Community-based Forest Management in the SAARC region

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Foreword

Participatory Forest Management (PFM) has evolved over decades in the south Asia region particularly in the South Asian Association for Regional Cooperation (SAARC) Region. The PFM has been termed differently in different countries, like community forestry or leased forestry in Nepal, Bhutan and Sri Lanka, social forestry in Afghanistan, Bangladesh and Pakistan and joint forest management in India and so on. Various forms of PFM have changed the landscape in many parts of the region. In certain cases, local people have successfully designed and implemented rules and regulations and are managing forests in sustainable ways. PFM has also created more space for social mobilization. There is no reason to believe that PFM is not benefiting the people as well as conserving the biodiversity and maintaining environment. However, there are also new emmerging challenges and obviously opportunities too.

The SAARC Forestry Centre under the Participatory Forest Management Division has invited papers on benefit sharing mechanism of resources from the community-based forest management in the SAARC Member States. The initial objective to bring the publication was to share the benefit sharing practices from the community-based forest management in SAARC Member States and learn from it and implement successfully. But as we received papers from authors in the SAARC Member States, we have started receiving not only papers on benefit sharing of resources from CFM but also related to CF covering wide range of topics including governance in community forest (CF), biodiversity conservation through community based natural resource management, ecological and economic transformation of forest in CF and social and ecological synergy in CF. So, it was decided that all these papers are worth including in this publication.

It is our sincere hope that with this publication will serve to identify and encourage the implementation of promising strategies and approaches in the sustainable management of resources through involvement of people. This publication also highlights some issues and problems related to PFM but it does not provide in-depth analysis on the extent of issues and problems.

It is further expected that the wealth of information and experiences reflected in this publication will lead to understand the dynamics of CF development in the region and will further strengthen planning and implementation of PFM for the benefits of the society and environment.

Lastly, I appreciate and thank all the authors of the papers for their contribution and also encourage other colleagues, researcher, and field practitioners of the SAARC Member States to contribute papers in future.

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Table of Contents

Benefit Sharing Mechanism: a strategy for effective people participation in afforestationy activities in Bangladesh.

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Abstract

PROSHIKA is a development organization but since its inception in 1976 it has given top priority to environmental protection and natural regeneration through involving the organized poor people. PROSHIKA believes that people can contribute to natural protection through afforestation when properly motivated and assisted under benefit sharing mechanism. PROSHIKA's social forestry activities are directed towards poverty alleviation through a comprehensive approach in implementation strategies. This paper is highlighted on the plantation activities of PROSHIKA from 1991 to 2001 through benefit sharing mechanism. PROSHIKA planted about 5.9 million seedlings with active participation of 4291 organized groups (20 persons on average) in this period. The seedlings are planted in roadside like, feeder roads and highways, embankment, railways and private land. From 2002 after completing the rotation period, trees are sold and sale cash are distributed among the beneficiaries according to benefit sharing mechanism. From 2005-2010, about BDT 94.3 million is distributed among 14678 beneficiaries and BDT 33.7 million are distributed among road authorities. This will also contributed to address deforestation and climate change issue in country.

1. Background

Benefit sharing mechanism has been given new dimension for people participation in afforestation programme in Bangladesh. Millions of trees are found in the alongside of the roads that has been planted through participation of rural people under benefit sharing mechanism. Due to colonial rule, people had no access to the forest and the aim of the forest management was only for revenue collection before independent of Bangladesh. At the same time, more than 90% of the state-owned forestland is concentrated in 12 districts in the eastern and south-western regions of the country, and 28 districts out of 64 districts have no state-owned forest at all (GOB 1990). The state-owned forests are 10 times larger than the village forests, but contribute only about 20% **o**f total forest products while village forests contribute is about 80% (FMP 1993). So, people feel the availability of firewood, fodder, house construction materials, medicinal plants, fruits in their daily life. In the decade of seventy, government and non-government initiated different strategies for extensive plantation activities involving local people. In that case, PROSHIKA a non-government organization in Bangladesh has shown tremendous success in afforestation activities involving local people under benefit sharing mechanism.

In mid seventy, PROSHIKA started afforestation by distribution of seedlings for homestead plantation for free of cost among the organized members at the grass-root level. But it was

experienced that organized people need awareness building, technical know-how for plantation, and availability of seedlings at their doorsteps. Then PROSHIKA initiated a full-fledged programme in the name of 'Social Forestry Program'.

PROSHIKA first initiated roadside forestry in mid eighty involving organized people in two districts like Sirajgonj and Manikgonj. But it was experienced that plantation would not ensure the survival of the planted seedlings. Socio-economic status of the involved people became a big issue. Question arises, who will take care the plantations for long term, what is their benefits from the plantations, which will resolve the social conflict, etc. Then new idea evolved as 'Benefit Sharing Mechanism' (BSM) that was an essential part of effective participation of local people and sustainability of the established plantations.

Bangladesh is one of the densely populated country in the Asia and situated between the Himalyan Mountain chain and the Bay of Bengal. At present about 160 million people live in the 14.4 million ha of land. As per Forestry Master Plan (FMP) in 1993, agricultural land makes up 9.25 million ha (64%) of the country while forestland accounts for 2.56 million ha (17.8%). Of 2.56 million ha of total forest land only 2.22 million ha is state-owned with 1.4 million ha as classified land and 0.73 million ha as unclassified. Village Forest covers only 0.27 million ha which is 1.9% of the total land area. The per capita availability of forestland in Bangladesh is less than 0.02 ha., which is one of the lowest in the world. A report by USAID (1990) reveals that the forest cover is only about one million ha. or 6% of the country's total land area. South-Asia had an annual deforestation rate of 0.6% the period during 1981-90. In comparison, Bangladesh had a deforestation rate of 3.3%, which is about 10-12 thousand ha. per annum during the same period. The total production in Bangladesh has been estimated at around 193 million cu. ft. in the year 2000, however the expected requirements for that year was 351.8 million cu. ft. This deficit was devastating for the rural communities, particularly the low-income people. The energy consumption pattern in Bangladesh is characterized by a heavy dependence on biomass fuel, which accounts for 73.1% of the total energy used from, agricultural residues (65.5%), woodfuel (22.5%), and animal dung (14%) respectively (FAO, 1998: 59, 132). This scenario states the people participation in afforestation programme.

Photo: *A roadside plantation raised by PROSHIKA organised group in 1995*

In the above circumstances, afforestation through social forestry activities can have good and sustainable results, and achieve national and international recognition. These practices are appropriate in conditions of poverty because the planted trees can provide immediate returns and benefits for the poor. If this Programme is to contribute to the alleviation of rural poverty and stop forest depletion, it must be implemented based on a participatory approach where the participants (poor people) can actively take part in planning,

implementation, and benefit-sharing activities. All categories of marginal lands (i.e., roads, railways, and embankment), that- are state owned and controlled by different government agencies may be considered for afforestation programme.

Since its inception, PROSHIKA, has focused on the development of group consciousness to protect and generate natural resources. PROSHIKA, as a non-government development organization, has been working with the poor throughout Bangladesh since 1976. Its mission is to "conduct an extensive, intensive and participatory process of sustainable development through empowerment of the poor." PROSHIKA has specific objectives of: "structural poverty alleviation; environmental protection; improvement in woman's status; increasing people participation in public institutions; and increasing people capacity to gain and exercise democratic and human rights." PROSHIKA is committed to sustainable development by redressing the exploitative development practices and initiating ecologically sensitive development programmes (PROSHIKA 2002: 42-45). To enhance effective participation and to build up capacity of the poor, PROSHIKA has facilitated the creation of an organization of the poor called "*Trinomol Janasangathans*" (grassroots people's organization), provided them with training and education services and also supported them, with credit, technical assistance and marketing skill (Discourse 1998: 69-70).

2. What is done (Program activities)

Afforestation under Social Forestry Programme requires innovative approaches in organization, motivation, training, technical and credit assistance. There is growing consensus among policy makers that government alone cannot solve the pressing problems of rural poverty and deforestation. PROSHIKA believes that members should organize themselves and be involved directly in production, marketing and benefit sharing systems related to afforestation. Tree growing with people participation can: a) increase income and employment opportunity for the poor; b) help the people meet their demands for timber, fruit, fodder, medicinal plant and fuel; c) increase tree- coverage in Bangladesh and thus contribute to the biomass production. PROSHIKA provides various types of seedlings for the poor to plant on the roadsides, marginal lands and in homesteads areas. During the last three decades, a number of international organizations have come forward to provide assistance to the PROSHIKA's afforestation programme - WFP (World Food Programme), European Commission (EC), Henrich Boll Foundation, Ford Foundation, etc.

Considering this fact, PROSHIKA at first developed a team of skill and well-trained staffs who were also educated mainly in forestry, agriculture and other science disciplines. Their main responsibilities are the development of afforestation under BSM.

Participants selection for Afforestation Activities: Before mobilizing local people, PROSHIKA carries out baseline survey through participatory rural appraisal (PRA) techniques and use of questionnaire. The baseline survey collects socio-economic data on the status of local people, institutional framework, culture, geographical status, natural resources, different barriers and opportunities etc. Depending on the result of the baseline survey, in each village, landless, marginal farmers, labour, "hard-core" people are organized in to primary groups.

People can understand their needs, rights and root causes of poverty if they are properly organized and gain a degree of firm consciousness of this matter. By getting training people become able to take part in planning, execution and monitoring of any development activities

and by being organized together allowing them to overcome the hardest challenges. The target people in PROSHIKA's interventions are:

- *hardcore people* - those having no land or homestead; disabled; destitute; widow; female headed households who have to sell their physical labour to earn a livelihood.
- *landless* - those having a homestead but no land and who try to make a living from casual labour or petty trading.
- *marginal household* - those who are able to produce 50% of their food needs from their own labour and who also have to work as casual labours.

At grass root level target people are organized in primary groups of 15-20 members, with separate male and female groups. Primary groups then form federation at village, union and thana levels, and perform specific responsibilities. Here 'village' refers to geographical location where around 200 - 250 households exist. In Bangladesh, nearly 80% of the population lives in a village. The livelihood of these people depends on agriculture and, selling labour. At the same time, a 'union' is comprised of at least 3-5 villages and 'Thana' is an administrative unit of the government comprised of 12-15 unions.

Assistance for Benefit sharing: In the early ninety, people had no idea of how to request and obtain a lease from the appropriate authority for afforestation activities, and therefore access to these lands was difficult. Some authorities, do not agree to lease to private organizations for 15-20 years, considered longer than the rotation cycle of the plantation itself assumed at 10-15 years. PROSHIKA had to make extra effort for leasing the land from the concerned land owning agencies. The right to plant is established by making benefit-sharing agreements in non-judicial stamps, with a set of conditions. The agreement involves the landowners, PROSHIKA, and the concerned groups. The agreement sets the percentage of the final harvest of trees that would be shared. Usually, the group gets 65% of the benefits, the land-owning agency gets 25% and implementing agency 10%, but it can vary on different situation. In the 1990s, benefit sharing mechanisms were rarely adopted. Now these are a much more common practice.

