished rural communities. Additionally, we investigated the efficacy of agroforestry practices and the role of women within this context.

History of Social Forestry in Bangladesh

In 1967, social forestry was first introduced in Bangladesh with the primary goals of establishing two nurseries in Dhaka and Rajshahi and distributing seedlings from those nurseries. Later, in 1979, the Community Forestry project, the first of its kind in the country, was launched to encompass the seven greater northwestern districts of Dinajpur, Rangpur, Bogra, Pabna, Rajshahi, Kushtia, and Jessore. The project, which spanned six years, received funding from the Asian Development Bank (ADB) and technical assistance from the UNDP and the Food and Agriculture Organization of the United Nations (FAO) as an associated agency. The Forest Department under the Ministry of Agriculture and Forestry was responsible for executing the project. Subsequently, from 1979, various social forestry programs were initiated in Bangladesh to promote the socio-economic well-being of the rural poor and create employment opportunities in rural areas (De, 1996). For example,

1. Community Forestry Development Project
2. Betagi-Pomora Community Forestry Project
3. Thana Afforestation and Nursery development Project
4. Expanded Social Forestry Project
5. Forestry Sector Project
6. Coastal Greenbelt Project
7. Coastal Bank Rehabilitation Project
8. Rehabilitated Zumia Family Development and Security Camp Project

Approximately 31,304.0 hectares of previously encroached and deforested land have been converted into plantations. Among these plantations, about 31,000 families, predominantly from impoverished backgrounds, have been included as beneficiaries or participants. Each family has been allocated one hectare of forest land, and they hold usufruct rights under written agreements. Additionally, in 35,060.0 kilometers of strip plantations, nearly 300,000 landless and economically disadvantaged families have also been engaged as participants through written agreements (GOB, 2003).

Social forestry is considered a vital aspect of rural development in Bangladesh and has emerged as a prominent strategy for both rural development and forest management (Rahman, 1991). Ensuring the involvement of participants from similar socio-economic and cultural backgrounds is a significant challenge in this type of forestry. To address this, it is essential to discuss the program's components with the people and adapt them based on their input. This approach fosters self-sustained participation and minimizes errors during implementation. When participants are conscious, organized, and well-informed, their active involvement enhances the project's efficiency and contributes to its overall success (Huq and Alim, 1995).

Table 1. Historical development of community forestry programs in Bangladesh

Programs	**Period**
Taungya System	1871
Forestry Extension Service Phase 1	1962-63
Betagi-Pomora Community Forestry Project	1979-80
Jhumia Rehabilitation Program in CHT Phase 1	1979-89
Development of Forestry Extension Service Phase 2	1980-85
Community Forestry Project	1982-87

Afforestation and Nursery Development Project	1987-95
Jhumia Rehabilitation Program in CHT Phase 2	1990-95
Participatory Social Afforestation	1991-98
Forest Resources Management Project: Forest Directorate Component	1992-2001
Extended Social Forestry Project	1995-97
Coastal Project	1995-2000
Forestry Sector Project	1997-2004
Sundarbans Biodiversity Conservation Project	1999-2006
Nishorgo Support Project	1999-2006
Char Development and Settlement Project 3	2005-10
Reedland Integrated Social Forestry Project	2005-10
Afforestation in the Denuded Hill Areas of Division	2008-12
Biodiversity Conservation and Poverty Alleviation Through Afforestation in the Greater Rajshahi and Kushtia District	2008-12
Participatory Social and Extension Forestry in CHT	1008-12
Community Based Adaptation to Climate Change through Coastal Afforestation	1009-12
Revegetation of Madhupur Forests Through Rehabilitation of Dependent Local and EthnicCommunities	1010-12
Poverty Alleviation through Social Forestry	2010-13

Source: BFD (2011), Muhammed *et al.* (2005), Zashimuddin (2004), Biswas and Choudhury (2007), Hossain (1998)

METHODOLOGY

Data Collection

The research relies on secondary data obtained from various online sources, specifically published articles. We established specific criteria for selecting articles, which include

1. the necessity for the research to focus on Bangladesh,

2. the study area being within Bangladesh, and

3. alignment with our research objectives. Adhering to these criteria, we examined approximately 16 articles to gather our data.

Data Analysis

For the analysis of our data, we follow descriptive statistics. we use Microsoft Excel to analyze our data.

