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EFFECT OF CO-MANAGEMENT SYSTEM ON THE LIVELIHOOD OF FOREST DEPENDENT COMMUNITY OF SINGRA NATIONAL PARK (SNP)

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ABSTRACT

Sal forests of Bangladesh have been severely damaged due to encroachment, over exploitation, uncontrolled commercial logging, illegal felling, overgrazing and collection of fuel wood as a source of energy by the people living in and around the forests. So, forest management with a strategy to include local people so as to improve Sal forests condition and livelihoods of local communities is the demand of time. In this connection, Integrated PA Co-management (IPAC) project was launched by the Forest Department (FD) with the assistance from United States Agency for International Development (USAID). The aim of the project was to improve the livelihood of forest dependent community through greater access and control over local forests. Hence, the study was undertaken to identify the impact of co-management system on the livelihood of forest dependent community of Singra National Park (SNP) situated in northern Bangladesh. The data were collected through quantitative and qualitative methods. The finding indicates that co-management approach has brought changes on the livelihood of forest dependent community and most of the changes have positive impacts on livelihoods. Now their livelihoods are stable, as most have substantial sources of securing income. The livelihood has improved due to the alternate income generating activities (IGA) like cow-rearing, vegetable farming, pig rearing, small grocery shops, handicrafts etc. provided to the community. However, the communities have experienced severe antagonistic relationships with forest officials. This factor affects their livelihoods. So, there is an immediate need to empower local participants, by which they can easily play the inner

role in decision making and governing all the forest management activities for their sustainable livelihood.

Key words: Sal forest, Co-management, Livelihood improvement and Bangladesh

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Introduction

1.1 General Background

Bangladesh is one of the developing countries in South East Asia having 14.40 million ha of total geographic area (Government of Bangladesh [GOB], 2011) consisting 13.36 million ha of surface land and 0.94 million ha are rivers and other inland water bodies (Ahmed, 1999; Bangladesh Bureau of Statistics [BBS], 2001). The country is also considered as one of the most vulnerable countries to climate change; many of its ecosystems including forests especially the coastal mangrove forests are already being heavily affected and likely to be intensified by the unprecedented combination of climate change, its associated hazards (e.g. flood, drought, salinity intrusion, river erosion). Bangladesh is a forest poor country has only 17.08% (2.52 million ha) of total forestland, in which 15 protected National Parks (45,312.65 ha) along with 13 Wildlife Sanctuaries (223,648.68 ha) (GOB, 2011).

Globally change in forest resource management from the last two decades is evident and people oriented approaches are adopted more widely than the traditional management system. In this type of management system, decisions regarding forest management are taken by local communities and other stakeholders (Ribot 2004; Brown 2009). The major reason behind the paradigm shift is to develop joint management between local communities and government agencies to manage and conserve forest resources on the basis of friendly relationship and trust. Thus management of forests through involving community becomes time demand approach.

Co-management or collaborative management is defined as a "situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources" (Borrini-Feyerabend *et al* 2000). Community Forest Management (CFM) become as protected area management policy as well as a mainstream

forestry policy to mitigate increasing deforestation and forest degradation and address the negative impacts on rural livelihood through the last 2-3 decades. Increasingly it influences the conservation and development policy and recently the climate change policy. A state-community collaborative program which is commonly known as protected area co-management has been initiated from 2004 with the broader aim of protecting forest, sharing resource management with forest communities and ensuring the livelihood security of the forest communities. After piloting projects in 5 protected areas the co-management initiatives have gradually been implementing in other protected areas including Sunderbans mangrove forest.

Sal forests constitute about 10% of the total forest land of Bangladesh. Until the beginning of the 20th century, these forests existed as a continuous belt from Comilla to Darjeeling in India. The present notified area of this forest is largely honeycombed with rice fields. A total area of 0.12 million ha is distributed over the central and north-western region of the country. About 86% of the total forest land is situated in the districts of Dhaka, Mymensingh, Tangail and Comilla (central region) with the remaining 14% in the greater districts of Rangpur, Dinajpur and Rajshahi (Alam et al. 2008). Bangladesh is fighting with an increasing rate of deforestation and forest degradation; the existing natural forests are decreasing at a rate varying from 2.1% to 3.3% per year (Chowdhury, 2003 and BBS, 2004). Bangladesh has 17% of the landmass designated as forest but the statistics of FAO indicate that the actual tree cover is estimated at around 10.7% but in 1985 the forest cover was 36% (FAO 2005). A very densely populated country like Bangladesh where 1061 people live in per square kilometer and where land distribution is sharply skewed; 10% people hold 40% land and 60% are landless (World Bank, 2005), the pressure is already excessive on this very limited forest resource. Per capita forest land in the country is estimated around 0.02 hector or bellow which is one of the lowest in the world. With this limited and degraded forest resource, the changes in the climate and carbon dioxide concentration which is affecting the structure and function of ecosystems have significant consequences for its dependent community.

1.2 Statement of the Problems

The northwest region of Bangladesh is almost devoid of natural forest except some small patches of Sal forests existing in a few areas. Once the Sal forests were rich in biodiversity in the past but many associated species of Sal (including Amloki, Bohera, Haritaki) are no more found in these forests. Due to the loss of food source and habitat, these forests have become devoid of wildlife. To protect this forest, Singra Sal forest had been promulgated as national park in 2010. Due to huge population pressure and lack of livelihood support for forest dependent people, a great portion of the sal forest has been degraded. So to reduce the forest dependency of the people, Singra National Park (SNP) has been brought under the collaborative forest management approach through restoration and conservation of Biodiversity in the Sal forest. The co-management program was undertaken by Arranak Foundation with the donation of USAID and with the assistance of forest department, forest dependent community, and local leaders for sustainable management of the remaining Sal forests of the Singra National Park. However, the transformation of traditional forest management to people-oriented approach is not easy and, in fact, it is a major challenge in many developing countries (Nygren, 2005; Fisher, 2007; Islam and Sato 2012a, Islam and Sato, 2013; Ribot, 2002). On one hand their resource bases are degraded, their lives and livelihood become more and more insecure and on the other hand they have very poor capacity to cope or to adapt this very threatening situation. Again, community forest management can be an effective local institution to enhance the adaptive capacity of the vulnerable forest communities through enhancing their livelihood security. Therefore, it is very important to identify, to what extent the livelihood of the forest dependent community has changed due to co-management program.

1.3 Objectives of the Study

In view of the aforesaid discussion, the following specific objectives were formed to give proper direction of the study:

1. To determine the extent of livelihood improvement of the forest dependent community due to co-management program
2. To find out the demographic characteristic of the forest dependent community
3. To explore relationship between selected characteristics of the forest dependent community and their extent of livelihood improvement

   The characteristics are:

   a) Age
   b) Educational qualification
   c) Family Size
   d) Farm Size
   e) Total Income
4. To determine the problem faced by the forest dependent community and future expectation from co-management program.

1.4 Assumptions of the Study

The following assumptions were kept in mind for this study:

1. The forest dependent community (both man and women) included in the sample were capable of furnishing proper response to the questions reflected in the interview schedule.
2. The responses given by the respondents were reliable. They expressed the truth about their convictions and awareness.
3. The researcher as an interviewer was well adjusted to the socio-cultural environment of the study area.
4. Views and opinions given by the respondents included in the sample of the study were the representative views and opinions of the whole population of the study area.
5. The findings of the study would be particularly applicable to the study area. But, the findings may also be applicable to

other areas of Bangladesh where the physical, socio-economic and cultural conditions do not differ much from the study area.

1.5 Limitations of the Study

In order to make the study convenient and meaningful and considering time, money and other necessary resources available to the researcher, the following limitations were undertaken into consideration for the present research work:

i. Since the findings of the study were based on the opinion expression capability and ability to recall of the respondents, the study was confined to both their ability to recall and also their sincerity and honesty in providing the needed information.

ii. The study was confined to only one national park where co-management program was carried out.

iii. The researcher was relied on the data furnished by the forest dependent community during the interview.

CHAPTER II
REVIEW OF LITERATURE

This chapter deals with the review of past studies and findings related to the present study. Therefore, the researcher made comprehensive effort to review the previous research works directly or indirectly related to the present study in home and aboard. Literatures reviewed are presented below in four major sections. The first section deals with literatures on general concept of co-management. The second section deals with literatures concerning co-management system practiced in the forests of Bangladesh while in third section literatures regarding co-management system and livelihood improvement were discussed. Fourth and last section deals with the co-management system practiced in the different parts of the world.

2.1 Concept of Co-management

Collaborative management or co-management is 'a situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources' (Borrini-Feyerabend *et al.,* 2000).

The World Bank has defined co-management as 'the sharing of responsibilities, rights and duties between the primary stakeholders, in particular, local communities and the nation state: a decentralized approach to decision-making that involves the local users in the decision making process as equals with nation-state'.

According to Carlsson and Berkes (2005), all definitions of co-management have the same foundation which includes the following points: co-management is associated with natural resource management, existence of partnership between public and private actors and co-management is not a fixed state but a process that takes place along a

continuum. Humans are part of the natural ecosystems and only co-management takes this fundamental part of nature into account (Lane, 2001).

In 2008, the FD and USAID started the Integrated Protected Area Co-management (IPAC) project in 17 PAs and one eco-park in Bangladesh with the aim of improving local people's livelihoods through greater access to and control over local forest resources. IPAC project officials work with personnel in the FD, the Department of Fisheries (DoF), and the Department of Environment (DoE) to: 1) provide support to sustain success in biodiversity conservation and alternative income generating (AIG) activities at NSP and MACH pilot sites; 2) expand and support development of an integrated strategy and coherent national program to support co-management and environmental governance; and 3) mitigate and adapt to climate change (Sharma *et. al,* 2006).

The Bangladeshi government adopted its first co-management program for natural resources, the Management of Aquatic Ecosystems through Community Husbandry (MACH) project, to restore the productivity of three major wetlands between 1998 and 2007. In 2003, the FD launched the Nishorgo Support Project (NSP) with assistance from the United States Agency for International Development (USAID) to test a participatory co-management approach to PA management. The NSP broadly covered five PAs in Bangladesh (Lawachara National Park, Rema-Kalenga Wildlife Sanctaury, Satchuri National Park, Chunoti Wildlife Sanctaury and Teknaf Game Reserve) and lasted until 2007. NSP officials worked closely with the FD personnel and key conservation stakeholders to develop and implement a co-management strategy to help conserve the country's PAs. The focus of the NSP was on building equitable partnerships between the FD and key local, regional, and national stakeholders to assist in the conservation of Bangladesh's PAs (GOB, 2007).