Capacity building of involved beneficiaries: Training is integral to mobilization and awareness building of target people. Generally PROSHIKA offers two categories of training for capacity building of the group members: *human development training* and *practical skill development training*: Human development training can be described as a systematic process of awareness building, such as, 'Development and Organization', 'Women and development', 'Management and Development' etc. These kinds of trainings are offered to selected members of the groups to develop leadership capacity among group members that they are able to take part in decision-making process of development activities. Practical skill development training is meant for those who will undertake different employment and income generating activities, including forestry development activities like creation of a nursery, planting, management of plantation. As an outcome of the training process, participants from organized groups learn how to mobilize their own human and material resources for development actions, identify and use the unutilized and underutilized local resources.

Assistance for availability of planting materials: The establishment of a nursery is an essential part in the implementation of an afforestaion programme. Based on this realization, PROSHIKA started providing training, technical assistance and credit support to the group members for establishment of nurseries. Also, a remarkable numbers of nurseries were established by group members in different thana with their own fund, and PROSHIKA

provide training and technical support. As a result, a plantation site a sufficient numbers of nurseries were established with 30,000 to 50,000 seedlings grown. This ensured the existence of continued supply of planting material for the desired quality and quantities. The overall cost for growing the aforesaid number of seedlings is estimated at around Tk. 30,000 - 40,000 (1 $=Tk. 78). This cost is normally given to group members in the form of credit.

Plantations are established where the nearest suitable roadsides, railways, embankments are available to the concerned groups. Organized members seem to be well motivated to manage the plantation with their own contributions since the very beginning of the afforestation programme. To grow one kilometer or one-acre block plantation with 1000 seedlings, the estimated amount required around Tk. 5-8 thousand for purchasing and carrying the seedlings. The established nursery by any member of a particular group is treated as personal property. The group can purchase required seedlings for the plantation from the nursery. In most cases, the cost for the establishment of the plantation is borne by group members collectively. If needed, PROSHIKA provides additional credit in support of the establishment of the plantation. All members participate with self-employed labour. Group members may select the plant species that they prefer. During the training, and in regular group meeting, members are taught on criteria for choosing plant or tree species. In general, group members prefer fast growing species for establishing a plantation. PROSHIKA provides technical assistance for group mobilization and the whole range of activities needed in establishing the plantation, maintaining and harvesting the matured trees. Qualified technical staff are responsible for expansion of these activities at the thana level.

Photo: *A plantation raised by PROSHIKA group members in 1993*

Care and Maintenance of Plantation: Sometimes, plantations may fail due to lack of care. Proper maintenance such as, weeding, cleaning, watering is required immediate after planting. Damage by the cattle cannot be avoided without continued physical presence at the plantation site. Social conflict may also cause damage to the plantation. In order to ensure proper care for the plantation, one group member is selected as caretaker in charge of 500 seedlings for three years after planting. This approach secures high people's participation and responsibility in the 10 to 60 km plantation in each *thana*. With the assistance of WFP (World Food Programme), daily wages are provided to the caretakers in the form of food or cash. This system also creates short-term employment opportunities for the caretakers who are vulnerable members within the group. In addition, a caretaker can plant other crops in the plantation to generate additional income himself and other members. (a portion of the income goes to the group fund).

Monitoring and Technical support: A successful plantation depends on proper monitoring and appropriate technical assistance to the group members. Technical assistance is given in case of seed collection, germination technique, thinning and pruning, intercropping, pest and disease control etc. Also, from a management point of view, it is important to make sure that activities such as, resources collection, assistance to the preparation of the plan, distribution

of responsibilities among the groups are timely executed. Qualified staff at field and central levels monitor the activities.

Assistance to tree harvesting and benefit sharing: PROSHIKA provides all supports for selection of matured trees for harvesting, tree selling and distribution of benefit among the stakeholders. For this purpose PROSHIKA develops a guideline harvesting and tree selling process. This guideline covers age of trees (rotation), process for permission of government authority, marking and measurement of standing trees, measurement of tree volume, estimation of the price, tender call for tree sale etc. Then benefits are distributed among the parties as per benefit sharing agreements.

3. Results/Impact

***Increased Tree Coverage*:** The most significant achievement in participatory afforestation of PROSHIKA is a significant increase of tree coverage. During the three decades, group members organized by PROSHIKA have created a real revolution in afforestation by utilizing marginal land in rural areas. Among them plantation under benefit sharing mechanism from 1991 to 2001, a total of 6340888 seedlings of various quick growing species are planted in 6442 km strip and 1397 acres of block plantations (Table 1). The world food programme (WFP) and European Commission EC provided caretaker allowances for the plantations.

Table 1. Yearly Afforestation Activities with the Assistance of WFP and EC

Plantation Years	Involved groups	Strip plantation (km)	Block Plantation (acre)	Institute Plantation (no)	Total seedling planted
1991-92	354	337	0	0	212457
1992-93	310	573	0	0	486099
1993-94	405	497	27	0	693000
1994-95	478	430	0	0	430000
1995-96	392	156	0	0	250500
1996-97	378	193	41	0	318500
1997–98	616	884	357	0	844953
1998-99	399	840	205	0	625000
1999- 00	440	1195	215	98	899164
2000-01	519	1337	552	365	1581215
Total	4291	6442	1397	463	6340888

It is no doubt that this private initiative will play an important role in contributing to raising the national tree coverage target set in Forestry Master Plan (ADB 1993) to about 20% by the year 2020.

Tree harvesting and distribution of benefit among the beneficiaries: The most important part of the social forestry programme is benefit sharing among parties as per BSM. PROSHIKA has started tree harvesting after completing the rotation year of the plantation for 2001. Generally the rotation year are fixed 11^{+} years for quick growing species. From official record of PROSHIKA it is found that from financial year (FY) 2005-06 to FY 2009-10, a total of 151218 standing trees (Table 2) are sold in different Upazila (upz) of Bangladesh where 14678 group members are benefited from selling trees. In average 30 upzs in each year

come under this activity. About BDT 94.3 million are distributed among the 14678 participants (Table 3).

Table 2: *Year-wise tree sold in different parts of Bangladesh in last five years*

Year	No of UPZ covered	No. of trees sold	Sold price (BDT)	No. of involved Beneficiaries
2005-06	30	25510	20599867	1773
2006-07	38	36487	54617370	5360
2007-08	34	30655	34879427	4185
2008-09	29	28492	23382656	1800
2009-10	30	30074	26126652	1560
		151218	**159,605,972**	**14678**

According to BSM, group members have received 60-70% benefit from the sold trees. In mathematically, each participant has received BDT 6400. Though some cases, per participants have received about BDT 25,000.00 depending on growth performance, species, quality of timber, market price, and above all care and maintenance of the plantations.

Table 3: *Benefit sharing among the beneficiaries*

Year	No of UPZ	Involved Beneficiaries (no)	Cost (BDT)	Land Authority (BDT)	implementing agency (BDT)	Beneficiaries (BDT)
2005-06	30	1773	20599867	5726131	2513816	12359920
2006-07	38	5360	54617370	10923474	5461738	32770422
2007-08	34	4185	34879427	6975884	3487943	20927656
2008-09	29	1800	23382656	4676531	2823366	14029594
2009-10	30	1560	26126652	5454324	3878768	14232818
Total		**14678**	**159,605,972**	**33,756,344**	**18,165,631**	**94,320,410**

Benefit sharing mechanism has motivate to face the Challenges: Involved beneficiaries has faced the challenge arise from social barriers. For example, influential people sometimes used words to harass female caretakers. People also tried to damage the plantation established by poor people. These obstacles were overcome by group members by relying on each other and through motivation work. The main stimulant to face the social barriers is BSM.

Sustainability through reforestation: After harvesting the mature trees, the groups deposit a percentage of their share for reforestation to ensure the sustainability of these activities. This is one of the achievement due to BSM.

4. Evaluation/Evidence

PROSHIKA is playing a vital role in social and economic development as well as environmental protection by involving poor in afforestation and reforestation activities under BSM. Its experiences can be used by others in the country to increase tree coverage as well as fulfill the needs of local people. This approach may also be considered as an adaptation strategy to combat climate change, in which case, more legal supports would be needed through BSM. This process also contributes

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Benefits of Community Forestry program : A Case from Bhutan

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Abstract

Community Forestry (CF) program in Bhutan was first cautiously explored in the mid 1990s (Carter et al, 2009, p. 40) with the creation of the legal basis for CF in the Forest and Nature Conservation Act (FNCA) 1995 and the establishment of the country's very first Community Forests (CFs) managed by CFMGs in Eastern Bhutan. The main reasons for the slow progress of the CF programme were i) the persistency of scepticism of the local forest users (communities) over the actual transfer of forest ownership to them by the government and ii) severe reservations amongst government staff about the ability of communities to manage forests sustainably (Temphel and Beukeboom 2006).

1. Introduction

Community Forestry in Bhutan picked up its momentum in 2000 after the amendment of the Forest Act of 1969 as FNCR, 2000 which provided sufficient legal backing and scope for the people to engage in gainful forestry activities. Along with many other Area Development Projects, the Participatory Forest Management Project, phase I (2002-2007) and phase II (2007-2013) have been very instrumental in promoting community forestry program in the country. As of September 2013, total number of CFs in the country was 556 covering an area of 62,115 hectares (2.3% of the country's forest area) of forest land managed by 23,808 households (1/3 of the rural households) as Community Forest Management Groups.. Membership is based on household and not number of members within the household.
Forests are very important for the rural communities, as it supplies many products like timber, fuelwood, foods, etc. The community forestry programme in Bhutan seeks to strengthen the link between people and forest and can make significant contribution to their livelihood improvement.

Improvement of livelihood of poor and marginal section of the society is critical to ensure poverty reduction. It is crucial that the community forest benefits are shared amongst the CFMG members and ensure equity sharing of resources.

2. Back ground of CF development

Bhutan is located in the eastern Himalayas between China in the north and India in the south. About 72 percent of the country area is covered with forests. The long term goal of the country is to maintain 60 percent of the country's area under forest cover in perpetuity.
The Community Forestry Programme has evolved since 1979 when His Majesty The Fourth Druk Gyalpo then commanded to start the Social Forestry Programme.

- In 1985, the 2nd June was declared as Social Forestry Day, coinciding with the Coronation Day of the fourth King of Bhutan. It aimed to promote tree planting and creating environmental awareness.

- 1992, Community Forestry was decentralize to the District Administration from central level
- In 2000, the Community Forestry programme was legalized through enacting the Forest and Nature Conservation Rules, which was revised in 2003 and further, revised in 2006.

Revision of Forest and Nature Conservation Rules in 2006 has given more impetus to Community Forestry programme development specifying and detailing what needs to be done for community forestry programme.

