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Socio-cultural Impacts of Agroforestry Improvements in Narsingdi, Bangladesh

by

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Abstract

This research investigates the potential socio-cultural impacts that might result from an agroforestry improvement project in two study communities of Narsingdi District, Bangladesh. A range of qualitative research methods are employed for the investigation. Results reveal that culture is significantly linked to agroforestry practices in the study communities, and the project might have impacts on important socio-cultural domains in addition to the expected changes in income and agricultural production. The specific socio-cultural impacts that are identified include: loss of sharing and exchanging system of planting materials associated with local species, increase in dependency on new species over local species, loss of farmers' self-reliance and social differentiation. The study highlights the importance of understanding such socio-cultural impacts before the implementation of any development project so that the project can be designed in a way that is beneficial from a more holistic standpoint.

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CHAPTER 1 INTRODUCTION

Agroforestry has been practiced widely for a long period of time in many rural areas of Bangladesh, a country frequently defined by poverty, resource scarcity and overpopulation. In the face of a limited resource base and rapidly growing population, agroforestry (the production of trees combined with agricultural crops) contributes significantly to increased output of food crops and tree resources and meets the multidimensional needs of rural people. Agroforestry also contributes to environmental sustainability in rural areas. Thus, agroforestry helps sustain the rural economy and environment in Bangladesh, and is considered both an efficient method of resource use and a promising livelihood option to lift rural people out of poverty (Hauque 1993; Rahman et al. 2011).

Therefore, advancement in this sector is an important area of research and policy concern. Recently the Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), in collaboration with the South Asia Regional Office of the World Agroforestry Centre (ICRAF), has developed a project on 'Improvement of Agroforestry Practices for Better Livelihood and Environment' which is funded by the Sponsored Public Goods Research (SPGR) program of Bangladesh Agricultural Research Council (BARC). The project has proposed the development of existing agroforestry practices through scientific innovations in three districts of Bangladesh – Gazipur, Narsingdi and Khulna. To complement this project, there is an opportunity to extend the research beyond biophysical and economic analysis by undertaking a socio-cultural analysis of the agroforestry practices in the research areas, which is the focus of the present thesis. In the first chapter of this thesis, I present the purpose of the study with research questions as well as significance of the study, followed by an outline of the thesis.

1.1 Purpose of the study

Agroforestry is described by Nair (1989: 13) as a multiple-cropping land management system which "applies management practices that are compatible with the cultural practices of the local population," implying an intimate linkage of agroforestry systems with local culture and community. But, development of agroforestry systems is often focused only on the biological components and economic feasibility, while local perspectives and associated socio-cultural aspects remain relatively unexplored (Lai 1991; Szymanski & Colletti 1999). Previous studies showed that many of the programs on the development of natural resources have overlooked cultural aspects, and as a consequence the programs did not bring any positive impacts; rather they had negative consequences and jeopardized the lives and livelihoods of rural people (Cernea 1990; Rajasekaran et al. 1991; Verhelst & Tyndale 2002). Therefore it is important to include socio-cultural factors in the process of implementing new interventions and understand potential social and cultural changes that communities might experience from these interventions in advance, so that the proposed interventions can fit with cultural practices, norms and values of the areas in question. Thus the interventions can bring effective and sustainable output.

With this understanding, the focus of this research is to anticipate the potential socio-cultural impacts resulting from the introduction of new scientific agroforestry interventions in one of the selected research districts, Narsingdi. For this purpose, with the given emphasis on socio-cultural considerations, this research is guided by a Social Impact Assessment (SIA) approach. SIA, a component of Environmental Impact Assessment (EIA), is considered as an application of social science methodology which has more systematized concern for analyzing potential social changes resulting from new interventions than that of many other bodies of literature (Bowles 1981). In this research, a number of

participatory methods are utilized with the community members in two selected communities of Narsingdi district under the SIA framework to fulfill the research objectives stated below.

1.2 Research questions and objectives

The basic research question is 'How is culture related to development in this project?' It is investigated through two sequential questions: 'How is local culture related to agroforestry practices in the study communities and how will this local culture be impacted by agroforestry development interventions?' 'Culture' is observed in the study through specific socio-cultural dimensions. Thus, the intent of the study is to evaluate potential socio-cultural impacts resulting from the agroforestry development project, based on an understanding of the socio-cultural dimensions that are associated with the agroforestry practices in the study communities. To that end, two objectives are set for this study:

1. To identify and improve understanding of the socio-cultural dimensions that are associated with the existing agroforestry practices
2. To evaluate potential changes and impacts on local culture resulting from the introduction of project interventions

1.3 Significance of the research

Integrating socio-cultural elements into development projects leads to a more all-embracing approach (Verhelst & Tyndale 2002). Understanding the cultural significance and socio-cultural impacts in this context are instrumental to complement the design and implementation of the new interventions. The study emphasizes the importance of utilizing a SIA approach in the development project in advance to take into account a wide range of socio-cultural impacts, positive or negative, that the communities might experience due to the project.

This research process is also expected to bring benefits to the communities involved in the study. Community people were informed about the agroforestry interventions and they had an opportunity to express their opinions towards the interventions through this research. This process of community involvement recognizes the importance of cultural considerations while planning for interventions. Therefore, through the results of this study, the agroforestry project should be able to direct the interventions so they can fit more seamlessly with local culture and traditions.

The results and methodology of the study may also be useful in undertaking similar kinds of studies in other regions of Bangladesh. Also, given current deficiencies in the study of socio-cultural impacts from agroforestry projects, the present study attempts to develop indicators and a method for socio-cultural assessment. Therefore it has broad practical application and obvious potential in agroforestry research. Furthermore, the study is expected to contribute to the knowledge of SIA by utilizing the recent SIA literature on distinctions between 'social impact' and 'social change processes', as well as by providing unique insights to socio-cultural impacts which are often unaddressed in conventional socio-economic assessments.

1.4 Organization of the thesis

This thesis is organized in seven chapters. In Chapter 1, research questions with research objectives and significance of the thesis are presented. Chapter 2 encompasses a detailed description of the methodology that was employed to undertake the research including research approach, research design, data collection methods, sampling techniques and data validation strategies. This chapter also includes a discussion of reflexivity issues and study limitations.

In Chapter 3, a literature review is presented which begins with a definition of agroforestry systems as well as descriptions of different forms of agroforestry systems that exist in Bangladesh. After that, a discussion on the socio-cultural dimensions that can be related to agroforestry systems as well as social impacts within the agroforestry context is developed to reflect the importance of considering culture as a prime concern in development activities, followed by an elaboration of SIA which is employed in the study as a conceptual framework for guiding the analysis of social impacts in the context of agroforestry research.

Chapter 4 is about the study setting. This chapter includes a description of the study communities with their spatial, demographic, social and economic characteristics, along with a description of the agroforestry improvement project with its background, goals and designed interventions.

In Chapter 5, results of the research are presented that include a history of the two study communities in relation to their agroforestry practices along with the current dominant agroforestry system. This is followed by a description of the socio-cultural dimensions of agroforestry practices in the study communities and the impacts on these dimensions that might arise from the new agroforestry interventions.

A discussion of results is presented in Chapter 6 where 'social impacts' are discussed within the backdrop of recent literature on SIA as well as with particular attention to socio-cultural impacts. This discussion is followed by a discussion on policy and practice at the project level exploring project and community implications, and ended with some concluding remarks.

CHAPTER 2 LITERATURE REVIEW

In this chapter, I review the relevant literature pertinent to my research and present it in four sections. In the first section I begin with a definition of agroforestry systems with a short description of how it became an independent field of study and a tool for rural development. Along with this, I also describe different forms of agroforestry systems in the context of Bangladesh. In the second section, I discuss the socio-cultural dimensions related to agroforestry practices as well as social impacts within the agroforestry context to reflect the importance of considering culture as a prime concern in development activities. With this concern, I direct my discussion to Social Impact Assessment (SIA), a tool that is employed in the study to understand the connection between development activities and people. In this section, I discuss SIA followed by a presentation of SIA indicators in the context of agroforestry that can be helpful to initiate agroforestry social impact research.

2.1 Agroforestry systems

2.1.1 Agroforestry and its emergence as a rural development tool

Agroforestry is an integrated land management system that combines trees and crops in general that offers multiple benefits. Agroforestry can contribute to increasing biodiversity, carbon sequestration, soil fertility, and decreasing deforestation and soil erosion, thus improving environmental sustainability. It can also increase food and wood productivity, thus increasing income for farmers and decreasing poverty, as well as contributing to food security and improved nutrition. Though there are various definitions for agroforestry, the definition given by World Agroforestry Center (ICRAF) cited in Nair (1990: 1) is widely accepted:

> *Agroforestry is a collective name for land use systems and technologies where woody perennials are deliberately used on the same land*

management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. In agroforestry systems there are both ecological and economical interactions between the different components.

The practice of combining tree species and agricultural crops has been popular among the people from long ago as stated by Nair (1989: 13) “Agroforestry is a relatively new name for a set of old practices”. Looking back to the history described by King (1989), a form of agroforestry called 'slash and burn' or 'shifting cultivation' was popular among the people of Europe at least until the middle age and also in the Philippines, where trees were an integral part of their farming system but the main goal was food production from crops. But in the beginning of nineteenth century, the focus began to change. For example there was an introduction of the ‘taungya’ method for plantation of teak in the Tonze forests of Burma. According to King (1989), this situation lasted for a long period of time until the 1970s when all the work and research related to agroforestry focused on forest development, and researchers never envisaged this system as a tool for agricultural or rural development and land-management system. The situation started to change again during the 1970s when both the World Bank and the Food and the Agriculture Organization of the Unites Nations (FAO) started to take initiatives to develop agroforestry for rural development. In the mid 1970s, the International Council for Research in Agroforestry (ICRAF) was created to support, plan, and co-ordinate research on agroforestry which later was dubbed the ‘World Agroforestry Centre’ reflecting its change of focus and functionality (King 1989; Nair 1998).

The establishment of ICRAF helped to propel and coordinate research on agroforestry, and agroforestry became a science as well as a set of land-use practices. While the 'slash and burn' technique is the oldest form of agroforestry, various other forms of agroforestry are practiced throughout the world now, and

ICRAF with financial assistance from the United States Agency for International Development (USAID) and other donors collected information about the different agroforestry systems practiced in developing countries (Nair 1990). Some of those systems are: taungya, home-gardens, alley cropping, multi-layer tree gardens, silvopastoral systems, intercropping systems and plantation crop combinations. Since the 1980s, agroforestry has come to be seen as a valuable tool for rural development, and has become an independent field of study with its own merits distinguished from agriculture and forestry (Mercer & Miller 1998; Nair 1998).

2.1.2 Agroforestry systems in Bangladesh

2.1.2.1 Traditional agroforestry systems

Agroforestry is an age-old practice in Bangladesh as an indispensable part of rural lives and livelihoods. In most of the agro-ecological regions of the country, the farmers in the rural communities have been practicing agroforestry for centuries, where growing different tree species in their homestead compounds or/and in their crop fields is a common phenomenon with its virtue of short-term benefits from agricultural crops and long-term benefits from trees (Lai 1991; Alam 1993; Chowdhury 1993; Mallick 2000). In homestead agroforestry (also known as home-gardens), crops, trees, livestock and fish ponds in and around the homesteads are integrated into the homestead production system; while in crop fields, especially in rain-fed agricultural upland areas, farmers grow trees intentionally or retain the naturally occurring plants along field boundaries or within fields in association with the main crop (Ali & Ahmed 1991; Alam 1993). Cropland and homestead agroforestry are practiced on the private land of the land-owner. In addition, shifting cultivation and taungya system, the oldest traditional agroforestry systems, are practiced by the tribal communities in the hills which are the center of their livelihood activities (Miah et al. 2002). These are the 'traditional' systems in the country that have

been developed and practiced by the farmers through trial and error over centuries based on their needs and knowledge.

The country has been maintaining these various types of traditional agroforestry systems in different agro-ecological regions. Depending on the topography and climatic variations, there are several major agro-ecosystems in Bangladesh, such as floodplain, hill and terrace ecosystems (Miah et al. 2002). Homestead agroforestry, the most dominant system in the country, is found all over the country regardless of ecosystem. Cropland or farmland agroforestry is practiced predominantly in floodplain and terrace ecosystem areas, whereas shifting cultivation and taungya system are found in hill ecosystems.

Homestead agroforestry

'Homestead' is composed of home and adjacent land occupied by a household. With the increased scarcity of arable land, agroforestry in homesteads is considered as the potential area of intercropping in the context of rural Bangladesh which is usually managed by household members, particularly women (Khan 2007; Miah & Hossain 2010).

Homestead agroforestry is an integral part of the life of rural folks to meet their daily necessities and contributes to household food security. It provides opportunities for income generation with substantial benefits to resource poor farmers and female farmers (Miah & Hussain 2010; Alam & Sarkar 2011). It offers them a spectrum of products, such as food (fruits, vegetables, spices), tree products (timber, firewood), non-timber products (medicinal and aromatic plants, bamboos) and others (Miah & Ahmed 2003; Miah & Hussain 2010). The benefits of homestead agroforestry can be understood more clearly by some numeric representations. For instance, this system contributes nearly 50% of the cash flow to the rural poor, and also contributes about 70% of the fruit, 40% of the vegetables, 70% of the timber, and 90% of the firewood and bamboo requirement of Bangladesh (Miah & Hussain 2010).

In this system, rural people utilize their homesteads for multi-strata cropping that includes various types of tree resources (such as trees, shrubs, herbs) and rearing livestock. Farmers grow diverse species in three to seven layers where generally the lowest layer is comprised of shade-tolerant species (e.g. pineapple, turmeric, ginger), the lower-middle layer by medium sized trees (e.g. banana, olive, papaya etc.), the upper-middle layer by medium-tall fruit trees (e.g. jackfruit, mango, litchi etc.), and the highest layer by tall trees (e.g. palmyra palm, coconut etc.) (Miah & Husain 2010). Such multi-strata systems represent their wisdom as well as their necessities, and results in intensive plant associations and efficient use of the available land even in a small-sized homestead compound (Rahman et al. 2008; Miah & Hussain 2010). Because of the high species density and the characteristics of regeneration, homestead agroforestry systems are often compared to natural forest ecosystems (Khan 2007). The type of trees planted in a homestead varies by ecological and socio-economic factors such as farmers' judgment and preferences (Miah & Hussain 2010). Different studies note that farmers prefer fruit-bearing species where the most prevalent species are jackfruit and mango as those species provide households with food, timber, leaves as fodder and cash income (Ahmed & Rahman 2004; Rahman et al. 2005; Alam & Furukawa 2011).

Cropland agroforestry

In Bangladesh rice is cultivated in most of the croplands, and historically several species of tree have been growing naturally in these fields for years, and some farmers started keeping those trees in their croplands or the borders of their fields (Hocking & Islam 1994). Now the country is enriched with various patterns of cropland agroforestry systems throughout its different agro-ecological regions. In general, the composition and prevalence of tree species are different in different ago-ecological regions reflecting biophysical and social variations. Based on the dominant species of the respective region,

five interactive systems can be found in the country: date palm (*Phoenix sylvestris*) based systems in High Ganges River Floodplain, palmyra palm (*Borassus flabellifer*) based systems in Lower Ganges Floodplain, babla (*Acacia nilotica*) based systems in terrace ecosystems of Barind tract and jackfruit *(Artocarpus heterophyllus*) based systems in the central terrace ecosystem of Madhupur Tract (Ahmed 2001). The trees are planted on the borders or within the field, systemically or sporadically, usually with crops such as rice, wheat, jute, pulses, oilseeds, sugarcane, vegetables and others, and when trees have high canopy coverage (e.g. jackfruit) farmers grow shade-tolerant crops such as turmeric, ginger and aroid (Miah et al. 2002). In a study of cropland agroforestry in Bangladesh Hocking et al. (1997) found that, though farmers face some crop yield loss under tree species, they accept the loss in return for the tree products.

2.1.2.2 Agroforestry systems in the terrace ecosystem area

There are two terrace ecosystem zones in Bangladesh. One of these is situated in the central part of the country, namely Madhupur Tract. This Tract, a large upland area, is geologically a terrace from one to ten meters above the adjacent floodplain areas and extends across the districts of Gazipur, Narsingdi, Tangail and Mymensingh (Nishat et al. 2002; Rashid 2006; BBS 2008). Most of the land in the Madhupur Tract used to be covered by natural forest vegetation which is classified as tropical moist deciduous forest, with Sal (*Shorea robusta*) as the main dominant species (Rahman et al. 2005). But, due to extensive illegal deforestation, about 70% of the forest area has been depleted (Nishat et al. 2002; Rashid 2006).

To meet the needs for various tree products, rural communities living in and around the area are dependent on homestead and farmland plantations. It is recognized that about 80% of the national requirements of timber, fuel wood and bamboo are met by these plantations (Miah et al. 2002). A unique kind of agroforestry system prevails in the terrace ecosystems of Madhupur Tract for its

topographic and climatic situations where the jackfruit based agroforestry has developed predominantly in homesteads and as well as adjacent cropland areas (Khan 2007). Jackfruit, a multipurpose species, is inter-planted systematically with various crops such as pineapple and other shade-tolerant species as well as along boundaries or within fields randomly in the area (Miah et al. 2002; Hasan et al. 2008).

In part of Narsingdi district, agroforestry has been practiced for years and is considered as the main source for household food and energy security, cash income, employment generation, investment opportunities and environmental protection (Khan 2007). Burmese grape, locally called as *latkan* (*Baccaurea sapida* Muell.Arg.) is becoming popular in Narsingdi district as it grows well in the red soil of the terrace ecosystem, where it is cultivated under jackfruit trees (Alam 2004).

2.2 Linking culture and development

2.2.1 Socio-cultural dimensions of agroforestry practices

In agroforestry, the significance of culture arises since culture is the fabric of every community that shapes "the way things are done and our understanding of why this should be so" (CIDA 2010: 1). Though the realm of culture is often narrowly conceptualized, it is far beyond a simple conception, and is the sum of "complex whole of knowledge, wisdom, values, attitudes, customs and multiple resources which a community has inherited, adopted or created in order to flourish in the context of its social and natural environment" (Verhelst & Tyndale 2002: 10). This definition illustrates a whole range of elements of culture. Also it represents the 'organic nature' of culture; in other words, culture does not belong only to the past but also evolves as people innovate and adapt to changes over the course of time.

In the practice of agroforestry systems, these elements or dimensions are influential towards the attitude and orientation of rural farmers, and as such, an understanding of local culture with indigenous knowledge systems and practices is often emphasized for successful agroforestry interventions (Rusten & Gold 1995; Warren et al. 1995; Anacleti 2002). While much agroforestry research has addressed biological complexities associated with agroforestry systems, less emphasis is given to social aspects, which can in turn impact all spheres of agroforestry practices (Nair 1998; Rule et al. 2000).

Authors such as Hoskins (1987) and Rule et al. (2000) contribute to defining social dimensions specifically in the context of agroforestry. They note that these dimensions need to be considered as an integral part of any technology transfer/extension effort. Rule et al. (2000: 364) suggests, "For agroforestry to be successful – to be adopted and diffused throughout a social system – it will require an understanding of the social dimensions. Unless the social setting in which these practices or technologies are to be implemented is understood, technology transfer will be constrained." For instance, Puri & Nair (2004) note that though significant efforts have been given to promote and implement agroforestry practices in India, modern agroforestry technologies have not been widely accepted by the farmers possibly because the 'scientific principles' behind successful indigenous agroforestry systems have not been studied well.

Hoskins (1987) points out nine issues as crucial 'socio-economic' variables, which are: local uses and knowledge, tenure, organization, conservation, landlessness/distance, enterprises and marketing, labor, nutrition, and gender/age, though he acknowledges that these are not a universal list and variables may vary depending on the local contexts. Rule et al. (2000) explores 'social dimensions' as the forces and resources that are in place in a community that affect the adoption of agroforestry technologies. The forces are described in

five broad headings: culture, organization, population, environment and technology, and each of these constitutes a number of issues to be addressed. However, a deficiency is noticed in this literature due to a lack of refinement and detail regarding the socio-cultural aspects of agroforestry systems. Culture is often lumped with other categories of social aspects without adequate attention to what is meant by the idea of culture within an agroforestry setting.