2.2 Co-management Practices in the Forests of Bangladesh

Castro and Nielson (2001) reported that co-management agreements among indigenous people, state agencies, and other stakeholders offer substantial promise as a way of dealing with natural resource conflicts in a participatory and equitable manner. However, experience shows that co-management regimes can set into motion new conflicts or cause old ones to escalate. In practice the result may not be power sharing but rather a strengthening of the state's control over resource policy, management, and allocation. Instead of contributing to local empowerment, such arrangements may further marginalize communities and resource users. We use case material, primarily from northern Canada and South Asia, to explore the pervasive role of conflict in generating, shaping, and influencing the performance of co-management regimes.

Uddin et al. (2007) conducted an exploratory study in Lawachara National Park (LNP) to make a comparative analysis of co-management practice in protected area management. The study compares the socio-economic condition (income, social status, living style etc.) and forest dependency before and after implementation of co-management activities in LNP. Study reveals that after being implementation of co-management activities the average income level of 3 studied villages have rises on average 550 taka/HH s(1 US $ =Taka 70). Furthermore, many of the former illegal loggers became forest protector which makes their life more secured and respectable in the society than before. It was also found that peoples of study villages are now actively engaging in forest management activities and it is the only hope for conservation and restoration of forest resources not only in LNP but also in other protected areas of our country.

Shewli (2008) suggested that increased involvement of women in broad range of co-management activities is not only beneficial for their own

socioeconomic well being, but also imperative for sustaining the livelihood of their communities, and for preserving the forest and biodiversity on which these communities depends.

In 1995, the government approved the twenty-year Forestry Sector Master Plan (FSMP) for the protection and development of the country's forest resources. Similarly, the ADB-assisted Forestry Sector Project (FSP), which lasted from 1997-2006, encouraged afforestation activities on marginal lands belonging to various land owning agencies of the government. FSP paid local people for their involvement in the care and maintenance of tree plantations through a share of the tree thinning and pruning materials. The FSP also paid a handsome amount of money from sale proceeds based on a Participatory Benefit Sharing Agreement (PBSA). Under the FSP participants also received money on a daily basis from the FD for labor they contributed to plantation activities. The project covered sixty-four districts including seven PAs (Mukul *et.al* 2008).

Natural resource management issues are complex and so community members need to be motivated and made aware about relevant issues. At the beginning of Nishorgo Support project the Co-management Council (CMC) members could not sufficiently understand the whole project mechanism. Now local people are more aware of the situation that they have to protect the forest for their own benefit. Local community needs to be sufficiently motivated and funds constraints should be removed. If the CMC can work properly as an institution with adequate fund and active members then they will be able to protect the forest for the future generation (Hossain and Karim, 2009).

Protected area co-management initiatives is potential to enhance the adaptive capacity of the forest communities through enhancing livelihood security, access to forest benefits, forest decision making and institutions; however is not a policy panacea. The study aims to analyze

the outcomes of the co-management initiatives in Bangladesh to understand to what extent the co-management has transferred the control of forest management to local forest users. And, to what extent it has benefited the marginalized communities in regard of their decision making space, access to benefits, and livelihood opportunities. Based on the field survey in Chunoti wildlife sanctuary, this study summarizes that the initiatives is a good start to transfer to control to local communities but insufficient to address the marginal forest users who are most vulnerable to climate change and whose access and benefits are captured by local elite and the societal patronage relation (Anar Koli, 2010).

Evolution of co-management practices for forests and protected areas (PAs) is presented for South Asian region in order to comprehend the present co-management scenario in the region in general and Bangladesh in particular. This follows a review of current patterns of co-managing PAs in six main South Asian countries (India, Nepal, Sri Lanka, Pakistan, Bhutan and Bangladesh) with a view to discern enabling co-management policy issues and challenges. The relevance of emerging lessons is examined for Bangladesh in order to help decide future co-management priorities for the PAs. Co-management approach is particularly found suitable for Bangladesh PAs that are intimately interspersed with local communities, who practice cultivation and depend on forests for their livelihood. The protection of PAs and constituent biodiversity against biotic pressure cannot be effectively checked without establishing gainful partnerships with local stakeholders. More natural forest areas should be brought under PAs where co-management practices for in-situ biodiversity conservation should be implemented (Sharma, 2011).

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Dhali (2012) carried out an investigation on the gender relations following the implementation of co management model of forest management in Lawachara forest area. It has investigated some important and relevant aspects of gender relations in Lawachara protected area following the implementation of IPAC project. Co –

management model, implemented by IPAC, has become able to engage women with the forest management. These engagements not only reflect the participatory nature of the model but also ensure different kind of incentives which are very strong determinants of bargaining power. These supports including Ownership of fixed and/or temporary resources, Income earning opportunities, and Education and/or training on skill development, participation in community and/or state and/or NGO led activities have also increased access to food, control over labor and income, and participation in decision making process for those women who have been benefited from the co-management model.

Community involvement in protected area management is a relatively new practice in Bangladesh, initiated with the dual purpose of limiting forest degradation and enhancing community development. In this article, we focused on the latter, presenting the results of a community survey in and around Rema-Kalenga Wildlife Sanctuary, where collaborative management has been underway since 2004. A total of 302 members of the forest user groups (FUGs) were randomly selected and interviewed (23% of whom were female). Informants reported a satisfactory level of socio-economic development in the community since the initiation of the new management strategy. Two activities included in the collaborative management strategy- the provision of training for alternative income generating (AIG) activities and the allotment of available vacant lands for agriculture- significantly increased the community's annual income. Empowerment and improved social dignity of female participants was an additional outcome of the collaborative management approach. Community members also identified numerous shortcomings of the collaborative management project including failure to provide AIG training options that truly met the needs of the community, inequity in the distribution of training, and absence of pro-people manners of the local Co-management Committee toward community members. These shortcomings need to be addressed before the full potential of this, or any other participatory program of protected

area management in Bangladesh can be realized (Chowdhury et al. 2013).

A government-initiated experiment in co-management was conducted in the Rema-Kalenga Wildlife Sanctuary, Bangladesh. Chowdhury et al. (2014) analyzes the attitudes toward conservation by members of local communities living in and around the wildlife sanctuary. Training incentives on alternative income-generating (AIG) activities and allotment of agricultural lands were distributed among the Forest User Groups. It is of interest to policy makers and resource managers whether this technique leads to improved attitudes on the part of local people. Although there were different attitudes toward protected areas and conservation, overall, a favorable attitude of the respondents was observed. The opinions of respondents also varied based on factors such as village position, village dependency level on forest resources, ethnicity and gender. Increase in annual income resulting from the augmented skills by trainings on AIG activities and getting agricultural lands leased from the Forest Department contributed significantly to the variation in respondents' conservation attitudes. It is suggested that eliminating inequity and inequality in incentive distribution, discovering and launching training on more need-based livelihood activities, and liberalizing the restriction of resource extraction from the protected area by fixing the harvesting limit would encourage the community to be more cordially and actively involved in the conservation efforts of the sanctuary.

A satisfactory level of development has been observed in the socio-economic conditions of the community living in and around the Rema-Kalenga Wildlife Sanctuary due to the impact of the new management strategy. The provision of incentives in terms of training for Alternative Income Generating (AIG) activities and allotment of available vacant lands for agriculture had significant contribution to the increase in the community's annual income. Empowerment and improved social dignity of women participants signifies the introduction of the co-management

approach there. Lack of accurately need-based AIG options, inequality and inequity in the distribution of trainings among the FUG members and absence of pro-people manners of the local Co-management Committee were identified as the key incongruities, which need to be addressed properly for achieving the absolute success of the participatory programs of protected area management in Bangladesh (Chowdhury et al. 2014).

2.3 Co-management and livelihood Improvement in Bangladesh

An exploratory study was conducted by sohel et al. (2010) in Rema-Kalenga Wildlife Sanctuary (RKWS) which is a biodiversity hotspot zone of north-eastern Bangladesh. The main focus of this study is to assess the effectiveness of alternate income generating activities (AIGAs) provided by the Nishorgo Support Project (NSP or Nishorgo) as a tool for reducing dependence on forest resources by people living in and around RKWS and also play effective role in forest conservation. This study compares the socioeconomic condition (income, living style etc.) and forest dependency before and after implementation of co-management activities in Rema-Kalenga Wildlife Sanctuary. The major income generating livelihood activities were agro farming (30%), followed by fuelwood collection (22.50%), nursery raising (12.5%), cattle rearing (10%), fisheries (7.50%) and others. Study also reveals that after being implementation of the co management activities the average income levels of the studied villages have rises on 578 Tk/HHs (1US$ = 70 Taka, Taka means Bangladeshi currency). Furthermore, many of the illegal loggers became forest protector, which make their life more secured. It was also found that peoples of the study villages are now actively engaging in forest management activities and it is the only hope for conservation and restoration of forest resources not only in RKWS but also in other protected area's of our country.

Rokeya Begum (2011) stated that natural forests in Bangladesh have been severely degraded due to over exploitation, encroachment, fire, uncontrolled and wasteful commercial logging, illegal felling, overgrazing, and the collection of fuelwood to support the energy needs of a large population. In 2003 the Forest Department (FD) with assistance from the United States Agency for International Development (USAID) launched the Nishorgo Support Program (NSP) to test a participatory co-management approach to protected area (PA) management. The project lasted until 2007 and was followed in 2008 by the Integrated PA Co-management (IPAC) project with the aim of improving local people's livelihoods through greater access to and control over local forest resources. In this investigation, the livelihoods of local people in two villages and their involvement in management of Madhupur National Park. Based on data collected between September and December 2009 it can be said that farmers in the study area are heavily dependant on forestry-related activities to support livelihoods. Residents of both villages have a long history of participation in outside-initiated social forestry programs, and farmers have become suspicious that these programs may not provide the benefits promised, may limit their access to forest resources, and may exacerbate long standing conflicts with the FD. Moreover, despite their history with these programs, many people have little knowledge of co-management. The potential exists for various alternative income generating (AIG) activities that could help improve the livelihoods of the local people and the management of Madhupur National Park.

Mian et al. (2012) studied the impact of Madhupur National Park on local peoples' livelihoods. Present management system was discussed to emphasize park management authority contribution on local livelihood. Present park management system plays an important role to reduce people and park animosity by providing aid and training to the local offensive persons and involve them into park conservation. A trend

analysis of decreasing forest offences represented that, the present management system is better than past time and it could be able to reduce people park animosity.

Islam and Sato (2012) reported that the most common feature of Participatory Forestry Programs (PFPs) were the contribution of financial capital to the participants, whereas other livelihood capitals faced constraints and difficulties. In addition, inequity issues and social capital differences were created between the ethnic and non-ethnic participants, and a lack of commitment by the local Forest Department resulted in PFPs having limited success in creating sustainable livelihoods for the participants. The overall situation revealed that PFPs alone were not sufficient to conserve and develop the Sal forests or assure people's basic needs. Therefore, a long-term-integrated approach by the Forest Department is necessary to address the diversified needs of low-income forest-dependent people in a more sustainable way.