Community forests established has increased rapidly from 2008 onwards, it is because Forest Policy is clear on CF development, legal framework is clearer, and there are implementation guidelines to support the field staff. On top of that there is political will to support community forestry development (refer figure 1)

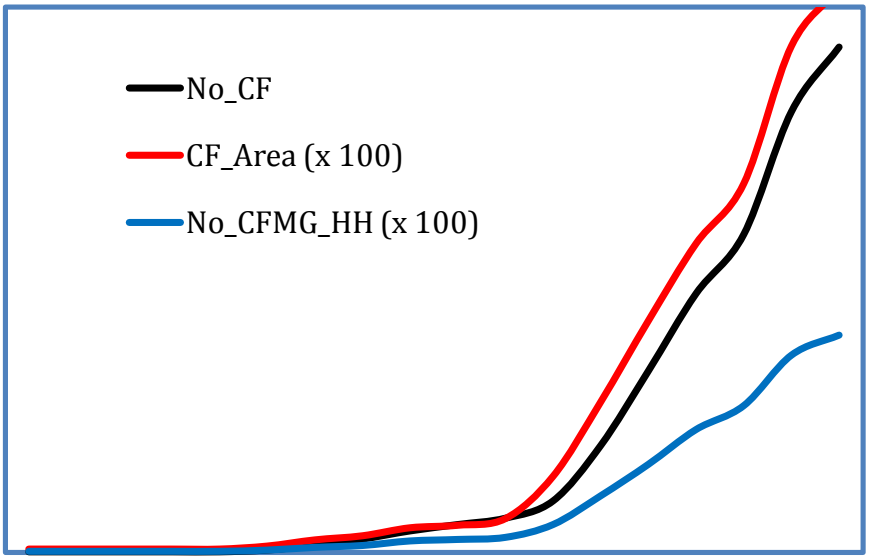

Figure 1. Trend of CF establishment over the years (Source SFD, 2013)

3. Policies Facilitating Benefit Sharing

Revised Forest and Nature Conservation Rules 2006 is very clear about CF development. The key policies and laws that guide the benefit flow between the communities and government are succinct. The Forest and Nature Conservation Rules 2006 states upon issuance of the Community Forest Certificate, all forest produce from the Community Forest shall be the property of the CFMG. Forest produce from the Community Forest may be extracted by the members of the CFMG for their own use and for sale on a sustainable basis" (p.30, DoF, 2006).

> *"No royalties shall be levied with regard to such harvesting where the harvest is conducted or permitted by the CFMG for personal use by the member households of the CFMG, provided such harvesting is done as per Management Plan prescription. The CFMG may set prices for the sale of forest produce to members of*

the CFMG. When the amount of forest produce harvested from the Community Forest in accordance with the Management Plan exceeds the requirements of the members of the CFMG, the CFMG may sell (or authorize its members to sell) the excess produce to persons, agencies or in the market. The prices shall be set by the CFMG.". (p. 36 – 37. DoF, 2006).

4. Government Support for Equitable Distribution of CF resources

There is no such as resource distribution mechanism adopted by any CFMG, rather they supply forest product based on the needs of the members (Temphel et al, 2005). However, the government has provision that each and every registered households in Bhutan will have right to request for subsidized rural timber for construction of house or renovation, but after certain period of time.

As per Forest and Nature Conservation Rules 2006 *"subsidized timber for new construction/reconstruction of rural houses shall be supplied once in 25 years. Subsidized timber for repair/extension/renovation of rural houses shall be supplied once in a block period of 5 years. In case of shingles, standing trees shall be supplied once in 3 to 5 years depending on the climate condition of the locality"* (p.90, FNC Rules 2006). The royalty on timber for rural house construction/repairs/renovation is very minimal; it ranges from US $ 0.1 to 1 for a tree.

Besides having right for rural timber, once the community forest is established and have full potential to fulfill CFMG needs, the CFMG member will have no right to apply for rural timber (this is not legally mentioned but that is the understanding at the moment). The CFMG can also sell the surplus timber or any forest products from the CF after fulfilling their needs, but the CFMG will have to pay the royalty as per the prevailing government rules and regulations.

However, if the CFMG does not manage the community forest as per the management prescriptions, then the Department of Forests and Park Services have right to take back the forest and cancel the management rights. So, the government support for equitable distribution is very clear, between government and CFMG, but within the CFMG it depends on by-laws of CF. In some by-laws of CF it states that the entire CFMG member has the right to obtain any kind of forest product from the CF upon obtaining the permit from the CFMG executive members and the fees collected will be deposited in CFMG bank account. In almost all the community forest management plans the principle of equity and justice are mentioned as basis for the sharing of benefits arising from the community forest, but the mechanism to be followed are not clearly outlined (Namgay & Sonam, 2006).

As an example of benefit-sharing mechanism, the practice in Druk Tshenden community forest management group at Paro, Bhutan is presented in pictorial form (figure 2 and 3).

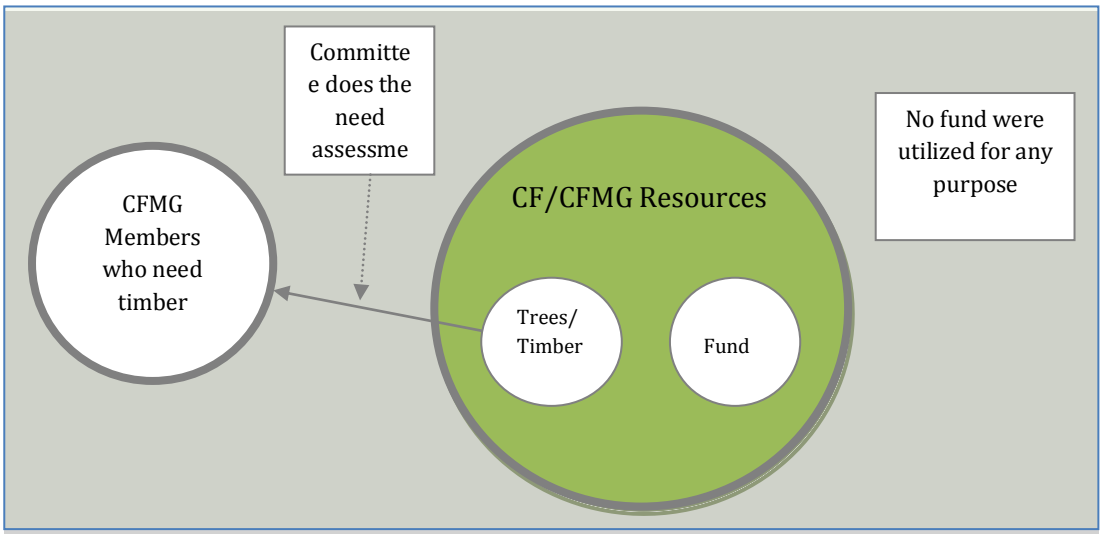

Figure 2: Current practices of resource sharing within the CFMG of Druk Tshenden CF

Of all, handing over of Government Reserved Forest as Community Forests to the community itself is a big move from the Department of Forests and Park Service to resource sharing and contribution to poverty reduction.

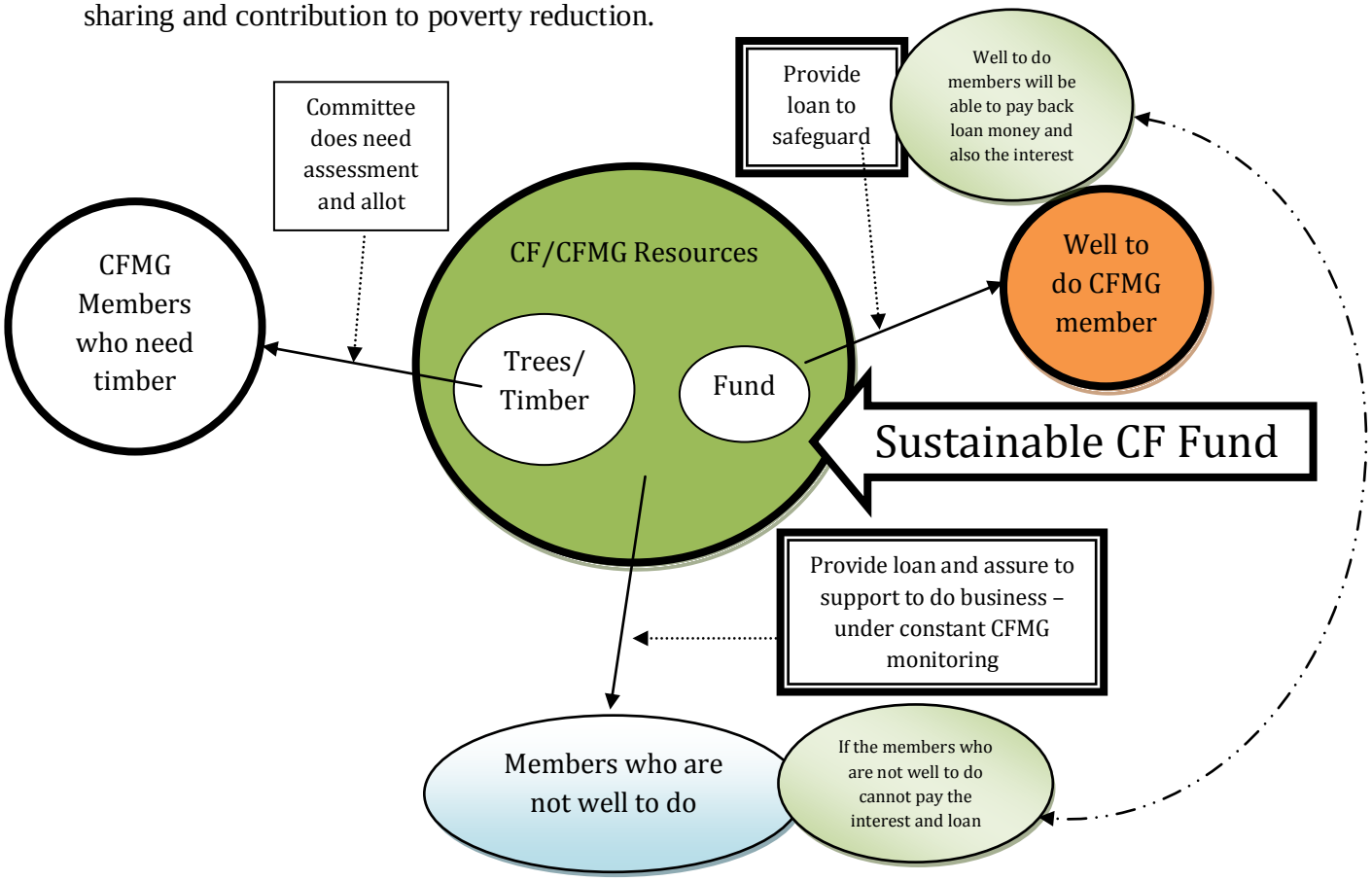

Figure 3: Proposed benefit-sharing mechanism that could be practiced in CFs

5. Community Forest Contribution to Poverty reduction

The Rural communities of Bhutan form 69 percent of the total population. Forests form an integral component of the rural livelihood system. Rural communities rely heavily on forests for grazing their cattle, fuelwood, timber, food and leaf litter for farm. Non-wood forest products are an invaluable source of rural food subsistence and in some areas contribute substantially to rural incomes and livelihoods (Temphel et al, 2005).