Livelihood and Food Security

The citizens of Bangladesh, a densely populated nation, rely extensively on forests for essential resources like fuel wood and timber. However, the country's forest reserves have faced significant depletion due to considerable biotic and abiotic pressures. To counteract the escalating deforestation rates, the concept of Participatory Social Forestry was introduced in the early 1980s (Muhammed, *et al.*, 2009).

Assessing food security lacks a sole, straightforward measure. It hinges on factors like, agricultural output, the inflow of food through imports and donations, job prospects, income generation, decisions within households regarding resource allocation, utilization of healthcare, and nurturing practices (Jones *et al.*, 1998).

Obasi (2004) identified income, household size, education, staple food costs, and the gender of the household head as primary influencers of household food security. From social forestry a good portion of benefits can be achieved.

Table 2. Participatory Benefit Sharing Agreements

Type	Stakeholder	Share of benefit (%)
Woodlot and Agroforestry in areas	Forest Department	45
	Beneficiaries	45
	Tree Farming Fund	10
Sal forests conservation and development	Forest Department	65
	Beneficiaries	25
	Tree Farming Fund	10
Strip plantation in the private or public lands other than Forest Department owned lands	Forest Department	10
	Land owning agency	20
	Beneficiaries	55

	Local Union Parishad	5
	Tree Farming Fund	10
Char land and foreshore plantation	Forest Department	25
	Beneficiaries	45
	Land owner or tenant	20
	Tree Farming Fund	10
Khari (natural canal or ditch) and pond bank rehabilitation and plantation in Barind Tracts	Forest Department	25
	Beneficiaries	45
	Land owner or tenant	20
	Tree Farming Fund	10
Plantations and natural forests except Sal forests	Forest Department	50
	Beneficiaries	40
	Tree Farming Fund	10
Social forestry in the forest department owned lands initiated by local people	Forest Department	25
	Beneficiaries	75
Social forestry in the government, semi-government or autonomous organization lands initiated by local people	Forest Department	10
	Beneficiaries	75
	Land owning agency	15

Source: BFD, 2011.

Research shows that, Individuals without land are more engaged in the social forestry project. The income of farmers practicing social forestry saw an elevation upon their project involvement. Prior to project participation, majority fell within the income bracket of 336-500 US dollars. Subsequent to joining the project, a significant majority moved into the income category of 666 US dollars and above. This suggests that social forestry farmers can considerably enhance their income levels after becoming part of the project (Chowdhury, 2004). Alam, *et al.,* (2012) stayed that, 55% people demonstrated a moderate perspective regarding social forestry. Merely 36.25% exhibited a strongly positive viewpoint, and 8.75% held a slightly positive outlook. The majority of the local populace, constituting 63.75%, also maintained a moderate stance. About one-third of the surveyed local communities displayed a high level of support, whereas 13.63% exhibited a less favorable disposition.

According to Muhammed, *et al.*, 2009, Prior to the implementation of social forestry, each household typically had 1.7 wage earners, and their average annual family income ranged from 272 US dollars to 1,056 US dollars, while expenditures averaged around 571.7 US dollars, with a range between 272 to 905 US dollars. However, upon becoming involved in social forestry initiatives, significant changes occurred. Participants engaged in woodlot, agroforestry, and strip plantations reported average base incomes of 521 US dollars, 546 US dollars, and 580 US dollars, respectively. Further, the participants received an average of 2,747 US dollars, 980 US dollars, and 704 US dollars from the final harvesting of woodlot, agroforestry, and strip plantations, respectively. By considering interim benefits, the combined average total returns for each participant from these three types of plantations amounted to 3,338 US dollars, 3,092 US dollars, and 1,786 US dollars, respectively.

Research in Bogra and Jessore shows that the mean initial earnings of participants hailing were recorded at 713 US dollars and 743 US dollars, respectively. On average, individuals in Bogra received 442 US dollars from the ultimate harvest of strip plantations, while those in Jessore received 391 US dollars. When interim benefits are factored in, the overall average returns per participant from strip plantations were calculated as 711 US dollars in Bogra and 439 US dollars in Jessore.