Nevertheless, there are examples throughout the literature to understand how different socio-cultural dimensions are linked in traditional farming and local tree growing and management in different communities of developing countries. In a study by Jena et al. (1997), a whole range of socio-cultural aspects are found to be embedded with traditional farming systems in the tribal rural community of Kuttia Kondh of India, which were: local knowledge system, religious practices, economic welfare, traditions, beliefs and festivals. Nair (1998) notes that most agroforestry research puts emphasis on the use of multipurpose and exotic species in selecting tree species while giving little attention to indigenous species which require critical consideration in agroforestry projects. Certain indigenous trees are often socio-cultural representations of the pertinent community and greatly valued by the community members. For instance, Jena et al. (1997) describes the significance of Sago-palm trees in the tribal rural community of Kuttia Kondh of Orissa, India. The use and management of these trees for palm-wine production are not confined within their economy but also contribute to their social life and cultural pattern. Sago-palm groves are the place of their social gathering where they discuss and take decisions on the important issues related their community such as cultivation endeavors or any village conflict while drinking the wine together. Their festivals and rituals are embedded within a system of supernatural and spiritual beliefs. There is folklore associated with the tree that expresses their attachment with these trees in their daily lives to sweep away their pain and give them a way to smile and lead a restful life.

Religion is often a dominant aspect in the management of trees or forests. Sacred groves are forest fragments which are communally protected by a community who has religious association with the grove. In India, these groves are associated with a deity, where the community believes that the deity presides over the grove and any kinds of disturbance will crucially affect the local deities causing diseases, natural calamities or crop failure (Gadgil 1975; Pal 2011). Hunting and logging are usually strictly prohibited within these groves and the fresh leaves and its green branches are never cut, while in some groves honey collection and deadwood collection are done on a sustainable basis (Gadgil 1975; Pal 2011). These groves have socio-cultural and ecological values (such as, conservation of rare species of trees and biological diversity). On the contrary, Ingles (1997) notes that, in Nepal, though people form social organization on the basis of religious belief to protect their religious forests, again it is because of their religious belief that they exploit other parts of the forest for the wood needed for their religious activities.

Social relations and networks play important roles in farming communities. A study of a farmer-led agroforestry extension project in the villages of Western Kenya showed that dissemination of seed and knowledge within and between the villages was dependent on informal social networks, that is, the kinship ties of the farmers with their relatives, groups, neighbors and friends (Kiptot et al. 2006). Also, in a study on an extension project in Mexico, it was found that farmers trust their informal relationship with neighbors, friends to collect or exchange seeds more than any other source, whereas in Zimbabwe the situation was quite opposite where observing others' fields and learning from others are assumed to be witchcraft (Meinzen-Dick & Adato 2007).

Another important socio-cultural dimension related to agroforestry is gender. Hoskins (1987) mentions that certain agroforestry techniques such as homestead-gardening have more viability in such societies where women's

mobility is discouraged by the prevailing culture. In the use of forests and trees, Maag (1997) describes how the activities of men and women differ in the tribal communities of central Nepal, for example, women are more involved with the activities related to collection of household supplies (lopping trees, gathering firewood and leaf litter) whereas men mainly carry out the propagation and cutting of the trees.

It is understood that a spectrum of issues is involved within the realm of culture. To narrow down the scope of what constitutes culture in the context of this study, certain indicators are formulated in later section.

2.2.2 Social impacts within the context of agroforestry

Research and development projects have shown that agroforestry practices increase household incomes, generate environmental benefits, and are particularly well suited to the situations of resource poor farmers. Realizing the prevailing importance of agroforestry, there has been a significant increase in the number of rural development projects related to agroforestry, and researchers are working throughout the tropics to develop improved agroforestry systems during the last two decades with an aim to increase productivity and sustainability of the system (Scherr & Mullar 1991; Franzel et al. 2004).

It is widely accepted that development interventions are undertaken to formulate and implement strategies that bring positive changes in the communities involved (Cochrane 1979; Kelly & Steed 2004; CIDA 2010). As a result of the interventions, the expected positive changes may come into being; such as the economy of the whole community may grow. But the effects of economic growth on other aspects of social life have frequently been ignored. It may also affect a wide matrix of socio-cultural aspects, such as social interactions, land use practices, community values, norms and practices in the community (Burdge & Johnson 1994). Therefore, it necessitates the discovery of

the associated social impacts of the development initiatives before they occur so that desirable impacts can be enhanced and undesirable impacts can be mitigated.

In Bangladesh, to improve the existing agroforestry practices geared towards reducing poverty and attaining environmental sustainability, the agroforestry research agenda includes “collection and screening of different tree and crop species in different agro-ecosystems; tree-crop interactions; development of management practices for increased productivity and economic benefits; improvement of existing agroforestry practices for improvement of system performance; development of processing technologies for improvement of agroforestry products, fruit trees and medicinal plants, etc.” (Miah et al. 2002). Thus, agroforestry development research projects are expected to bring these positive changes through scientific biophysical interventions into the existing agroforestry practices. For successful adaptations to the innovations, in addition to these expected benefits, there is a concern regarding other impacts that are also associated with these interventions; some of which may not be immediately observable or intentional. Therefore, it is critical to explore the potential for unintended consequences in order to address these potential impacts at the outset of a project.

In comparison with other fields of study such as agriculture, forestry or livestock projects, Scherr and Mullar (1991) note that the provision, information needed, appropriate methodology and indicators for assessing the impact of innovations in agroforestry projects are limited. They describe a study conducted by ICRAF during 1988-1989 which reports that, out of 108 agroforestry projects conducted worldwide, about only 45% included some type of impact analysis. But those impact analyses were mostly associated with poor indicators and methods as well as with an emphasis on evaluating the number of trees planted and area under agroforestry while overlooking social impacts. The study is

relatively old (1991), but it remains helpful when there is an absence of such aggregate research on social impacts related to agroforestry sector. This lack of published research indicates that social impact analysis remains underdeveloped in the sector.

A few isolated case studies are available, however. In a study conducted in the Kingdom of Tonga, Makino (2003) describes the socio-cultural impacts that arose due to the changes in traditional agroforestry systems in the country. In its long history, the people of Tonga have been self-reliant by practicing various forms of traditional agroforestry systems that enable them to meet their household needs and bring the surplus to markets. In the last few decades, due to changes caused by the introduction of modern technologies along with their traditional systems, there has been positive economic benefit in terms of substantial income for the farmers. But, in addition to this, there have been negative impacts on the Tongan socio-cultural environment and traditional agroforestry practices. For instance, the needs of the Tongan population have become more diverse and their traditional agroforestry practices no longer meet these diverse needs; their economic expectations have grown; and also they have lost their self-reliance and become dependent on agrochemicals and agricultural machines.

With these concerns, development interventions are criticized by authors that have only a growth-centered orientation while failing to recognize the social, cultural and spiritual aspects of local communities; thereby limited success is observed from these interventions (Barua 2010). Barua (2010: 372) suggests that “development needs to be embedded in and based on local knowledge, culture and bio-physical environments”. The necessity for socio-cultural compatibility in development projects can be well explained by Kottak’s (1985) study of 68 projects (cited in Finsterbusch 1995: 241) that states:

Many of the experiences documented here illustrate the tendency to address technical and financial factors and to neglect social issues. Perhaps the most significant finding of the present study is that attention to social issues, which presumably enhances sociocultural fit and results in a better social strategy for economic development, pays off in concrete economic terms: the average economic rates of return for projects that were socioculturally compatible and were based on an adequate understanding and analysis of social conditions were more than twice as high as those for socially incompatible and poorly analyzed projects.

Based on a review of this literature, it is clear that current deficiencies in our understanding of social and cultural impacts requires attention, considering that the connection between culture and development has been a key factor in determining the success of a project.

2.3 Social Impact Assessment (SIA)

Given the discussion above, a Social Impact Assessment (SIA) framework will be useful to study social and cultural impacts in agroforestry research projects. SIA is "essentially about understanding the relationship between a set of activities (which occur as a result of a project, programme or policy) and people and organization in the communities where those activities occur, whether or not they are the intended beneficiaries" (Baines et al. 2003: 32). It is defined by the Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, ICGP (1995: 11) as the process of identifying and understanding the social impacts that are likely to occur as a result of any planned intervention, where 'social impacts' imply:

the consequences to human populations of any public or private actions - that alter the ways in which people live, work, play, relate to one another,

organize to meet their needs and generally cope as members of society. The term [social impacts] also includes changes to the norms, values, and beliefs of individuals that guide and rationalize their cognition of themselves and their society.

Also, Barrow (2000: 4) defines SIA as a "systematic assessment of social and cultural impacts for a proposed development".

The need for SIAs stems from the idea that the negative unanticipated effects of development may offset the benefits of the development (Lynch & Western 2000). As such, SIA is intended to ensure that the proposed development maximizes the benefits and minimizes costs that affect local people, and also to permit the social costs and benefits to be considered in the decision-making process (Bowles 1981; Vanclay 2003). The discussion of costs and benefits often creates a problem of equity as those who win and those who lose may not be necessarily the same persons; therefore its role is also to determine "Who benefits and who loses? (if a proposed action were to be implemented*)*" (Wolf 1983: 15).

2.3.1 Social Impact Assessment as Socio-cultural Impact Assessment

SIA has become a component of Environmental Impact Assessment (EIA), a key tool for the assessment of possible impacts that result from a proposed project, due to the increased recognition of the need to include social considerations in any evaluation and decision-making process (Burdge & Vanclay 1996). EIA itself has been frequently criticized by scholars due to its failure to address socio-cultural impacts adequately. Most EIAs have a narrow concentration on certain tangible aspects of culture (such as historic buildings, archaeological site etc.) in expressing cultural concerns, while ignoring a wide range of sophisticated and intangible aspects of culture (such as traditional practices, norms, values, etc.) that are embedded within human communities (King 1998; Barrow 2000; Nakamura 2008). An emphasis on only tangible objects

"avoids the complex values associated with people's connections to place and their interaction with the landscape around them" (English 2002 cited in Nakamura 2008: 431).

The place where socio-cultural concerns are thought to be well positioned is in SIA. SIA emerged as a specific concept in the early days of U.S. National Environmental Policy Act (NEPA) legislation of 1969; appeared first in 1973 during a discussion of potential changes in Inuit culture due to the Trans-Alaska pipeline; and started growing significantly in the 1980s (Burdge & Vanclay 1996; Barrow 2000; Turnley 2002). SIA has been well adopted in many countries of the world now. In Bangladesh, although it has no separate statutory status yet, it has been practiced as an integral part of EIA since its inception in the country from the early 1990s, specifically by the international development agencies for projects they fund (Momtaz 2005).

Though a SIA is expected to acknowledge socio-cultural concerns, in practice most SIAs are found to have little connection with these, and have remained a rather under-developed field of study (King 2000; Heikkinen 2008). Sometimes cultural impacts are perceived as 'soft', highly subjective and difficult to quantify; and therefore these are frequently overlooked (Turnley 2002; MacDonald 2008). King (1998: 126) argues that "SIA is often seen as the study of those attributes of society that can easily be counted. In fact, social factors are often subsumed entirely by economics, under the rubric of socioeconomics". Thus, SIAs, biased to work with easily measureable socio-economic variables, rarely address a spectrum of socio-cultural aspects in the analysis. In the SIA literature, there are some established sources of social indicators that are used to assess the potential social impacts in a community due to any policy change or development project. For example, ICGP (1995) has developed a list of 30 social indicators under five broad groups, while Rabel Burdge has provided a list of 26 indicators which is slightly modified from the former one (Vanclay 2002). These

lists are more targeted to measurable indicators (Vanclay 2002), and therefore create a limitation in addressing social issues. This results in considerations about the appropriate integration of socio-cultural issues within SIA to have a comprehensive look at the 'soft', qualitative and unquantifiable factors, as these factors are often most crucial but left behind (King 1998; Barrow 2000; Sagnia 2002). With this concern, King (1998) envisages SIA as Socio-cultural Impact Assessment (SCIA), emphasizing more on the socio-cultural domain than the socio-economic.

2.3.2 Social change processes and social impacts

In the recent literature of SIA, Vanclay (2002) and van Schooten et al. (2003) expand the understanding of social impacts by making a distinction between social change processes and social impacts. Vanclay (2002: 190) defines SIA as follows:

> *Social impact assessment is the process of analysing (predicting, evaluating and reflecting) and managing the intended and unintended consequences on the human environment of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions so as to bring about a more sustainable and equitable biophysical and human environment.*

Vanclay (2002) and van Schooten et al. (2003) argue that most SIA indicators that are typically considered in SIAs are not basically impacts in themselves but rather social change processes that can lead to impact. Social change processes are invoked by interventions and take place regardless of local setting. These processes may or may not lead to social impacts depending on the social, cultural, economic, political and historical context of the community in question or mitigation measures that are put in place. Thus social impacts are inherently context-specific and are felt or experienced by the community people. For instance, the influx of temporary workers due to the establishment of an

industry is not a social impact, but a social change process that may create impacts such as loss of community cohesion, uncertainty among residents etc. or may not if properly managed. These impacts will be different in different communities. The impacts can be positive or negative, and may be intentional or unintentional. With this distinction, they have developed six general groups of social change processes and seven groups of potential social impacts that not only include negative impacts but also positive ones, to build an awareness of the range of social impacts, but not to use it as a checklist. Rather they suggest impacts can be identified most effectively by analyzing the pathways that lead to the impacts from social change processes.

2.3.3 SIA approaches and methodology

In the early days of SIAs, it was predominantly 'technical' in stance based on scientific empiricist discourse, and more recently there has been an increasing recognition of the benefits of a more 'participatory' approach (Barrow 2000; Becker et al. 2004). Technical SIA is a place where experts being neutral to social phenomena produce quantifiable impacts from a pre-selected list of indicators using mostly secondary data sources and therefore is assumed to be value-free and objective. This approach is criticized as it assumes that communities respond to changes in similar fashion, and its pre-selected indicators constrain the study to a small set of social phenomena (Becker et al. 2004). In contrast, the participatory approach acknowledges the social context of the impacted community and provides opportunity to use the knowledge and experience of people of that community in projecting impacts while experts play a facilitator role (Becker et al. 2004). Therefore this approach is appreciated as a more democratic process, though also criticized as being value-laden and subjective (Barrow 2000). The use of participatory methods to gather data for SIA reflects the appreciation of local knowledge of the community people in this process (Baines et al. 2003).

Within these approaches, SIA is generally conducted through a series of steps. In the SIA literature, a number of scholars have contributed to develop and describe the general procedure for SIA. To the simplest, Dietz (1987) describes the process in three major phases: identification, analysis and evaluation. Wolf (1983), ICGP (1995) and Barrow (2000) present ten steps; Taylor et al. (2003) present six steps and there are many other scholars where all of them have some common steps as well as some variations among them. The common steps include: scoping, profiling, formulation of alternatives, projection, evaluation, mitigation and monitoring. Scoping deals with identification of key issues, variables and potentially-affected people to be described at the early stage of a proposed project. Profiling enables understanding the baseline condition by looking into the existing social context and past trends associated with the community. Projection and estimation/assessment of effects predicts what is likely to happen and who is affected considering the scenarios of 'with' and 'without' interventions, and then comparing the two scenarios determines what differences the changes really make and what impacts are most significant. At the evaluation stage, who benefits and who loses and whether overall impact is acceptable are evaluated. If unwanted impacts are identified then measures are developed in the mitigation stage. Monitoring involves measuring actual versus predicted impacts through observation and providing feedback to policy and often follows ex-post audit to understand the effectiveness of the SIA.

To realize the full potential of SIA, these steps can be conducted in two phases: scoping, profiling and estimation of effects during design phase as 'ex-ante', and monitoring, evaluation and ex-post studies during the implementation phase as 'ex-post', where the former deals with the prediction of impacts and the latter is more evaluatory in nature (Baines et al. 2003). Most of the SIAs that are practiced are ex-ante, that is, they predict impacts at advance. The present research is built on ex-ante SIA.

While there is considerable agreement regarding the procedures for SIA in the published literature, there is debate on the methods for identifying impacts (Becker et al. 2004). Generally SIA researchers make use of a range of social science research methods for gathering data (Vanclay 2003). The methods adopted depend on the approach selected and steps to be undertaken (Barrow 2000). There is debate on choosing between technical or participatory approaches, similarly between qualitative or quantitative or mixed methods. Fitzgerald (2003) suggests that determination of the appropriate research methods to understand potential social changes arising from a project depends on several issues such as time, availability of existing information, and the field situation of the research. He further notes that quantitative data is typically collected when concerned variables can be meaningfully quantified or where statistical summaries are necessary using secondary sources and surveys to collect primary data, while qualitative methods are employed to understand social phenomena typically using semi-structured interviews, group interviews and focus groups, workshops and participant observation as primary data sources. However a mixed method approach is also used to create a more complete picture of the social situation. In the case of qualitative methods, he elaborates that these methods are often used in SIA for reasons such as: they enable local people to express their own circumstances; they can lead to an understanding of local knowledge and experience; they are flexible and therefore enable exploration of unexpected issues; and they are cost effective.

Pertaining to methods, Finsterbusch (1995) advises that SIA should use a full range of social science research methods that are needed to provide key information for taking effective policy decisions and managing negative impacts; but as well these should be cost effective in terms of money and time since sometimes SIAs are not put into practice unless its benefits are greater than its costs. He further adds that though individual interviews and surveys are used mostly for SIA field research, focus groups or workshops are more cost effective

and have the benefit of producing opinions through discussion among several participants and the process continues until a list of issues are adequately addressed. In this research, focus groups are used as the prime research method. More detail on its use in the research is provided in the 'methods' chapter.

2.3.4 SIA indicators in the context of agroforestry

It is not easy (or advisable) to provide a standardized universal list of social indicators in the context of agroforestry. The indicators would vary depending on the local context of a given community and perspectives of the local people, which necessitates the development of certain subjective indicators. Burdge & Johnson (1994) also acknowledge the difficulty to catalogue and study the true dimensions of social impacts; but at the same time they also note that there are still some basic dimensions that depict the fundamental characteristics of a community to evaluate the potential impacts from a development project.

For this study, the literature on the formation of indicators in SIA is studied (such as Burdge & Johnson 1994; ICGP 1995; King 2000; Burdge 1994 cited in Vanclay 2002; van Schooten et al. 2003). Also, literature on cultural resources, agroforestry in Bangladesh and socio-cultural dimensions of agroforestry in developing countries is studied (described in previous sections). Based on these literatures, an attempt is made here to identify and formalize a set of indicators that can relate to the socio-cultural dimensions of agroforestry systems in Bangladesh. These indicators can be used to evaluate the potential socio-cultural impacts from an agroforestry development project. These are as follows, but not limited to:

- Relationship with natural environment (King 2000)

Use of the natural environment and dependency on the natural resources by the communities for subsistence, religious, recreational or other purposes are

intrinsically their cultural expressions that reflects their material needs as well as spiritual views that shape their living. In the agroforestry context, 'agricultural environment' can be characterized as the 'natural environment'.

- Traditional/local practices and knowledge (Hoskins 1987; Muller & Scherr 1990; King 2000)

Communities have their own traditional tree planting practices and associated knowledge that are fine-tuned with the socio-cultural setting of the communities. These practices and knowledge influence their land use practices, classification of planting, the species they value, adaptation to changes etc.

- Linkages with family and friends/social networks (ICGP 1995; Vanclay 2002; van Schooten et al. 2003)

Social networks or linkages with both family and the wider community are important in agroforestry practices. These networks represent the traditional patterns of social interactions among the members of agroforestry communities that largely characterize the culture of the pertinent community. Mallick (2000) notes that, in Bangladesh, knowledge of traditional farming transfers from one generation to another generation by family kinship and learning from neighbors with whom people spend time.

- Gender (Hoskins 1987; CIDA 1995)

Gender identities and gender relations are culturally-sensitive issues. Expectations about the attributes, behaviors and roles related to men and women illustrate the culture of a community. There is distinction between women's work and men's work in many communities as well as the cultural explanation of such distinctions. Ahmed (1993) notes that, in the villages of Bangladesh, women play a more significant role in homestead-gardening compared to men, where most women are involved with livestock or poultry related works, vegetable production and vegetable seed storage; but their

participation remains limited outside the homesteads. Also, Miah & Hossain (2010) note that homestead agroforestry is a key self-employment opportunity for women in Bangladesh where they contribute to the major labor input.

- Cultural norms, values and beliefs (King 2000)

Cultural norms, values, and beliefs function as organizing principles in the ways that people work, relate to one another and organize to meet needs within a community. In agroforestry, farmers' land use practices and tree management, their work distribution inside or outside of their homes, etc. are governed by norms or traditions that prevail in the community.

- Religion (CIDA 1995; King 2000)

In many communities, religious factors may have implications for the uses of plants and farming systems. Bangladesh is predominantly a Muslim populated country with a fairly large population of Hindu people. Depending on the religion, the practice, uses and management of plants can differ. A study conducted by Miah & Rahman (2004) in two different religious communities (Hindu and Muslim) in Narsingdi district, Bangladesh revealed that religious sub-culture had an obvious effect on the green coverage, species preference and species diversity in homestead agroforestry. Hindu communities were found to have higher coverage and diversity of tree and shrubs in their homesteads than Muslim communities, as Hindu communities depend on various plant species for their religious activities and practices.