Poverty in Bhutan is about 12 percent (RGOB, 2012) of total population. With understanding and more evidence surfacing that the community forest can benefit people substantially and potential to contribute to poverty reduction, Community Forest Programme has been identified as one major programme that could contribute to poverty reduction in the 10th Five Year Plan of the country. Though Community forestry is relatively a new initiative in Bhutan, it has progressively advanced at various levels of planning and implementation, and benefiting the community forest management group. Community forestry has an immense scope for generating income and contribution to poverty reduction through enterprise development and sale of timber and non-timber forest products.

6. Benefits of CF

Since 2000, the CF has become popular and prominent in rural areas. With increasing of number of CFs, the benefits from CFs also has become more significant. Some good impacts are already noticeable with the communities. The establishment of community forest has benefited the communities in different ways. It has benefited through management rights and access to resources, governance and empowerment, increased community participation, establishment of local institutions and economically. It has also contributed to environmental conservation.

6.1 Access to Resources and Sense of Ownership

By drawing community forest management plan and handing over to the community forest management group after the approval of the CF plan by the government gives a strong sense of ownership to resources. Issuance of community forest ownership certificates authenticates and gives the Community Forest Management Group (CFMG) more confidence to manage the resources and strengthen trust between government and people. The "ownership" over their resources is often mentioned as the motivation by a community to establish a CF (Temphel & Beukeboom, 2006).

The long bureaucratic process to get the permit from the Department of Forests and Park Services to extract forest product from the Government Reserve Forests (GRF) has been drastically reduced after more and more CFs are being established. With an approved community forest management plan, the communities have easy access to their forest resources. The CFMG member can request any forest products from the community forest through the CFMG committee members and extract the product immediately. The long process to get timber permit through territorial forestry system is no more relevant after

handing of CF to the CFMG. The CF has to first meet their requirement or demand, surplus products are allowed for sale following the guidelines in place.

6.2 Governance and Empowerment

Decentralization policy has given the Geogs (block comprise of villages about 200 – 500 households) the responsibility for preparing their own developmental plans, many of which include community forestry. Handing over of GRF as a community forest with certificate to community empowers the community forest management group to manage and utilize the particular forest. Community forestry involves a new relationship between the Department of Forests and Park Services and the local communities, whereby the communities have direct responsibility for managing a valuable national asset, and Department of Forests and Park Services play more of a facilitation and extension role and the community forestry programme is a marked departure from the former approach of central management of national forests to community based forest management.. However, the Department have the power to cancel or revoke the community forestry ownership certificate if the CFMGs do not follow the management prescriptions. ,

6.3 Increase Community Participation

"Establishment of community forestry leads to community empowerment and local decision making. The CF processes has instilled people to perceive good benefits for their livelihood and motivates them to participate in sustainable management of forests. Interestingly, the three communities (Dozam, Masangdaza and Yakpugang) have already invested labour worth of about US $ 18,000 in their CF (Wangdi & Tshering, 2006). There are also cases and evidences that forest fire has been reduced once the forest is handed over to the communities as a CF."

CF provides platform for every member of the community to participate irrespective of gender and social group. But it is a challenge for the CF to ensure that poor people and socially disadvantaged groups' voices are heard and considered.6.4 Establishment of Institutions

'The community forest management group establishment has increased social cohesion and collaboration within CFMGs, thus leading to self governance which become local institutions. .. Collective action evolved through day-to-day informal interactions within the community in which members share their concerns (Temphel et al, 2005). Forming a CFMG and their collective effort has given the community forest management group members' self-confidence and a sense of belonging toward the group. Already established groups, make it easier to start planning of any activities, organizing the group, agreeing on points, practice of good governance. Establishment of community forest management group with the by-laws in the plan enables the community to better organize themselves for the benefits of the community. As an organized group they can better express themselves in the Geog Yargye Tshogdu (Block Development Committee meeting), justify their rights and better express their priorities (Temphel & Beukeboom, 2006).'

6.4 Economic benefits

"The economic outcomes at this stage are positive, but variable. The CFMGs have still not derived significant or maximum economic benefits from their CFs. Nevertheless, many of the CMFG members have harvested timber from the community forest and built and renovated their houses (Wangdi & Tshering, 2006).

The formation of community forest management group also mandates opening of a group savings account with any of the Financial Institutions for community forestry development.. A total of Nu 14.31millions stands as the gross fund balance as of, December 2012, besides meeting their expenses. Most of the fund are also loaned to members at very low interest rates. Microfinance helps rural households to plan and manage consumption and investments, cope with risks and improve their living conditions. Saving schemes are normally the major source of finance before other microfinance schemes are explored (Temphel & Beukeboom, 2006).

The CF programme has also started to focus on Non-wood forest products development, which has become interestingly important. The NWFP has huge potential to generate income particularly through local value addition and benefit communities.

'The CF program has improved rural livelihoods through generation of income, employment and availability of CF funds for local development, besides self-sufficiency of CFMG members in forest products and securing forest resources for future generations.'

6.5 Ecological benefits

The establishment and hand over of the area as CF also renders the following ecological benefits:

a) Protection of forests against fires, illegal activities and water catchments from soil erosion.
b) Sustainable management and improvement of forests through plantations
c) Reducing pressure on GRF by meeting their requirements from CF

7. Increased environmental awareness amongst CFMGs Present and Future Challenges

Resources including financial benefit sharing among the CFMG depend upon by-laws of the group. More than 30 percent of the by-laws address the equity sharing of resources. Nevertheless, some of the CFMGs have already implemented the by-laws particularly on resource sharing and find effective in addressing poverty. Some CFMGs are on the verge of revising their by-laws realizing that there is need to incorporate benefit-sharing mechanism to address equity issue. However, good governance practices and equity sharing resources is still remaining an issue, which need to be looked into carefully and addressed. Beside that there are other challenges, which need to address in short as well as long term. Community forestry programme will expand rapidly once the people see the benefits.

- The benefit sharing mechanism in the CF management plan for CFMG is very weak, this needs to be strengthened and made clearer how benefits will be shared.
- To increase the benefits of CF to rural livelihoods and contribute to poverty reduction, education and extension services should be strengthened.
- CF being still considered at early learning stage, the CFMG members are not ready to cope up with requirements like record keeping. So the capacity building of CFMG is very crucial for record keeping and reporting, thus benefit flow and sharing can be monitored and documented.
- NWFP management and benefits from community forest has not been explored as much as desired. But recently, more importance has been given to NWFPs, as sucso, technical know-how to manage the NWFPs are a big challenge.

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Analysing Governance of Community Forestry in Bhutan: A Case Study from Punakha Dzongkhag

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Abstract

Governance in community forestry was analyzed in Punakha Dzongkhag, western Bhutan. Main aim of the research was to analyze the current status of good governance in community forestry in Bhutan. A secondary objective of the research was to investigate the 'stumbling blocks' and 'building blocks' in community forestry program focusing on its establishment and managements aspects.

Following the suggestions of a workshop on governance in natural resource management at the Regional Community Forestry Training Center in 2009, three components of good governance (laws and other norms, institutions and processes) along with four associated principles (accountability, transparency, participation and rule of law) were considered as the conceptual basis of this research. Data were collected through pre-tested questionnaires, focused group discussion and a stakeholder workshop. Secondary information was collected from records maintained in different offices. Data were analyzed using statistical packages.

The results of this study indicated that community forestry in Bhutan was characterized by the application of good governance principles. 'Laws and other norms' indicated that Bhutan has enabling conditions for community forestry. 'Institutions' involved in community forestry program provided more 'building blocks'. 'Processes' in establishing community forests were considered as 'stumbling blocks' due to many bureaucratic steps. From among the four principles of good governance, all stakeholders involved in the community forestry program were found accountable with presence of 'watchdog bodies'. Transparency needs to be enhanced by developing mechanisms to lodge complaints and appointing internal auditors. Community forest management group members were actively participating in decision making processes and followed the 'rule of law'.

Key words: *community forestry, governance, good governance, Bhutan, Punakha*

1. Introduction

Community forestry as a term means different things to different people, depending on their background and experiences. Regional Community Forestry Training Center (RECOFTC, 2004) states that: "Community forestry involves the governance and management of forest resources by communities for commercial and non-commercial purposes, including subsistence, timber production, non-timber forest products, wildlife, conservation of biodiversity and environment, social and religious significance. It also incorporates the practices, art, science, policies, institutions, and processes necessary to promote and support all aspects of community based forest management".

In Bhutan, community forestry involves the governance and management of forest resources by communities for both commercial and domestic purposes. Governmental bodies like Dzongkhag Forestry Sector (DzFS), Territorial Forest Division (TFD), under Department of Forests and Park Services (DFPS), district administrations, and *Geog* administrations were heavily involved in facilitating the communities (providing 'building blocks') to establish, manage and utilize community forest (CF) resources on long-term sustainability.
Fisher and Gilmour (1990) mentioned that the major barriers ('stumbling blocks') to successful implementation of community forestry are institutional and organizational rather than technical. With more than 19 years of experience working with local communities in community forestry program, it was found true especially in Bhutan and CF establishment undeniably incurs a lengthy procedure.

The terms governance and good governance were being increasingly used in development literature. Governance is complex, covering global-local links, sector-sector links, and differing values, but it is increasingly recognized that governance problems underlie many forest problems (Mayers *et al*., 2005). Governance is guided by policy, enforced by laws and executed through institutions (Mayers *et al*., 2005). A governance workshop held at RECOFTC in partnership with SNV, Netherlands in October 2009 (attended by the researcher), identified three components of governance (laws and other norms, institutions and processes) along with four principles of good governance (accountability, transparency, participation and rule of law). These three components and four principles were used as conceptual basis of this research.

The main aim of the research was to analyze the current status of good governance in community forestry in Bhutan using a case study of Punakha dzongkhag to obtain detailed insights. A secondary objective of the research was to investigate the 'stumbling blocks' and 'building blocks' in community forestry program focusing on its establishment and managements aspects. Punakha dzongkhag was chosen for the detailed case study for two reasons: 1) the concept of community forestry started in Punakha dzongkhag in 1994 and 2) it has the highest number of community forests in the country during the research period.

2. Methods

For the case of this study in Punakha, 581 households registered as community forest management group (CFMG) members were the sample population. Simple random sampling was used and Yamane (1967) provided a simplified formula to calculate sample size. From this formula, 237 households need to be interviewed. However, 242 respondents were interviewed in the field, with an increase of five respondents. One community forest executive committee (CFEC) member from each CF and foresters working in DzFS and TFD

were involved in a stakeholder workshop. Participatory Rural Appraisal tools such as: questionnaire survey, focused group discussion and semi-structured interviews were used for data collection.

3. Results

3.1 Current status of good governance in community forestry

Current status of good governance in community forestry in Bhutan was analyzed through its three components and four principles. They were explained separately hereunder.

3.1.1 Laws and other norms

'Laws and other norms' were considered as the policies, act, rules and CF manuals. Forest and Nature Conservation Rules (FNCR) were very much crucial for the community forestry program in Bhutan. The revision of rules in 2000, 2003 and 2006 incorporated more flexibility especially in terms of CF size and area. Figure 1 shows significant increase in number of CFs when more flexibility was given in FNCR, 2006. The frequent revisions of the rule have been important in enabling CF establishment to move ahead rapidly.