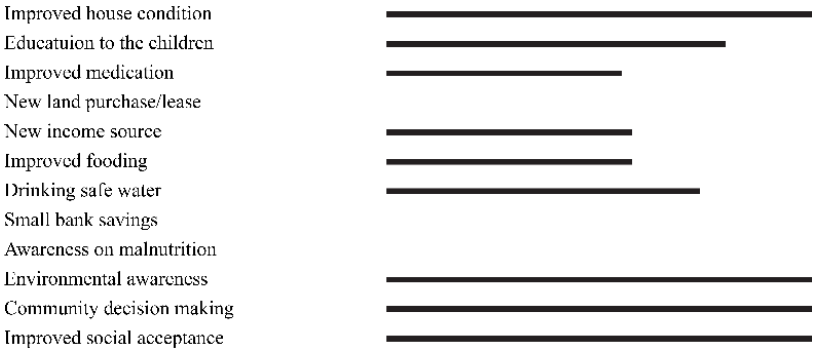

Fig 1. Scale of preferences on different socio-economic indicators (Muhammed, et al., 2009)

One research shows that, before participating in the social forestry initiatives, both the planters from the Unique Sustainable Practices (USP) and the villagers residing in the forest regions were originally landless shifting cultivators. Their circumstances were shaped by factors such as population pressure, rampant illegal logging in forested zones, and a shortage of suitable land, which compelled them to shorten their fallow periods. This, in turn, led to decreased crop yields and food scarcity. The absence of employment opportunities in the remote hilly territories and the diminishing access to forest resources further heightened the vulnerability of their livelihoods. Engagement in the social forestry projects was undertaken with the dual purpose of bolstering their livelihoods and augmenting the forested areas within the region. Subsequent to their participation in social forestry projects, these individuals managed to establish various forms of livelihood capital, signifying a positive change in their circumstances (Nath and Inoue, 2010).

The participants took part in the social forestry with the aim of bolstering their own means of living. Following their engagement in the program, they managed to develop various forms of livelihood resources along with key components of these resources. Based on the revenue origins of the participants, the income derived from social forestry emerged as the primary contributor to their overall yearly earnings, constituting approximately 52% for non-ethnic participants and 49% for ethnic participants. Additionally, those participants who garnered lower crop yields from the social forestry encountered greater difficulties in

acquiring sufficient food and leaned more heavily on daily wage labor to sustain their usual way of life (Islam and Sato, 2012).

Agroforestry has been widely recognized as a crucial approach to both conserving species and fulfilling the basic needs of impoverished populations in developing nations (Islam, *et al.*, 2022). This method has gained substantial popularity, particularly among small-scale farmers in Bangladesh, where more than 87% of them engage in agroforestry practices (World Bank, 2020; BBS, 2019). Given the limited land availability in densely populated Bangladesh, with only 0.048 ha of arable land and 0.02 ha of forest land per capita (World Bank 2022), this practice holds significant promise. Notably, even with these challenges, over 21.8% of the population remains in poverty, heavily reliant on natural resources for their livelihoods (Islam and Hyakumura, 2021).

In such a context, the adoption of tree-crop-based production systems emerges as a favorable strategy to enhance food security and livelihoods among rural farmers, while also safeguarding biodiversity (Islam and Hyakumura, 2019; Nair, 1990; Islam, *et al.*, 2015). Analyzing income sources, agroforestry contributes the most (64%) to farmers' household income, followed by agriculture and livestock (21%), day labor (12%), remittances (2%), and other sources (1%, including small businesses). The substantial income derived from agroforestry practices has a positive influence on the farmers' ability to save annually. Although their annual savings account for only about 7% of their total income, this indicates a positive trend in terms of the financial resilience of agroforestry farmers (Islam, *et al.*, 2022).

The development of a native agroforestry technique presently utilized by the Garo population in Bangladesh. This approach combines tree crops to provide shade, control weed growth, and ensure ecological stability, while also integrating agricultural crops and pineapple cultivation for economic benefits (Khaleque and Gold, 1993). In research from Sheikh, *et al.*, (2021) we come to know that, just 4% of participants attained security as a result of engaging in agroforestry, and merely 3% directly achieved employment opportunities through this practice. Similarly, 3% of respondents were able to directly access household income benefits. In contrast, a significant 90% of respondents experienced a comprehensive livelihood pattern, encompassing security, employment generation, and household income, all concurrently.