These insights from the literature are helpful to gain an understanding of the socio-cultural dimensions that can be related with agroforestry practices in Bangladesh. With considerations of this wide range of topics, through field research, the intent of this study is to refine the list of these dimensions to a subset of critical impact areas.

CHAPTER 3 METHODS

In this chapter I describe the details of the research approach, research design, data collection methods, data analysis approach and data validation strategies that guided the research. In addition, a discussion is also provided on how I impacted the study as a researcher, along with some study limitations.

3.1 Research approach

The present research is guided by an SIA framework to understand the existing socio-cultural context related to agroforestry practices and then anticipate social impacts that might arise from the project interventions in the two study communities of Narsingdi district, Bangladesh. As described in the literature review, qualitative methods can be more effective than quantitative methods in SIA field research for understanding social phenomena. To that end, I employed a qualitative approach in this research utilizing a variety of qualitative participatory methods that were required for the intensive exploration of the research objectives. These methods are: semi-structured interviews with project investigators, informal interviews with key informants, field observation, timeline, focus group interviews with local farmers, and follow-up interviews. It took me about two and a half months for primary data collection starting from November 13, 2011 to January 29, 2012 using these methods.

Within the different approaches of inquiry for qualitative research guided by Creswell (2007), a combination of case study and ethnography was used in this study. As case study research, two villages were investigated to explore the contextual setting and impacts of the improvement interventions utilizing a variety of data collection methods. Again, within this broader framework of a case study, only one particular cultural group of individuals - farmers, who are related to agroforestry practices for long period of time, was observed; thus following an ethnographic approach. To be more precise, a focused ethnography

(Knoblauch 2005) was employed in that the research was focused on a particular issue - the impacts of the improvement interventions on clearly identified communities related to agroforestry practices, and involved a shorter period of field research within more intensive data collection tools.

3.2 Background research

Prior to initiating field research, I reviewed the published literature on agroforestry including articles, books, journals and papers presented at workshops and conferences. The content of these documents allowed me to form a broader understanding of agroforestry practices in Bangladesh as well as the social context of agroforestry in developing countries. A review of SIA literature including SIA indicators, social change processes and impact, methods for SIA, and SIA within the context of agroforestry was also conducted. These insights are described in the 'literature review' chapter, and were helpful in designing the research with specific qualitative data collection methods such as interviews, focus groups and other methods, and developing draft schedules for those methods with questions to be asked.

3.3 Human ethics

The study was conducted with strict adherence to human ethics protocols. Prior to conducting my field research, human ethics approval was attained for this research from the Research Ethics Board at University of Alberta. Protocols were clearly defined for collecting informed consent, maintaining data confidentiality and privacy, minimizing risk and discomforts associated with the research participants and so on. Documents including an information sheet, consent form, introductory letter to invite participants for interviews, and interview schedules were also assessed by the Board.

At the beginning of every interview, I supplied participants with an information sheet and consent form explaining what is written in those papers,

that is, a brief description of my research, method of participation, rights as a participant and some other issues, and sought informed consent as demonstrated in the attached information sheet and consent form (Appendix A and Appendix B). In the interviews with project investigators, informed and signed consent was sought in cases with high literacy, whereas informed consent was sought verbally in the interviews with local farmers because of their varying educational backgrounds and sometimes their fear of signing any document. After they understood everything and provided their informed consent, the interview was conducted. During the session, they were free to share as much or as little information as they wanted and were also made aware that they could withdraw from the study at anytime according to their wish. When the findings from the conversations are represented, anonymity of the participants is maintained.

3.4 Research design

Based on the literature review, research methods and interview schedules were developed prior to the excursion to Bangladesh for my field research. Once I reached Bangladesh, I attained a general idea about the agroforestry improvement project in an introductory meeting with the project investigators from Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), who were designing and implementing the agroforestry interventions, and also had a chance to visit their project sites in the sub-districts of Narsingdi with them. Later on, a number of informal field visits were made. In light of the practical insights from the meeting and field visits, necessary revisions were made to my initial proposal. For instance, the investigators were focusing their activities on cropland agroforestry under the project. But initially in my research plan I was not focused specifically on this type of agroforestry. As stated in the 'literature review' chapter, farmers in the rural communities of Bangladesh practice homestead agroforestry and/or cropland agroforestry. Since

the main project was dealing with the cropland agroforestry improvement, data collected in this research focused on cropland agroforestry. With this focus on cropland, another revision was made in the methods of the study. At the beginning I was interested to conduct focus groups with men and women. But I chose to revise it when in the preliminary fieldwork I had informal conversations with local farmers including men and women, and found there is significant difference between the work distribution of men and women in cropland and homestead. Men are involved in cropland agroforestry and women do not participate actively there. Women play a larger role in homestead agroforestry (which is also reflected in the literature review). Therefore, with the particular focus on cropland agroforestry, there was a lack of women participants in the study. In addition, activities under the agroforestry improvement project had already been started in Narsingdi with several cropland agroforestry farmers who were all male as the primary project beneficiary. Based on these issues, two types of focus groups were redesigned: one with beneficiary and another with non-beneficiary cropland farmers. Accordingly, the methods and interview schedules were modified and this process of modification continued as required.

The two and a half months of data collection took place in two sub-districts, Shibpur and Belabo of Narsingdi. Data collection started at Shibpur and Belabo after a selection of two case study villages from those sub-districts, with more informal field visits, and progressed with other research methods, and ended up with focus group discussion as the principal research method. Focus group interviews were preferred as the principal means of data collection in the research, as it is a very effective method to gather diverse and extensive data on a topic incorporating a broad range of views of the participants over a relatively short period of time (Mack et al. 2005; Cameron 2010). Apart from this, the most significant rationale for using focus groups in qualitative research is that they explicitly rely on group interaction (Kitzinger 1995; Morgan 1996). This interaction creates a group effect, that is, “a kind of *chaining* or *cascading* effect

in which each person's turn of the conversation links to, or tumbles out of, the topics and expressions that came before it" (Lindolf & Taylor 2011: 183). Thus group dynamics help exploring and clarifying the data and insights in a way that might not emerge in one-to-one interviews or other research methods. As such, focus groups were designed in the research to allow discussion of the social dimensions associated with agroforestry and potential positive or negative social impacts of the project through a shared stock of views and knowledge and back-and-forth dialogue among the participants.

The whole data collection period can be generally described in two phases where the first phase involved scoping and profiling through exploration of key ideas and relevant issues utilizing a number of research methods, such as interviews with project investigators, informal interviews with key informants and timeline. Interviews with project leaders enabled understanding of the planned interventions. The informal conversations with key informants helped initiate other research methods and explore relevant issues to focus on. Also, this method, along with the timeline, allowed in-depth understanding of the socio-cultural and historical context of the research sites, with particular attention to cropland agroforestry. The second phase consisted of predicting social impacts utilizing focus group discussions with two types of groups and some follow-up interviews.

During the data collection period, I was assisted by a local field assistant who had already been appointed under the project in Narsingdi for making contacts with potential farmers who could be brought under the project, supervising the activities of local beneficiary farmers according to the guidance of the project leaders, and acting as liaison between the project leaders and the beneficiary farmers. He is a locally well-known person and also an agroforestry farmer. He helped acquaint me with the communities, become familiar with the project areas and beneficiary farmers, and locate people whom I could contact

for my research. He also introduced me to the local farmers and explained my purpose to them. After he provided those introductions, as a national of Bangladesh, it was easy for me to directly talk with the local people and familiarize myself within the communities.

It was also possible to conduct the interviews and focus groups directly by me in the Bengali language. The questions were narrated with utmost considerations of the local language and locally-used terms and forms so that the community people could easily understand the questions. All the interviews and discussions except for some informal ones were recorded with a digital voice recorder. In addition, in every field visit I took field notes, sometimes with key points when the whole conversation was recorded and sometimes with detailed information when the conversation was not recorded in case of any hesitation for recording by the participant. It helped me to keep track of the information attained. I also took photographs from time to time.

3.5 Research activities

3.5.1 Selection of research sites

Activities under the project had already been started in three sub-districts of Narsingdi - Shibpur, Belabo and Raipura, with many activities seen in the first two sub-districts. This research took place in these two sub-districts (Shibpur and Belabo), and one village was selected from each of these two for in-depth analysis.

The selection of the villages to be studied from the sub-districts was based on the accessibility of the study site for data collection as well as considerations related to research constraints (such as, time, finance). Rahman et al. (2005) selected their study areas in a similar way to conduct research on agroforestry in Gazipur. The selection of villages was based on other considerations as well, such as:

- Local people in the village have been practicing cropland agroforestry traditionally for a long period in their surroundings.
- There should be some indication of socio-cultural activity or socio-cultural impact in the village which can be observed, discussed, and documented.

Considering these criteria, two villages, Kumartek and Chitam, were selected from Shibpur and Belabo respectively, with the help of the project investigators and local field assistant.

3.5.2 Preliminary fieldworks

Data collection at the study sites started with informal fieldwork and later followed a more structured approach. A number of informal field visits were made to the study sites that consisted of field observations and casual and informal conversations with local people including local farmers (men and women) and key informants about their community and experiences with cropland agroforestry. This preliminary fieldwork provided me with a number of opportunities. It allowed me to have an understanding of the community context and their agroforestry practices, which helped me in making necessary modifications in my initial research plan. It also helped me to prepare for the other research methods (e.g. timeline, focus groups) by making myself and my purpose familiar to the local people and building rapport and trust with them, meeting with key informants and other potential participants and establishing contacts with them. Data observed from this method was also integrated and cross-checked with the data gathered from other methods.

3.5.3 Data collection procedure and sampling

3.5.3.1 Semi-structured interview with project investigators

Before going through the data collection phase in the field, in-person interviews with the project investigators from BSMRAU, who are assigned to introduce and implement the agroforestry interventions, were conducted. The interviews were semi-structured with open-ended questions that allowed me to maintain a focus on the concerned issues while also providing flexibility in response to the emerging situation (Dunn 2010). The interview schedule is included in section C.1 of Appendix C. It was conducted face-to-face with four key project investigators. These interviews were intended to gather a detailed description of the planned interventions under the project.

The participants were selected through chain referral or snowball sampling (Bradshaw & Stratdford 2010) in which the people with whom contacts are already established recommend other people to be interviewed. In this case, contact had already been established with the principal investigator of the project and he further recommended other key project personnel as potential participants.

Once I knew the potential participants, I contacted them by phone and sought their permission for the interview with due explanation of the purpose of my research, their significance as the participants, and a general idea of the interview questions and how long it may take, as guided by Dunn (2010). After an expression of initial interest, a suitable day and time for the interview was chosen for each participant according to their convenience. All the interviews took place separately in their respective office in BSMRAU. At the beginning of the interview session their informed signed consent was taken and thereafter the interview was conducted capturing it in a digital recording device. It took around one hour for each participant.

From the interviews, information about the planned interventions were prepared in diagrams to represent and share the information in easily understandable form with the community people. These materials became an important part in the focus group interviews.

3.5.3.2 Informal interview with key informants

At the beginning of the fieldwork stage, with the help of the local project assistant, I met with six key informants, three in Shibpur and three in Belabo, including a primary school teacher and social worker who are also involved actively in agroforestry practices, officials of the agricultural section in *Union Parishad* (local level administrative unit) and locally well-known and experienced farmers. I had a chance to conduct informal interviews with them in which they were asked to expand on their knowledge and experience related to cropland agroforestry in their communities.

These key informants provided firsthand information about their communities, people's experience with agroforestry practices, historical perspective of the practices, contemporary changes of the practices with some key factors of such changes, and recent dominant agroforestry practices. These interviews were either recorded if permitted or noted down extensively in case of any hesitation about recording by the participant. They referred other potential participants for focus groups and timeline.

3.5.3.3 Timeline

A timeline was created with elderly farmers from the community to gain a historical perspective on agroforestry systems. This exercise helped in understanding the community from the perspective of community members in the context of cropland agroforestry practices. The timeline involved recalling past events chronologically and capturing the major changes and transitions that took place over time (Kumar 2002). The factors that induced those changes were

also revealed. The timeline was constructed in the two research sites separately through a meeting with a small group of three elderly male farmers in each area. They were asked to describe how and why agroforestry systems have changed over time in the region in the context of cropland agroforestry.

The participants were selected using two forms of purposive sampling – referral or snowball and criterion (Bradshaw & Stratdford 2010). With the help of the key informants, the participants for the timeline were identified based on certain preselected criteria: age and length of experience with agroforestry practices. To facilitate the conversation, I followed a semi-structured interview schedule (section C.2 in Appendix C). During the meeting, the key points were noted down and then at the end these were organized in chronological order and finally read out to the participants to check if the order was appropriate. It took around 1 hour to finish the timeline session in each village.

3.5.3.4 Focus group interviews with local farmers

Focus groups were conducted with two groups of local farmers where each group consisted of not more than ten people as suggested by Mack et al. (2005) and Cameron (2010). These two groups were: (a) farmers who were not included in the project – non-beneficiary farmers, and (b) farmers who participated in the project – beneficiary farmers. This approach allowed me to capture differences in the perspectives held by beneficiary and non-beneficiary farmers. Thereby, it enabled the gathering of a more diversified array of responses and a more extended basis for socio-cultural analysis in the changing agroforestry systems. Each focus group consisted of two parts, where the first part was about current agroforestry systems and the second part was about the proposed system.

(a) Focus group interview with non-beneficiary farmers

The first focus groups included discussions with non-beneficiary farmers in the two study sites of Shibpur and Belabo separately. The focus group was conducted with eight non-beneficiary farmers in Shibpur and seven in Belabo. The participants were selected using two forms of purposive sampling – snowball and criterion. Adult male farmers were the participants in the study. Their selection was based on certain criteria such as: considerable experience and knowledge on agroforestry practices, and currently active in cropland agroforestry practices. Since the study was focused on cropland agroforestry, there was a lack of women participants for the interview as usually they do not participate actively in cropland agroforestry (explained earlier). With the help of the key informants who were contacted during the preliminary fieldwork phase, a draft list of potential participants was made. Afterwards, I met with each of them in-person, saw their cropland agroforestry activities, had a short conversation with them and then prepared a final list of participants who not only met the criteria but also were willing and enthusiastic to participate in such group discussion. The focus group was organized in two parts aiming:

> Part 1: To discuss the socio-cultural dimensions that are linked with agroforestry practices
>
> Part 2: To represent the information of planned agroforestry interventions and discuss the potential social impacts as a result of the interventions

(b) Focus group interview with beneficiary farmers

At the very initial stage of the project, there were a total of four beneficiary farmers - two in Shibpur and the other two in Belabo under the project. One focus group discussion was conducted with all four of them. This discussion was also organized in two parts:

Part 1: To know current activities of the beneficiary farmers under the project

Part 2: To represent the information of planned interventions and discuss the potential social impacts

These were guided discussions; the schedules of these two types of focus groups are attached in sections C.3 and C.4 of Appendix C. The schedules were designed in two parts with discussion-generated questions. In the case of non-beneficiary farmers, the first part involved questions pertaining to socio-cultural dimensions related with the current agroforestry systems, and in the case of beneficiary farmers, the questions were related to current activities under the project. In both focus groups, the second part included questions pertaining to potential changes and impacts, followed by some questions pertaining to general information about the participants. Before finishing, the general information about the participants regarding their age, occupation, education, household and land ownership was gathered considering that they might feel more comfortable to give this information at this stage after the conversation session than at the beginning.

Each focus group was conducted at a convenient time and place according to the participants' preference. Non-beneficiary participants preferred a 'neutral' location. Consequently, in Shibpur the non-beneficiary farmers' focus group took place at a local primary school, and in Belabo it took place in the *Union Parishad* Office. Beneficiary farmers preferred to have the discussion in the home of one of the participants. The two parts were held together on the same day as per the suggestion and convenience of the participants that lasted for 2.5 hours to 3.5 hours. I facilitated the focus group interview along with a trained note taker. It was recorded in the digital voice recorder.

Following Cameron's (2010) suggestion, I, as the facilitator initiated the discussion by giving an overview of my research and the role of this discussion in

my research and then introducing them to the themes that we were going to discuss so that they could remain focused from the beginning of the discussion until the end. Also, they were asked to add all of their own views without any hesitation and be assured that there was no correct answer from any particular person so that diverse views and dialogues could be created among the participants. Their informed consent was also taken verbally.

After this introductory phase, the discussion was guided with the questions from the two parts of the schedule. In the first part, the participants were asked certain questions pertaining to socio-cultural dimensions related to agroforestry (in the non-beneficiary focus group), and current activities under the project (in the beneficiary focus group). Such exercises explored the information pertaining to the questions, at the same time there was the highest flexibility for all other questions to be generated from the discussion as guided by the group.

After the end of first part, there was a break of 15 minutes and then the next part started. In this part, the information related to the planned interventions was shared with the participants in a form of diagram where the interventions to be taken under the project were shown in Bengali (Figure 3.1). A translation of the diagram is included in Appendix D.

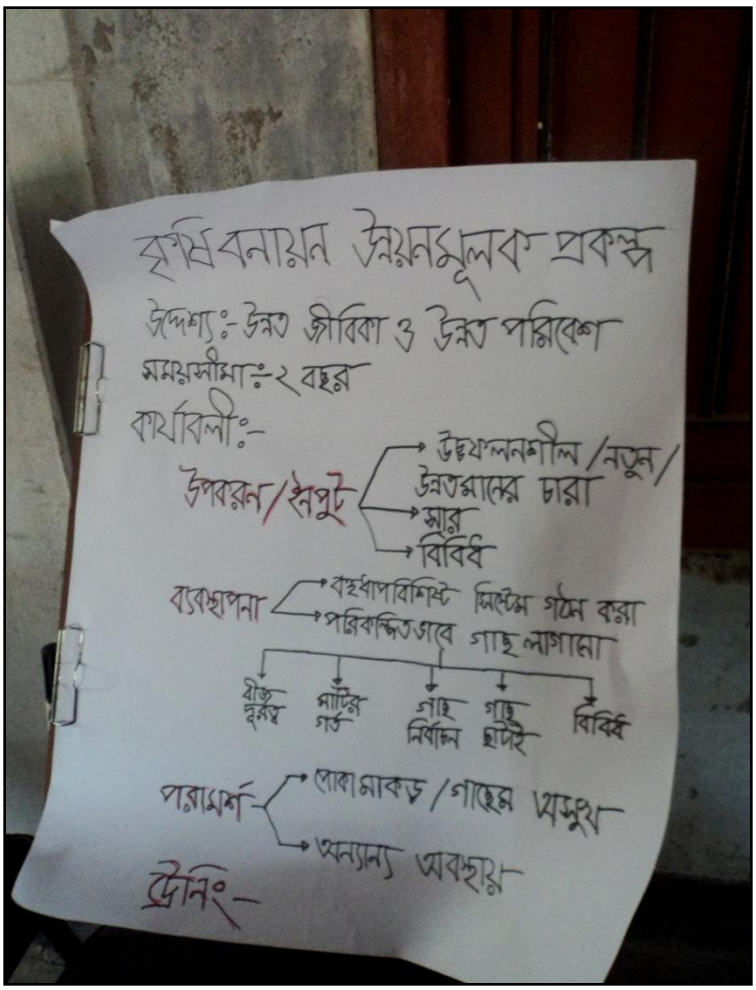

Figure 3.1: The diagram used in focus group interviews as a way of discussing impacts

With the help of the diagram, I explained the project to the participants as a way to discuss impacts. It took more effort to make the non-beneficiary farmers understand the project context than the beneficiary ones who were more acquainted with the interventions. Then they were asked to narrate their perceptions related to potential social changes and impacts as a result of these interventions, allowing them to express their answers from themselves rather than directing them towards any answers from my questions. In doing so, they were asked to compare the current situation with hypothetical future states, that is, "what is likely if there is development". Dialogues generated spontaneously among the participants while they were adding their views along

with others, complementing each other at the point of consensus and again differentiating their views at the point of disagreement.

3.5.3.5 Follow-up interview

Finally, after the completion of the focus groups, follow-up interviews were conducted in-person with four participants, including three participants from the focus groups and key informants, and one from the project personnel These interviews were attempted to generate detailed insights on the issues that emerged as important and highlighted during the focus group and key informant interview. For instance, additional investigation became necessary on the issue of current prevailing dominant agroforestry system – 'jackfruit-Burmese grape' in the region as the participants' preferences were much concentrated on that system. So arrangements were made for follow-up interviews with some participants.