Forest Department (FD) of Bangladesh initiated a project in the Madhupur Sal forest area to protect forests and improve the livelihoods of forest-dependent people in a sustainable way. Islam et al. (2012) analysed the nature and extent of peoples' participation in Madhupur projects, and evaluated the project's impacts on the livelihoods of participating people through empirical data. The result revealed that capacity building of encroachers and forest-dependent families were the basic achievements of this project. Natural assets, social relationships, and the utilization of human capital through alternative livelihood strategies have provided security and improved livelihood assets of participants. All participants were appointed as paid community forest workers, received incentives, and established a good relationship with the FD, which dismissed participants' forest offences and mobilized their participation. Moreover, protection of encroacher intervention in Sal forests and substantial re-vegetation went hand-in-hand in a synergistic way that made the project initially successful, but community

empowerment issues will need more attention from the FD to ensure the sustainability of the project.

Protected areas are an appropriate means for managing biodiversity and have become increasingly central to conservation strategies. However, declaring a natural resource to be protected has an immense influence on the livelihoods of many local communities living in and around the protected area. Islam and Sato (2013) explores the role of protected sal forests—namely, the Madhupur National Park (MNP) on the livelihoods of forest-dependent ethnic minorities, drawing empirical data from ethnic households. The results revealed that the MNP has brought changes, most of which have had negative impacts on ethnic livelihoods. Now their livelihoods are not stable, as most do not have substantial sources of securing income. In spite of this, the ethnic communities have experienced severe antagonistic relationships with park managers and faced social inequity; all these factors affect their livelihoods. Therefore, establishment of a legitimate process to constructively work with the local communities is the most feasible and just way to achieve conservation and development.

2.4 Co-management system practiced in the world

Jing-wen et al. (2001) collected a great quantity of relevant data by investigating more than 50 nature reserves. Based on the analysis of development and management situation of the protected areas in China, the main problems were put forward, such as, no unified management for income and managing activities, lack of special guideline and effective supervision, lack of income and investment, investing financial difference in different provinces. All these problems caused the lack of funds for construction, as well as the damage of resources and environment. Furthermore the conserving activities have to transmit to the profits in many protected areas. Combined with these problems, the primary solution programmers also were put forward.

Yasmi (2003) find out the underlying causes of conflicts between local people in Bulungan Research Forest (BRF), Indonesia with coal-mining and logging companies. Conflict between local people and mining companies was triggered by the fact that the mining operation caused water and air pollution and soil degradation. Another cause for the conflict was the compensatory facilities (e.g. clean water, electricity, compensation fee, etc.) provided by the companies to local people that were often delayed or unsatisfactory. Local people perceived that their major problem with logging activities was the adverse impact to residual plants such as rattan, eagle wood, medical plants, etc. Not only did that, logging companies not allow local people to cut trees for their own uses such as for houses or churches.

Tachibana and Adhikary (2005) conducted a survey in the Middle Hills of Nepal to find out the role of community management for the improvement of the conditions of local natural resources. They stated that co-management systems, which are the forest users groups registered at the local forest offices, contributed to increase tree regeneration. In the case of Nepal, the official support from the forest offices enhanced the functions of community management. However, community management systems without any external support are not ineffective. Result of the study also suggests that they reduced the incidents of forest fire and grazing activity.

Matta and Kerr (2007) draw an discussions with Forest Department officials to examine the influence of these forces on the outcomes of Joint Forest Management (JFM) in Tamil Nadu, India. An empirical inquiry into the operational aspects of JFM indicates the important roles of political parties, powerful people, and other state institutions and functionaries as well as the flow of foreign funding. Further, the strong demand by local people for socio-economic development interventions as opposed to improvement of degraded forests belittles the role of the Forest Department relative to other departments. Numerous other conditioning

factors and relationships are explored. The authors call for reforms in public governance to allow better participation of all the actors involved for this participatory management approach to succeed and sustain.

The Joint Forest Management program in India is one of the largest co-management efforts in natural resource conservation in the world. Apart from providing livelihoods to forest dependent populations, forests provide crucial subsistence needs of housing materials, food, medicine, fuel-wood, small timber and non timber forest products. Since the colonial era, forest dwellers and traditional stakeholders, including tribal populations have been deprived of forest ownership and usufruct rights by exclusionary, hierarchical ‘command and control ‘management. Since 1970s there has been an awakening and advocacy for thwarting exclusionary forest management and conservation through the involvement of local people. An analysis of policy transformation in forestry governance in India over the last four decades reveals a wide gap between the actual outcomes and the expectations of people. The research paper attempts to highlight the causes of this gap and puts up reasoned arguments recommending possible integrated structural, institutional and socio-cultural solutions (Vemuri, 2008).

Among South Asian countries, Sri Lanka has only recently ventured into community management of its forests. Nuggehalli and Prokopy (2009) focus on a qualitative exploration of two communities in a rainforest conservation project in Sri Lanka. The high level of women's participation is attributed to motivating factors and facilitating conditions. Obstacles to forest co-management outcomes include reduced forest dependency and top–down decision making. Adaptive implementation strategies compensate for these obstacles by establishing strong networks and structural organizations in forest boundary communities. This suggests that an intervention addressing the actual needs of stakeholders, rather than focusing on perceived problems, would allow for increased participation.

Das (2009) in an empirical study assesses the impact of community-based initiative under gender sensitive joint forest management (JFM) programme on sustainable rural livelihoods (SRL) across the socio-economic groups of forest fringe community based on JFM and non-JFM villages. The study suggests that strong livelihood sustainability criteria within the SRL framework meets for all marginal landholding and landless categories of households, which live below poverty line and that are almost dependent on forest resource for their livelihood security. The study also suggests that law or force can not effectively control the illegal collection of timber forest products (TFPs) for this poor households until and unless a considerable increase in the legal forest products (non-timber forest products like sal leaves and fuel wood) and wage income from forest meets their minimum livelihood security.

Protection of forest resources presupposes active participation of forest dependent communities. Active participation in forest conservation activities requires a sense of commitment, attachment and motivation on the part of the forest dwellers. In this paper a dynamic optimization model is employed to focus on the likely socio-economic determinants of participation. On the basis of a case study in a remote rural region in India, index of determinants of participation and actual participation indices are derived and found to be only moderately correlated. Despite the existence of small size, low quality agricultural land and irrigation facilities that encourage participation, poor level of social cohesion, absence of awareness and implementation of forest extension programmes, lack of motivation by forest committees, non-government organizations (NGOs) and Panchayats, fear of eviction from forest land, biased administrative machinery and lack of trust in the unjust efforts of forest department etc. stand in the way of effective participation by villagers and need immediate policy intervention. Grant of permanent tenurial right to forest dependent people, mitigating the fear of eviction, extension of various support facilities and ensuring a cohesive trust

between forest department and forest protection committees seem most urgent for ensuring meaningful participation (Datta and Sarker, 2010).

Forest tenure reform has opened economic and livelihood opportunities for community forestry management through the devolution of management rights under broader decentralization reforms. However, the transfer of rights and associated power to forest communities is usually partial. The view of property as composed of 'bundles of rights' allows for the disaggregation of rights transferred from government to local people. In practice, it is common that rights held by natural resource stakeholders encompass only part of the rights bundle. This partial transfer of rights shapes community forestry institutions and the manner in which they function. When communities and state agencies share responsibilities and benefits of forest management, they collaborate within co-management systems. Co-management systems are attractive to governments because they open avenues for local participation in resource governance and more equitable benefit-sharing while maintaining some level of state control. However, co-management systems can place a greater burden on community level actors without providing the corresponding benefits. As a result, co-management can fail to meet expectations. In response, the promotion of community forestry may require greater emphasis on adjusting forest regulatory frameworks, institutions, and agencies, to allow more freedom by community-level actors in developing forest management systems (Cronkleton et al., 2012).

CHAPTER III

METHODOLOGY

In any scientific research, methodology plays an important role. This enables the researcher to collect valid and reliable information related to the hypotheses or researchable questions, which can be analyzed in order to appear at correct conclusions. The methods and procedures followed in conducting this study are described in this Chapter.

3.1 Locale of the Study

The empirical research was conducted in neighboring area of Singra National park (SNP). The study was conducted with the people living in and around the forest area i.e. forest dependent community.

3.1.1 Brief Description on Singra National Park (SNP)

Northern part of Bangladesh is devoid of natural forest but only small patches of sal forest are found in the area. Singra Sal Forest is one of them. Singra Sal Forest is promulgated as Singra National Park (SNP) in the year 2010. The total area of the SNP is 306 ha. The park is situated in Old Himalayan Piedmont Plain Area belonging to AEZ. 01. Geographically it is located between 25^0 90'-26^0 30' north latitude and $88^0$20' - $88^0$50' east latitude. SNP beat is under Thakugaon forest range of Dinajpur forest division. As a representative of Sal bio-geographic zone, Singra National Park is famous for its Sal forests that are remnants of once extensive northern Sal zone. It has great community development opportunities through eco-tourism, as its recreational value is high and its easy accessibility. A large number of people from the neighboring regions visit this park for recreational activities. Sal, Segun and Gamar are the primary plant species of this park. Singra National Park is a major dwelling ground for several unique breeds of Fox, native to this region. The River Norto flows through the park and merges with the River Punorbhoba at its southernmost corner. Once the Sal forests were

rich in biodiversity in the past but many associated species of Sal (including Amloki, Bohera, Haritaki) are no more found in these forests. Due to the loss of food source and habitat, these forests have become devoid of wildlife. Aside from general population depending on these forests for fuel wood and other forest products, a number of indigenous communities live in and around these forests and they depend on the forest for food and other necessities of life.