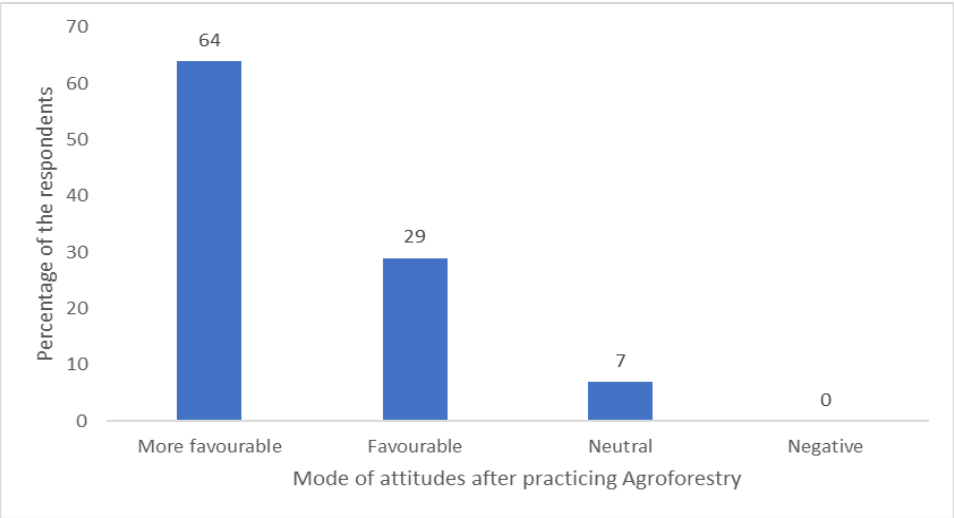

Fig 2. Farmer’s attitudes towards agroforestry in the research area (Sheikh, et al., 2021).

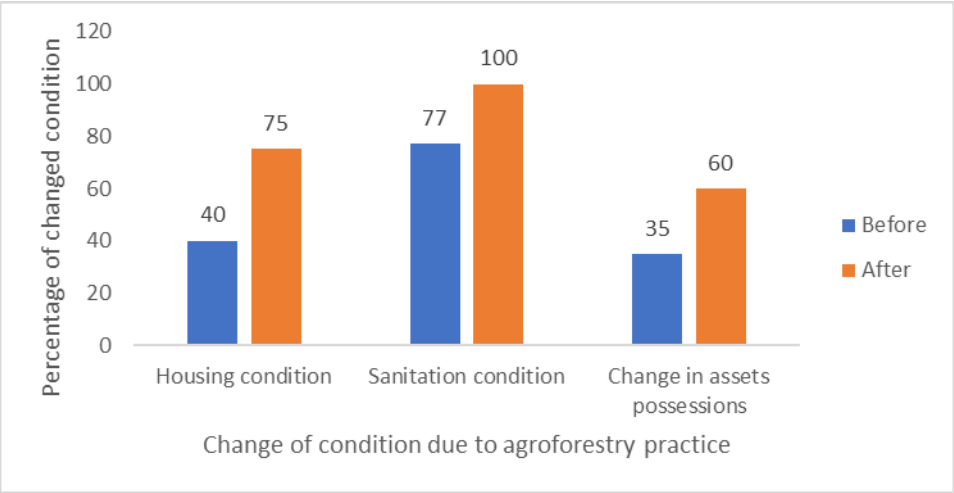

Fig 3. Change of condition due to agroforestry practice in the research area (Sheikh, et al., 2021).

WOMAN PARTICIPATION

Reflecting on the concept of gender equality, it involves examining how tasks and responsibilities are distributed between individuals of different sexes. A study conducted by the FAO in 1990 explored this aspect. A research outcome indicated noticeable variations between genders in nearly all activities, except for "overall supervision." Across most tasks, women contributed significantly more labor than men. The average percentage of labor input was markedly higher among females compared to males (Ahmed and Laarman in 2000).

The Village and Farm Forestry Project (VFFP) was initiated in 1987 by the Swiss Development Cooperation (SDC) with the aim of enhancing socioeconomic conditions in specific target communities while promoting environmental conservation. This initiative was implemented in various rural areas of Bangladesh with support from local non-governmental organizations (NGOs). The project encompassed two tree planting schedules: "bariland" (homestead) planting and "khetland" (cropland) planting. Despite facing challenges initially as noted by Hocking and Banu (1995), Huda (1995), and Islam (1994), the project underwent a successful transformation during its second phase. This success was attributed to the integration of a comprehensive extension package, the involvement of "core farmers" as extension agents, the adoption of innovative nursery and tree plantation methods, and an increased emphasis on women's participation.