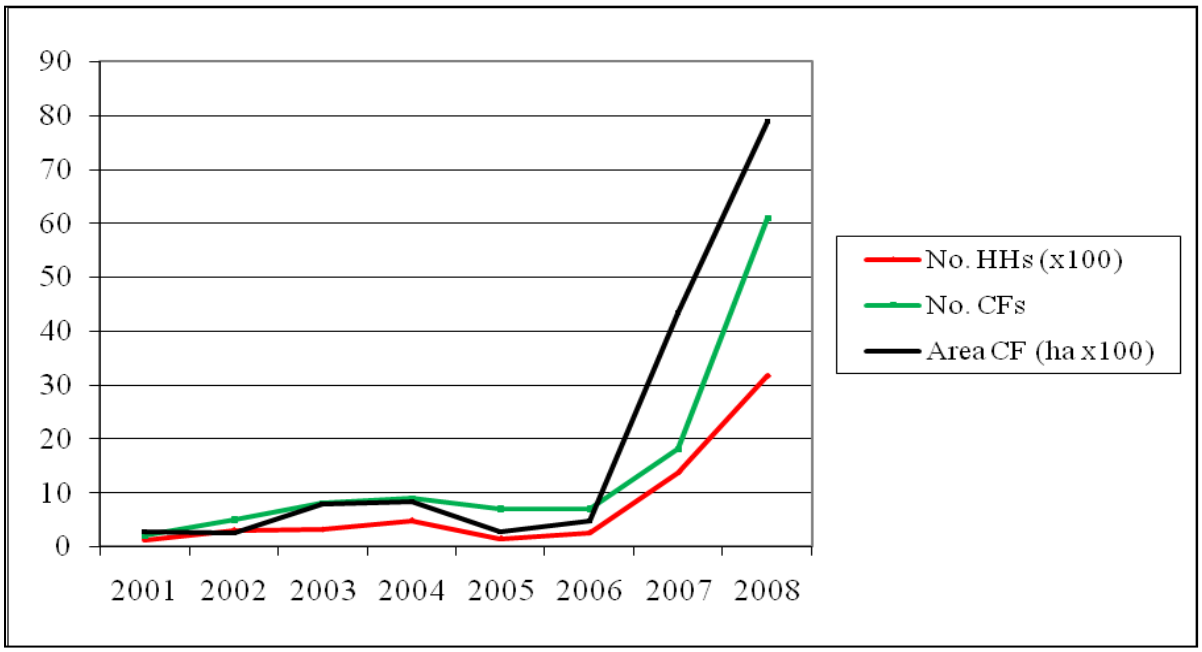

Figure 1: Number of CF established in Bhutan and Punakha after revision of rules

3.1.2 Institutions

For the purpose of this research, 'institutions' were regarded as DFPS, Social Forestry Division (SFD), TFD, DzFS, Dzongkhag administration, *Geog* administration, donor agencies and CFMG. The results from the questionnaire surveys with 242 CFMG respondents were presented in Figure 2. The analysis revealed that from among various institutions, DzFS was the most important and influential institution in community forestry program.

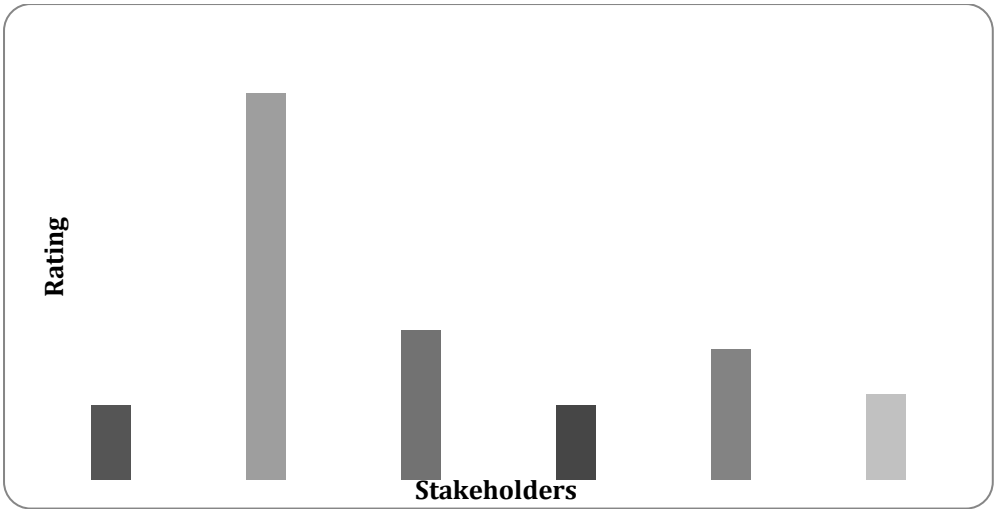

Figure 2: Most important and influential institution in community forestry program, rated by CFMG members (n=242)

To triangulate the finding from questionnaire survey, *"Stakeholder Influence Mapping*" tool was used during a stakeholder workshop. Participants arranged different stakeholders within a triangle. The closer a stakeholder at the apex of the triangle, the more influence they has (Figure 3). The size of the circle represented the size of the stakeholders. The intersection between different stakeholders shows the collaboration and relationships between each others in CF program.

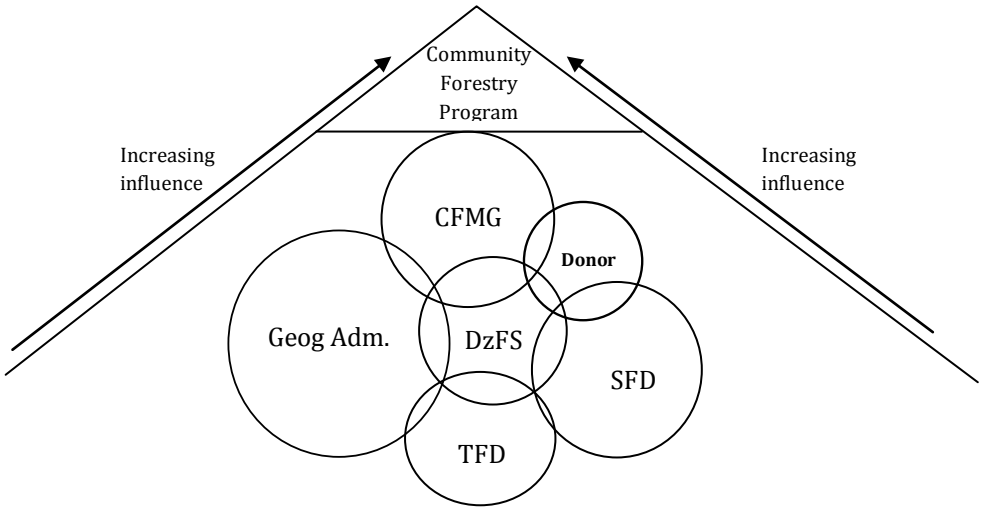

Figure 3: Stakeholders' influence over community forestry program in Punakha

The findings from this tool revealed that community forestry program were influenced by CFMG and supported by other stakeholders. It also showed that DzFS was the cornerstone for the community forestry program in Punakha and possibly in whole of Bhutan.

3.1.3 Processes

In this study, 'processes' were regarded as the CF establishment processes mentioned in FNCR, 2006 and CF Manuals for Bhutan, 2004. Figure 4a and 4b shows the opinion of 242 CFMG and nine DzFS respondents on CF establishment processes respectively.

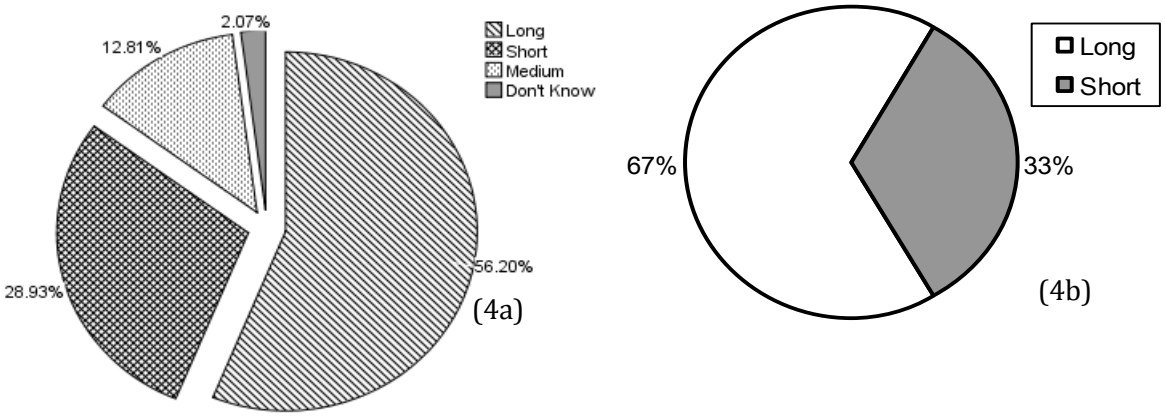

Figure 4: Respondents opinion over CF establishment processes, rated by: (a) CFMG members (n = 242) and (b) DzFS staff (n = 9)
Legend: Long = 1 year, Medium = 6 months, Short = 3 months

From CFMG, more than 56 percent of the respondents said that CF establishment incurs a lengthy procedure. It was then cross checked with the DFS staff. The DzFS staff (67 percent) was in support of the CFMG members and said that the CF establishment undeniably incurs a lengthy procedure.

3.1.4 Accountability

Accountability was analyzed using the accountability relationship framework from RECOFTC, 2009. Figure 5 shows that stakeholders within the framework were held accountable to those above and below them. Stakeholders such as CFEC, DzFS and elected government representatives were found accountable in overall management of the CFs and functioning of the CFMGs. TFD and SFD were more accountable in monitoring and evaluation, and check and balance thereby acted as a 'watchdog bodies'. DzFS's services for the CF/CFMGs were accountable to the SFD and likewise, the movement and/or transits of CF products outside the CFs were accountable to the TFD. The functioning of the CFMGs and/or CFEC was accountable to the elected government representatives such as *Gup*, *Mangmi* and *Tshogpas*.

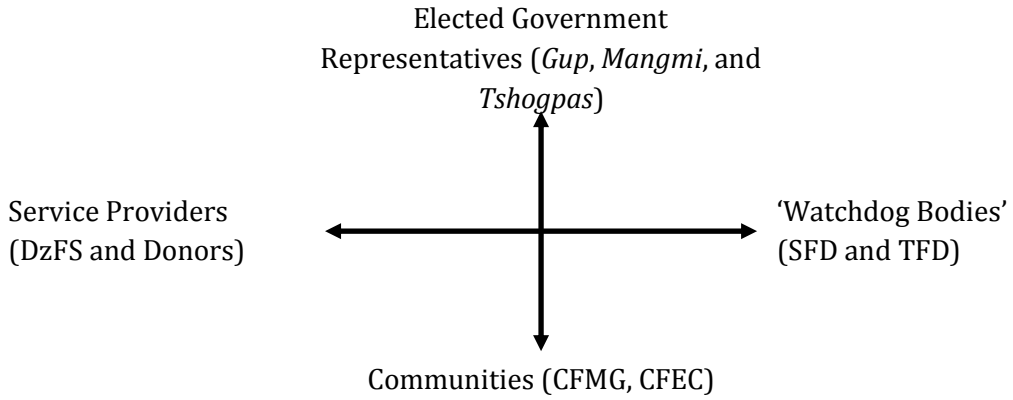

Figure 5: Accountability relationships in community forestry program in Punakha

3.1.5 Transparency

To analyze the transparency, a question was asked whether or not the CFMG members were sufficiently informed about the overall management of their CF. Table 1 revealed that out of 242 respondents, about 83 percent said that they were sufficiently informed and 14 percent said that they were not informed adequately.