3.5.3.6 Secondary data

In addition to the primary data, certain secondary data was collected from the Bangladesh Bureau of Statistics (BBS) and Soil Resource Development Institute (SRDI) to supplement the description of the study areas. A map of the study area was collected from Banglapedia through its website. Also, analyses related to agroforestry in Bangladesh, performed by BSMRAU researchers for other studies, were found in the BSMRAU library.

3.6 Data analysis

The specific data analysis procedures used within the case study and ethnography approach are described by Creswell (2007). Following that, data analysis was conducted in this research. After the completion of the data collection phase, firstly the audio recordings of all the interviews were transcribed into text version (in Bengali) by a paid transcriber. Once I returned to

Canada, I translated those transcripts into English. Then the text data was coded using a qualitative data analysis software program, NVivo, which enabled me to reduce the raw data into meaningful segments, assign tags to each segment, and organize the codes under broader categories or themes. Four main themes were developed that matched with my research focus, which are - historical perspective of agroforestry practices, current dominant agroforestry system, socio-cultural dimensions related to agroforestry practices, and social impacts of development project. All the codes were grouped under these themes. Then, data within each theme was examined to find similarities and differences across the two case study sites and responses of different categories of participants (e.g. between beneficiary farmers and non-beneficiary farmers).

Creswell (2007) recommends that data analysis can be represented in three phases for ethnography and case study – description, analysis and interpretation of the case/culture sharing group. In lieu of this, first a detailed description of the setting of each study region and project was prepared which is presented in the 'study setting' chapter, followed by the outcome of analysis as presented in 'results' chapter, and finally interpretation in the light of the literature review and *lessons learned* as presented in 'discussion' chapter.

3.7 Data validity and reliability

Reliability and validity are the crucial criteria for evaluating the design and findings of qualitative research. Throughout the course of the research a number of strategies were used to enhance its reliability and validity. Local farmers were selected purposefully on the basis of their agroforestry expertise and knowledge so that they could act as 'information rich cases' (Baxter & Eyles 1997). Also, a relation of trust and rapport was built with the participants, and their willingness and enthusiasm was considered for participating in the interviews. This process encouraged them to contribute at their maximum rather than providing any partial accounts of their experiences. Hence the gap between

what they reported and what actually happened was minimized (Baxter & Eyles 1997). Another thing is, there was no language barrier between the participants and me, and I communicated with them directly in local language and locally used terms - that added further reliability.

Triangulation, that is, application of multiple methods such as observation, interviews, focus groups, recordings and other methods was used in the research to strengthen both the reliability and validity of the findings (Golafshani 2003). For instance, the key issues that emerged in focus groups were triangulated with the inputs attained from preliminary fieldwork including informal interviews with key informants, and a consistency was found among those methods in terms of key findings.

Inquiry audit where both the process and the product of the research are examined for consistency, also improved the validity of the research (Lincoln & Guba 1985). As explained by Baxter & Eyles (1997), graduate student–professor supervisory relationship could be considered as a way of inquiry audit. From the onset of the research, my supervisors at the University of Alberta helped me to evaluate and decide matters related to research design such as participant selection, methods used, data analysis and interpretation techniques; this minimized idiosyncrasy in the design and interpretation of the research.

3.8 Reflexivity

Qualitative researchers are themselves an instrument of the research and therefore reflexivity is required. Reflexivity, defined as “self-critical sympathetic introspection and the self conscious analytical scrutiny of self as researcher”, is a way to write self into the text (Mansvelt & Berg 2010: 344). By employing this concept, I will acknowledge my interests, perspectives, experiences and roles that influenced the research.

My involvement in this research began with my keen interest in engaging in a research that is going to take place in Bangladesh, which is my home country. I have grown up in Dhaka, the capital of Bangladesh, and finished my undergraduate study there, and later came to Canada to pursue my Master's degree.

Throughout the research process I have made several choices. My academic experiences and personal preferences are reflected in some of those choices. For example, I was influenced in determining the guiding framework of the research - Social Impact Assessment (SIA), by my academic experiences. One of my graduate level courses was on SIA that included theoretical knowledge on SIA as well as practical experience through a class project. This academic experience created a huge interest in me and motivated me to think along this line.

In the choice of research approach, I preferred to work with qualitative methods. During my undergraduate studies, I conducted a number of class projects where some were based on quantitative approach and some on qualitative, and I found that it is qualitative research that interests me most because it is how I get the opportunity to explore the issues of concern from practical experience and I can talk with people directly and learn from them in their context. This previous experience built up my desire to work directly with people using a qualitative participatory approach.

Another example of how I influenced the research can be reflected in the fact that I am a young Bangladeshi female university student. Being a young Bangladeshi female student who has gone to Canada for higher study, I was much appreciated by the local people and they were very respectful to me. They trusted and accepted me within their community easily. They were very cooperative to me and willingly participated in the interviews. But at the same time, as a female, I had to be accompanied by anyone always during my

fieldwork due to security reason. Also, I did not do any movement outside after dusk during my stay in the study villages due to the social norms and values that prevail in the villages.

3.9 Limitations of the study

In this study, focus group interviews were used as the principle means of data collection. Generally speaking, focus group participants are not representative of the population in a community and also the results from focus groups do not necessarily represent the perspectives of the whole community. The group may influence the data it produces. To minimize these limitations, a number of methods were utilized in the study so that data could be triangulated and main themes pulled out through the use of other methods.

While conducting focus group interviews, sometimes the opinions of a participant influenced other participants and they moved quickly towards a general consensus. For example, in a focus group, when they were asked what could be the impacts as a result of the agroforestry improvement interventions then biasness was created among the participants; one participant talked about the economic benefits and all other participants also supported it without giving much more thought into other insights. It became difficult to mitigate the bias within the group, and a deadlock situation occurred for a while when participants got confined in one point and no more views were coming up. However, an attempt to overcome this situation involved probing questions and an invitation to thinking about issues from multiple perspectives. This approach helped to break open a more diverse conversation on the topic.

Another limitation of the study is related to women participants in the interviews. Given the absence of female beneficiaries in the agroforestry improvement project, and a lack of women farmers actively working in cropland agroforestry, only the male participants were included in the interviews. In doing

so, I did not go into detail to identify whether there is any indirect involvement of women in cropland agroforestry or any indirect impact on women that could be identified in relation to the project. This limitation requires further study.

Furthermore, I could not conduct a large number of interviews due to time constraints. Therefore I put emphasis not on the number of participants but on few participants who could contribute to the narrative and provide more in-depth insight into the impacts of this agroforestry project.

Though residents of the study area were very helpful and cooperative in providing information, sometimes it was challenging to make them understand exactly which type of information was necessary. It is due to the nature of the data needed. It is quite difficult to describe a non-material thing like socio-cultural issues. Community residents are embedded within this socio-cultural context for years but they never thought to describe it in a specific way.

For the preparation of the timeline, some difficulties arose when the participants could not recall the exact time period of different transition situations in the history of their agroforestry practices.

The research work was conducted during winter (November 2011 - January 2012) when there were no fruits or crops in the agroforestry fields. The study could be enhanced if a field visit could be arranged in summer (June - July, 2012) as this is the fruit season in Bangladesh when all the major fruits (e.g. jackfruit, mango, Burmese grape) grow and ripen and farmers spend their high time of activity both economically and culturally. This timeframe could improve the observation and findings related to the socio-cultural activity embedded with the cropland agroforestry systems. Given the time allowance for an MSc. thesis and financial constraints, it was not possible to make this arrangement.

Furthermore, I collected the data from one study district. The study could be more strengthened if I could collect data from one more district which is

under the project and undergoing the same process such as Gazipur and Khulna district. Then it might be possible to delineate which findings are unique in the context of Narsingdi and which are common with other districts and this comparison could provide a more meaningful representation of findings in a broader context. But it was again delimited by constraints like time and resources.

Despite these limitations, the study offers an attempt to introduce an SIA approach within an agroforestry development project with attention to intended and unintended social consequences.

CHAPTER 4 STUDY SETTING

With my goal to understand the socio-cultural impacts of agroforestry improvements in Narsingdi district, it is important to describe the context of the project as well as the study region. Hence, in the first section of this chapter I focus on elaborating the project context with detail on its background, goal, designed interventions and ongoing activities. The information was attained from the interviews with the project investigators and the Inception Report of the project. In the second section of the chapter, with a brief introduction to Bangladesh, I discuss the two regions of Narsingdi where the research took place with their spatial, demographic, social and economic characteristics. Preliminary fieldworks, informal interviews with key informants and secondary sources are the sources in writing this section.

4.1 Context of the agroforestry improvement project

The present study was generated under the umbrella of a project on 'Improvement of Agroforestry Practices for Better Livelihood and Environment'. This project is designed and implemented by Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), with technical assistance and advice provided by South Asia Regional Office of the World Agroforestry Centre (ICRAF). The project duration is two years starting from June 2011 to June 2013 with funds allocated by the Sponsored Public Goods Research (SPGR) program of Bangladesh Agricultural Research Council (BARC), an autonomous organization under the Ministry of Agriculture, Government of Bangladesh. The project has proposed the development of existing agroforestry systems through scientific innovations in three areas of Bangladesh, namely Gazipur, Narsingdi and Khulna.

The goal of the project is stated as "poverty alleviation and environmental enrichment through agroforestry" under which the objectives are: (a) to develop/improve the agroforestry systems for maximizing production

and income through utilizing improved technologies, and (b) to examine/quantify biological (production), economic and environmental advantages achieved through the new interventions (Miah 2011). These objectives are expected to be attained through certain intended changes that are likely to take place due to the project: (a) increase in production and income of the beneficiary farmers by about 25%, and (b) change in living standards by about 20% and improvement of soil health and micro-environment by about 10% by the end of the project (Miah 2011). With these objectives it is apparent that the project is emphasizing economic and biophysical concerns, while there is an absence of attention to social concerns. This present study addresses this absence.

With the intended changes in respect to the two objectives mentioned above, the project investigators/scientists from BSMRAU plan to develop some cropland agroforestry demonstration plots in the beneficiary farmers' lands; and expect that once the new systems are developed and the beneficiary farmers start getting benefits from it, other farmers of the locality will become motivated to adapt the new systems in their own lands. Thus the results and successes of the project will spread. They also expect that the demonstration fields under the project will be established as research fields for ICRAF, and additionally the university people can work in these fields in the future.

In this project, the project scientists are working particularly with cropland agroforestry. As explained by them, cropland agroforestry has two main components – trees and crops, and people can easily replicate this type of agroforestry system in their own lands by observing the demonstration plots, whereas homestead agroforestry is complex both in terms of design and farmer's choices. Every homestead is unique in its agroforestry practices and the micro-sites of each homestead (approach road, front yard, backyard and boundary) are used differently in different homesteads. Therefore it becomes

difficult to implement or extend any common design or management practice to every homestead and thus it will not help other people following the same thing, added by them. They further explained that, as their objectives focus on income improvement, cropland is a better option which is more directly related to economic returns or commercial purposes than homestead.

As part of the project, the project investigators have targeted to work with around 50 cropland agroforestry farmers as beneficiaries where some farmers will be helped to establish new orchards in their fallow or unproductive land and the rest will be helped to improve their existing orchards with new agroforestry systems/interventions through a 'scientific' approach. According to the project scientists, farmers lack knowledge on certain management practices, use of high-yielding species, and selection of appropriate tree-crop combinations within the traditional agroforestry systems; and as such the production is low while there is much scope to improve system productivity. Therefore, with the scientific approach, the project scientists are intervening in three aspects: (a) improving management practices, (b) replacing traditional varieties with high-yielding varieties and (c) developing a multi-strata system.

Improvement of management practices include: preparing land for planting (weeding, making appropriate size of holes for planting seedlings), applying fertilizers and irrigation according to soil conditions, planting trees in planned ways (maintaining distance between trees/crops, selecting suitable tree-crop combinations), tree pruning, controlling insects and other issues. Soil tests are conducted for determining appropriate soil management. Figure 4.1 depicts the activities of farmers under the project where they had already prepared the land by cleaning the weeds and previously grown turmeric, and now are engaged in planting middle-sized species (citrus) and crops (tomato) under jackfruit trees with the considerations of distance between the species, pit size for planting seedlings, fertilizer and other advice prescribed.

Figure 4.1: Farmers started developing crop and middle-sized species strata

Secondly, under the project it is preferred to introduce high-yielding varieties of some locally well-known species such as lemon (*Citrus limon*), guava (*Psidium guajava*) and jujube (*Ziziphus mauritiana*) as well as high-yielding varieties of some new species that were not cultivated before in Narsingdi. The new species include two citrus species – orange (*Citrus sinensis*) and mandarin orange (*Citrus reticulata*). However, under the project a local species in high demand, Burmese grape (*Baccaurea sapida* Muell.Arg.), is not promoted. One project investigator explained their point of view in this regard. According to him, it requires 5-6 years for the Burmese grape tree to bear fruit, but the project people have to show the result of their interventions quickly to the local people, so they have promoted those species which require less time to bear fruit. According to another project investigator, Burmese grape was not included because annual crops cannot grow under the shade of Burmese grape, and it would not be an improved agroforestry system without the presence of annual crops. He also added that farmers are already growing Burmese grape, so they

rather preferred a diversified production system, and therefore promoted new citrus species that are not cultivated in the region but are suitable to grow.

Finally, another aspect is to develop a multi-strata agroforestry system. In the project area, generally farmers have two-storied agroforestry systems consisting of perennial tree species and annual crops in the croplands. Under the project it is intended to introduce a species as the middle story species such as lemon, mandarin orange or guava, and thus to develop three-storied agroforestry systems in cropland with this new intervention. Figure 4.2 shows a demonstration plot under the project where the multi-strata system is introduced with the incorporation of citrus species in the middle story. Figure 4.3 provides a closer look to the banner from that demonstration plot that illustrates the information related to the project (project name, goal, funding and implementing body as described earlier), previous two-storied agroforestry system in the land and the introduced changes under the project.

For implementing these new systems or interventions, they have selected beneficiary farmers based on some criteria, mainly: (a) they have land available, (b) their lands are well accessible alongside the road, (c) their lands have suitable jackfruit tree density under which other trees and crops can be incorporated, and (d) they have water available for irrigation. After that, the farmers were contacted and asked if they are interested in working under the project following the instructions provided by the project scientists. Sometimes, it was not easy to convince the farmers because they did not believe that the project would be beneficial for them or that the project would continue. But later they agreed to participate when they were assured that the project is a research project that would increase their income, and they would fully retain the ownership and yields of the trees planted under the project.

Figure 4.2: One demonstration plot introducing multi-strata agroforestry in cropland

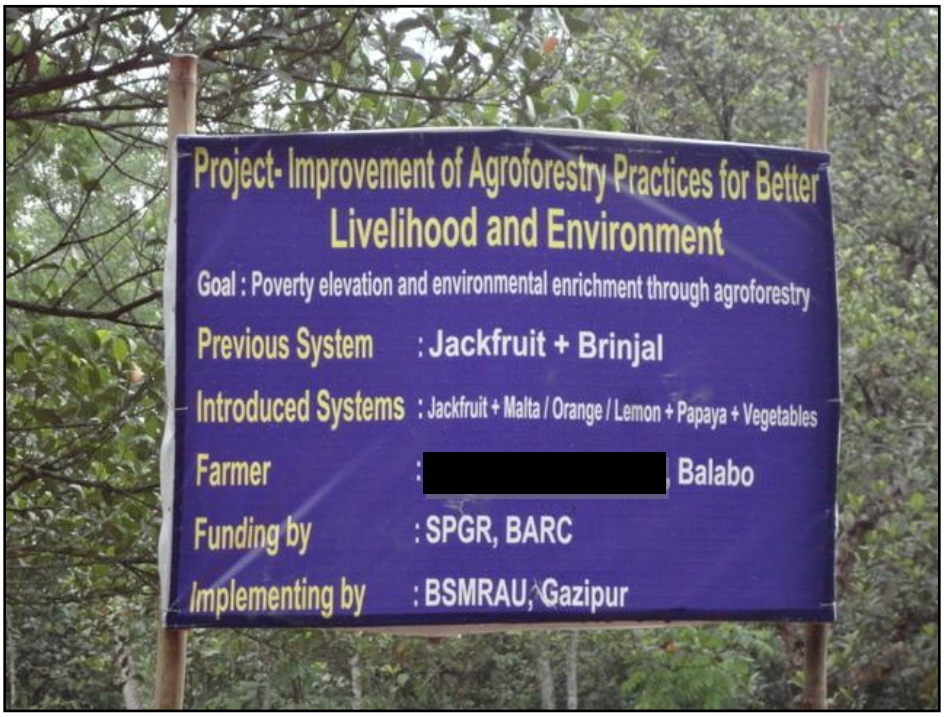

Figure 4.3: Banner in the demonstration plot showing the introduced changes

Afterward, these farmers were given inputs such as quality seedlings, fertilizer and training on management practices free of cost under the project. All labor for planting, irrigation and protection were the responsibility of the farmers.

When the field data for the study was collected, activities under the project had already been started with five farmers as the beneficiaries in Narsingdi district. The beneficiaries were from three sub-districts of the district – Shibpur, Belabo and Raipura where there were two beneficiaries in each of the first two sub-districts and one beneficiary in the last sub-district. A significant amount of project activities was running in Shibpur and Belabo.

4.2 Study regions

The study was conducted in Narsingdi district, Bangladesh. Bangladesh, a small country of 147,570 square kilometres located in South Asia, which emerged as an independent country in 1971. Dhaka is the capital city of the country. It is surrounded by India in its north, east and west side, Myanmar in East and the Bay of Bengal in the south. It is in the low lying Ganges delta with hundreds of rivers flowing through the country. While the country mostly consists of fertile floodplain land, there are also some hilly regions and highland areas (BBS 2011b). It is a developing country with more than 75% of the population living in rural areas (BBS 2011a). Most rural people are directly or indirectly engaged in a wide range of agricultural activities. Though there is an increase in industrial and service activities in recent times, still the economy is primarily based on agriculture. The majority of the population are Muslim (88%) by religion and over 98% speak the Bengali language (BBS 2011a). The country is divided into seven administrative divisions with each subdivided into several districts. Each of the districts is further subdivided into several sub-districts. In the rural areas, the sub-districts are called *Upazila* that consist of several unions, with each of the unions further divided into several villages, where villages are the smallest administrative unit.

Narsingdi is one of districts under Dhaka division, Bangladesh. The present study was conducted in the Shibpur and Belabo sub-districts of Narsingdi. These regions were chosen because these are the project sites of the agroforestry improvement project; particularly the terrace ecosystem areas of these regions are covered by the project. Shibpur covers a total area of 207 square kilometres and consists of 196 villages in 9 unions. Belabo has an area of 118 square kilometres and consists of 99 villages in 7 unions (BBS 2007a). Two villages were studied from each of these two sub-districts (described in the 'methods' chapter). The study village from Shibpur sub-district was Kumartek which is under Joynagar Union, and the study village from Belabo sub-district is Chitam which is under Bajnabo Union.

4.2.1 Spatial characteristics

Both of the study regions are located at the north-east side of Dhaka city - Shibpur is about 56 kilometres away from Dhaka city and Belabo is about 79 kilometres away. Both sub-districts are situated in the proximity of Dhaka-Sylhet national highway, which acts as the main gateway to the other parts of the country. Also, there are rivers around the sub-districts that play a significant role in the communication from these two regions to other places. Figure 4.4 depicts the map of the study district delineating its sub districts and other important features such as the national highway with the thick red line. In the inset, the position of the district is shown within the map of Bangladesh.

Figure 4.4: Map of the study district, Narsingdi (Source: Sarkar, 2006)[1]

The two sub-districts consist of two ago-ecological zones - Madhupur tract zone and floodplain zone. About 37% of the total area of Shibpur and 35% of the total area of Belabo lie in Madhupur tract (SRDI 1991; SRDI 2003). The selected two study villages from the sub-districts are under the Madhupur tract zone characterized by distinct topography being a terrace, generally standing one to ten meters above the adjoining floodplain. Abundant lush greeneries are

[1]This image has been produced and included in this research paper for the purpose of review under the s.29 Fair Dealing provision in the Canadian Copyright Act.

visible throughout the terrace areas that contribute towards a comfortable environment in the regions. Like other parts of the country, the two sub-districts enjoy sub-tropical monsoon climate with the effect of predominantly three seasons, namely monsoon (July to October), winter (November to February) and summer (March to June) (SRDI 1991; SRDI 2003). Monsoon is characterized by heavy rains with most of the rainfall of a year occurring in this season, winter is dry and cool, while summer comes with high heat and humidity. Both the regions have fairly similar temperature conditions with an average annual temperature of 26 degree Celsius, while an average minimum of 19 degree Celsius is found in January, and an average maximum of 29 degree Celsius is found in May (SRDI 1991; SRDI 2003). The amount of rainfall varies slightly between the two regions. Shibpur faces an average annual rainfall of 1876 millimetres of which 86% occurs during monsoon, while in Belabo the average annual rainfall is 2355 millimetres of which 94% occurs during monsoon (SRDI 1991; SRDI 2003).