Ahmed and Cabbage (2003) conducted a study in Dinajpur, Bogra, Mymensing, Pirojpur, and Chittagong to explore gender-based differences in involvement within social forestry. In their research, both men and women exhibited a moderate-income level, averaging 25,000 taka per year, which was higher than the national average of around 12,000 Taka. The participants had relatively large family sizes, averaging approximately 6.5 members. The literacy rates among the participants exceeded the national average, standing at 98.5% (for males with 38.9% having higher education) and 90.7% (with 25.5% having higher education) for females. The average age of the respondents was in the mid-thirties, and a majority of them were married.

Interestingly, when it came to the "assessment of your needs/requirements," women's participation was significantly higher than that of men. This discrepancy could possibly be attributed to women's heightened

concern about their needs being adequately incorporated into the various components of the project.

About 84% of the women had no income prior to their involvement in social forestry programs, while the remaining 16% had a maximum income of Tk. 600 per month. Following their participation in these programs, the distribution of average family income changes. Roughly 5% of the total women increased their income by up to Tk. 300, another 5% by Tk. 300 to Tk. 600, 22% by Tk. 600 to Tk. 900, 25% by Tk. 900 to Tk. 1200, 16% by Tk. 1200 to Tk. 1500, 14% by Tk. 1500 to Tk. 1800, and 13% by more than Tk. 1800 per month.

Our findings indicate that certain older women are earning more than Tk. 1500 per month, surpassing the earnings of the youth (earning between Tk. 600 to Tk. 1500 per month). However, despite their higher earnings, the participation rate of older women was lower (around 27%) compared to that of young women (approximately 65%) in rural areas (Kabir, *et al.*, 2007).

Forest Area Enlargement

Bangladesh is situated in the northeastern part of South Asia, lying between 20°34’ and 26°38' north latitude and 88°01' and 92°41' east longitude. The country spans an area of 14.757 million hectares and experiences a subtropical climate with distinct periods of rainfall and dryness throughout the year. Out of the total land area, approximately 9.6% (5,284 square miles) consists of state forest lands under the control of the Forest Department. However, only 60% of these lands have tree or bamboo cover, with the remaining being either encroached upon or barren.

Additionally, there are around 742,000 acres (1,159 square miles) of privately-owned homestead forest groves with varying tree and/or bamboo crops. These homesteads make up only 12% of the forest land but play a crucial role in supplying nearly 80% of the total fuel wood, timber, and bamboo consumed in the country. Despite advancements, approximately 75% of the total energy consumed in Bangladesh still relies on traditional biomass fuels like straw, fuel wood, and cow dung.

The forestry sector's policies have been widely criticized for their ineffectiveness in contributing to the national economy. The existing departmental manuals of the Forest Department have provided limited scope for public involvement in forestry matters. Evaluation studies have shown that forests under state control are in a very poor condition, indicating the need for significant improvements in the management and conservation of these valuable natural resources (GOB, 1990; Magno, 1986; Task Force, 1987; FMP, 1992).

According to estimates, Bangladesh has approximately 4.65 million hectares of land available for social forestry, which accounts for approximately 31% of the country's total area (BFD, 2011). Since the mid-1980s, the Forest Department has implemented community forestry programs, resulting in the establishment of 30,666 hectares of woodlot plantations, 8,778 hectares of agroforestry plantations, and 48,420 kilometers of strip plantations. Additionally, around 19,790 hectares of woodlot and agroforestry plantations, along with 8,566 kilometers of strip plantations, have been harvested as part of these initiatives (Safa, 2004).

Table 3. CF project achievements since the mid-1980's in Bangladesh.

Components	**Achievements**
Strip plantations	48,420 km

Woodlot plantation	30,666ha
Agroforestry plantation	7,738 ha
Embankment plantation	1,338 ha
Foreshore plantation	645 ha
Village afforestation	7,421 villages
Seedling for sale and distribution	201 million

Source: Muhammed *et al*. (2005).

Limitation

Despite the numerous benefits, there are also certain limitations in social forestry. From a project called The Chandra project, most appealing aspect revolves around the assurance that engaged farmers would equitably distribute the sustainably farmed produce alongside the government. In the initial stages, this commitment significantly bolstered farmers' enthusiasm. However, there is now a sense of doubt among the farmers regarding the pledged advantages. They have consistently communicated their lack of reception of any official contractual paperwork from the government pertaining to the proposed arrangement for sharing benefits. This circumstance has given rise to broad discontentment and a prevailing atmosphere of suspicion among them. Furthermore, a majority of farmers have conveyed that their logistical support from the Forest Department occurs on an intermittent basis (Khan and Begum, 1997).