Table 1: CF information dissemination

Valid		Frequency	Percent
	Yes	200	82.6
	No	34	14.0
	No Response	8	3.3
Total		242	100.0

To make it more specific, the overall information was segregated into three specific aspects. These information aspects in the CFs includes; (1) information in annual plans and programs, (2) information in meeting and its resolutions and (3) information in CFMG fund and its management. The interview result showed that more than 71 percent were informed in all three aspects of the CF and only 8 percent of the respondents were not informed in all three aspects (Figure 6).

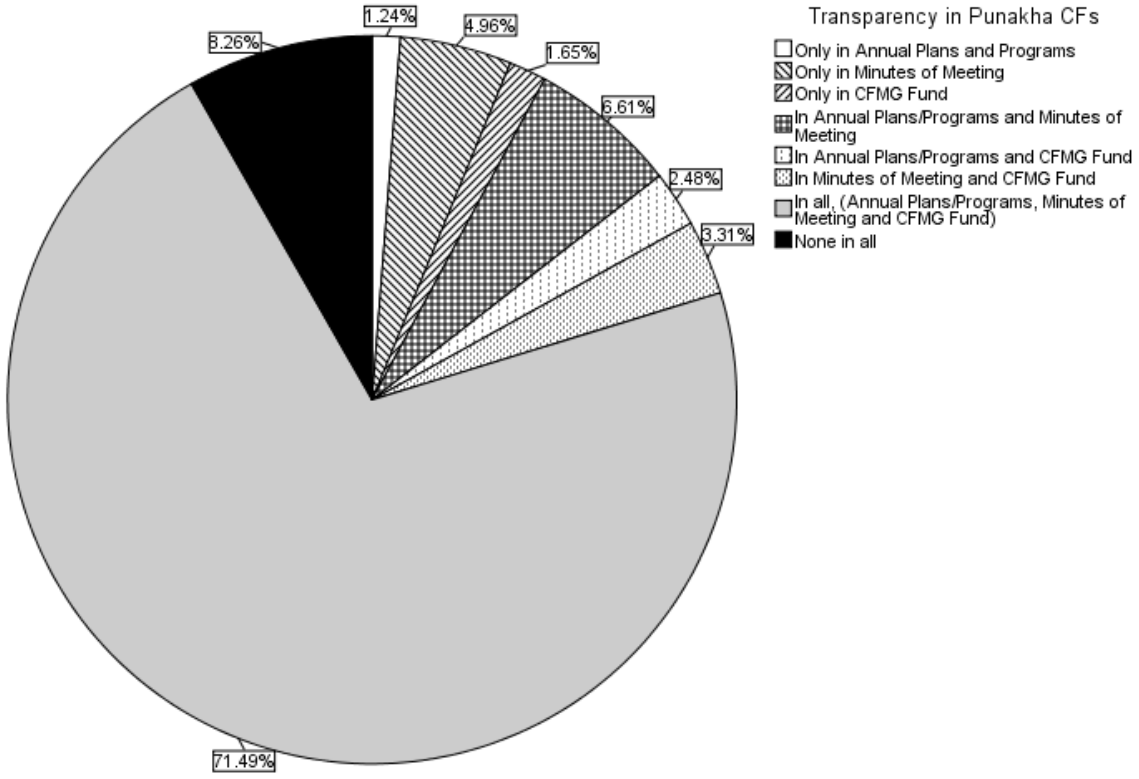

Figure 6: Transparency in Punakha's community forestry (n = 242)

For other questions to analyze the transparency, CFMG members were asked whether or not they have internal auditors and mechanisms to lodge complaints, Figure 7 shows the result.

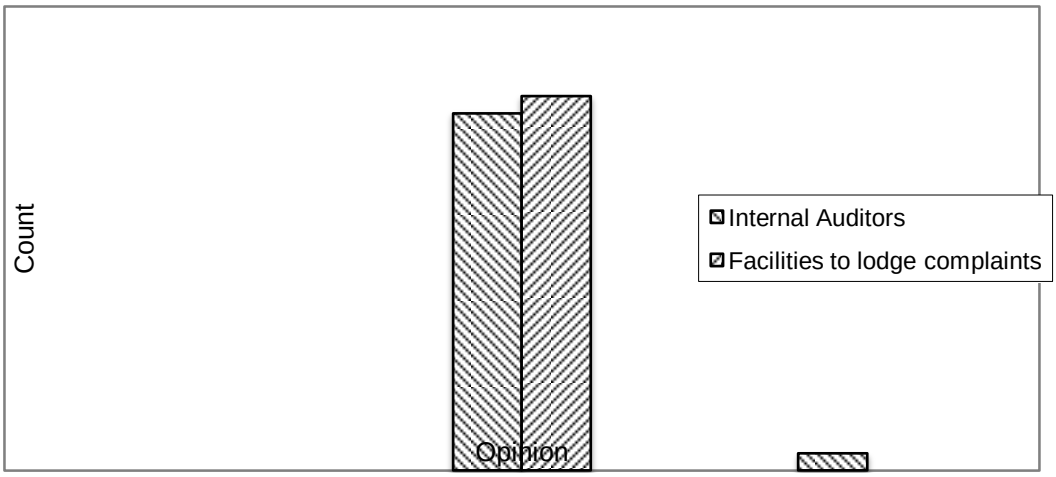

Figure 7: Transparency in community forestry program, rated by CFMG (n=242)

More than 95 percent of respondents agreed that there were no internal auditor(s) and all the respondents (100 percent) said that there were no mechanisms to lodge complaints by its member(s).

3.1.6 Participation

Participation in CF activities and decision making processes were encouraged irrespective of gender and social status since inception of the CF in Punakha. Although there was specific mention of equal opportunity for female and male aspirant for CFEC, traditionally in Punakha, females usually give a high regard to males, hence, males were more in CFEC (Figure 8).

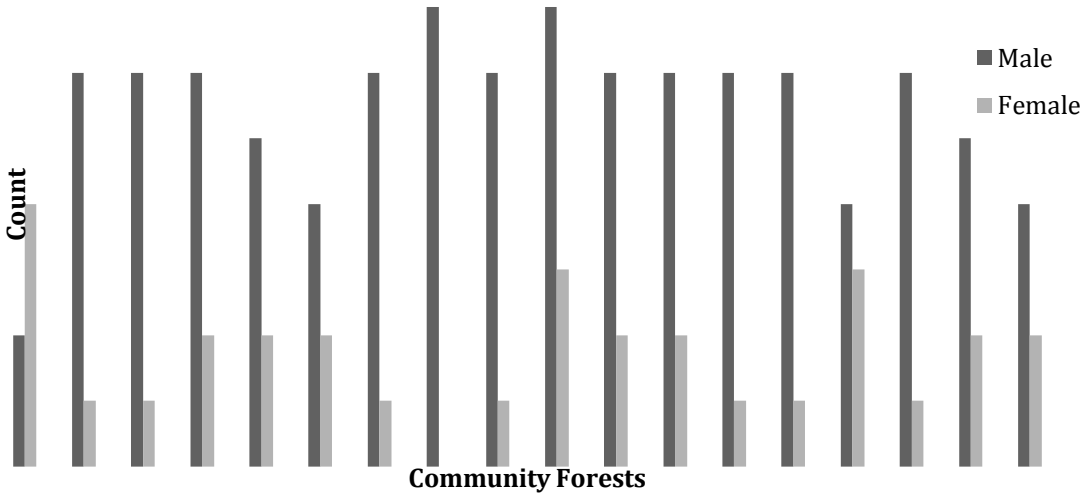

Figure 8: Gender distributions in CFEC in each CF of Punakha

Gender participation in three major activities (training, study tour and workshops) was derived during the interview with the 242 respondents. Frequency of the gender participation in training, study tour and workshops was derived with bar chart. Out of 242 respondents, 37 males and 34 females has participated in training (Figure 9a), 19 males and 12 females

participated in study tours (Figure 9b), and finally, 11 males and six females participated in workshops (Figure 9c).

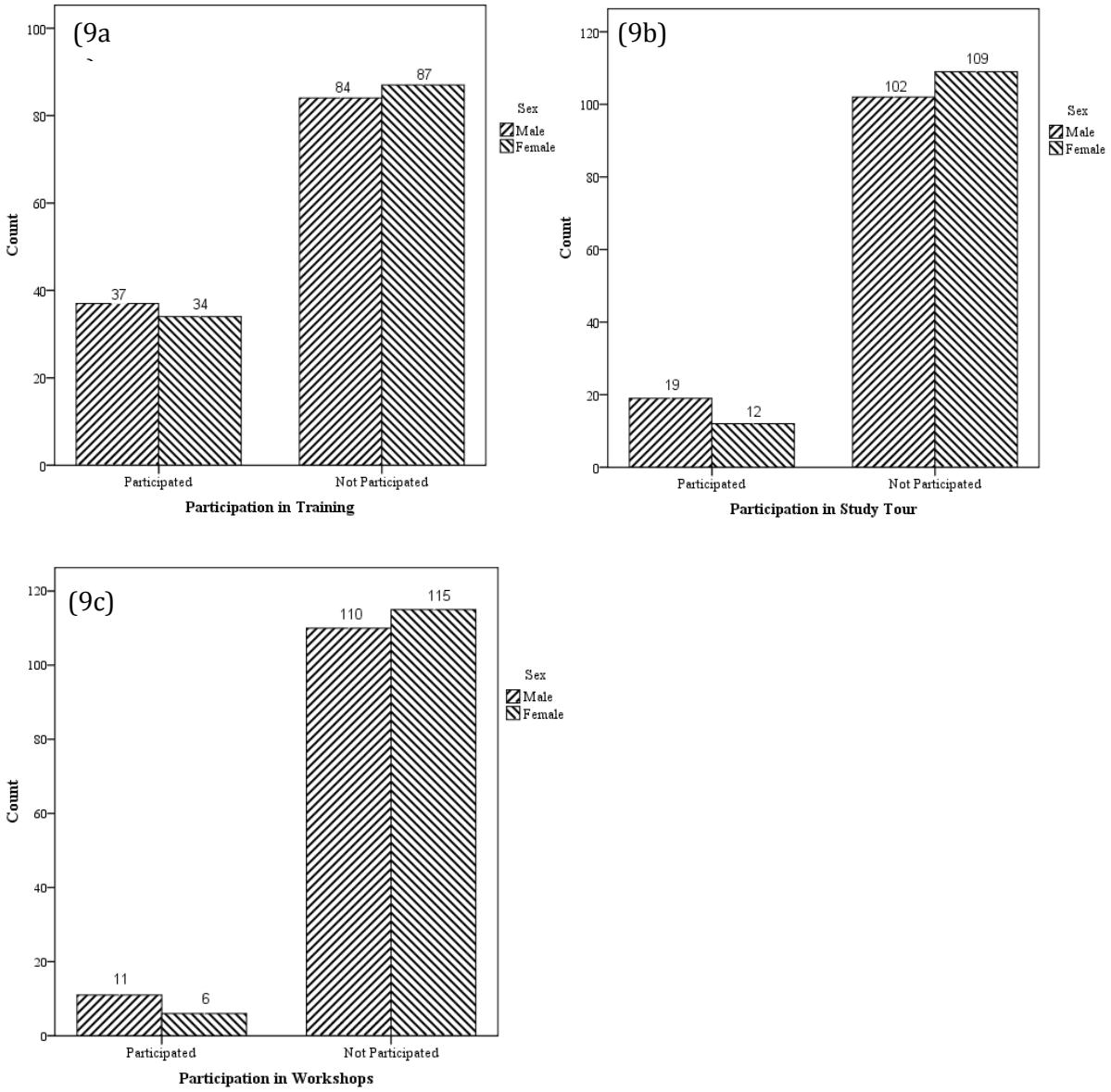

Figure 9: Gender participations in: (a) training, (b) study tour and (c) workshop (n=242)

Participation of both males and females in all above three activities would be more in the actual field, but the results showed few due to random selection of the respondents during the questionnaire survey.