The terrace areas consist of uplands locally called “chala” and low valleys locally called “baid” (SRDI 1991; SRDI 2003) shown in Figure 4.5 and Figure 4.6.

Figure 4.5: Landscape with uplands and lowlands

Figure 4.6: Land elevation with uplands and lowlands

The uplands are dissected by the valleys where substantial level uplands remain between the valleys, but sometimes there is also rolling topography of low relief (SRDI 1981). The valleys are flooded by rainwater during the monsoon whereas the uplands cannot hold the rain water. The soil of the uplands is characterized as deep, friable, well drained, clay loams to clays with variation in color from red to yellow-brown. In the adjoining valleys, it is grey silty clay loams to clay (SRDI 1981).

The land-uses of the regions are mainly determined by the elevation of the land in relation to flooding and availability of soil moisture (SRDI 1981). Thus a difference in types of vegetation can be seen between the uplands and the valleys. The key informants such as agricultural officers of respective *Union Parishad* (local administrative unit) enriched the understanding of land-uses in the uplands and valleys. Fruit trees such as mango, jackfruit, litchi, jujube, olive, pineapple, banana, Burmese grape etc. are common in well drained soils of the uplands. Therefore a variety of fruit species is grown in each farm there either in cropland or homestead. Under the big fruit trees (such as jackfruit, mango, litchi) various types of spices (such as turmeric, ginger), vegetables (such as cucumber,

sponge gourd, chilli, papaya, eggplant/brinjal, bitter gourd) and fruit species (such as lemon, pineapple, Burmese grape) are grown (Figure 4.7 and 4.8), and irrigated by simple hand methods or using power-pumps or hand tube-wells. On the other hand, agricultural practices are different in the valleys than in the uplands. These valleys can support growing rice in flooded conditions. So rice is the main crop in the valleys where two varieties of rice are grown successively in a year. These crops are Aman rice and Boro rice, and sometimes vegetables are grown as interim crops in between the plantation of the two rice varieties (Figure 4.9).

Figure 4.7: Cropland agroforestry with jackfruit, Burmese grape and eggplant in the upland of Shibpur

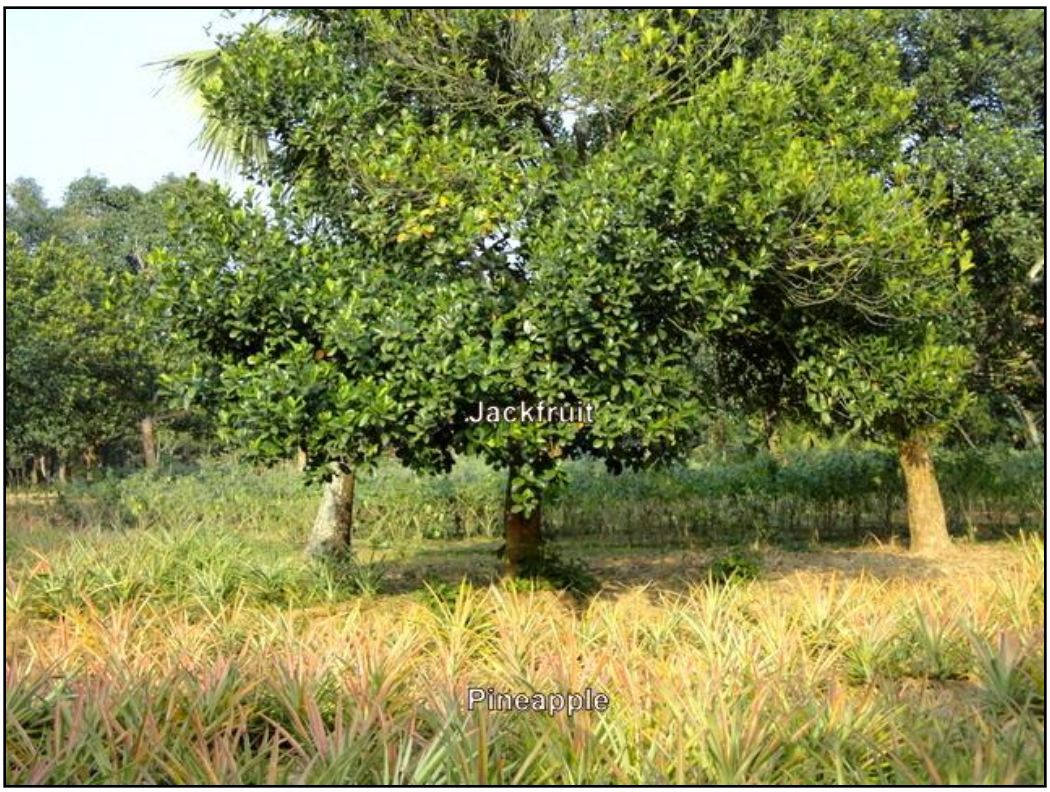

Figure 4.8: Cropland agroforestry with jackfruit and pineapple in the upland of Belabo

Figure 4.9: Rice cultivation in the low valleys

4.2.2 Demographic characteristics

According to the census of 2001, the population of Belabo and Shibpur are 164,038 and 265,177 with a population density of 1,394 persons per square kilometre and 1,282 persons per square kilometre respectively (BBS 2007a). On average, people have small land-holdings in these regions where per person land availability is only 0.25 acres (0.1 hectares) in Belabo and 0.22 acres (0.09 hectares) in Shibpur (SRDI 1991; SRDI 2003).

The study villages are very small rural communities. Kumartek, the village from Shibpur, covers an area of 200 acres where 106 households with a population of 479 reside. Chitam, the village from Belabo, constitutes an area of 219 acres that holds 167 households with a population of 766 (BBS 2007a). However, according to the community people, the population of the communities has significantly increased within the last ten years. The literacy rate of Kumartek and Chitam are about 36% and 22% respectively for the population of 7+ years (BBS 2007a).

4.2.3 Social and economic characteristics

The two communities share similar social, economic and cultural contexts. Though the communities seem to be homogenous, a closer inspection into the communities reveals that there is a combination of people from different social characteristics such as poor to wealthy, illiterate to highly educated, and Muslim and Hindu. They irrespective of occupation, economic status, education status and religion live collectively. A sense of unity prevails among all the community members. They are concerned about the issues, developments and problems related to their villages.

In both villages most households depend on agricultural activities for their income. But some are also engaged in non-farm activities such as business, service, non-agricultural labor (e.g. rickshaw/local van pulling, construction

worker) and others. In addition, it is found that many earn from multiple income sources. In such cases, agriculture is their main source of income but as well as they are involved in other economic activities too.

In recent years, the income of many households has increased. It is mainly due to the increase in remittances from people who have gone aboard for work (especially in the Middle-east countries) and the increase in selling agricultural products to other cities and outside countries. Also, there are rural-to-urban migrations where some people move to the cities, particularly Dhaka city to work and have higher opportunity to earn income in different non-farm activities than are available in the village. However it is also observed that many migrants to the urban areas come back to the villages to work on their agricultural lands at certain times. These people acknowledge the farm activities in own land as an 'independent' job, and realize that they can earn the same or even more from their land-holding while it enables them to stay in their own village context with their families. It marks the significance of agricultural activities in the villages that acts as a pathway for their economic as well as social life.

In both study villages, stratification is observed in terms of ownership of agricultural land-holdings. A majority of the population owns agricultural lands in small and fragmented amounts (.05 acre to 2.49 acres), about 80% in Kumartek and 78% in Chitam (BBS 2007b). Beside this, in the two extremes, there are some well-to-do people (about 7% in Kumartek and 13% in Chitam) who own substantial amount of land (above 2.50 acres), and there are landless people (about 13% in Kumartek and 9% in Chitam) who may have only a very small portion of homestead area but no farm-holdings (BBS 2007b). Most of the landless people work as sharecroppers or day laborers in others' land.

Apart from lands used for agricultural purposes, the other dominant land-use in the upland is residential. People have developed their habitations in the

upland in a clustered manner. There is a mix in the types of housing where some houses are made of brick and some are of soil (Figure 4.10 and Figure 4.11).

Figure 4.10: Red soil made house

Figure 4.11: Brick made house

People have built their houses in their own lands and all are one-storied. Usually the type of building materials used depends on the financial condition of the people. Generally the prosperous and well-to-do families own brick-built houses whereas poor and low-income people build house using red soils of the uplands. However, all these types of houses are intermingled within the study villages.

The people of the villages enjoy a certain amount of infrastructure of which the significant ones are roads, electricity and local markets. The Dhaka–Sylhet national highway acts as the main link from these regions to the other parts of the country including the capital, Dhaka. Within the sub-districts there are well developed paved regional road networks. The villages also have internal local road networks, where some are paved and some are unpaved. The inhabitants usually move from one place to another by walking in case of very short distances. They usually use local vans or rickshaws for long distances within the villages.

Local markets are important places for the rural folks. There are a number of markets operated by government through leasing mechanisms as well as markets that are developed from local initiative. Morjal Bazaar (market) is in the closest vicinity of the people of Kumartek, about 5 kilometers away from Kumartek and about 10 kilometers away from Chitam. It plays a central role for selling the products in Kumartek. In Chitam, people usually go to Amlabo Bazaar, Belabo Bazaar, Puradia Bazaar and some also come to Morjal. Morjal is frequently mentioned by the rural people as it stands just beside the Dhaka-Sylhet highway. However, some people prefer selling their products in the market whereas some people prefer selling their products directly from the farm gate to wholesalers.

There is electricity connection in the villages, but not all households avail the facility. 40% households have electricity in Shibpur and 24% of households have electricity in Belabo (BBS 2007a). The increase in income in recent years has

enabled the residents to enjoy the facilities of modern amenities like television, and refrigerators.

However, these small rural communities are in a transitional phase due their proximity to the Dhaka-Sylhet national highway. Both, the easy accessibility with Dhaka city and the increase of income in the communities in the recent years, have led to the import of various aspects of urban culture into the life of the rural people in the villages.

CHAPTER 5 RESULTS

In this chapter, the results of the study are organized in four sections. In the first section, I begin by describing a history of the two study communities that depicts the changes that are taking place in their cropland agroforestry practices. In its continuity, I discuss the agroforestry system that is becoming more important to these communities in the second section. With an understanding of this changing scenario, I then discuss the socio-cultural dimensions that are related to their agroforestry practices, followed by social impacts that might arise from the introduction of the new agroforestry interventions (described in the previous chapter) in the last section.

5.1 Historical development of cropland agroforestry systems

A timeline was created with participants of the two study communities. The timeline enabled a collective understanding of the developments and changes in their cropland agroforestry practices from historical contextual perspectives. It also enabled an understanding of the factors that expedited agroforestry changes. Though few differences were noted in the cultivation pattern between the two communities during the 1970s, research shows that both communities share a similar history as described chronologically in the following paragraphs.

In the past (more than 100 years), people used to cultivate in lands which had favorable conditions for growing rice, the staple food of the country. As the soil of the uplands cannot hold adequate rain water, people did not pay attention to it. They had an abundance of lands in the low valleys where they could grow rice in irrigated conditions. The population was very low; they had less demand and grew paddy only for their subsistence. The social condition of people during those days was described by a participant in this way:

Our grandparents were in shortage of money. They had large amount of land but the return out of the land was low. Though the return was low, they could meet up their needs but they did not have cash in their hand. They lived by meeting up basic necessities. They did not lead a luxurious life.

During this time, there were naturally grown dense bushes and reeds (*Phragmites australis*) having an appearance like jungle with a few jackfruit and mango trees in the uplands. People used the reeds for making the roofs of their houses and gradually started growing some fruit trees specifically jackfruit realizing the climatic suitability of growing these trees in the uplands. These fruit trees met their need for fruit for family consumption and the wood of the tree was an extra benefit to them.

Over time, there have been several changes in their agricultural practices and they have adapted to growing different new crops and species in different time periods. As the population grew, so grew the demand for food which forced people to start cultivation significantly in the uplands. From the 1950s, people started to grow taro and turmeric under the jackfruit and mango trees. Along with those species, later on there was an increasing trend of growing peanuts because of its high return over a relatively short period of time. But after some years farmers stopped growing peanuts because it needed extensive monitoring on the fields during the night as jackals ate up the peanuts and destroyed the fields. Also, the condition for the cultivation of peanuts became unsuitable as it requires substantial sunlight but the increased density of trees reduced the availability of sunlight on the farmland. These were the traditional agroforestry practices in the early memories of research participants in both of the study regions.

After this period, a variation between the two regions was noted by the participants in terms of diverging preferences for agroforestry crops under the

jackfruit trees. Farmers of Shibpur took the advantage of tube-wells for irrigating their lands to grow more vegetables such as eggplant, flat beans, green pepper and other vegetables when it was introduced during the 1970s. The production of vegetables was further prompted by the introduction of electricity at the end of 1980s that enabled the use of low-lift power-pump for efficient irrigation purposes. People started to grow new varieties of vegetables such as red spinach and Malabar spinach with this improved irrigation facility. In Belabo, the trend was a little different during the 1970s, where farmers started to concentrate on growing pineapple. At this time, an influential person of Belabo brought pineapples from another region, started cultivating it and later on the cultivation spread around the sub-district because of its low investment, limited care requirements and quick return on investment. It is in this time period when people started to sell their surplus crops and fruits.

However, during the 1980s, with the increasing human population, fragmented and small land condition from one generation to another and increased price of basic commodities, a significant change is noted by the research participants in the form of a transition from subsistence crops to more cash crops. They started to produce jackfruit, vegetables and pineapples commercially. This change was largely catalyzed by significant infrastructural developments that took place during that time period (such as the Dhaka–Sylhet national highway in 1985 and electricity at the end of 1980s). More recently the development of internal road networks during the 1990s also influenced the change. With the highway development, agricultural products could easily be transported to various parts of the country and so farmers started to obtain higher prices for their products. Before this time, the only way to carry the products for selling purposes to other parts of the country was by river which took longer time, cost more and above all was not convenient. People had to carry products to markets with great difficulty as the internal road network was also not well developed. When the internal road network expanded it was the

foremost turning point for selling products that enabled farmers to carry products easily to markets using local vehicles. Also the wholesalers could buy products directly from the farmers. According to a participant:

> *Before, people did not have the scope for doing this [cash crops]. There were no roads, no power-pumps. They do not have any experiences regarding this. There were less people. Now, when they got the scope, they have started this kind of farming [cash crop production] for the increased income.*

More recently, during the 1990s, Shibpur farmers have turned to growing Burmese grape more than any other commercial crop. As Burmese grape trees grow, vegetables cannot grow in the land under the shade of the Burmese grape tree. Thus the increased cultivation of Burmese grape has brought a change in the agricultural practices in the region with a decreased production of vegetables (Figure 5.1). It is not a new species to the region where it has been growing for long in many homesteads with other diverse species for household consumption at a very small scale (one or two trees). But its cultivation expanded significantly when two persons from nearby villages started growing it on a large scale in the 1980s with large commercial returns. When people saw their profits, it created a widespread reaction among the farmers of the nearby villages and they followed them to grow Burmese grape extensively. In addition, the development of the Dhaka–Sylhet national highway has prompted the expansion of the cultivation. Particularly for Burmese grape, the communication network is very important because farmers need to sell the fruits quickly after collecting those from the trees or else the fruits become discolored. Good marketing facilities have also developed alongside the highway to transport the fruits outside the region.

Figure 5.1: Jackfruit-Burmese grape based agroforestry system, densely grown and unsuitable for growing vegetables

In Narsingdi, Burmese grape grows better than in other parts of the country. Media also played a significant role in spreading the success of growing Burmese grape in the region. As a result, Burmese grape is now grown as a major agroforestry crop along with jackfruit in Shibpur. Though pineapple has been more popular in Belabo, Burmese grape has gained popularity in Belabo in recent years as the farmers realized that cultivation of pineapple leads to reduced soil fertility. Consequently, from Shibpur the trend of growing Burmese grape is expanding significantly in Belabo taking the place of pineapple. During the last few years, farmers are also growing some timber trees such as acacia and eucalyptus in their lands.

However, with the increased production and income situation since the 1980s, the participants made comparisons between the condition of their previous generations and the present time. Though this increase has improved

the socio-economic condition of farmers, it has brought some adverse effects to their croplands. High production has increased the demand for chemical fertilizers and pesticides, while before people used to produce less to meet their needs and required to use only natural fertilizer. Also, previously, there were a small number of trees on the land but the production from each tree was higher than that of present. Gradually, the soil fertility was also decreasing due to excessive cultivation. Besides, not only land, there have been some impacts in their social life too. As farmers have started to produce and earn more, they have also started to spend more for their increasing demand, especially demand for luxurious goods. People led a simple life before but life has become very complex with changed situation. A participant commented on the change in the society in the following way:

> *Now there are improvements. But price of everything has increased. Now people have more money but they need to spend more too. So they cannot manage now. Before, people had lesser income but they had fewer expenses too. They could live happily by depending on the nature. They were poor then in a sense that they did not have that much cash money; but they could maintain their life by fulfilling their needs. Now people earn more but as they need to spend more, they cannot save anything.*

From the above discussion on cropland agroforestry, it can be said that significant transitions have taken place in the history of cropland agroforestry practices as shown in Figure 5.2. This system is based on mainly two components, and between the two, jackfruit as main tree component has remained unchanged over time while changes are taking place for crop components. At present, Burmese grape is considered as the main crop component. Changes have been accelerated by population pressure, infrastructural developments such as roads, electricity and market facility and

some other factors. Change has also taken place in the communities from subsistence towards more cash crop production. On the other hand, in homestead agroforestry, people have been involved in multi-strata cropping from time immemorial. The composition and number of species in the multi-strata system become diverse and dense over time because it is seen that people of every generation plant more trees in addition to the trees grown by their previous generation.

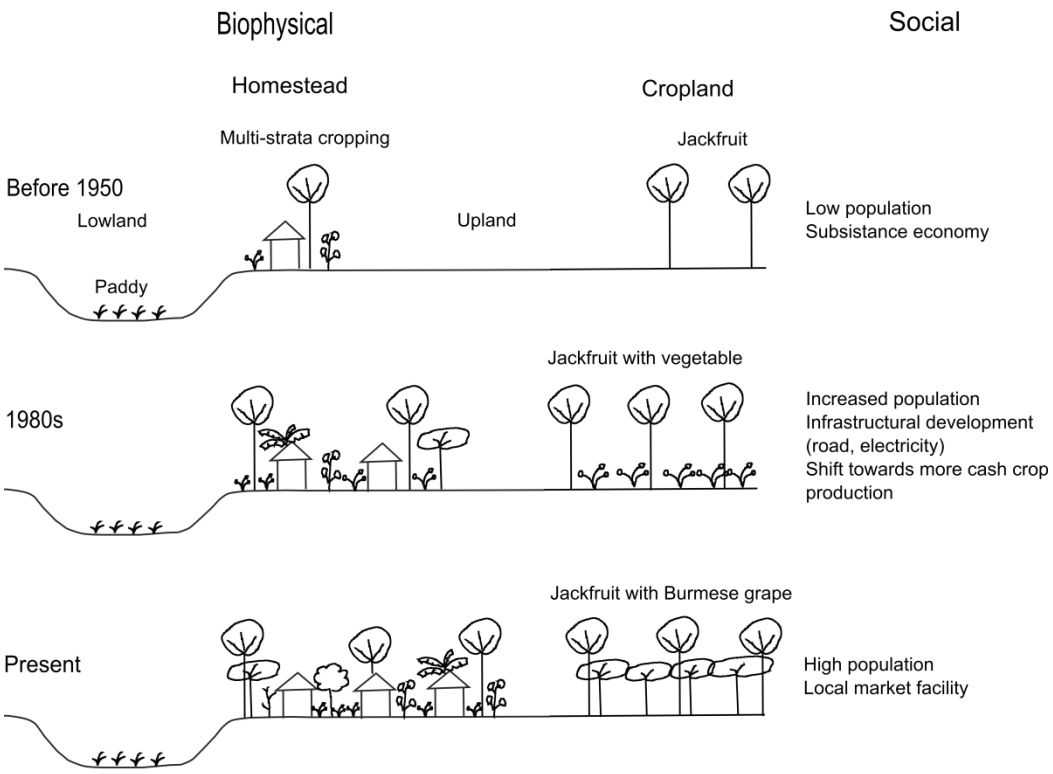

Figure 5.2: Significant changes in cropland agroforestry practices

5.2 Current dominant agroforestry system

The dominance of a jackfruit-Burmese grape based agroforestry system has added to the legacy of agroforestry practices in the study communities. Participant farmers in all field research activities (key informant interviews, timeline, focus groups and follow-up interviews) repeatedly discussed this agroforestry system. With traditional tree jackfruit they prefer to grow Burmese

grape more than any other species, reflecting their priority and preference around this system in the present context of their agroforestry practices.