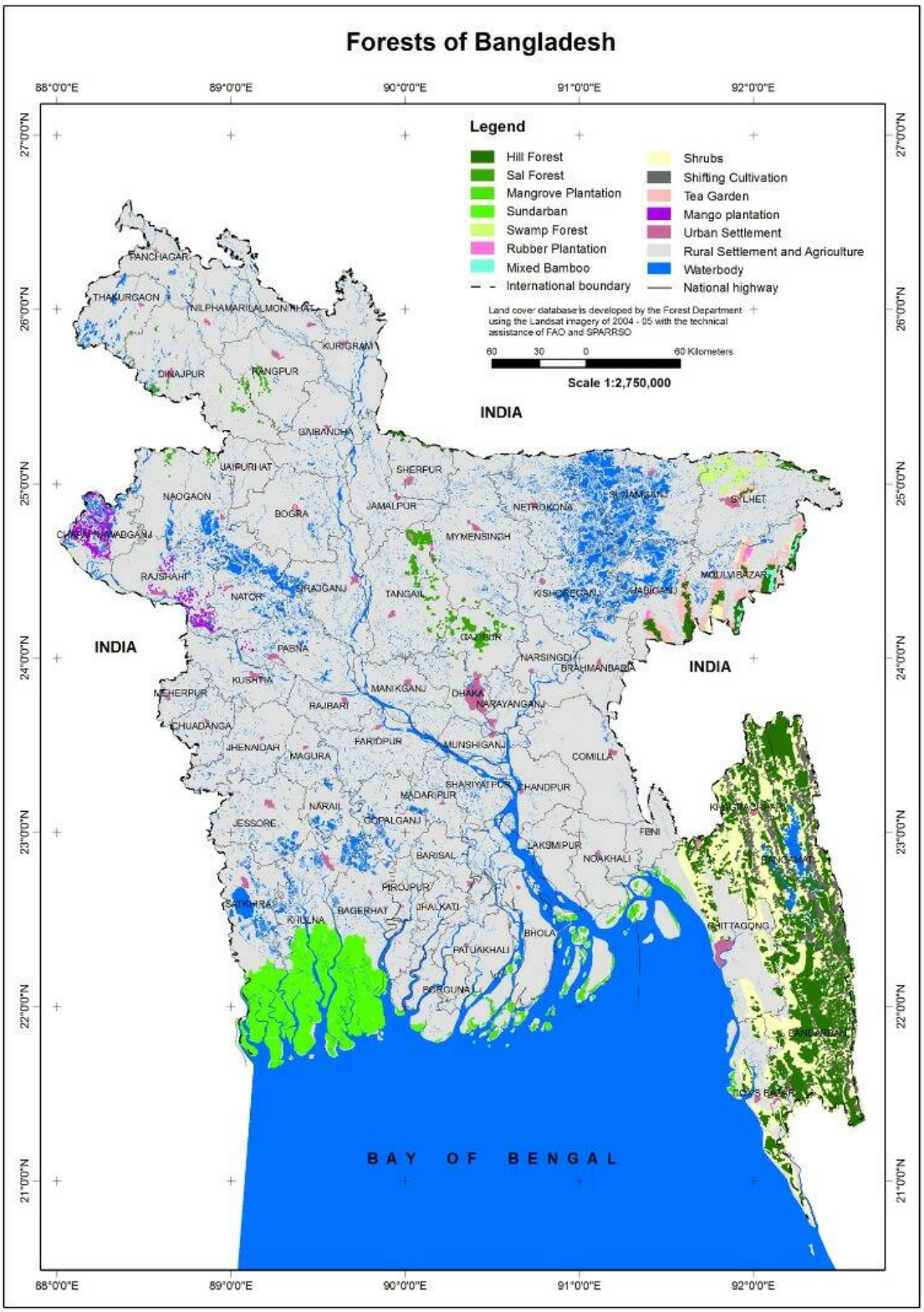

Fig 3.1 Map showing forest area of Bangladesh

3.1.2 Brief Description of the co-management program

Name of the organization: Arannyak Foundation and RDRS Bangladesh			
Project title: Restoration & Conservation of Biodiversity in Singra National Park.			
Starting date: July' 2009 (Phase-I)	Project completion date: June'2014 (Phase –II)		
Project Location: Birganj & Kaharol, Dinajpur			
Total Area under project (ha.): 345 ha			
Number of Project participants: 233	Male: 130	Female: 103	
Number of groups: 09	Male:	Female:	Mixed: 09
Number of Union Level Federations (if applicable): 01			
Number of Federation Houses established (if applicable): 01			
Amount of RLF: 15 lakh	AF contribution: 15 lakh	Community contribution:	
Present RLF amount revolving: 15 lakh (but disbursed revolved loan amount equivalent 27,20,000)			
Number of IGAs: 09 nos			
Names of IGAs: Vegetable farming, Cow rearing, Pig rearing, Mat making, Sewing cloths, Van & rickshaw pulling, Small grocery Shop keeping, Business of seasonal fruits etc.			
Five profitable IGAs in descending order: Vegetable farming> Business of seasonal fruits> Fish culture> Mat Making> Cow rearing			
Number of trees planted: 120,000	Within forest: 110,000	Within household: 10,000	
Name of species planted: (Used separate sheet below)***	Fruit trees: 18000	Timber trees: 70,000	
	Medicinal plants: 22,000		
Survival with height (meters): 78% Approximately, 3.5 to 5 meters			
Area conserved, where applicable (conservation area in ha): 225 ha			

Number of cooking stove provided to beneficiaries (if applicable): 215 nos
Cost of cooking stove: 750 tk/Stove
Subsidy provided for cooking stove: 750 tk/Stove
Any other support provided to beneficiaries (Such as; sanitary latrine, GFS, Rainwater harvesting tank): 27 nos Sanitary latrine

3.2 Sampling Procedure

Multi-stage random sampling procedure was followed in this study. SNP was at first purposively selected because SNP was one of most important sal forest under the Dinajpur Forest Division where the co-management program was carried out. Data were collected from 9 groups and each group consists of 26 beneficiaries. Among the 9 groups one group belongs to minority (Saontal) which has 25 numbers of beneficiaries. Thus the total population size of the study is 233. Among the 9 groups, 11 beneficiaries from 8 groups, total of 88 beneficiaries and 14 beneficiaries from minority groups were taken as a sample of the study. So, 102 beneficiaries were selected from these 9 groups by using random sampling procedure as the sample of the study.

3.3 Selecting Criteria of the Respondents

1. The respondents were kept confined within the beneficiaries selected for co-management program.
2. The respondents were selected who are literate, trained by the GO and NGOs and that is why all types of the farmers i.e., small, medium and large farmers were not equally included in the study.

3.4 Variables and Measurement Techniques

The selected characteristics of the respondents were considered as independent variables. The characteristics were age, family education, family size, religion, farm size, family income, occupation, origin of household, distance of market and household from the forest. On the

other hand, extent of livelihood improvement of the respondents was selected as dependent variables of the present study.

3.4.1 Measurement of independent variables

The procedure followed in measuring the independent variables have been discussed in the subsequent sections.

3.4.1.1 Age

The age of the respondents was measured in terms of years from his birth to the day of interviewing. A unit score was assigned for each year of one's age. The variable appears in item number 1 in the interview schedule (Appendix-A).

3.4.1.2 Family Education

Education was measured in terms of one's year of schooling. One score was given for passing each level in an educational institution. On the other hand, family education of a respondent was measure by summing up the total educational score of his family members including him. The variable appears in item number 2 in the interview schedule (Appendix-A).

3.4.1.3 Family Size

The family size of a respondent referred to the total number of individuals in the family including himself/herself, his/her husband/wife, children and other dependent members. The total number of the family members was considered as the scores. It was measured on the basis of her responses to item number 3 in the Interview Schedule.

3.4.1.4 Religion

Information regarding the religion of the respondents was found out in four categories giving score to each religion. The religion of the

respondents was categorized into four category viz. Muslim, Hindu, Christians and Others. It was measured on the basis of his/her responses to item number 4 in the Interview Schedule.

3.4.1.5 Farm size

Farm size of a respondent refers to the total area of land on which his family carried out operations. The variable appears in item number 5 in the interview schedule (Appendix-I). It was computed in hectare by using following formula (Rashid, 2006, Mondol, 2009).

$$FS = A_1 + A_2 + A_3 + \frac{1}{2}(A_4 + A_5)$$

Where,

FS = Farm size

A_1 = Homestead area (including garden and fellow land)

A_2 = Own land under own cultivation

A_3 = Land taken from others as mortgage

A_4 = Land taken from others on borga (one-half share)

A_5 = Land given to others on borga (one-half share)

3.4.1.6 Occupation

Occupation of a respondent was measured based on his/her primary and secondary source of income. Information regarding the occupation of the respondents was found out in giving score to each occupation. It was measured on the basis of his/her responses to item number 6 in the Interview Schedule.

3.4.1.7 Family income

The family income of a farmer was measured on the basis of his family`s yearly earnings from crops (rice, wheat, maize, potato), fish farm, livestock, land lease, business, service and others. The family income was expressed in Taka. In measuring the variable, total earning in Taka of a

respondent was converted into unit score. A score of one (1) was assigned for each ‘1000’ Taka of the annual income of a respondent (Waheduzzaman, 2004, Mondol, 2009). The variable appears in item number 7 in the interview schedule (Appendix-A).

3.4.1.8 Origin

Origin of the respondents was measured on the basis that whether they are from same village/area, same district, other district or from other countries. Each response was assigned with a score. Finally, origin of the respondents was measured on the basis of his/her responses to item number 8 in the Interview Schedule.

3.4.1.9 Distance of Household to Singra National Park

Household distance of the respondents to Singra National Park was measured on the basis how far (Kilometers) they live from the forest. Each response was assigned with a score. Finally, origin of the respondents was measured on the basis of his/her responses to item number 9 in the Interview Schedule.

3.4.1.10 Distance of Household to Market

Household distance of the respondents to market was measured on the basis how far (Kilometers) the nearest market from their household. Each response was assigned with a score. Finally, origin of the respondents was measured on the basis of his/her responses to item number 10 in the Interview Schedule.

3.4.1.11 Involvement with co-management program

Respondents’ involvement with co-management program was measured on the basis of how many years they are involved with the program. Each response was assigned with a score. Finally, involvement of the

respondents with co-management program was measured on the basis of his/her responses to item number 11 in the Interview Schedule.

3.4.2 Measurement of dependent variable

As stated earlier, the dependent variable of this study was livelihood improvement of the respondent due to participation in co-management program. Extent of livelihood improvement of the beneficiaries was assessed through DFID's sustainable livelihoods (SL) framework (DFID, 2000).

A livelihood comprises of six assets—namely, natural, physical, human, financial, and social assets/capital—as well the activities and access that together determine the level of living improvement by the individual or household (Hussein & Nelson, 1998; Scoones, 1998). This concept is widely used by the UK Department for International Development (DFID) for livelihood analysis. DFID developed a framework which looks at the basic dynamics of livelihoods and how people are represented on a set of assets as a basis for their livelihoods (Das, 2009; Shahbaz, 2009). To explain the interrelationship among the different capitals DFID's framework is very useful (DFID, 2000; Warner, 2003). DFID's framework is also useful for explaining the interrelationship among different livelihood capitals and their utilization in diversifying livelihood strategies to achieve desirable outcomes in the available enabling environment. The capitals are the building blocks of the respondents' livelihoods and a range of capitals are needed to attain positive livelihood outcomes (DFID, 2000; Warner, 2003). Previously, beneficiaries have been fully dependent on sal forests to develop their livelihood capitals (Gain, 2002). The impacts in particularly are those which shape positively and negatively on the livelihood capitals of beneficiaries and their means of living.

Therefore, livelihood of the respondents was measured by DFID's model through five (Human, Social, Physical, Natural and Financial) capitals after involvement with co-management program. The scale for livelihood

improvement was a four rating scale. In measuring the extent of livelihood improvement, scores were separately assigned for each capitals where 0 for no change, 1 for slightly increased, 2 for increased and 3 for highly increased.