A study shows that, Within the realm of social forestry, the majority of individuals were acquiring loans to address needs like seasonal crop cultivation, livestock rearing, home repairs, or during instances of family illness. These loans were typically secured from local NGOs or occasionally from relatives and neighbors. Notably, a mere 21% of ethnic and 39% of non-ethnic participants managed to access loans from various origins. Loans obtained from relatives were generally devoid of interest, while those sourced from NGOs and other channels incurred a relatively substantial interest rate of at least 7% (Islam and Sato, 2012).

CONCLUSION

Since its inception, social forestry has demonstrated a commendable track record in enhancing the livelihoods of rural communities. This initiative has not only positively impacted livelihoods but has also elevated the overall quality of life for participants. Moreover, social forestry has engendered a sense of empowerment and participation among the rural populace. Nonetheless, certain challenges persist that require focused attention. To ensure the sustained success of social forestry, it is imperative that the forest department enhances its responsiveness to the needs and concerns of participants. The formulation of decisions should be a collaborative effort, incorporating the insights and perspectives of those directly involved. This shift toward a more inclusive decision-making process can lead to more effective and relevant strategies. Additionally, addressing the issue of loan interest rates is pivotal. The financial burden imposed by high interest rates on loans obtained from NGOs and other sources can hinder the progress and financial

well-being of participants. By minimizing these interest rates, participants would be better positioned to invest in their livelihoods and contribute to the overall success of the social forestry program.

ACKNOWLEDGEMENT

The authors appreciate the support provided by Agroforestry Department, Bangladesh Agricultural University, Bangladesh.

STATEMENTS AND DECLARATIONS

Funding: The authors did not receive support from any organization for the submitted work.

Competing Interest: The authors declare no competing interests

Ethics Approval: Not applicable.

Consent to Participate: Not applicable.

Consent for Publication: The final version of the manuscript was reviewed and approved by all authors.

Data Availability: All data generated or analyzed during this study are included in this article

Authors' Contribution: All authors contributed to the study conception and design. Kazi Kamrul Islam guide us to prepare the materials. Material preparation and data collection were performed by S. M. Kamran Ashraf and Saleha Khatun Ripta. The first draft of the manuscript was written by S.M. Kamran Ashraf and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Conflict of Interest

There is no conflict of interest declared by the authors.

REFERENCES

1. AHMED, M. R., and CUBBAGE, F. W. (2003). Gender differences of participation in social forestry programmes in Bangladesh. Journal of Forests, Trees and Livelihoods, 13(1), 79-100.
2. Ahmed, M. R., and Laarman, J. G. (2000). Gender equity in social forestry programs in Bangladesh. Human Ecology, 28, 433-450.
3. Alam, M. J., Rakkibu, M. G., and Rahman, M. M. (2012). People s Attitude Towards Social Forestry: A Case Study in Rajshahi. Journal of Environmental Science and Natural Resources, 5(1), 217-222.
4. Bangladesh: Economy (2024). Available online: http://www.adb.org/countries/bangladesh/economy (accessed on 4 April 2024).
5. BBS (2019). Agriculture Census, Bangladesh Bureau of Statistics (BBS); Government of Bangladesh: Dhaka, Bangladesh.
6. BBS (2023). Available online: https://bbs.gov.bd/site/page/dc2bc6ce-7080-48b3-9a04-73cec782d0df/%E0%A6%9C%E0%A6%BF%E0%A6%A1%E0%A6%BF%E0%A6%AA%E0%A6%BF- (accessed on 4 April 2024)