They find jackfruit and Burmese grape suitable to grow together. According to a timeline participant from Shibpur:

> *Burmese grape grows well in the shadows of jackfruit tree. Jackfruit tree is very high but a Burmese grape tree does not grow after a certain height. So now everybody cultivates Burmese grape as agroforestry crop with jackfruit.*

Along with this, Burmese grape has become easily adapted within the farmers for its virtue of good economic return as well as its low resource requirements for growing as explained by another timeline participant of Shibpur:

> *More money can be earned from Burmese grape. It also takes less care. You need to water once or no matter if not. No cost is involved with it. Wholesalers come from outside and buy directly the Burmese grapes from the fields. The money we can get by selling Burmese grape from one field is higher than that of the money we can get by selling vegetables whole year round*.

The production of fruits in the Burmese grape tree starts after 5 years of plantation. The production increases with the increment of years, and after 10 years it becomes fully productive. Production is substantial; around 120-200 kilograms for a tree aged 5-10 years and 400-800 kilograms for a tree fully matured tree (Figure 5.3). Besides high production, as it requires less time and care, it provides the farmers opportunity to have spare time to do other economic and social activities. It is understood that they consider Burmese grape as a compatible species with the condition of their life and in their agroforestry activities.

Figure 5.3: Burmese grape tree with abundant fruit in premature stage

Farmers also identified different supports they need in regard to some of the problems they are facing with Burmese grape production. Sometimes there are insects in Burmese grape trees. Sometimes the fruits of the trees do not develop properly. Also, they noted problems related to male and female trees. Most of the seedlings of Burmese grape are male and a few are female. Male Burmese grape trees do not bear any fruit, but it is not possible to distinguish between male and female trees before the first flowering which is after 5 years of plantation. So farmers have to go through this uncertainty about fruit bearing trees for these 5 years. After the first flowering, they keep a few male trees in their orchard and cut all the other male trees. Then farmers again plant and wait and in this way it takes a long time to fill the gap. In the last five years, some experienced farmers are using a vegetative propagation system, namely 'grafting' to produce female saplings. But not all farmers can do this as it requires sophisticated skill and experience. In addition, the price of the grafted

saplings is high if farmers want to buy them from market. When one project leader in a follow-up interview was asked why the project does not include supports or inputs for Burmese grape (such as training on vegetative propagation), he reasoned Burmese grape as out of their agenda. But, however, he also noted an important suggestion for improved Burmese grape production:

> *As the farmers get fruits from female trees, they [farmers] remove almost all the male trees. As a result, it creates a problem for pollination, and the flesh of the fruits remains under-developed. So, male trees should be introduced to improve the Burmese grape production*.

This idea perhaps explains the problem faced by the farmers related to under-developed fruits in their trees that many farmers may be not aware of.

The farmers have adapted this system so extensively that marketing facilities and local activities have developed accordingly to facilitate this system. Morjal Bazaar, a local permanent market, which is in the closest vicinity of the people of Shibpur, plays a central role in facilitating the marketing of jackfruit and Burmese grape. This market was first initiated by the local people as a place for selling local products and later on the local government brought it under its control. The market is situated beside the Dhaka-Sylhet national highway. As jackfruit and Burmese grape are the most valued fruits, during the fruit harvesting season, the market committee facilitates special arrangements for selling these important seasonal fruits by arranging temporary spaces beside the highway so there exists a good transportation system for carrying those from the market to other parts of the country using trucks. The wholesalers come from different parts of the country to the market and buy the fruits from the farmers. Burmese grapes are exported to other countries too.

About half of the farmers of Shibpur go to Morjal Bazaar to sell their products and the other half prefer to sell their products to the wholesalers or traders who collect the products from their farms. In the latter case, the farmers

make a contract with the traders in advance to sell their products based on an estimation of their production. Due to a greater distance from the Morjal Bazaar to Belabo than Shibpur, most of the farmers of Belabo sell their products to traders, who then sell those in Morjal Bazaar while some other farmers go to their nearby local markets and also Morjal Bazaar. Farmers get higher prices if they sell their product in the Morjal Bazaar than selling products directly from farms to the traders. In spite of this, many farmers prefer selling directly from their fields with a minimum profit for several advantages, such as, avoiding the hassle of selling in the market with respect to carrying cost, time and other issues as well as avoiding the risk in case of low production.

From the above description, it is apparent that the jackfruit-Burmese grape based system has developed as the dominant agroforestry system indigenously in the regions in recent years. Farmers have accepted this system widely, and their present practices and future improvement plans are embedded with this system. Though they are facing some problems related to the system, they feel encouraged to maintain this system because of the obvious benefits. Certain supports are expected for the improvement of the system. Local activities and specialized temporary marketing facilities have also developed based on these species. It is understood that this system is demonstrated as a prioritized and well suited system by the communities.

5.3 Socio-cultural dimensions associated with cropland agroforestry practices

Embedding in the changing scenario described above, the socio-cultural dimensions that are associated with cropland agroforestry practices were investigated with non-beneficiary focus group participants of the two communities using the indicators developed in literature review. The participants explored and described the specific dimensions pertaining to their cropland agroforestry practices. Description of each of these dimensions

represents the cultural values, norms and practices involved with those. Significant variation was not found between the two communities in terms of these dimensions. These dimensions are described below.

5.3.1 Relationship with agricultural environment

In both communities, people are found to be intrinsically related with their agricultural environment. The crop and tree resources fulfill their various local needs, such as vegetables, fruits, firewood, timber and others. Also, these are the sources of their income through selling fruits, vegetables and timber. They act as insurance for them too since they can easily sell a jackfruit tree for substantial profit when they are in need of high cash or emergency. In addition to fulfilling their needs, these practices provide them a way to relate to one another in their social life. Based on these practices, they have shared stock of knowledge, experience and traditions. They consider themselves as self-reliant as they do not need to depend on something else but agroforestry activities for their basic needs.

Though they face several resource constraints such as availability of water, finance and land, they appreciate their way of life as farmers. The exchange of dialogues among the focus group participants of Belabo expressed the way they value the association of their life with agroforestry:

> *Participant 1: We are definitely proud of agroforestry farmers because I run my family with it. I am mentally satisfied with it.*
>
> *Participant 2: The joy I have, when fruit grows in my orchard knows no bound. The extent of happiness a farmer gets, when fruit is grown in his orchard, cannot be measured. It brings self-happiness, satisfaction.*

Participants of Shibpur shared similar opinions about their self-reliance:

Participant 1: By the blessing of Allah we are self-sufficient because of agroforestry.

Participant 2: Even the people who have no lands in the area are in good position because they can find lots of scope to work in these lands.

Thus it is found that the farmers appreciate their way of life as farmers and recognize their self-reliant characteristics being involved with their agroforestry activities.

5.3.2 Traditional practices and knowledge

The communities have over a hundred year history of settlement and people of these communities have been practicing agroforestry for many decades. It has enabled them to gather practical experiences and knowledge of agroforestry practices. This knowledge and experience is passed on from one generation to another, and influences their agroforestry practices in many ways, such as how they manage trees and crops in their farms, which species to value and grow, how they adapt to changes and how they use fertilizers or pesticides. Participants of Shibpur expressed about the importance of traditional knowledge on their agroforestry practice:

Participant 1: This is not learned from any book, rather learned from traditions.

Participant 2: We have not gained any scientific knowledge. We are practicing like the way our ancestors practiced before. Such as, turmeric is grown in shades while taro and eggplant are grown in sunlight. We can understand which crop will grow in which place of the field easily by visiting the place.

Participants of Belabo also noted similar opinions:

We are cultivating trees considering their size, shape and type. We have learned this from the experience of our ancestors. Almost all plants require more or less sunlight while some plants grow well in the shades such as Burmese grape. Pineapple does not grow in shade. We have become expert about these matters by learning from our ancestors.

Though they acknowledge the role of agricultural officers or other experts, they emphasize their practical knowledge gained from close relation with fields as more valuable than the knowledge of these experts. One of the participants of Shibpur expressed this in the following way:

An officer may say that turmeric would grow well in a specific part of the land, but the farmer says that eggplant would grow well in that place. It is seen that the farmer's prediction is right. Farmers have learned by living with the land. They know very well how much fertilizer or pesticide is needed for a land.

While they have learned agroforestry practices from their ancestors, it is a continuous process that they are also making changes to these practices and knowledge according to their needs (such as food, money) and available resource capacity to grow their crops (such as land, water, money) or cope with new problems. They bring the changes utilizing “trial and error” method or “learning by observing” from other’s success and failure.

Farmers value certain local species particularly jackfruit that they have learned to grow from their ancestors with its variety of uses in their life such as fruit, timber, and firewood, while Burmese grape has become an important part of the recent agroforestry practices. It is not that they keep the jackfruit trees only for economic values, but often for the ancestral ties that are linked with the trees. A participant of Belabo noted it this way:

Some jackfruit trees were planted by a farmer's ancestor. He will not want to cut those to show respect to his ancestors and will keep those as a memorial though the taste of the fruits of those trees might not be good.

They continue to grow this species as it relates to their family tradition and expressed its importance to them over any other species. According to the participants of Shibpur:

Participant 1: Jackfruit is our traditional fruit. If we find any other tree posing any threat for growing jackfruit, we will stop growing that.

Participant 2: Jackfruit is our pride.

Farmers do not even grow some species in the middle of jackfruit orchard such as gooseberry or timber trees because these species are harmful for jackfruit tree.

After jackfruit, they value Burmese grape most. They have found that Burmese grape is very compatible to grow with jackfruit as explained by a participant of Belabo:

Many trees do not grow under the shade of other trees. On the other hand, some trees grow very well in shade such as Burmese grape. That's why I planted Burmese grape under jackfruit trees. Jackfruit trees do not harm the growth of Burmese grape but helps.

Thus the traditional practices that they hold reflect their ancestral customs, their contemporary changes according to need and available resources and their reliance on local species.

5.3.3 Linkages with family and friends

In both the communities, people have strong linkages with their relatives, neighbors and friends that enable the communities to sustain by working as a whole. They show cohesiveness among themselves irrespective of wealth and religion that helps them to act together when they face any type of social, economic and agricultural problems. It was found that, these close linkages with each other among the community members have a great influence on their agroforestry activities in both the communities. A participant of Belabo described this in the following way:

> *All the farmers are connected here with each other through the bondage of land. You cannot find this in other part of the world. After observing the production in my orchard, if anyone asks for seedlings from me I will never deny…One farmer voluntarily participate in other farmer's work. One farmer helps others by giving suggestions.*

The farmers have a 'sharing' system of knowledge and seed distribution associated with their local species among them. They produce seeds and seedlings of the indigenous plants by themselves such as jackfruit, Burmese grape, eggplant, olive, flat beans and other vegetables, and exchange those with each other. For instance, if one farmer has flat bean and another has eggplants, they exchange their seeds between each other. If exchange is not possible, then sometimes they collect seeds by paying money to fellow farmers. However, in case of some non-traditional species such as timber species and high-yielding species of jujube, mango and lemon, they need to buy those from the nurseries or markets.

Because of this system, farmers have more trust in the quality of seeds or seedlings of the fellow farmers than from similar materials that are bought from the market. In the former case they can observe the productivity of the plant and feel secure that the planting material can provide them with good crops,

whereas they are insecure about buying planting material of non-traditional species with a higher cost from outside the community. The reason for their insecurity is explained by a participant of Belabo:

> *We often do not get quality seedlings [of the non-traditional species]. We are being cheated. I might become interested to grow high-yielding lemon by observing a lemon orchard. But it might be the case that I do not get the good seedling. There are some dishonest sellers who at first sell good seedlings but later on mix bad seedlings with the good ones to have excessive profit. This is becoming a risk for me.*

Besides seed collection, the farmers follow each other's advice and suggestions for tree management, pest control, use of fertilizers and solution of any problem related to agroforestry practices. A participant of Shibpur explained the way farmers solve a problem collectively:

> *If we face any serious problem, we set up a board. We walk in the land to observe the problem and discuss among ourselves. Sometimes we find the solution from ourselves.*

In Shibpur, social relations play another significant role in helping the farmers to irrigate their lands. Not all the farmers in the village have motor pumps for irrigating their lands, but they can use the motors from their fellow farmers and pay the bill afterwards.

Linkages with friends and relatives are also important paths for the dissemination of tree management issues or species within the village or beyond village boundaries. Sometimes the farmers obtain new seeds from their friend's or relative's places who live in nearby villages, and if the cultivation of the seeds proves beneficial it spreads among their fellow farmers within the village. In this way, cultivation of many species spreads from one area to another. For instance,

the extensive cultivation of pineapple and Burmese grape has been promoted in these villages in this manner.

It is understood that, through their linkages with one another they are attached to significant socio-cultural practices related to collecting local planting materials, trusting and following fellow farmers, and spreading species and tree management issues or technologies.

5.3.4 Cultural traditions

Agroforestry is related with the cultural traditions of the people in these communities. They harvest most of their important fruits such as jackfruit, Burmese grape, mango and pineapple within the months of May to August. They celebrate that time by inviting their relatives, exchanging ceremonial gifts and sending fruits to relatives and friends. The local agricultural office arranges exhibitions where people show their best fruits and prizes are distributed among the farmers. Participants of Shibpur described the festivity of the time this way:

> *Participant 1: There is a rule in this region that the daughters expect cloths-ornaments from their fathers' place in fruit season. A festive mood exists everywhere.*
>
> *Participant 2: We have to send fruits to the relatives' house in this time. We have to send the best fruit.*
>
> *Participant 3: Singing and dancing are arranged in the village.*

The seasonal fruits especially jackfruit become a part of their food habit in this season. While rice with vegetables is their usual meal, many like to eat only jackfruit as the meal in a whole day during this season. Especially the children are more inclined to eat jackfruit. People like to eat the seeds of jackfruits as a vegetable too, and jackfruit is also related to the various festivals

in these communities (e.g., weddings). Traditional cakes are made of it during the festivals.

This is the season when people do not mind if someone else eats fruits from their orchards. They have an interesting custom related to this for jackfruit in the society: they let anyone eat ripe jackfruit from their orchard but there is provision of severe physical punishment for those who steal unripe fruits for the purpose of selling. The reason for such provision was explained by the participants of Shibpur:

> *Participant 1: This is our tradition. It has been going on like this from past. If you want to eat then eat the ripe one, why stealing the unripe one?*
>
> *Participant 2: In our area we do not guard our jackfruit trees. We cannot save our jackfruits if the thieves start stealing the fruits. So, severe punishment is given for stealing.*
>
> *Participant 3: After harvesting the jackfruits from the tree, these are kept outside our homes. Nobody steals other's jackfruit.*

Also, people have extra money in their hand in this season, and with an altruistic feeling the well-off families help the poorer families so that they do not face financial difficulties and can enjoy the time. Also people donate jackfruit or major fruits from their trees for the development of local social welfare institutions such as school, college and mosque. More money is collected by selling those fruits instead of collecting money.

Therefore it can be said that people of the communities possess socio-cultural activities based on their agroforestry practices that bring happiness to their lives and provide them a way of celebration beyond merely the financial returns from selling products in the marketplace.

5.3.5 Religion and traditional beliefs

The significance of religion and traditional beliefs was not found in cropland agroforestry practices but was prevalent in homestead agroforestry practices. Hindu families generally grow some specific species in their homesteads such as holy basil trees or locally said *tulshi* (*Ocimum tenuiflorum*) that they use in religious rituals.

In case of traditional belief, some people grow some specific species in their homesteads that relate to this belief. For instance, some people believe that planting the neem tree (*Azadirachta indica*) in the south side of the house protects the household members from diseases. Also, some think that planting beavertail cactus/*fonimonsha* (*Opuntia basilaris*) and barringtonia/*hijol* (*Barringtonia acutangula*) in homestead protects from witchcraft. However, many people also grow these species in their homesteads not from any traditional belief but for their medicinal values.

5.3.6 Gender

In these communities, differences were found between cropland and homestead agroforestry based on gender. Men are involved in cropland agroforestry, whereas women are generally involved in homestead agroforestry on lands that are adjacent to their homesteads. Women do not usually go to work in the croplands that are distant from their houses. Male members of the family make decisions related to agroforestry but they also take suggestions from their wives. A difference was also noted on obtaining agricultural training as expressed by one participant of Belabo:

> *In most the cases men are getting the training. Women are given the training for vegetable production in homestead. Men are given training for cropland agriculture.*

The difference between men and women participation in cropland and homestead is guided by the prevailing cultural norm of the communities that leads the women to work more in homesteads than croplands. This difference was also noted by women homestead agroforestry farmers during preliminary fieldwork days.

As women were not direct project beneficiaries and were not involved in focus group interview, it was not possible to get their views about project interventions. However, one can assume from general knowledge of the social context that women participation might increase in cropland agriculture with the increased emphasis on croplands through the efforts of this project. Women may become more involved in cropland agriculture, particularly in post-harvesting and processing activities. Though this might affect their traditional household activities (e.g. cooking, taking care of children etc.) to some degree, the increased involvement in economic activities might also results in more decision making power in their family. Women also might have more opportunity to work in home-gardens, especially if project interventions (e.g. citrus species) become adopted within the homestead. This point is discussed further in the 'discussion and conclusion' chapter. However, I am not able to explore these questions in more detail due to the limitation of the study related to women participants (described in 'methods' chapter). Since men were the direct beneficiaries of the project and there is lack of active women participants in cropland agroforestry, interviews were conducted with only men. This limitation requires further in-depth study to investigate the indirect involvement of women in cropland and impacts on them.

In summary, dependency on local agricultural environment, traditional practices and knowledge, linkages with families and wider community, cultural traditions and gender are found as relevant socio-cultural aspects in relation to cropland agroforestry practices in the study communities. From the above

description, various cultural values, norms and practices that are found to be involved with each of these socio-cultural dimensions are summarized in the following table.

Table 5.1: Socio-cultural dimensions related to cropland agroforestry

	Socio-cultural dimensions
Relationship with agricultural environment	• Appreciation of life as a farmer • Self-reliance
Traditional practices and knowledge	• Reliance on ancestral customs • Dependence on available resources to grow species • Dependence on local species
Community linkages	• Share and exchange of local planting materials • Trust and follow local sources (fellow farmers, friends and relatives)
Cultural traditions	• Cultural celebrations related to fruit harvesting season (inviting and sending fruits to relatives or friends, exhibitions, making traditional cakes) • Punishment for selling stolen seasonal fruits • Donation to local social welfare institutions
Gender	• Difference between men and women participation in cropland

5.4 Social change processes and social impacts

After understanding the socio-cultural dimensions, the potential social changes that might arise due to the implementation of the project were discussed in the focus group interviews with non-beneficiary farmers of the two communities as well as beneficiary farmers. From the discussions, the potential social change processes that are invoked by the interventions were identified as well as the potential social impacts that might result from these processes.

While both types of focus groups participants (beneficiary farmers and non-beneficiary farmers) were hopeful that if the project becomes successful

then other people from the communities would adapt the new interventions, at the same time some important impact areas were also discussed. Significant differences were not found in the opinions of the two non-beneficiary focus groups, but were found between the two types of focus groups.

From the interviews with both the beneficiary and non-beneficiary focus groups, the identified social change processes and the impacts that might result from those processes due to the interventions are described below with a tabular representation in Table 5.2 showing the impact pathways. It is followed by an illustration of the possible linkages among the different impacts in Figure 5.4.

5.4.1 Increase in income

All three focus group participants provided optimistic views towards the project in relation to the potential to increase income if high production is attained under the project. They anticipated a number of positive social impacts with the increase of income. Increase in income might improve their lifestyle in multiple ways, including improved education for their children, communication, entertainment, assets (housing, livestock, land) and medical facilities. Increase of income might also contribute to increased nutrition levels for their household members and increased welfare activities in the communities.

5.4.2 Increase in use of new high-yielding varieties

As described earlier, Burmese grape is an increasingly important agroforestry crop in the communities. With this trend, both beneficiary and non-beneficiary farmers expressed their utmost interest in favor of Burmese grape under the project. The beneficiary farmers noted that they wanted to grow Burmese grape under the project. But under the project, five high-yielding species of lemon, mandarin orange, orange, jujube and guava were instead offered to them. Among those, they were not ready to grow guava and jujube in

any way because they have already experienced that these species do not grow well in the region. So they had three options left. Though lemon is grown in the region, the other two citrus species are new in the region. This indicates a shift in using new species more than local species with the new interventions.