For clear understanding and in depth analysis of livelihood improvement, rank order for each capital was computed by using Livelihood Improvement Index (LII)

$$LII = (C_{hi} \times 3) + (C_i \times 2) + (C_{si} \times 1) + (C_n \times 0)$$

3.5 Statement of Hypothesis

According to Kerlinger (1973) a hypothesis is a conjectural statement of the relation between or more variables. Hypotheses are always in declarative sentence form and they are related, either generally or specifically from variables to variables. In broad sense hypothesis are divided into two categories: (a) Research hypothesis, and (b) Null-hypothesis.

3.5.1 Research hypothesis

Based on review of literature and development of conceptual framework, the research hypotheses were ‘there were relationships between characteristics of the beneficiaries with livelihood improvement through co-management program.

3.5.2 Null hypothesis

The null hypothesis developed for this study ‘there were no relationships between characteristics of the beneficiaries with livelihood improvement through co-management program.

3.6 Tools for Data Collection

In order to collect desired information, an interview schedule was prepared keeping the objectives of the research in mind. The schedule was prepared in Bangla (English version of the interview schedule is enclosed in Appendix-A) for understanding of the respondents. Respondents opinion based question have been included in the schedule along with the selected characteristics of the respondents.

The schedules were pre-tested in actual field situation before using the same for final collection of data among 15 respondents of the study area. Necessary correction, additions and alternations were made in the interview schedule on the basis of results of pre-test. The interview schedule was then printed in its final form.

3.7 Method and Time of Data Collection

Data were collected by the researcher himself from the sample respondents through personal interview by using interview schedule. Data were collected during the whole month January 2015. Necessary co-ordination was obtained from the beat officers and NGO staffs. Data obtained from the respondents were transferred to master sheet and then compiled to facilitate tabulation. The qualitative data were converted into quantitative by means of suitable scoring techniques.

3.8 Data Processing and Analysis

The collected data were compiled, tabulated, coded and analyzed for statistical analysis according to the objectives of the research. Descriptive statistics such as range, mean, number, percentage, standard deviation and rank order was used wherever necessary in describing the selected variables. Pearson's Product Moment Correlation Co-efficient (r) was used to examine the relationships of independent variables for

livelihood improvement. The soft-wares: Excels and SPSS were used to analyze the data.

CHAPTER IV

RESULTS AND DISCUSSION

In this Chapter the findings of the study and interpretation of the results have been presented in three sections according to the objectives of the study. The first section deals with the selected personal characteristics of the beneficiaries involved with co-management program. The second section deals with the extent of livelihood improvement and last section deals with the relationship between dependent and independent variables.

4.1 Demographic Variables of the respondents

Human life is aggregation of variety of attributes. For this reason, it can be assumed that different characteristics of the beneficiaries might have influence on their livelihood. The selected characteristics were age, family education, farm size, family size, family income, occupation etc. A brief summary of the scoring methods with basic statistics have been presented in the Table 4.1.

4.1.1 Age

According to Smith and Zope (1970) an individual's age is one of the most important factors pertaining to his personality makeup, since his need and the way in which he/she thinks and behaves are all closely related to the number of years he/she has lived. It is a norm in Bangladeshi traditional cultures that people respect the elder people, seek advice from them and obey their decisions. The elders are important in many ways they have long experience in many spheres of life.

The age of the beneficiaries ranged from 19 to 60, the mean being 38.71 years and the standard deviation is 11.79. According to the age, beneficiaries were classified into three categories are: young aged (≤ 35), middle aged (36 to 50) and old (above 50) based on their observed score as shown in Table 4.1.

Data contained in Table 4.1 reveal that most of the beneficiaries belong to young and middle aged and the percentage is 41.2%, while 17.6 percent were in the old aged category. The findings may be due to the reason of nature of the population of this study. Young and middle aged people are generally energetic, they always involved themselves in progressive and innovative programs and they can take easily any decision.

Table 4.1 Characteristics profile of the respondents (n = 102)

Characteristics	Scoring method	Range	Categories	Respondents		Mean	SD
		Observed (Possible)		No.	Percent		
Age	No. of year	19-60 (Unknown)	Young aged (≤35)	42	41.2	38.71	11.79
			Middle aged (36-50)	42	41.2		
			Old aged (>50)	18	17.6		
Educational qualification	Year of schooling	0.0-16 (Unknown)	Illiterate (0.0)	3	2.9	6.23	4.68
			Can sign only (0.5)	24	23.5		
			Primary level (1-5)	18	17.6		
			Secondary level (6-10)	42	41.2		
			Above secondary level (>10)	15	14.7		
Family size	No. of members	2-16 (Unknown)	Small (≤ 3)	15	14.7	5.65	2.58
			Medium (4-6)	57	55.9		
			Large (>6)	30	29.4		
Farm size	Hectare	0.012-3.95 (Unknown)	Landless (up to 0.2 ha)	6	5.9	1.15	1.09
			Marginal (0.201 to 0.6 ha)	9	8.8		
			Small (0.601to 1.0 ha)	39	38.2		
			Medium (1.01 to 2.5 ha)	39	38.2	208.65	253.76
			Large (> 2.5 ha)	9	8.8		

Family income	('000' Tk.)	22.40-1339 (Unknown)	Low income (>45.11)	57	55.9		
			Medium (45.12-462.40)	18	17.6		
			High (>462.41)	27	26.5		

4.1.2 Family education

Exposure to formal education is very important for shaping-up the behavior of an individual. Education compels an individual to seek, accumulate as well as assimilate knowledge for appropriate uses. Education always plays an important role for participation in decision-making process (Rahman, 2008). Moreover, educational qualification influences use of communication sources of the respondents.

The family educational scores of the beneficiaries ranged from 0.0 to 16, the mean being 6.23 and standard deviation 4.68. Based on educational qualification scores, the beneficiaries were classified into five categories such as illiterate (0.0), can sign only (0.5), primary level (1-5), secondary level (6-10) and above secondary level (>10) as presented in Table 4.1

Data presented in Table 4.1 indicate that the educational qualification for most of the respondents were secondary level (41.2%), followed by the beneficiaries those can sign only (23.5%). Moreover, 17.6% of the respondent had completed primary level education and 14.7% completed above secondary level education. Only 2.9% beneficiaries were illiterate. The educational qualification of 97.1% beneficiaries were under secondary level is due to their socioeconomic condition, higher dependency for managing their livelihood. Another reason is that, most of the beneficiaries were of middle and young aged those have strong attraction towards study and the lowest number of were illiterate because of the old aged people involved in the study.

4.1.3 Family size

Family size scores for the beneficiaries ranged from 2 to16 with an average of 5.65 and standard deviation of 2.58. Based on the family size scores, family size of the beneficiaries were classified into three categories viz. small family (≤3), medium family (4-6) and large family (>6). Among the beneficiaries, 55.9% had medium family, 29.4% had large family and 14.7% had small family. Family sizes of the most of beneficiaries were medium to large. This is the common scenario of this area. Most of the people in rural area preferred joint family and don't strictly follow family planning compared to city area.

4.1.4 Farm size

The most important production factor of farming is the land. It is a scarce resource in Bangladesh. The farm size is the main indicator of holding farming status by the farmers. The farm size scores of the sample farmers ranged from 0.012 to 3.95 hectares, the average being 1.15 hectare and standard deviation 1.09. According to DAE (1999), the farms were classified in to five categories such as landless (up to 0.02 ha), marginal farm (0.201 to 0.2 ha), small farm (0.201 to 1.0 ha), medium farm (1.01 to 3.0 ha) and large farm (>3.0 ha) shown in Table 4.1.

Data presented in Table 4.1 show that the majority of the respondents had medium and small sized farm (38.2%), 8.8 percent had marginal and large size farm while 5.9 percent respondents were landless. This means that overall farm size of the respondents were small to medium. Most of the respondents mentioned that their primary job is farming and took land in the form of lease or borgha or in contractual basis from others for sack of farming.

4.1.5 Family income

The family income (taka in thousand) of the farmers ranged between 22.40 to 1339 with a mean of 208.65 and standard deviation of 253.76. Based on the annual income the beneficiaries were classified into three categories such as low income (≤45.11), medium income (45.12-462.40), high income (>462.41) as shown in Table 4.1.

Data furnished in Table 4.1 indicate that the highest proportion (55.9 percent) of the beneficiaries had low income compared to 26.5 percent under high and only 17.6 percent under medium income group. The reason behind most of the beneficiaries were of low income is due to their dependency on farming where as a remarkable portion of the beneficiaries were in the group of higher income was due to their involvement with farming along with a source of fixed income like business, job etc.

4.2 Religion

Religion of the beneficiaries were identified through four categories viz, Muslim, Hindu, Christian and others. Maximum number of beneficiaries (70.6 per cent) was Muslim followed by 23.5 per cent Christians whereas minimum (5.9 per cent) number of beneficiaries belongs to the religion Hindu (Table 4.2). The higher portion of Muslim is the common scenario of Bangladesh where 90 per cent people belongs to the religion Muslim.

Table 4.2 Religious belief of the respondents (n = 102)

Religion	Frequency	Percent
Muslim	72.0	70.6
Hindu	6.0	5.9
Christian	24.0	23.5
Others	0.0	0.0
Total	102	100.0

4.3 Occupation

Occupations of the beneficiaries were classified into two groups; primary occupation and secondary occupation. Furthermore, occupation types were categorized into four category viz. service, business, farming and others (Day laborer, Rickshaw puller). Maximum number (73.6 per cent) of beneficiaries were engaged with farming as their primary occupation followed 20.6 per cent beneficiaries choose business as their primary profession whereas minimum number of beneficiaries choose services and others as their primary profession.