7. BFD (2011) Homepage, Bangladesh Forest Department, <http://www.bforest.gov.bd> (Accessed 5 December 2011).
8. BFD, (2005), Homepage, Bangladesh Forest Department, http://www.bforest.gov.bd, (Accessed 5 December 2011).
9. Chowdhury, S. A. (2004). Participation in forestry: A study of people's participation on the social forestry policy in Bangladesh: Myth or reality? (Master's thesis, The University of Bergen).
10. De Tapan Kumar, (1996), Shamajik Banyan, Anuva De, De Kutir, Talagram, Barura, Comilla.
11. FAO (1990). Women in Agricultural Development: FAO's Plan of Action, Food and Agriculture Organization, Rome.
12. FAO, (1978). Forestry for local community development. FAO, Rome, Italy, FAO Forestry Paper No. 7, 114.
13. Ferdousi, S., and Dehai, W. (2014). Economic growth, poverty and inequality trend in Bangladesh. Asian Journal of Social Sciences and Humanities, 3(1), 1-11.
14. Forestry Master Plan (FMP). (1992). Forestry Master Plan: Forest Institutions, FMP Project 372001/23, Ministry of Environment and Forests, UNDP/FAO Project BGD/88/025, Dhaka.
15. Gilmour, D. (2016). Forty years of community-based forestry: A review of its extent and effectiveness. FAO forestry paper, (176).
16. GOB (Government of Bangladesh), (1990), The Fourth Five Year Plan 1990-1995, Planning Commission, Ministry of Planning, Dhaka.
17. GOB (Government of Bangladesh), (2003), Participatory Forestry Newsletter, A Quarterly Newsletter of Forest Sector Project, Bulletin No. 1, May 2003.
18. Hocking, A., and Banu, F. L. (1995). Village and Farm Forestry in Bangladesh-Meeting Rural Women's Interests in Trees, Technical Document 25, Swiss Development Cooperation, Dhaka.
19. Huda, A. T. M. A. (1995). An overview of gender issues in village and farm forestry project. In Ahmed, N. U., and Hamid Miah, M. A. (eds.), Gender Issues in Agriculture, Bangladesh Agricultural Research Council, Dhaka, 157-162
20. Huq Md. Fazlul and Prof. Alim A, (1995), "Social Forestry in Bangladesh- State of Art Study", BARC Winrock International, Agro forestry and Participatory Forestry Research and Training Support Program, Dhaka, Bangladesh.
21. Imam, M. F., Islam, M. A., and Hossain, M. J. (2018). Factors affecting poverty in rural Bangladesh: an analysis using multilevel modelling.
22. Islam, K. (1994). Village and farm forestry programme in Bangladesh. In Village and Farm Forestry Programme-VFFP, Proceedings of the workshop held on January 25, 1994, Swiss Development Cooperation, Dhaka, 35-61.
23. Islam, K. K., and Sato, N. (2012). Participatory forestry in Bangladesh: has it helped to increase the livelihoods of Sal forests-dependent people? Southern Forests: Journal of Forest Science, 74(2), 89-101.
24. Islam, K. K., Fujiwara, T., and Hyakumura, K. (2022). Agroforestry, livelihood and biodiversity nexus: The case of Madhupur Tract, Bangladesh. Conservation, 2(2), 305-321.
25. Islam, K.K.; Hyakumura, K. (2019). Forestland concession, land rights and livelihood of ethnic minorities: The case of the Madhupur Sal forest, Bangladesh. Journal of Forests, 10, 288.
26. Islam, K.K.; Hyakumura, K. (2021). The potential peril of Sal Forest land grabbing in Bangladesh: An analysis of economic, social, and ecological perspectives. Environ. Dev. Sustain, 23, 15368–