3.1.7 Rule of law

The existence of by-laws, executive committees and nomination of its members through consensus in the general meetings indicated that the members of community forestry management groups followed the 'rule of law'. Further, through 'rule of law' the assessment focused more on the enforcement of CF by-laws by CFMG members and outsiders' respect on it. In terms of CF by-laws enforcement, 235 respondents out of 242 were confident to

enforce their CF by-laws (Figure 10a). While 186 out of 242 said their CF by-laws were respected by outsiders (Figure 10b).

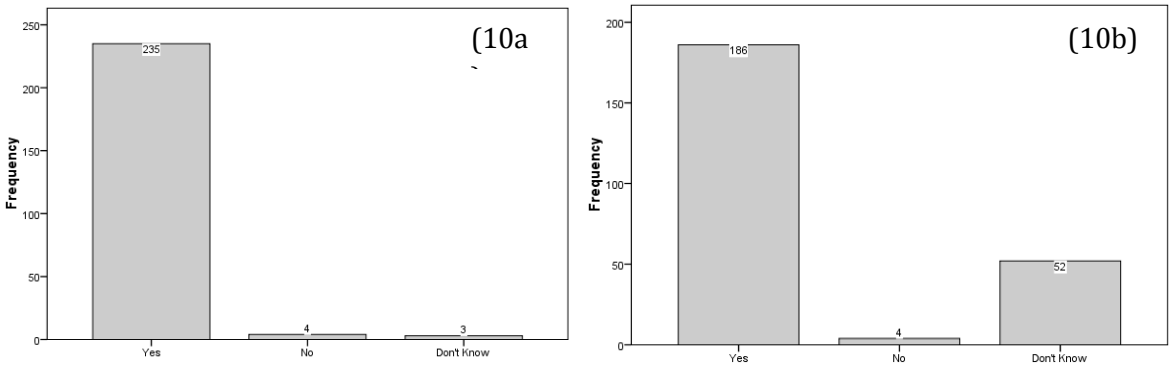

Figure 10: Opinion of CFMG members on: (a) CF by-laws enforcement and (b) CF by-laws respected by outsiders (n = 242)

In short, it was revealed that CF by-laws were found to be enforceable internally (within CFMG) and reputable externally (by outsiders). This is because the CF by-laws were framed as per the requirements of the FNCR, 2006.

3.2 Investigating the 'stumbling blocks' and 'building blocks'

The second objective of this study was to investigate the 'stumbling blocks' and 'building blocks' when establishing and managing a community forest. The findings were elaborated separately hereunder.

3.2.1 The 'stumbling blocks'

Respondents from CFMG (242 respondents) rated the stakeholders to find out who act as 'stumbling blocks' in CF establishment and management separately. Table 2 shows the cross tabulation of stakeholders and CFMG's rating on 'stumbling blocks' in CF establishment. It was found that all the stakeholders involved in CF establishment were rated against 'No stumbling blocks' column (Table 2).

Table 2: Cross tabulation of stakeholders and CFMGs' rating on stakeholders' 'stumbling blocks' in CF establishment

Stakeholders involved in CF establishment	CFMG ranking on 'stumbling blocks' in CF establishment			Total
	No 'stumbling blocks'	Some 'stumbling blocks'	Many 'stumbling blocks'	
DFPS	222	4	16	242
DzFS	241	1	0	242
Dzongkhag Adm.	241	1	0	242
Geog Adm.	229	12	1	242
SFD	225	15	2	242
TFD	225	12	5	242
Total	1383	45	24	

Table 3 shows the cross tabulation of stakeholders and CFMG's rating on 'stumbling blocks' in CF management. It was also found that all the stakeholders involved in CF management were rated against 'No stumbling blocks' column (Table 3).

Table 3: Cross tabulation of stakeholders and CFMGs' rating on stakeholders' 'stumbling blocks' in CF management

Stakeholders involved in CF management	CFMG ranking on 'stumbling blocks' in CF management			Total
	No 'stumbling blocks'	Some 'stumbling blocks'	Many 'stumbling blocks'	
DFPS	242	0	0	242
DzFS	224	18	0	242
Dzongkhag Adm.	242	0	0	242
Geog Adm.	231	11	0	242
SFD	241	0	1	242
TFD	218	16	8	242
Total	1398	45	9	

3.2.2 The 'building blocks'

Stakeholders involved in CF establishment and management were also rated based on the 'building blocks' they provided. Table 4 shows the cross tabulation of stakeholders and CFMG's rating on stakeholders' 'building blocks' in CF establishment. It was found that DzFS provided many 'building blocks' compared to other stakeholders.

Table 4: Cross tabulation of stakeholders and CFMGs' rating on stakeholders' 'building blocks' in CF establishment

Stakeholders involved in CF establishment	CFMG rating on 'building blocks' in CF establishment			Total
	No 'building blocks'	Some 'building blocks'	Many 'building blocks'	
DFPS	224	0	18	242
DzFS	4	3	235	242
Dzongkhag Adm.	222	4	16	242
Geog Adm.	195	34	13	242

SFD	216	7	19	242
TFD	51	174	17	242
Total	912	222	318	

Table 5 shows the cross tabulation of stakeholder and CFMG's rating on stakeholders' 'building blocks' in CF management. It was again found that DzFS provided many 'building blocks' in CF management compared to other stakeholders.

Table 5: Cross tabulation of stakeholders and CFMGs' rating on stakeholders' 'building blocks' in CF management

Stakeholders involved in CF management	CFMG rating on 'building blocks' in CF management			Total
	No 'building blocks'	Some 'building blocks'	Many 'building blocks'	
DFPS	219	6	17	242
DzFS	3	10	229	242
Dzongkhag Adm.	220	9	13	242
Geog Adm.	204	26	12	242
SFD	71	151	20	242
TFD	218	10	14	242
Total	935	212	305	

From this analysis, it can be concluded that DzFS provided more 'building blocks' compared to other stakeholders. If the current capacity of DzFS and CFMGs were further enhanced, community forest management could be a viable regime contributing to sustainable forest management in Bhutan.

4. Conclusion

The results indicated that community forestry in Bhutan was characterized by the application of good governance principles. It was also revealed that all the stakeholders provided more 'building blocks' than 'stumbling blocks' in community forest establishment and management. Although the processes in establishing CFs incurred long bureaucratic procedures, it did not hamper the progression due to the vibrant institutions such as Dzongkhag Forestry Sector. Hence, Punakha dzongkhag made a record in Bhutan with highest number of 18 CFs (during the time of this study), when some district had just few.

In terms of accountability, it was revealed that all stakeholders were accountable with a presence of 'watchdog bodies'. With regard to participation, both male and female were actively involved in decision-making processes. There was not much difference between male and female participating in activities such as training, study tours and workshops. With regard to the rule of law, community forest by-laws were found to be enforceable internally (within CFMG) and reputable externally (by outsiders). However, there need to develop mechanisms to lodge complaints and appoint internal auditors to enhance the transparency.

Community forest management groups in Bhutan, with enabling policies and more 'building blocks' can become viable local institutions for sustainable management of forests and its resources. The key to creating and supporting such viable local institutions lies in a good governance approach, spearheaded by the DzFS. By ensuring robust institution building, that is, by enhancing the capacity of DzFS and CFMGs and strengthening good governance principles (accountability, transparency, participation and rule of law) community forest management can be a viable regime contributing to sustainable forest management in Bhutan.

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Community forestry and participatory research: three generations of challenge

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Abstract

Late 20th century forestry talks much of the 'paradigm shift' from scientific to community forestry. Most countries in Asia have some community forestry policy, yet there is enormous diversity of terminology and models of community forestry. Wealth of experiences have been gathered and discussions often focuses on social and institutional aspects, known as the 'second generation issues'. Countries embarking on community forestry recently need to work through earlier stage, sorting out ground rules: tenure, regulation and developing management plans. While this attention to policy and social issues is essentials, it runs the risk of neglecting the need for good technical know-how. Community forestry is technically challenging both for forester and community members.

"Over the years, one thing that has become increasingly evident is that there can be no single model for community forestry." (Nurse and Malla 2005)

1. Introduction

Forestry of the late 20th century talks much of the 'paradigm shift', from scientific forestry to community forestry. In this paradigm shift, there is no doubt that Asia is the world leader, and most countries in Asia have some form of community forest policy. Yet even within Asia there is enormous diversity of terminology and models for community forestry. Some of this range is shown in appendix 1.

The wealth of experience provided by these different models has been much analysed by practitioners, donors and academics (e.g. Agrawal and Chhatre 2006, Borrini-Feyerabend et al. 2000, Carter and Gronow 2005, Nurse and Malla 2005, Ojha et al. 2003).
The discussions will focus on three generation

2. Three Generations Issues

The discussion often focuses now on the social and institutional aspects, known as the '**second generation issues'**. These include the equitable sharing of costs and benefits, and governance (building community organizations and partnerships between communities and foresters). They are particularly prominent issues in the countries with the longest experience of community forestry, such as Nepal and India.

Countries embarking on community forestry more recently can benefit from these experiences, but still need to work through the earlier stages, what might be called the '**first generation issues**' of sorting out the ground rules: tenure, regulation, and developing management plans. Above all there is a need for policy development for community forestry programme, and capacity building amongst both foresters and community forest managers. Community forestry demands new roles of both: community members need to acquire silvicultural skills in forest resource assessment, marking and treatment. Perhaps even more, they need skills in administration, decision-making and record-keeping. Foresters who have often been trained in the classical virtues of technical forest management now need communication and facilitation skills. Community forestry involves a new relationship between the forester and communities, whereby communities have direct responsibility of managing forest and forester to play monitoring, facilitating and extension roles (Temphel et al 2005).