Varied opinions were recorded from the participants for the new citrus species. In every focus group, while some participants expressed their confidence to grow the new species, other pointed out the uncertainty associated with those and perceived it as a potential risk. A non-beneficiary participant of Belabo added an example of BAU-*kul* (a high-yielding variety of jujube) to reinforce the issue of risks associated with new species.

> *Much is dependent on the species. For instance, mandarin orange is not cultivated in our village. If this species is given in the project then many farmers might not want to take this risk. The cultivation of BAU-kul got a huge interest here few years ago. Now nobody wants to grow it as many failed to grow it and later on they had to cut the trees.*

Increased use of new varieties can potentially bring a deviation in some socio-cultural aspects identified in Table 5.1. Farmers are reliant on local species and they do not need to go anywhere else to collect seedlings of the local species but from their own farm or from neighbors. In the case of new species, in every focus group discussion, concerns were expressed related to the availability of these species' seedlings after the termination of the project. Though some argued that they can buy seedlings of new species from nursery/market or from where the seedlings are bought for the project, some also indicated that they might face difficulty in attaining quality planting materials as sometimes good materials are not available in the market or they might need to go to Sylhet, a distant district, from where seedlings are collected for the project. This indicates potential threats of reducing dependency on local species and local planting materials or in other words increasing the dependency on buying materials from

markets, as well as losing their local sharing system of seed collection associated with the local species. Also, this system leads to increased exposures to outside untrustworthy sources to collect planting materials for new species instead of their own trusted sources. One participant from the beneficiary farmers assessed the new interventions in the following way:

> *[The project is] Good. But, we did not need to spend that much in our own way of cultivation. Also, it is necessary to be ascertained that we get quality seedlings after the termination of project.*

In every focus group, it was expressed that if the interventions do not bring expected yields, they will continue to grow more Burmese grape trees reflecting their reliance on the local species.

Beside these impacts, some positive impacts were also anticipated by the participants. Yield might increase with the introduction of the high-yielding species as well as these species might contribute to the diversity of the agroforestry practices in the communities. Also, the promotion of these new varieties and management practices related to those might add knowledge and experience to their agroforestry practices even if the project does not prove that much productive.

5.4.3 Increase in use of inputs/resources

While non-beneficiary farmers seemed more interested in getting free inputs, beneficiary farmers added some new thoughts from their practical experience being involved with project. They pointed out their concern about increased use of externally purchased inputs for implementing the new interventions:

- Large investment is required to follow suggested management practices
- New species are more expensive to grow than local species

According to the beneficiary farmers, the project has provided them the seedlings and fertilizer, but in addition to these inputs they need to invest significant funds for hired labor and irrigation to follow the suggested management practices under the project. They have to bear about 60%-70% of the total cost and the rest is borne by the project. While they acknowledged the new system might result in increased production with these suggested practices, they also noted that it might not be well suited for small-scale or poorer farmers because they might be not able to arrange this initial big investment.

Even, if these suggested management practices are not considered, they explained the concern of more expense related to new species than local ones. Farmers require low inputs in terms of irrigation, care and time to get a good production from Burmese grape compared to the new citrus species. Also, the planting materials of the new species are expensive for them to buy from the markets. In this case, which farmers might grow new species instead of Burmese grape, was explained by the non-beneficiary participants of Shibpur:

> *Participant 1: Those who have many lands, will want it more than small landholders. The small landholders will not be willing to do this cutting their Burmese grape trees.*
>
> *Participant 2: Those who have fallow lands will be willing to do this.*

Their idea resembled the characteristics of the beneficiary farmers who participated in the project. In this project such farmers were chosen who are fairly wealthy and might be interested to take the chance of growing new species in their spare lands, reflected in the words of the beneficiary farmers:

> *Participant 1: We already have Burmese grape and jackfruit orchards. Now we are growing [new species under the project] in our fallow lands with the intention that if the production is good we will continue growing those. It will not matter that much if we undergo loss in this project.*

Those who have small amount of lands will think of growing Burmese grape than orange. It will be profitable for them to grow Burmese grape. Why would he want to take the risk of growing orange or mandarin orange?

Participant 2: The cost needed for one orange tree is similar to around 50 Burmese grape trees.

These insights indicate that the interventions might be not useful for all types of farmers. These interventions are based on utilizing high resources such as money, labor and water that might reduce the possibility to include the poor farmers while at the same time increase the likelihood of adoption by wealthy farmers, and thus have potential impact of social inequity and further socioeconomic differentiation in the communities.

It was also noted by a participant of Belabo that when all the people do not get equal opportunities then there might be disappointment in some people or they might have a more competitive attitude. This indicates a potential to create social tension**.** Besides, increased dependency on more external inputs can add another level of negative impact on self-reliance characteristics of farmers. However, the interventions might be associated with another positive impact. There is the potential of increasing employment in agricultural labor sector with this increased need for labors.

Based on the above description, the identified social change processes with their associated impacts are presented in Table 5.2. In summary, while both groups (beneficiaries and non-beneficiaries) acknowledged the potential benefits of the project, it was also revealed, beyond these benefits there might be several other social impacts that are more related to social and cultural domains, for instance loss in local sharing system of planting materials, decrease in dependency on local species, social inequity and others.

Table 5.2: Potential social change processes and social impacts

Social change processes	Social impacts	
	Positive	Negative
Increase in income	• Improvement in lifestyle • Increase in nutrition level • Increase in social welfare activities	
Increase in use of new varieties	• Increase in knowledge • Increase in yield • Diversity in agroforestry practices	• Risk of proper growth • Decrease in dependency on local species and planting materials • Loss in local sharing system of seed distribution • Increased exposure to external untrustworthy sources
Increase in use of inputs (money, agricultural labor, irrigation, time)	• Agricultural labor employment	• Social inequity and differentiation • Loss of self-reliant characteristics • Social tension

5.4.4 Linkages among different types of impacts

To this point, analysis of the impact pathways has been quite straight forward. The aim was to identify the social change processes and social impacts distinctively. For instance, Table 5.2 shows 'increase in use of varieties' could cause several impacts including positive (increase in knowledge, yield and diversity) and negative impacts (decrease in dependency on local planting materials, loss in local sharing system of seed distribution, and increased exposure to external sources). However, these direct pathways of change have a way of creating other changes (Slootweg et al. 2003). Therefore complex relationships and iterations are involved amongst all the social change processes and impacts.

Figure 5.4 illustrates a situation with complex linkages that could exist amongst the social change processes and impacts, in addition to the linkages identified in Table 5.2.

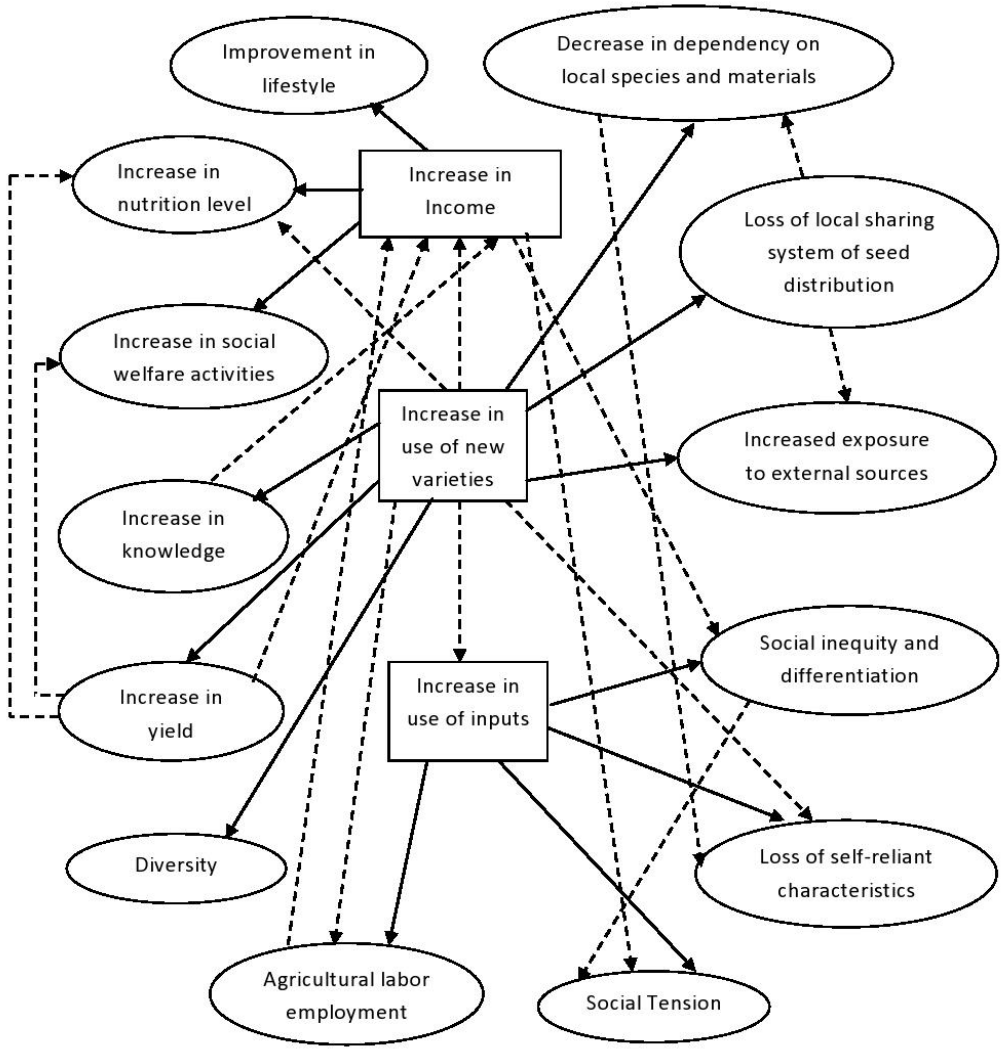

Figure 5.4: Possible linkages amongst the social change processes and social impacts

Social processes that result directly from the interventions are the first-order changes that can lead to other processes - the second and higher-order change processes (Slootweg et al. 2003). For instance, 'increase in use of new varieties' can lead to processes of 'increase in income' and 'increase in use of inputs'. Also, there could be feedback mechanisms amongst the impacts and processes. For instance, the social impact 'agricultural labor employment' can stimulate the

social process of ‘increase in income.’ Besides, impacts themselves interact with each other, for instance, ‘decrease in dependency on local materials’ could lead to ‘loss of self-reliance’. So the social processes and impacts could be linked with one other in complex iterative ways.

5.5 Summary

The timeline exercise has depicted the changes that the communities have experienced from the distant past to the present. It is apparent that people have adapted to growing different new crops and species in different time periods according to their need, while also shifting towards more cash crops. These changes were promoted by several factors like population increase, road development, market facility and some other factors. The major changes are represented in Figure 5.2. Burmese grape has been a significant addition in the recent history of agroforestry practices within the study communities. It is found that the jackfruit-Burmese grape system is well suited to the communities such that the system has emerged as the dominant system in recent years.

Within this changing context, it is found that these communities share a similar socio-cultural base and are attached to certain socio-cultural dimensions in respect to their cropland agroforestry activities. From the description of these dimensions, various cultural practices, norms and values that are involved with these dimensions are explored and presented in Table 5.1. Finally, the social change processes that might arise from the project interventions with their respective impacts are anticipated. These change processes and impacts are shown in Table 5.2 to give an idea that, in addition to positive impacts, negative impacts might emerge in a number of socio-cultural areas.

CHAPTER 6 DISCUSSION AND CONCLUSION

In this chapter, a discussion on the results of the study is presented where I discuss 'social impacts' within the backdrop of recent literature on SIA as well as with particular attention to socio-cultural impacts, followed by a discussion exploring project and community implications of the study. The chapter ends with some concluding remarks.

6.1 Discussion

Based on a review of the results, the research presented in this thesis suggests that culture is significantly linked to agroforestry practices in the study communities. In this research, culture has been operationalized through a number of socio-cultural dimensions. In the literature review, drawing upon published literature on agroforestry systems in Bangladesh, social context of agroforestry in developing countries and SIA indicators, a set of subjective indicators have been developed to distinctly represent the socio-cultural dimensions related to agroforestry systems in Bangladesh. The fieldwork considered these indicators for cropland agroforestry practices in the study communities, and refined those to a subset of potential impact areas resulting from the implementation of the project. Research shows that some of these dimensions particularly 'traditional practices', 'community linkages', and 'relationship with agricultural environment' are of particular importance from a social impact perspective. Various cultural practices, norms and values that are observed through these dimensions (presented in Table 5.1), for instance local sharing system of planting materials, reliance on local species and local sources and dependency on available low resources, are related to many of the potential impacts that are identified in this research (presented in Table 5.2).

These impacts are further discussed here within the framework of recent literature on SIA given by Vanclay (2002) and van Schooten et al. (2003) as

presented in the literature review. According to these scholars, there is a distinction between social change processes and social impacts. Social change processes are set in motion by interventions and these processes may or may not lead to social impacts depending on the local context of the community in question. In analyzing the social impacts, this distinction has been insightful in this research. Three social change processes are identified in the research that are underway through the agroforestry interventions regardless of local setting; and then social impacts, positive or negative, are identified that might occur from these processes within the context of the study communities. In this case, it could be a challenge to distinguish the impacts that are anticipated to occur due to the interventions from the changes that are taking place inherently in the communities. In this regard, an appropriate study of the baseline situation and its changes through time and an investigation of socio-cultural dimensions have been useful to identify the impacts that might occur as a result of the project but not as a result of inherent/background trends within the broader Bangladeshi society.

The identified social processes are: increase in income, increase in use of new varieties, and increase in use of externally purchased inputs. Example of a social change process and its respective impacts from this study can portray how social processes that are underway in the project could lead to the impacts. For instance, 'increase in use of new varieties' is a social process. With such increases, several social impacts (in particular socio-cultural impacts) might emerge within the context of the study communities. As explained in the 'results' chapter, there exists a high community linkage as reflected by the local sharing system of resources among farmers in their traditional agroforestry practices. They are highly coupled with each other to share and exchange knowledge and local planting materials among themselves. They are reliant on these local sources (fellow farmers, friends and relatives) who they trust and value. By overlooking these cultural practices, the social process (increase in use

of new varieties) that is underway through the project interventions might implicitly drive the farmers to loosen their local sharing system. Moreover it might increase their dependency on new species over local species and thus to external untrustworthy sources (market) for the new species over local sources. Similarly, another social process is 'increase in use of inputs' which might have social differentiation and equity implications. The project is designed in such a way that the implementation of the interventions requires high inputs in terms of cash, labor and water whereas farmers' traditional practices are dependent on their available low resources to grow crops. Though the high inputs can be more easily managed by wealthy farmers, this potentially impedes the adoption and practice of the interventions by small-scale and poorer farmers. Consequently the benefits of the agroforestry interventions can be gained by the wealthy farmers but may be out of reach of poorer farmers. By analyzing the impact pathways in this way, a whole range of potential social impacts are identified in this research that are led by the social processes set in motion through the project. This distinction has contributed to build greater awareness of the processes that cause impacts as well as better impact detection and prediction.

From the identification of the impacts, substantial differences are noticed between the impacts revealed in the study and the impacts considered in the project. The project has considered only impacts related to income and yield as intended outcomes while it has not adequately recognized some other significant impacts. Though some other positive unintended impacts of the project are revealed in the study (such as diversity, agricultural labor employment, increase in knowledge), the negative impacts that might emerge in a number of important socio-cultural areas are also revealed. These impacts are more 'hidden' than the economic benefits. In the literature review, it was observed that most of the SIAs are focused on 'socio-economic,' whereas 'socio-cultural' impacts are often not addressed. Scholars such as King (1998), King

(2000), Barrow (2000), Sagnia (2002) and MacDonald (2008) note concern about the lack of attention to socio-cultural impacts in the practice of most of the SIAs. In response to this concern, this study can be seen as effective in understanding the range of social impacts that communities might experience due to the project with a focus on the challenging and important identification of socio-cultural impacts in contrast with more conventional socio-economic assessments that relate to income, employment, agricultural production and related factors.

While identifying the socio-cultural dimensions and the socio-cultural impacts, some potential challenges to the success of the project have appeared in the study. A discussion on these challenges is important for the project personnel and communities to consider. These challenges can be discussed in two broad headings:

- the capability of the farmers to adapt with the new interventions and
- the acceptability of the new interventions

From the study, it is apparent that the capability of the farmers to manage resources for their agroforestry practices is a critical issue. Land, water, cash and labor are the required resources for their practices. Considering these resources, in the croplands, farmers grow species that (a) require less water as there is scarcity of water in the uplands, (b) require less labor and less care so that they can be involved in other social and economic activities, and (c) do not need a big amount of cash in buying the inputs such as labor, fertilizer and planting materials. Since the majority of farmers in the communities (about 80%) are small-scale farmers, most cannot reap the benefit of the project if the project is not designed to suit their abilities and resource capacities. Therefore the increased resource requirement of the new interventions might become a constraint to the success of these interventions, as many farmers are either not capable or do not have access to such large resources. Under the project, it is also observed that, those farmers have been included who have availability of

land and can manage the required resources to implement the interventions. These issues of access to project benefits are linked to the observed social and economic differentiation that exists within the region, and have a bearing on the project goal of 'poverty alleviation'. There appears to be a contradiction between the project goal and project interventions in this regard. If the goal of poverty alleviation is to be achieved, the development project needs to be designed accordingly so that these interventions are conducive to the resource capacity of poorer farmers as well as wealthy farmers.

The other challenge is related to the new agroforestry systems or interventions that are introduced by the project scientists. Project scientists have chosen the systems that are important for their research purpose but substantially differ from farmers' expressed priorities and preferences. If farmers had some say in the design of a new system, they might select a very different agroforestry system for scientific improvement. As described in the historical overview presented in the 'results' chapter, farmers have spontaneously developed jackfruit-Burmese grape based systems throughout the communities, and they prefer Burmese grape more than anything else whereas scientists are trying to introduce such species that tend to compete with the established local system. It is discussed in the result section that, four of the five species provided by the project are questioned by the local farmers. Two species were rejected by farmers because they had already experienced that these species do not grow well in the region, and the other two are citrus species that were not grown before in the communities. Therefore there appears to be a disconnection between farmers' preference and project interventions which might create a challenge for the success of the project.

Given the situation above, while there are such challenges in place for implementing the new agroforestry systems or interventions, it is useful to think

about the scenario that could emerge in future. There could be several possibilities:

(a) Scenario 1: The project becomes successful and farmers are able to demonstrate new systems with citrus species in croplands.
(b) Scenario 2: Farmers accept the new citrus species but they prefer to grow those more in homesteads than croplands.
(c) Scenario 3: In spite of the efforts to introduce the citrus species, people reject citrus species and Burmese grapes become more dominant in the communities.

Figure 6.1 illustrates these scenarios. The 'biophysical' part of these scenarios is explained at first followed by the social part. The first scenario depicts that, the challenges might not prove to be a significant impediment and farmers are able to integrate the new systems with citrus species into their cropfields. High yields and economic benefits motivate the farmers to grow the citrus species largely and the cultivation of these species spreads in the whole region as expected in the project.

The second scenario depicts that even though the project scientists have planned to incorporate citrus species as a middle story plant in croplands, farmers might not do so and continue their present practices (such as jackfruit-Burmese grape) in cropland, whereas the citrus might shift to homestead instead of croplands and be used more for family consumption rather than sale. This scenario is plausible because, as a middle story crop, there is more possibility for the citrus species to be incorporated in the homestead where the multi-strata cropping system is already in practice. Multi-strata system is not practiced significantly in cropland agroforestry while it is dominant in homesteads. It can be explained by the fact that resource constraints have less effect on the farmers in the homestead than in cropland. For instance it is easy to take care and protect crops and use the easily available resources of homestead (e.g. roof top

water, tube-web water) in case of homesteads whereas it becomes difficult to arrange these resources and take the care in the distant croplands.