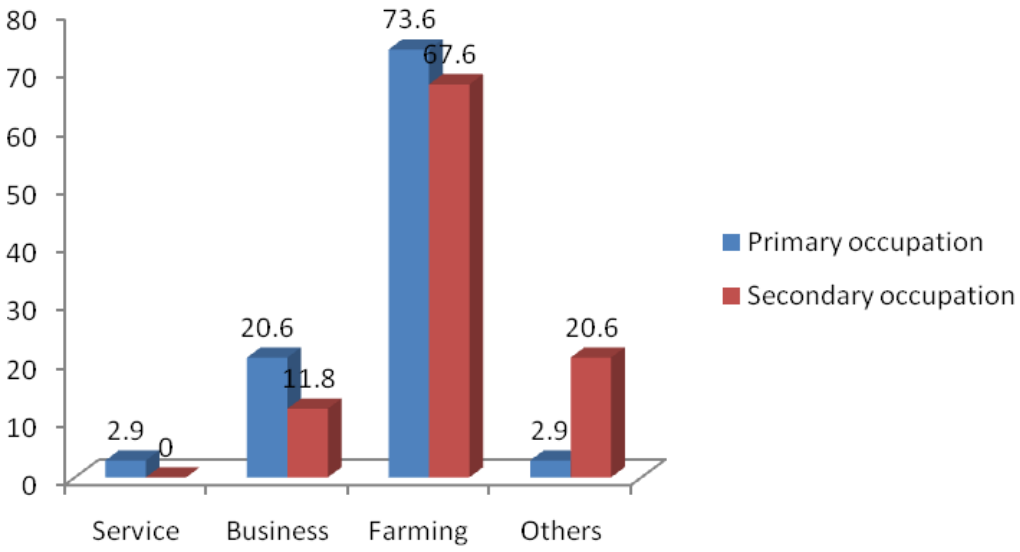

Figure 4.1. Showing occupation of the respondents

Again, in case of secondary occupation highest number (67.6 per cent) of beneficiaries was involved with farming followed by 20.6 per cent were day laborer or rickshaw puller and 11.8 per cent were businessman. Farming is a common occupation in Bangladesh where 80 per cent people were farmer and people those have permanent jobs were directly or indirectly engaged with farming (Figure 4.1).

4.4 Origin

Origin of the respondents was grouped into four categories viz. from same area/village, from same district, from other district and from other country. Among the respondents, 79.5 per cent were from same area/village, 17.6 per cent from other district and 2.9 per cent from other country living around the forest area.

Table 4.3 Origin of the respondents (n = 102)

Origin	Frequency	Per cent
From same area/village	81	79.5
From same district (not same village)	0.0	0.0
From other district	18	17.6
From other country	3	2.9
Total	102	100.0

The respondents found from the other country were from neighboring country India. They have migrated to Bangladesh from the border of Dinajpur region a long way ago and now they are permanent inhabitant of Bangladesh.

4.5 Living distance from forest and market

Living distance of the respondents were categorized into three category viz. <1 km, 1-3 km and more than 3 km. Highest number (81.4 per cent) of respondents were residing within 1 km of SNP followed by 14.7 per cent lived within 1-3 km and 3.9 per cent respondents were living 3 km away from SNP.

Table 4.4 Living and market distance of the respondents (n = 102) from SNP

Living Distance	Category	Frequency	Per cent
From Singra National Park	<1 km	83.0	81.4
	1-3 km	15.0	14.7
	>3km	4.0	3.9
	Total	102	100.00
From Market	<1 km	39.0	38.2
	1-5 km	63.0	61.8
	>5km	0.0	0.0
	Total	102	100.00

Again, distance of the market was grouped into three category viz. <1 km, 1-5 km and more than 5 km. Maximum distance from the market was 1-5 km while minimum distance from the market was less than 1 km from the living place of the respondents.

4.6 Livelihood Improvement through Co-management

The DFID Sustainable Livelihood (SL) framework (DFID, 2000) was applied to assess the extent of livelihood improvement of the beneficiaries involved with co-management program in SNP. Livelihood improvement was measured through five capitals namely-human, social, physical, natural and financial capital of DFID's sustainable livelihood

framework. Human capital refers to the skills, knowledge, and ability to work. Due to co-management program, training related to forest management has increased. Among the respondents, 85.3 per cent respondent agreed that training related to forest management has increased a lot while 14.7 per cent respondents things that there has not been any change on training facilities related to forest management. According to forest department officials and NGO staffs, they had provided short duration training to the beneficiaries of co-management program on forest management. They had also taken them to different forests as part of study tour to learn practically on forest management. However, the training program does not cover all the beneficiaries of co-management program. These training programs increases the level of awareness among the beneficiaries and it is reflected on the literacy rate educational facilities of the respondents.

Table 4.5 Extent of livelihood improvement through co-management

Sl. No.	Items	Extent of improvement			
		Highly increased	Increased	Slightly increased	No change
	Human				
1.	Increased training related to forest management	8.8	52.9	23.6	14.7
2.	Increased literacy rate	17.6	55.9	23.5	2.9
3.	Increased education facilities	23.9	50.0	17.6	8.8
4.	Increased children education	29.4	35.3	20.6	14.7
	Social				
1.	Increased participation in social organizations (e.g. NGOs)	8.8	50.0	29.4	11.8
2.	Increased relationship with the NGO staff	41.2	50.0	8.8	0.0
3.	Increased social relationship with other communities	11.8	55.9	20.6	11.8
4.	Decreased overall conflicts	23.5	64.7	11.8	0.0
	Physical				
1.	Increased agriculture	20.6	47.1	23.5	8.8
2.	Improved house infrastructure	14.7	50.0	26.5	8.8
3.	Improved road infrastructure	11.8	47.1	32.4	8.8

4.	Increased livestock and poultries	14.7	52.9	23.5	8.8
	Natural				
1.	Increased tree coverage and abundance	23.5	41.2	23.5	11.8
2.	Increased supply of firewood products	8.8	38.2	29.4	23.5
3.	Increased wildlife/animals and wild food	0.0	44.1	26.5	29.4
4.	Increased non-timber forest products	11.6	26.5	50.0	11.8
	Financial				
1.	Increased employment opportunities	5.9	47.1	23.5	23.5
2.	Increased forest based income (e. g. fruits, honey)	0.0	32.4	20.6	47.1
3.	Increased household income	5.9	47.1	26.5	20.6
4.	Increased household expenditure	8.8	47.1	32.4	11.8
5.	Increased tourism	23.5	50.0	17.6	8.8

Most of the respondents (87.1 per cent) express their opinion regarding the increase in literacy rate. Half of the respondents also things that, educational facilities has also increased due to the participation in co-management program. Consequently, educational facilities for the children have also increased and it is about 85.3 per cent while 14.7 per cent did not find any change regarding to facilities of child education.

Social capital can be viewed as culture, belief systems, and networks of mutual support that exists within and between households, extended family, and communities (DFID, 2000). Improving trend in the social capitals has been found among the respondents as a result of participation in the co-management program. Most of the respondents ensures their higher rate of participation in social organization like NGO's than that of past. Among the respondents, 88.2 per cent reported that participation in social organization has increased due to participation in co-management program. As a result of higher participation in social program, relationship between the beneficiaries of co-management program and NGO staffs has also improves. All the respondents agreed their relationship with NGO staff's has increased and 41.2 per cent beneficiaries reporting highly increase in relations.

Moreover, beneficiaries' things that their relationship with other communities has also increased and it is about 88.2 per cent. As a result of increasing relationship of the beneficiaries with the communities and NGO staff's, all respondents (100 per cent) agreed that overall conflict gas decreased. However, 11.8 per cent respondents oppose with the response regarding participation in social organization and social relationship with other communities.

Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods and also includes assets such as housing, tools, and equipment that people own (DFID, 2000). About 91.2 per cent beneficiaries make sure that their agricultural productivity has increases due to involvement in co-management program. The reason behind this increase is in knowledge and involvement with different social communities and also getting the support of quality inputs for production from NGO officials due to engagement with co-management program. Consequently, house and road infrastructure has also improved (91.2 per cent) a lot than the past. Different Income Generating Activities (IGA's) was given to the beneficiaries of co-management program. Among the different IGA's, livestock rearing and vegetable farming was cultured by most of the beneficiaries resulting in improved house infrastructure by generating higher income and increased in number livestock (91.2 per cent) through livestock rearing. However, 8.8 per cent beneficiaries disagree with the improvement in physical capital.

Natural capital is the term used for the natural stocks from which resource flows and useful services for livelihoods are derived (DFID, 2000). It refers to environmental assets such as land and common property resources or free (open access) natural resources-such as forests, water, or grazing land. About 88.2 per cent beneficiaries agreed that tree coverage and abundance has increased because of tree planting initiatives taken during co-management program. During plantation program, 120,000 numbers of trees of timber, fruit and medicinal species was planted in the forest and household of the beneficiaries. Among the

tree species, 110,000 species was planted within the forest and 10,000 species was planted within the household. In the forest, 70,000 timber species, 18,000 fruit species and 22,000 species was planted resulting in increase in tree coverage and abundance. The beneficiaries ensure increased supply of firewood products (76.5 per cent). Although the forest dependent people was restricted to extract leaves from forest but supply of firewood increased due the trees planted in the household but 23.5 per cent people disagree with this statement. The beneficiaries also think that wild animals have increased (70.6 per cent) due to increase in tree coverage while 29.4 per cent people confirmed no change in number of wild animals in the forest. Due to massive plantation carried out in the forest, people (88.2 per cent) confirmed increase in non-timber forest product but 11.8 per cent people oppose with this improvement in natural capital.

Financial capital denotes the financial resources that people use to achieve their livelihood objectives (DFID, 2000). Among the beneficiaries, 76.5 per cent people reported in increase in employment opportunities. This increase is due to the IGA's provided to the people. The training given to the beneficiaries on handicrafts, sewing cloths, small business resulting in increase in employment opportunities while 23.5 per cent people disagree with this opinion. Due to the increased in employment opportunities, income of the households also increased (79.4 per cent) resulting in increase of household expenditure (88.2 per cent). But in case of forest based income, people divided in two sections. About 52.9 per cent agreed with the increase in forest based income but 47.1 per cent people disagree with this opinion. However, in case of increase in tourism, 81.2 per cent people confirmed that tourism has increased while 8.8 per cent people find no change in tourism.

Furthermore, a schematic presentation of DFID's livelihood capitals pentagon in Figure 4.2 shows sums up all capitals, both the positive and negative sides. Therefore, the shape of the five livelihood capitals pentagon is used to show schematically the variation in the beneficiaries'

access to asset/capital. The explanation is that the center point of the pentagon, where the lines meet, represents minimum access to assets while the outer perimeter represents maximum access to assets (DFID, 2000). Except for the natural and financial capital, a sign of dramatic improvement of the livelihood (Human, Social and Physical capitals) of beneficiaries of SNP program can be identified through the pentagon. The beneficiaries of SNP program were brought under short term training which has changed their way of thinking resulting in increased literacy rate.

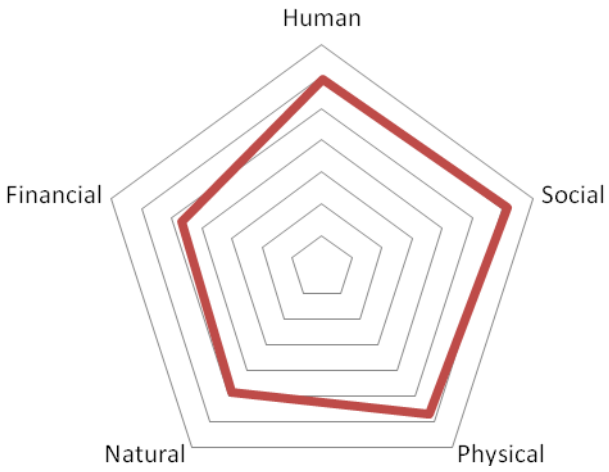

Figure 4.2. Effects of co-management activities on the livelihood capitals pentagon (red line)

Consequently, the light of education helped them to increase their involvement with different social organization resulting in decrease of overall conflict. Although, they still have conflict with forest officials regarding forest management. Meanwhile, different Income Generating Activities (IGAs) like cow rearing, vegetable farming, small grocery shop keeping etc were given to the beneficiaries resulting in increase in number of livestock and other physical resources. The agricultural productivity of the beneficiaries has also increased due to their involvement with different social groups from where they receive information regarding modern farming. However, improvement in both natural and financial capitals are in satisfactory level but not remarkable

like the other capitals. The income of the beneficiaries has increased due to different IGAs but their forest based income has not increased at all.