15390.
27. Islam, K.K.; Jose, S.; Tani, M.; Hyakumura, K.; Krott, M.; Sato, N. (2015). Does actor power impede outcomes in participatory agroforestry approach? Evidence from Sal forests area, Bangladesh. Agroforest. Syst, 89, 885–899.
28. Islam, K.K.; Rahman, G.M.; Fujiwara, T.; Sato, N. (2013). People's participation in forest conservation and livelihoods improvements: Experience from a forestry project in Bangladesh. Int. J. Biodivers. Sci. Ecosyst. Serv. Manag, 9, 30–43.
29. Islam, K.K.; Saifullah, M.; Hyakumura, K. (2021). Does Traditional Agroforestry a Sustainable Production System in Bangladesh? An Analysis of Socioeconomic and Ecological Perspectives. Conservation, 1, 21–35.
30. Jones, R. P. and Parikh, A. (1998). The Determination of Agricultural Wage Rates in Bangladesh. Journal of Agricultural Economics, 49 (1): 111-113.
31. Kabir, M. E., Bosunia, A. K. M. A., Islam, M. A., and Mowla, R. (2007). Social Forestry for Women Livelihood in the Rural Society of Jessore, Bangladesh. Khulna University Studies, 207-212.
32. Kazianga, A, Udry, C, 2006, Consumption smoothing? Livestock, insurance and drought in rural Burkina Faso, Journal of Development Economics, 79(2), 413-446. DOI: https://doi.org/10.1016/j.jdeveco.2006.01.011.
33. Khaleque, K., and Gold, M. A. (1993). Pineapple agroforestry: An indigenous system among the Garo community of Bangladesh. Society and Natural Resources, 6(1), 71-78.
34. Khan, N. A., and Begum, S. A. (1997). Participation in social forestry re-examined: a case-study from Bangladesh. Development in practice, 7(3), 260-266.
35. Magno V. C, (1986), Community Forestry Handbook, ADB Community Forestry Project, Ministry of Agriculture-Forest department, Food and Agriculture Organization of the United Nations.
36. McCarthy, E. D. (2005). Knowledge as culture: The new sociology of knowledge. Routledge.
37. Moeliono, M., Thuy, P. T., Bong, I. W., Wong, G. Y., and Brockhaus, M. (2017). Social Forestry-why and for whom? A comparison of policies in Vietnam and Indonesia. Forest and Society, 1(2), 78-97.
38. Muhammed N., Koike, M., Sajjaduzzaman, M. and Sophanarith, K., (2005), Reckoning social forestry in Bangladesh: Policy and Plan versus implementation, Journal of Forestry 78: 373-383
39. Muhammed, N., Haque, F., and Koike, M. (2009). The role of participatory social forestry in the enhancement of the socio-economic condition of the rural poor: A case study of Dhaka Forest Division in Bangladesh. Forests, trees and livelihoods, 19(1), 47-67.
40. Muhammed, N., Koike, M., Sajjaduzzaman, M. and Sophanarith, K. (2005) Reckoning social forestry in Bangladesh: Policy and plan versus implementation, Journal of Forestry 78: 373–383.
41. Nair, P.K.R. (1990). An Introduction to Agroforestry; Springer: Dordrecht, The Netherlands.
42. Nath, T. K., and Inoue, M. (2010). Impacts of participatory forestry on livelihoods of ethnic people: experience from Bangladesh. Society and Natural resources, 23(11), 1093-1107.
43. Obasi, P.C. (2004). Household Food Security in lmo Stat a Reflection of Nigrian Situation. J. Agric. and Social res. 4 (1): 42-59
44. Purnomo, E. P., and Anand, P. B. (2014). The conflict of forest tenure and the emergence of community-based forest management in Indonesia.
45. Rahman, A., (1991), Social Forestry in Bangladesh: The Betagi-Pamora Experience, Paper presented at the Seminar on Betagi-Pamora Community Forestry Projects, December 15, 1991, Bangladesh Agricultural Research Council, Dhaka
46. Ravallion, M, Walle, D, Gautam, M, (1995) Testing a social safety net, Journal of Public Economics, 57(2), 175-199. DOI: https://doi.org/10.1016/0047-2727(94)01446-U

47. Safa, M.S. (2004) The effect of participatory forest management on the livelihood and poverty of settlers in a rehabilitation program of degraded forest in Bangladesh, Small-scale Forest Econ. Manag. Policy 3: 223–238.
48. Sheikh, R., Islam, M. A., Sharmin, A., Biswas, R., and Kumar, J. (2021). Sustainable agroforestry practice in Jessore district of Bangladesh. European Journal of Agriculture and Food Sciences, 3(1), 1-10.
49. Task Force. (1987). Participatory Forestry in Bangladesh: Concepts, Experiences and Recommendations, A Task Force Report to the Ministry of Agriculture, Dhaka.
50. World Bank (2020). Agriculture, Forestry, and Fishing, Value Added (% of GDP) in Bangladesh; World Bank National Accounts Data: Washington, DC, USA.
51. World Bank (2022). Arable Land (Hectares per Person) in Bangladesh; The World Bank Group: Washington, DC, USA. Available online: https://data.worldbank.org/indicator/AG.LND.ARBL.HA.PC?locations=BD (accessed on 18 February 2022).
52. Yaqoob, N., Ali, S. A., Kannaiah, D., Khan, N., Shabbir, M. S., Bilal, K., and Tabash, M. I. (2022). The effects of agriculture productivity, land intensification, on sustainable economic growth: a panel analysis from Bangladesh, India, and Pakistan Economies. Environmental Science and Pollution Research, 1-9.