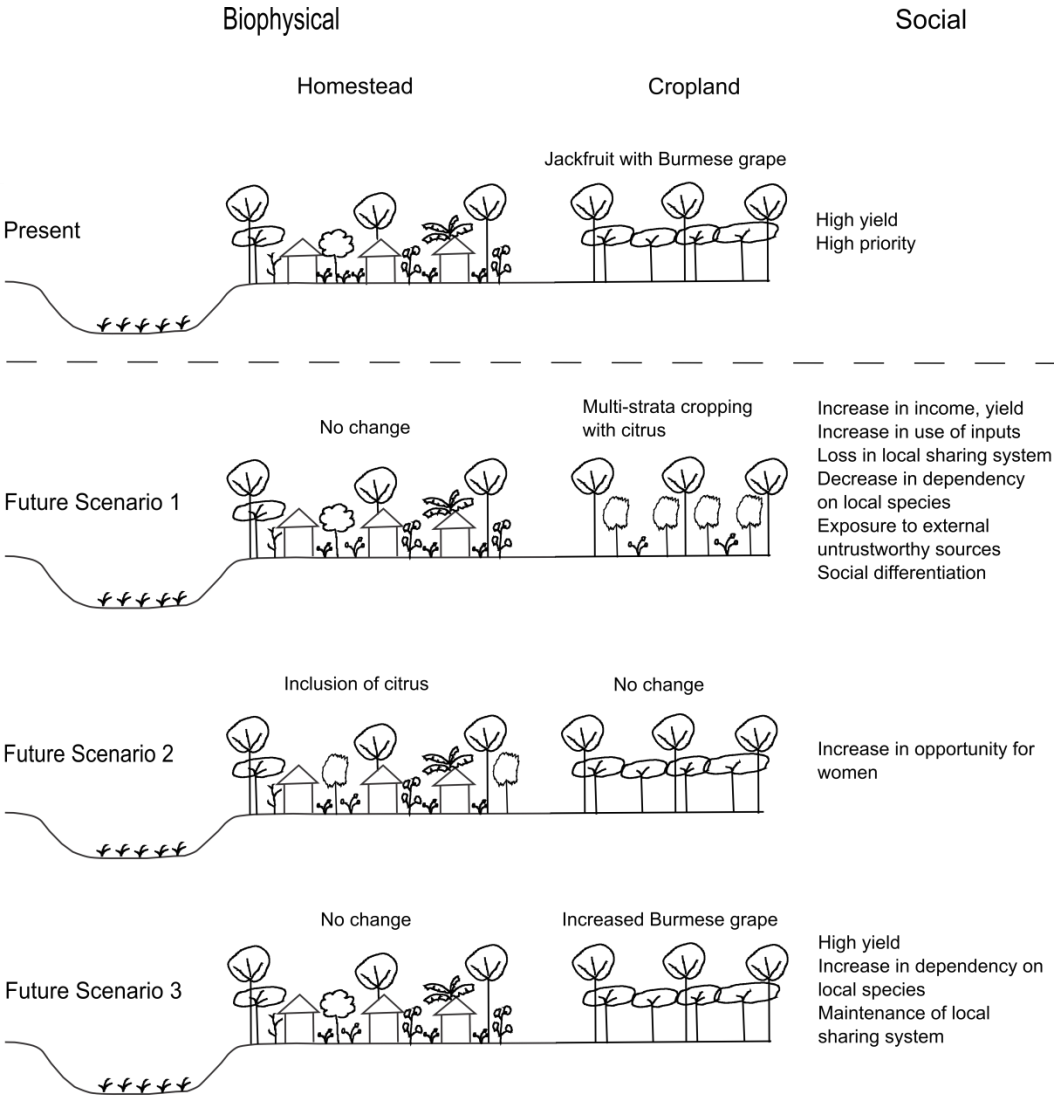

Figure 6.1: Possible future scenarios of agroforestry systems

Therefore, it is more likely convenient for the farmers to grow citrus species in homesteads in terms of resource use where the resources are easily available for them than the croplands. This hypothesis of the shift of citrus to the homestead is supported by recent studies undertaken in North-east India, Kerala and Bangladesh that show that, it is evident that citrus species are commonly

practiced in the homesteads (Nath et al. 2005; Das & Das 2005; Chandrashekara 2009; Miah & Hussain 2010).

The third scenario depicts that, people might decide against the new species both in the homesteads and the croplands because of the noted challenges. Already Burmese grape production is widely distributed and prioritized in the communities, and participants expressed in the interviews that they would increase Burmese grape production in their croplands in case of the failure of the project which reflects their reliance on the species. So it can be anticipated that, in this scenario, people grow more Burmese grapes.

In the 'social' part, if the first scenario is realized when farmers are able to demonstrate new systems, this will likely bring an increase in income and yield outcomes but at the same time it will likely be associated with an increase in use of inputs, loss of local sharing system, decrease in dependency on local species, increase in exposure to external untrustworthy sources and social differentiation and equity implications that have been discussed earlier in the chapter. The second scenario, when citrus species shifts to homestead agroforestry, might have gender implications. As in the prevailing culture women are more involved in homestead agroforestry than cropland, this shift might create more opportunity for the women in their homestead agroforestry practices. In the third scenario, when farmers grow more Burmese grape, they may increasingly learn to solve the problems related to Burmese grape (e.g. vegetative propagation), and this might result in higher yields of the fruits than present, at the same time it could contribute to maintain their dependency on local materials as well as strengthen the social cohesion based on the cultural practices of sharing and exchanging related to the species.

With the comparison from these three possible scenarios, it can be concluded that, the development interventions under the project appear to be uncertain around socio-cultural impacts, and there is potential for considerable

impacts on culture that are not immediately obvious from an outsider perspective. It can also be said that, these interventions might be better suited to the homestead than cropland. In addition, new systems may be needed as a way of improvement in a community when there is no developed system or the existing system is inefficient, but it is rather questionable in the presence of a widely distributed, highly productive and prioritized system that can also contribute to the maintenance of the existing socio-cultural traits. Ancleti (2002: 170) notes his views about imposing solutions to the communities by research authorities:

> *The tendency, however, has been towards finding alternatives to what people already have, rather than identifying where the inadequacies lie and improving on them.*

Conforming to this view, for a culturally sensitive development project, it is more instructive to preserve and incorporate what people already have and to improve the problems associated with those farming system than to impose something new as a way of improvement. Farmers are facing some problems regarding improved Burmese grape production and one project scientist also noted an important suggestion in regard to one of the problems presented in the 'results' chapter. The supports (e.g. teaching vegetative propagation) and suggestions regarding these problems of existing practices (e.g. keeping male trees for pollination) require particular attention. Also, the interventions can be built on utilizing the existing local sharing and exchanging system related to planting materials rather than commercially available materials. Toward this end, the insights from the research may be helpful for policy-makers and practitioners as well as communities in the decision-making process of agroforestry development in the region.

6.2 Conclusion

The present research has emerged under the project 'Improvement of Agroforestry Practices for Better Livelihood and Environment'. The project introduces a set of technical packages to develop or improve existing agroforestry practices in the croplands of selected areas in Bangladesh with an emphasis on economic and biophysical concerns.

The research started with the research question 'How is culture related to development in this project?' This is addressed in the research by evaluating potential socio-cultural impacts resulting from the agroforestry development project, based on an understanding of the socio-cultural dimensions related to the agroforestry practices in two study communities of Narsingdi, Bangladesh. In order to achieve the purpose of the study, data was collected through a variety of qualitative research methods: semi-structured interviews with project investigators, informal interviews with key informant, timeline, focus group interviews with local farmers and follow-up interviews.

The research has revealed that farmers in the study communities have certain socio-cultural traits embedded with their traditional agroforestry practices in croplands that help maintaining their practices for years, for example local sharing system of planting materials, reliance on local species and dependency on available local resources. It was also observed that many of these important socio-cultural traits might be impacted as a result of the project interventions in addition to the expected changes of the project related to income and production that have been described and discussed in the previous chapters. From the results of the study, it can be understood in response to the research question that, there is potential for considerable impacts on culture due to these interventions.

In analyzing the impacts, the distinction between 'social change processes' and 'social impacts' raised awareness on how social processes (that are underway by the project) might lead to impacts. Negative impacts can be minimized if these are assessed at the beginning of a project and proper attention is given. The findings indicate that if the potential social processes and socio-cultural impacts are not considered in designing a project, there is increased likelihood that the project will not meet its intended goals. Hence the findings emphasize the importance of identifying these impacts that are often not adequately recognized, before the implementation of any development project so that the project can be designed or modified in a way that proves beneficial both economically and socially for the communities.

In doing so, while introducing the interventions, applicability of the interventions needs to be assessed not only from economical or biophysical point of views but also in the socio-cultural context of the communities. From a modeling of future scenarios and their associated impacts, this study suggests a focus on the existing agroforestry system and specific supports (e.g. vegetative propagation of preferred species) to address the challenges associated with it, rather than imposing something new as a way of improvement of agroforestry systems in the study communities. The existing system is already widely distributed and highly productive as well as can support existing and important cultural characteristics within the region. The study also suggests to design the agroforestry interventions with reflections on integration into home-gardens and local sharing systems for seed distribution.

This is not to say that interventions that look into the biophysical or economic issues related to agroforestry practices are not needed to be considered, but the integration of cultural sensitivity in the development project is crucial. It is important to learn what the local farmers' value, what they have, what they want to do, and how capable they are of implementing a new system,

and designing the project accordingly so that the project can better suit the socio-cultural settings of the community and become successful while also avoiding detrimental impacts.

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APPENDIX A INFORMATION SHEET AND SIGNED CONSENT FORM FOR PROJECT PERSONNEL

UNIVERSITY OF ALBERTA

RESOURCE ECONOMICS AND ENVIRONMENTAL SOCIOLOGY
FACULTY OF AGRICULTURAL, LIFE AND ENVIRONMENTAL SCIENCES

5-15 General Services Building
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INFORMATION SHEET

Research Title: Cultural Impact Assessment of Agroforestry Systems in Bangladesh

Research description
This research intends to anticipate socio-cultural impacts resulting from the introduction of new scientific agroforestry systems. Cultural impact means the changes to cultural norms, values, traditions and practices. The goal of the research is to understand how local culture is related with the current agroforestry system, and whether there would be any impact on this local culture due to adoption of new interventions. To fulfill this agenda we are interested to explore the perspectives of local community people as well as project personnel (who are assigned to introduce and implement the interventions).

Method-personal interview
As a part of our research, you are invited to participate in a personal interview. This interview should not take more than 1 hour to complete. You may be asked to permit us to record the interview by an audio recording device. This will allow us to keep an accurate record of your views and therefore preparing accurate transcripts and translations of the conversation.

Confidentiality
Please note that, the information that you provide will be kept confidential. No personal information about you will be published in this project. All the voice recordings and transcripts/translations will be stored within a password protected electronic archive or a securely locked filing cabinet in our office at the University of Alberta. Only we, the research team, will have access to the information, and we will analyze the information and present the findings in the research in a way so that anonymity of the participants will be maintained.

Rights as a participant
If you agree to participant, feel free to provide information in a way that you like during the interview. You can also feel free to decline to answer any specific questions. Also, if anytime you wish to withdraw your participation, you are free to do so without any consequence. In such a case, we will not use any of the information that you have provided.

Benefits of the Study
Benefits of the research may include informing community people about the project activities and providing them an opportunity to express their opinions towards the activities, and therefore providing information about community impacts from agroforestry project interventions.

Contacts
If you have comments or questions please ask or contact without any hesitation to any member of the research team mentioned below:

Dr. John Parkins, Associate Professor, Department of Resource Economics and Environmental Sociology, University of Alberta, Edmonton, Alberta, Canada. Email: jparkins@ualberta.ca, Phone: 7804923610

Dr. Brent Swallow, Professor and Chair, Department of Resource Economics and Environmental Sociology, University of Alberta, Edmonton, Alberta, Canada. Email: brent.swallow@ualberta.ca, Phone: 7804926656

Rifat Shams, Masters of Science Student, Department of Resource Economics and Environmental Sociology, University of Alberta, Edmonton, Alberta, Canada. Email: rshams@ualberta.ca, Phone: 7802003042 (Canada), 01819161660 (Bangladesh)

If you have any concern about this project, you may also contact the following:
University of Alberta Research Ethics Office, Phone: 780-492-2615

CONSENT FORM

Have you received a copy of the attached information sheet?	YES	NO
Have you had an opportunity to ask questions about the research?	YES	NO
Do you agree to participate in an interview for this research?	YES	NO
Do you agree to being recorded by digital audio recorder during interview?	YES	NO

_____

Date

_____ _____

Signature of Participant Name (please print)

_____ _____

Signature of Researcher Name (please print)

Researcher contact:

Rifat Shams, Masters of Science Student, Department of Resource Economics and Environmental Sociology, University of Alberta, Edmonton, Alberta, Canada. Email: rshams@ualberta.ca, Phone: 7802003042 (Canada), 01819161660 (Bangladesh)

(The title of the research is modified after the fieldwork though the purpose of the research remained same.)

APPENDIX B INFORMATION SHEET AND ORAL CONSENT FORM FOR COMMUNITY MEMBERS

UNIVERSITY OF ALBERTA

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INFORMATION SHEET
(Information will be narrated to the participants orally in local language.)

Research Title: Cultural Impact Assessment of Agroforestry Systems in Bangladesh

Research description
This research intends to anticipate socio-cultural impacts resulting from the introduction of new scientific agroforestry systems. Cultural impact means the changes to cultural norms, values, traditions and practices. The goal of the research is to understand how local culture is related with the current agroforestry system, and whether there would be any impact on this local culture due to adoption of new interventions. To fulfill this agenda we are interested to explore the perspectives of local community people as well as project personnel (who are assigned to introduce and implement the interventions).

Methods- key informant interview/timeline/focus group/follow-up interview
As a part of our research, you are invited to participate in a key informant/timeline/focus group/follow-up interview. The focus groups will involve two sessions and should take not more than 4 hours with a break in between the two sessions. In case of key informant/timeline/follow-up interview, it should not take more than 1 hour to complete. You will be asked to permit us to record the discussion by an audio recording device. This will allow us to keep an accurate record of your views and therefore preparing accurate transcripts and translations of the conversation.

Confidentiality
Please note that, the information that you provide will be kept confidential. Neither the name of the participants will be published nor there will be any indication that allows to recognize individuals in the transcripts/translations. All the voice recordings and transcripts/translations will be stored within a password protected electronic archive or a securely locked filing cabinet in our office at University of Alberta. Only we, the research team, will have the access to the information, and we will analyze the information and present the findings in the research in a way so that anonymity of the participants will be maintained. Such as, if we use any direct quote from any participant no name or identifiers will be published.

Rights as a participant
If you accept to be a participant, feel free to provide information in a way that you like during the discussion. Also, if anytime you wish to withdraw your participation, you are free to do so without any consequence. In such a case, we will not use any of the information that you have provided.

Benefits and Risks

Benefits of the research may include informing community people about the project activities and providing them an opportunity to express their opinions towards the activities, and therefore directing to consider community impacts within the proposed new interventions.

We do not anticipate any risks to the participants in participating in this research. However, if you ever feel any discomfort in any matter you have the freedom to leave the discussion without any consequence; otherwise you can also make us aware of it.

Contacts

If you have comments or questions please ask or contact without any hesitation to any member of the research team mentioned below:

Dr. John Parkins, Associate Professor, Department of Resource Economics and Environmental Sociology, University of Alberta, Edmonton, Alberta, Canada. Email: jparkins@ualberta.ca, Phone: 7804923610.

Dr. Brent Swallow, Professor and Chair, Department of Resource Economics and Environmental Sociology, University of Alberta, Edmonton, Alberta, Canada. Email: brent.swallow@ualberta.ca, Phone: 7804926656.

Rifat Shams, Masters of Science Student, Department of Resource Economics and Environmental Sociology, University of Alberta, Edmonton, Alberta, Canada. Email: rshams@ualberta.ca, Phone: 7802003042 (Canada), 01819161660 (Bangladesh).

If you have any concerns about this project, you may also contact the following:
University of Alberta Research Ethics Office, Phone: 780-492-2615.

ORAL CONSENT FORM

(Consent will be taken orally and audio-recorded.)

Have you understood what is mentioned in the information sheet?	YES	NO
Have you had an opportunity to ask questions about the research?	YES	NO
Do you agree to participate in this research?	YES	NO
Do you agree to being recorded by digital audio recorder during interview?	YES	NO

_____

Date

_____ _____

Signature of Researcher Name (please print)

Researcher contact:

Rifat Shams, Masters of Science Student, Department of Resource Economics and Environmental Sociology, University of Alberta, Edmonton, Alberta, Canada. Email: rshams@ualberta.ca, Phone: 7802003042 (Canada), 01819161660 (Bangladesh)

(The title of the research is modified after the fieldwork though the purpose of the research remained same.)

APPENDIX C INTERVIEW SCHEDULES

C.1 Schedule for personal interview with project personnel

1. What do you mean by traditional agroforestry?

2. What do you mean by scientific interventions (stated in project proposal)? What does 'scientific' imply here?

3. How different will the proposed scientific approach be from the traditional system that is practiced by the farmers?

4. Are you looking into the improvement of agroforestry in both cropfield and homestead or only one of these two? Could you please describe the planned scientific interventions for that?

5. What are the motivations/reasons for such interventions?

6. Will the coverage of the improvements be within the whole district or there will be only a number of beneficiaries?

7. Already your project work is initiated and some people have become beneficiaries under the project.
   a. How are you selecting people as your beneficiaries?
   b. Are you presenting the information about the project to individuals or to a group or to a whole community?
   c. How are you motivating them to be a part of the project?
   d. Was there any difficulty to convince them?

8. For how long the project will continue? And after how much time the results of the project will come into being?

C.2 Schedule for timeline with older farmers

1. How long have you been involved with agroforestry practices in croplands?

2. Could you please explain some questions regarding the history and contemporary changes of traditional agroforestry practices in croplands in your region?

    a. How did agroforestry develop in this region from the beginning as long as you can remember?

    b. Do you find any differences of agroforestry activities from beginning up-to now? If so, how agroforestry activities have changed over time from one generation to the next?

    c. What have been the reasons for such changes?

    d. How is the current agroforestry activities different compared to the previous generations?

C. 3 Schedule for focus group interview with non-beneficiary farmers

Part 1: Exploring socio-cultural elements

1. Have you been practicing agroforestry in your cropfield traditionally for long? If so, could you please describe your knowledge and skill regarding these traditional practices?

2. What is the role of agroforestry practices in your life?

3. What resources/materials and facilities do you need for farming?

4. Are there specific plants and trees on your farm that are most valuable to you? What are those?

5. Do you think your family members, ancestors and relatives have an influence in your farming? How do they influence your farming practices?

6. Do you feel connected with the community people - neighbors, friends and other farmers? Do they have a role in guiding you in your farming?

7. Do the values/norms/customs/traditions that prevail in your community influence your farming practices?

8. Are there any traditional beliefs about specific type of trees?

9. Do you find any difference between the male farmers and female farmers in the farming practices in the field? If so, why such differences are observed?

10. Who take the decision on planning and management of your farm?

11. Does your religious affiliation have any implication on your farming?

12. Have you attained any agricultural extension services or training from any organization related to farming? If so, is this training/service influencing your farming activities?

13. How do you feel about the connection between you and agroforestry practices? Do you appreciate your way of life as a farmer?

14. What are your future aspirations in your life?

15. Is there any other key considerations?

(Information about the proposed interventions would be presented.)

Part 2: Assessing potential social impacts

16. How do you feel about the agroforestry improvement interventions? What are your attitudes towards the interventions?

17. Do you think there would be changes as a result of these interventions? If so, in what way? What might be the positive changes? What might be the negative changes?

18. Would there be any tensions in between beneficiary farmers and non-beneficiary farmers?

19. Do you want to see these interventions take place?

20. Do you have any concern/question about or expectation from the interventions?

21. Is there anything else that you want to add in this discussion?

(Before finishing, some general information of the participants regarding their age, occupation, education, household, income level and land ownership would be asked.)

C.4 Schedule for focus group interview with beneficiary farmers

Part 1: Knowing the activities of beneficiaries under the project

1. How have you engaged in the project?

2. What activities are you doing now under this project? When have you started the activities?

3. What are the changes that are going to take place in your field due to the project?

4. Are the activities based on your own knowledge and choice?

5. What inputs and technical supports do you get under the project? Can you get those inputs by yourself if needed?

6. Do you have to arrange any input by yourself?

7. What are the differences between your previous farming activities and present activities?

Part 2: Assessing potential social impacts

8. How do you feel about the interventions? What are your attitudes towards the agroforestry improvement interventions?

9. Do you think there would be changes as a result of these interventions? If so, in what way? What might be the positive changes? What might be the negative changes?

10. Would there be any tensions in between beneficiary farmers and non-beneficiary farmers?

11. Do you want to see these interventions take place?

12. Do you have any concern about or expectation from the interventions?

13. Is there anything else that you want to add in this discussion?

(Before finishing, some general information of the participants regarding their age, occupation, education, household, income level and land ownership would be asked.)

APPENDIX D TRANSLATION OF DIAGRAM PRESENTED IN FOCUS GROUP INTERVIEWS