Furthermore, for clear understanding and in depth analysis of livelihood improvement, rank order for each capital was computed by using Livelihood Improvement Index (LII) Figure (4.3-4.7). In case of human capital, maximum improvement takes place for educational facilities (189.3) followed by literacy rate (188.1) where as minimum improvements were found in terms of training provided to the beneficiaries (155.7).

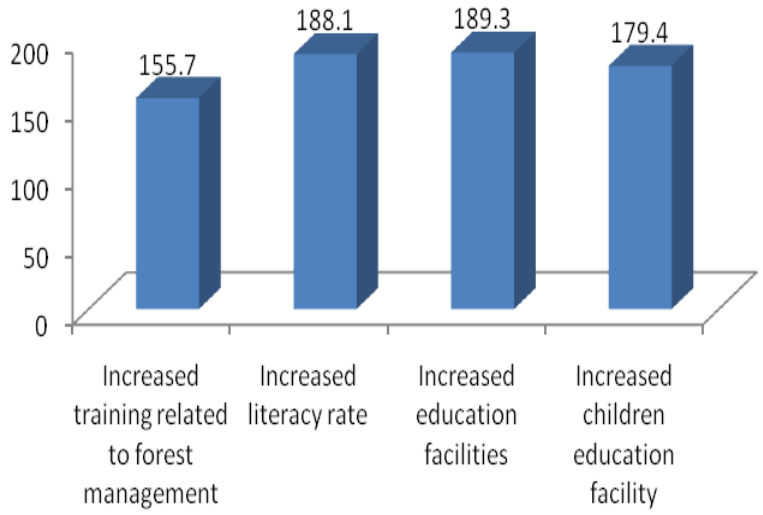

Figure 4.3 Improvement of human capital through co-management activities

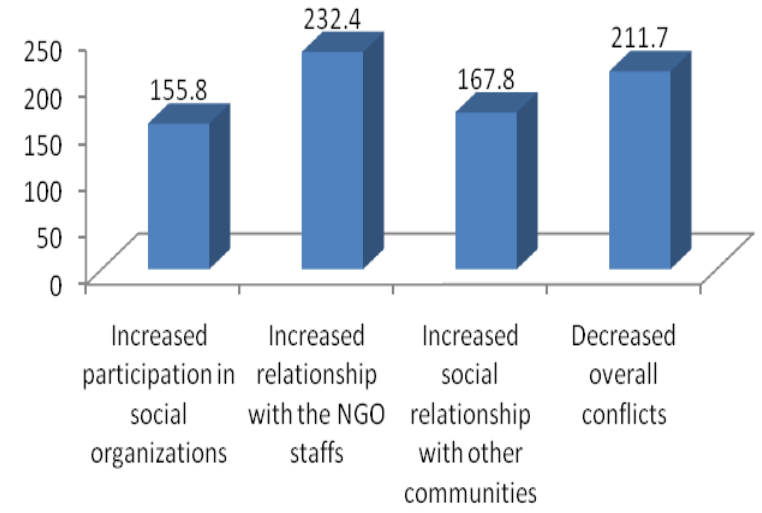

Figure 4.4 Improvement of social capital through co-management activities

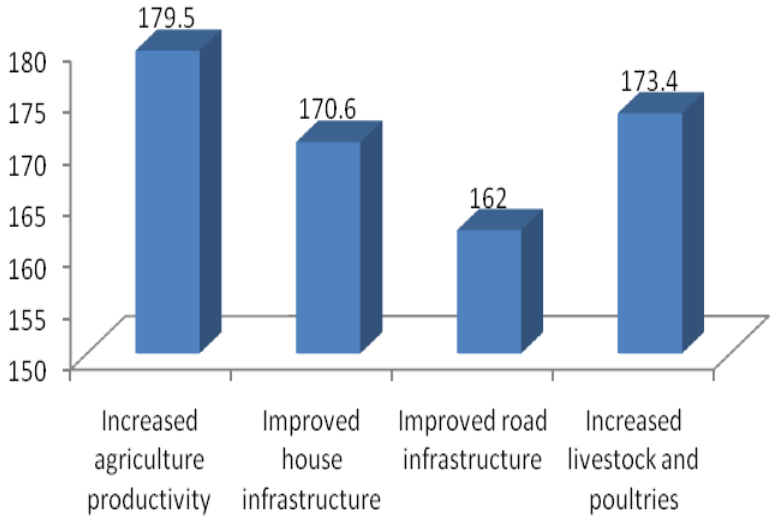

Figure 4.5 Improvement of physical capital through co-management activities

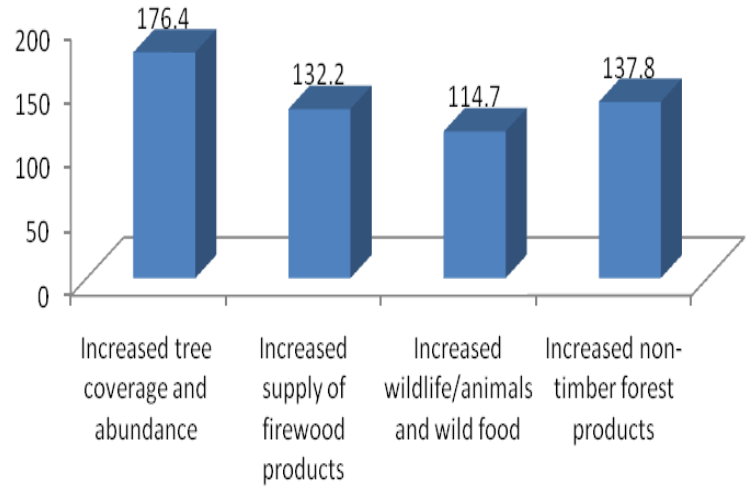

Figure 4.6 Improvement of natural capital through co-management activities

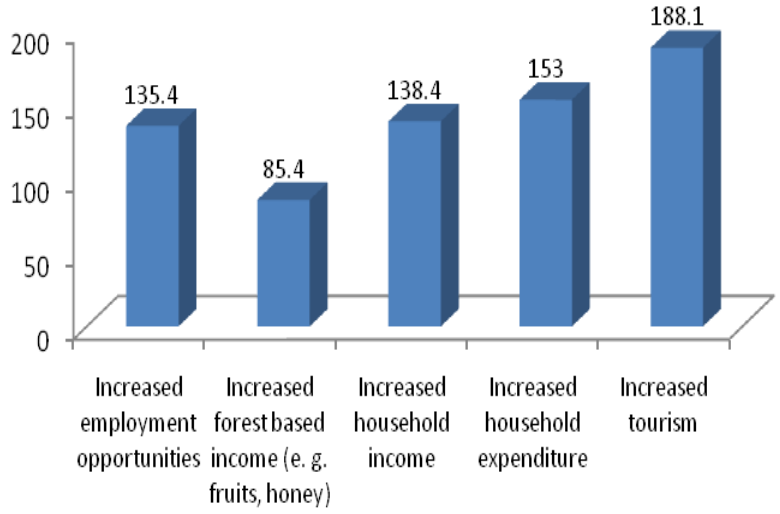

Figure 4.7 Improvement of financial capital through co-management activities

The minimum improvement in case of training facilities is due the higher expectation of the beneficiaries regarding training. Consequently, in case of social capital, improvement of relationship with NGO personnel was remarkable (232.4) followed by decrease of overall conflict (211.7). Again, improvement of agricultural productivity (179.5) and number of livestock & poultries (173.4) were maximum among the physical capitals and minimum improvement were in road infrastructure (162). The highest improvement of agricultural productivity and number of livestock is due to the information given to the beneficiaries and incentivies for rearing livestock whereas minimum improvement in road infrastructure is due to the less or no investment in this area. Increased tree coverage (176.4) and non timber forest product (137.8) were the highest improvement in case of natural capital and lowest improvement was in number of wild life (114.7). Tree coverage is maximum due to the plantation program taken in denuded area of the forest and in the homesteads of beneficiaries whereas minimum number of wild life is due the proper coverage of forest and due to source of food for wild life. Increased tourism (188.1) and expenditure of the household (153) were maximum in terms of financial capital and minimum improvement were in terms of forest based income (85.4). Tourism has increased due to facilities provided in the forest for tourists.

4.7 Relationships between the Dependent and Independent Variables

This section deals with the findings of the relationships between the selected dependent and independent variables of the study. Pearson's Product Moment Correlation of co-efficient (r) was used to determine the relationships between the selected independent and dependent variables and to accept or reject the null hypothesis. Five percent (0.05) and one

percent (0.01) level of significance was used as the basis for acceptance or rejection of a null hypothesis.

4.7.1 Relationships between age and livelihood improvement of beneficiaries

The computed correlation coefficient between age of the participants and their livelihood improvement status was 0.025 (Table 4.7). Based on the computed 'r' value the relationship between age and livelihood improvement of participation was not significant. Hence, the concerned null hypothesis could not be rejected. It may be concluded that age had no relationship with their livelihood improvement.

Table 4.6 Relationships between the dependent and independent variables

Dependent variable	Independent variables	Computed values of 'r' with 100 df	Tabulated value of 'r'	
			0.05 level	0.01 level
Livelihood Improvement	Age	.025	± 0.194	±0.254
	Family education	.214**		
	Family size	.147**		
	Farm size	.277**		
	Agricultural Income	.302**		
	Non-Agricultural Income	.061**		

** Correlation is significant at the 0.01 level
* Correlation is significant at the 0.05 level

4.7.2 Relationships between educational qualification and livelihood improvement of beneficiaries

The computed correlation coefficient between educational qualification of the beneficiaries and their livelihood improvement status was 0.214. Based on the computed 'r' value the relationship between educational

qualification and livelihood improvement of respondents was significant and followed a positive relationship. Hence, the concerned null hypothesis could be rejected. Thus, it could be said that there was a positive correlation between the educations of the beneficiaries with their livelihood improvement. Education helps to improve the human capital and build up the financial capital resulting in improvement of livelihood.

4.7.3 Relationships between family size and livelihood improvement of beneficiaries

The computed correlation coefficient between family size of the beneficiaries and their livelihood improvement status was 0.147. Based on the computed ‘r’ value the relationship between family size and livelihood improvement of respondents was significant and followed a positive relationship. Hence, the concerned null hypothesis could be rejected. Thus, it could be said that there was a positive correlation between the family size of the beneficiaries with their livelihood improvement.

4.7.4 Relationships between farm size and livelihood improvement of beneficiaries

The computed correlation coefficient between family size of the beneficiaries and their livelihood improvement status was 0.277 (Table 4.7). Based on the computed ‘r’ value the relationship between farm size and livelihood improvement of respondents was significant and followed a positive relationship. Hence, the concerned null hypothesis could be rejected. Thus, it could be said that there was a positive correlation between the farm size of the beneficiaries with their livelihood improvement.

4.7.5 Relationships between agricultural income and livelihood improvement of beneficiaries

The computed correlation coefficient between agricultural income of the beneficiaries and their livelihood improvement status was 0.302 (Table 4.7). Based on the computed ‘r’ value the relationship between agricultural income and livelihood improvement of respondents was significant and followed a positive relationship. Hence, the concerned null hypothesis could be rejected. Thus, it could be said that there was a positive correlation between the agricultural income of the beneficiaries with their livelihood improvement.

4.7.6 Relationships between non-agricultural income and livelihood improvement of beneficiaries

The computed correlation coefficient between non-agricultural income of the beneficiaries and their livelihood improvement status was 0.302. Based on the computed ‘r’ value the relationship between non-agricultural income and livelihood improvement of respondents was significant and followed a positive relationship. Hence, the concerned null hypothesis could be rejected. Thus, it could be said that there was a positive correlation between the non-agricultural income of the beneficiaries with their livelihood improvement.

CHAPTER V

SUMMARY AND CONCLUSION

5.1 Summary of the Findings

5.1.1 Demographic Characteristics of the respondents

The age of the beneficiaries ranged from 19 to 60, the mean being 38.71 years. Most of the beneficiaries belong to young and middle aged. The educational qualification for most of the respondents were secondary level while 2.9% beneficiaries were illiterate. Family sizes of the most of beneficiaries were medium to large. Majority of the respondents had medium and small sized farm. Moreover, maximum prpoportion of beneficiaries were in low income group while minimum were in middle income group. In case of religion belief of the respondents, highest number of respondents follow Islam as their religion while lowest proportion follow the religion Hinduism. Maximum number of beneficiaries were engaged with farming as their primary occupation whereas minimum number of beneficiaries choose services as their primary profession. Again, in case of secondary occupation highest number of beneficiaries were involved and lowest number were businessman. Among the respondents, majority were from same area/village or district only a few were from neighbouring country those have migrated to our country. The respondents found from the other country were from neighboring country India. The beneficiaries of the program were residing within 1-3 km of the forest area and majority of them were living within one kilometer of the forest area. Again, maximum distance from the house of the respondents to the market was 1-5 km while minimum distance from the market was less than 1 km from the living place of the respondents.

5.1.2 Livelihood Improvement through Co-management

The DFID Sustainable Livelihood (SL) framework (DFID, 2000) was applied to assess the extent of livelihood improvement of the beneficiaries involved with co-management program in SNP. Livelihood

improvement was measured through five capitals namely-human, social, physical, natural and financial capital of DFID's sustainable livelihood framework. Human capital of the respondents improves dramatically due to involvement in co-management program. In co-management program, farmers were trained on forest management by the forest and NGO officials. Although training frequent training programs were conducted but can not cover all the beneficiaries due lack of resources. These training programs increases the level of awareness among the beneficiaries and it is reflected on the literacy rate educational facilities of the respondents. Most of the respondents express their opinion regarding the increase in literacy rate. Half of the respondents also things that, educational facilities has also increased due to the participation in co-management program. Consequently, educational facilities for the children have also increased while a little portion of the respondents did not find any change regarding to facilities of child education.

Improving trend in the social capitals has been found among the respondents as a result of participation in the co-management program. Most of the respondents ensures their higher rate of participation in social organization like NGO's than that of past. As a result of higher participation in social program, relationship between the beneficiaries of co-management program and NGO staffs has also improves. All the respondents agreed their relationship with NGO staff's has improved. Moreover, beneficiaries' things that their relationship with other communities has also improved. As a result of increasing relationship of the beneficiaries with the communities and NGO staff's, all respondents agreed that overall conflict has decreased. However, 11.8% respondents oppose with the response regarding participation in social organization and social relationship with other communities.

Physical capital like agricultural productivity has increases due to involvement in co-management program through the information and inputs provided by the NGO staffs. The reason behind this increase is in knowledge and involvement with different social communities and also

getting the support of quality inputs for production from NGO officials due to engagement with co-management program. Consequently, house and road infrastructure has also improved than the past. Different Income Generating Activities (IGA's) were given to the beneficiaries of co-management program. Furthermore, tree coverage and abundance has increased because of tree planting initiatives taken during co-management program which is a part of natural capital. The beneficiaries ensure increased supply of firewood products due to the trees planted in the household. The beneficiaries also reported increase in number of wild animal and non-timber forest products due to increase in tree coverage. Moreover, the beneficiaries mentioned the increase in employment opportunity due to different IGA's provided to them. Consequently, the income of the respondents has also increased due to increase in employment opportunity which means the financial capital of the respondents has also improved due to participation in co-management program. Furthermore, through livelihood capitals pentagon rank order for each capital was computed by using Livelihood Improvement Index (LII) also shows the livelihood improvement through co-management program.

5.1.3 Relationships between the Dependent and Independent Variables

According to the computed correlation coefficients (r) among the selected characteristics of the respondent's family education, family size, farm size, agricultural income and non-agricultural income showed positive significant relationship whereas age, had no significant relationships with livelihood improvement through co-management program.

5.2 Conclusions

On the basis of the findings of the study and their logical interpretations the following conclusions were drawn:

1. Co-management system has improved the livelihood of forest dependent community. In initial stage, forest dependent communities were worried regarding their livelihoods as they were fully dependent on forest. But different trainings, crediit for income generating activities has helped them to secure their livelihood. Livelihood mprovement has also been reflected through the DFID's livelihood capitals.

2. Educational qualification, farm size, family size, agricultural and non-agricultural income of the forest depemdent communities are positively correlated with livelihood improvement.

3. Although livelihood of forest dependent community has improved but face antagonistic relationship with forest officials. To sustain the achievement from co-management programs, beneficiaries suggested to extend the project for couple of years more.

5.3 Recommendations

5.3.1 Recommendations for policy makers

Some suggestions have been made considering policy perspective and implementations aspects:

1. Need based training programs should be developed and implemented extensively for the respondents livelihood improvement.

2. Strengthening the linkage between GO and NGO collaboration with beneficiaries to make available of the required inputs, technologies and information's for agricultural practices need to be ensured.

3. For increasing respondents knowledge, information delivery system should be developed. Need based information's should be provided in this regard.

5.3.2 Recommendations for further study

The study conducted in specific location cannot provide all the information for proper understanding about respondents livelihood

improvement and related matters. The following recommendations are suggested for further study in this connection:

1. The present study on the livelihood improvement was conducted in one selected district of Bangladesh. Findings of this study should be verified by similar research in other areas.

2. This study investigated the relationship of selected characteristics of the respondents with their livelihood improvement status. Therefore, further research could be conducted to assess the relationships of other characteristics of the respondents with the same.

3. There are many NGOs as well as GOs which are working for livelihood improvement in the other community of this country. Those organizations should be included in future.

Appendix A

Interview Schedule
on

Effect of Co-management System on the Livelihood of Forest Dependent Community of Singra National Park (SNP)

Serial No. . . . . .

.

Name of Respondent	:	Father's/Husband's Name	:
Village/Para:	:	Union/ Ward	:

(Please provide information on the following aspects)

1. Age: Please mention your present age . . . . . .years.

2. Education: please mention your educational qualifications

a. Illiterate	……
b. Can sign only	……
c. Have passed class	……

3. Family Size: please mention the number of your family members

a. Male	……
b. Female	……
c. Total	……

4. Distribution of Household (Religion)

a. Muslim ……
b. Christian ……
c. Hindu ……
d. Others ……

5. Farm Size: Please indicate area of your land according to use

Sl. No.	Use	Local Unit	Acre
1.	Homestead area		
2.	Own land under own cultivation		
3.	Land taken from others as lease		
4.	Land taken from others as borga		
5.	Land given to others as borga		
Total land (Equation) = {1+2+3+(4×½)+(5×½)}			

5. Household main source of income:

Give particulars about your family income of last year from different sources.

Sl. No	Source of income	Production	Market price	Total (TK.)
1.	Subsistance agriculture			
2.	Vegetables			
3.	Fruits			
4.	Poultry			
5.	Fish culture			
6.	Domestic Animals			
7.	Service			
8.	Business			
9.	Day labour			
10.	Rickshaw/Auto- Rickshaw driving			
11.	Unemployment			
12.	Firewood and NTFs collection			
11.				Others (if any)
Total (TK.)				

6. Distribution of Household as Origin

a. From same area/village .....
b. From same district (not same village) .....
c. From other district .....
d. From other country .....

7. Distance of Household to Singra Sal Forest (Km.)

a. <1 .....
b. 1-3 .....
c. >3 .....

8. Distance of Household to Market (Km.)

a. <1 .....
b. 1-5 .....
c. >5 .....

9. Duration of Involvement with Rehabilitation Program: please mention your duration of involvement

How many years you are involved? _____ Years

10. Extent of Livelihood Improvement:
Please mention your opinions on the following subject matter regarding your livelihood improvement

Sl. No.	Capitals	Extent of improvement							
		Before involvement in rehabilitation program				After involvement in rehabilitation program			
		1	2	3	4	1	2	3	4
	Human								
1.	Increased training related to forest management								
2.	Increased literacy rate								
3.	Increased education facilities								
4.	Increased children education facility								
	Social								
1.	Increased social organizations (e.g. NGOs)								
2.	Increased relationship with the RDRS staff								
3.	Increased social relationship with other communities								
4.	Increased decreased overall conflicts								
	Physical								
1.	Increased agriculture productivity								
2.	Improved house infrastructure								
3.	Improved road infrastructure								
4.	Increased livestock								
	Natural								
1.	Increased tree coverage and abundance								
2.	Increased supply of firewood products								
3.	Increased Wildlife/animals and wild food								
4.	Increased non-timber forest								

	products								
	Financial								
1.	Increased employment opportunities								
2.	Increased forest based income (e. g. fruits, honey)								
3.	Increased household income								
4.	Increased household expenditure								
5.	Increased tourism								

1=High, 2=Moderate, 3=Slight, 4=Not at all

Thank you for your cooperation.

.....

(Signature and date of the interviewer)

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