Furthermore, while this attention to policy and social issues is essential, it runs the risk of neglecting the need for good technical know-how. Community forestry is technically challenging to both foresters and community members, because it requires them to go beyond their traditional areas of knowledge. Foresters are used to relying on quantitative scientific silvicultural training. Community members of course have their own knowledge about the forest. Such 'local knowledge' or 'indigenous technical knowledge' has been the focus of much study (e.g. Chambers, Pacey, and Thrupp 1989, Klooster 2002, Sinclair and Walker 1999). But forests, and the world that forests occupy, are changing and new types of knowledge are needed, which must come from participatory research, and the collaborative development of silvicultural guidelines (Donovan 2001).

This need for new knowledge might be classified as a '**third generation issue**', not because it is a lower priority than the others, but because in reality attention is not often paid to these challenges until the regulatory and social aspects have been clarified so that people feel enough confidence to spend time improving the forest. These issues relate closely to the model for forestry that CIFOR has labeled 'adaptive collaborative management' (Colfer 2005). Adaptive management follows a learning cycle as shown in figure 1a, and is a widely recognised approach for dealing with complexity and uncertainty in natural resource management (Boo and Wiersum 2002, Walters 1986). Adaptive *collaborative* management can be represented as in figure 1b. Here, the different coloured arrows represent various stakeholders who accompany each other in the learning cycle, and exchange experiences at key learning points. In the words of Hartanto, Lorenzo, and Frio (2002):

> *"ACM aims to improve the ability of forests stakeholders to collectively manage a complex and dynamic system through continuous adjustments to their management systems. At the heart of the strategy are the conscious efforts to observe and learn about the impacts of the management on forests and subsequently improve it."* [p. 185]

Figure 1 a. The Adaptive Management Cycle (source: Anna Lawrence)

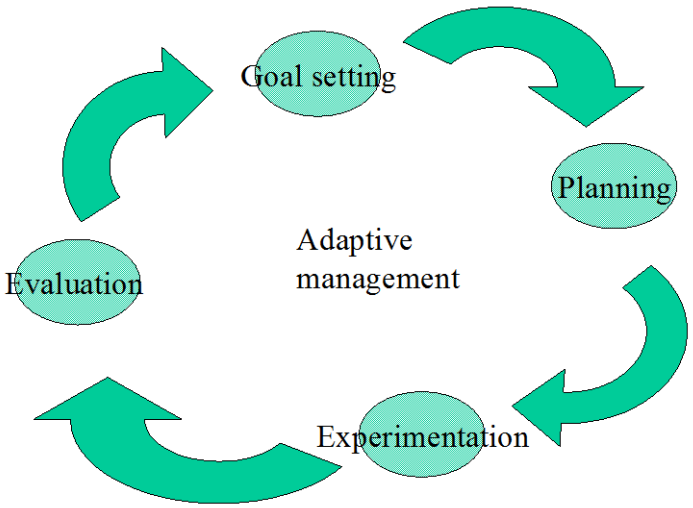
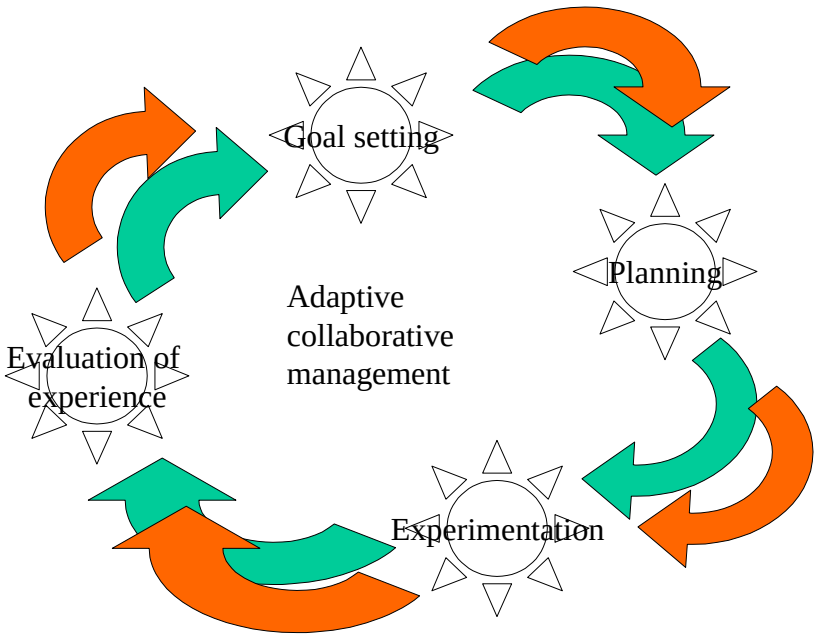


Figure 1 b. The Adaptive Collaborative Management (ACM) cycle (source: Anna Lawrence). See text for explanation.



This model allows us to see the whole process of community forestry as an experiment, but we can also consider that participatory research is taking place at various stages in the cycle. At least four stages can be proposed here:

1. The phrase 'participatory rural appraisal' or PRA is now familiar to many foresters in Bhutan. It refers to the use of shared, visual methods to enable every relevant stakeholder to join in assessing the forest resources and deciding which needs and challenges will be addressed through the management plan. This first, appraisal, stage is research in itself; the forestry officials in the field have to help members of the community find out about their forest resources and needs, in order to write the management plan.

2. A more detailed stage is the forest inventory. This is not always thought of as research, but because it involves gathering data with different stakeholders and interpreting that data, this too is a form of participatory research. Of course, this stage depends particularly on the technical knowledge of the forester, so it is not always very participatory. Most technical knowledge relates to timber species however. Increasingly, researchers and facilitators are helping communities develop new methods to conduct reliable inventories of non-timber forest products (NTFPs). For example, Stockdale and Ambrose (1996) report on a method for estimating rattan yield in Indonesia without having to cut down the rattan. And Ojha and Bhattarai (2003) describe ways to assess the stock of argeli (*Edgeworthia gardeneri*), as NTFPs had not been included in the operational plan for Bhitteri Pakha in Nepal, a community that depends on this species economically.

3. A third stage of participatory forest research is experimentation. Inventory involves collecting data about an existing situation; silvicultural experiments involve changing the situation and looking at the effect of that change. In Bhutan, some communities are conducting informal silvicultural experiments, for example by trying out different heights and frequencies of pruning Blue pine. Some communities are trying out planting native tree species in the barren area to meet their required needs. Other are experimenting with planting some cane species in the broadleaved forest of community forest to diversify natural resource production to meet the community's different needs.

   In a recently completed project in South India and Nepal, communities and NGOs have been testing the most sustainable ways to harvest eleven NTFPs (Lawrence et al. 2006). For example, in Agumbe village, in the Western Ghats of Karnataka, villagers are testing a method which involves plucking the leaves from cinnamon trees instead of breaking off while branches. Early results show the trees are healthier and it is likely that they will produce more regeneration thereby making their population more sustainable.

   However this type of research is less common. It is an area where communities and foresters could effectively work together. It is frequently identified by foresters as one of the most important constraints to community forestry. At a training workshop in participatory research, held at Jakar RNR-RC in March 2006, the most commonly identified challenge for community forestry was listed as 'lack of technical know-how'. This is both at community forest management group level and amongst foresters, because in a community forestry situation foresters are being asked for advice about species and problems that are different from the usual ones of timber management.

This is the case not only in Bhutan. A survey of research priorities for participatory forest management in six countries found that 'lack of appropriate silvicultural methods' was ranked as the second priority (after communication) by both project staff and forest users (Lawrence and Green 2000). As Donovan (2001) has pointed out:

'*For the most part, community forestry has made little progress in developing new technologies to enable the natural forest to better meet villagers' many needs for different forest products and services [and] foresters have had difficulty in supplying the technical information they need. … As a result, community forestry is falling short of its potential.'* [p. 4]

4. The last stage in the ACM cycle (figure 1b) where participatory research can make a contribution is the monitoring and evaluation (or M&E) stage. Like PRA, it is one stage within a bigger cycle – but a stage that itself involves activities that can reveal new knowledge to the community and foresters. M&E involves the selection and measurement of indicators. Different stakeholders may select different indicators or even interpret progress differently. For example, a study of one community in Nepal found that although both wealthy and poor villagers had the same idea of a 'good forest', there were big differences between them in perceptions of benefits. Wealthier people generally felt they had benefited from community forestry, while poorer people had lost access to fuel wood because the forest user group had imposed strict protection rules. In Bhutan, by contrast, the different socio-economic groups within the community forest management groups appear to have equal access to forest resources from community forests. Generally, the poorest group has the largest percentage of members who have directly benefited from the community forests (Buffum, et al 2005). The activities of choosing and using indicators can therefore reveal different priorities to the stakeholders.

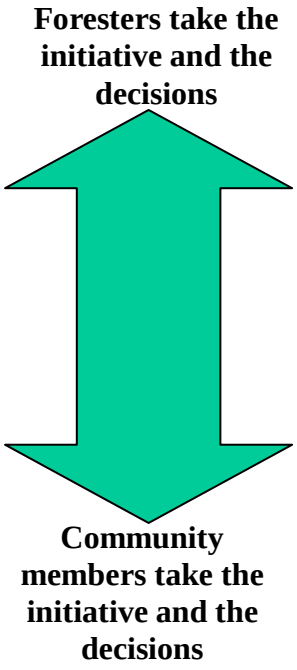
So there are at least four areas of adaptive collaborative management where research can be conducted jointly between CFMG members and foresters. What should be the balance between them? Foresters are after all used to making most of the decisions about forest management, and in many cases have access to information and methods that are unfamiliar to the villagers.

One helpful way to think about this follows the analysis of farmer participatory research by Biggs (table 2). Where foresters are attempting to introduce a new technology (such as a new species, or a new variety), they may want to take a contractual approach. This is because the new species might be quite risky for farmers – for example, if they invested in it but it did not grow. It is appropriate in this situation for the researchers to carry the risk, and to pay the farmers to test the technology.

However farmers and community forest users also conduct their own experiments, albeit informally. One of the advantages of participatory research is that it enables foresters and researchers to address the problems which are most relevant for villagers, in a holistic social context. Therefore by supporting the community's own research, the results will be most realistic and relevant to that community.

Table 2: a typology of farmer participatory research (adapted from Biggs, 1989)

Type	Characteristics
contractual	forest researchers contract with farmers to provide land or labour to test out a new technology (e.g. tree variety)
consultative	forest researchers consult farmers about their problems and then develop solutions; farmers test scientists' solutions
collaborative	forest researchers and extension officers collaborate with farmers as partners in the research process
community	forest extension officers support farmers' informal research



There is a balance to be achieved. Contractual research may produce results, which are interesting to the scientists but not immediately useful to the villagers, while community research may produce useful results for the community, but ones that cannot easily be used by any other community because they are so specific to that place. By adopting an intermediate approach to research, with the more consultative or collaborative methods, foresters and scientists can make sure that the overall research design gives results that can be used elsewhere.

Some of the examples given above relate not only to community forestry but to private farmland, and to agroforestry systems. In fact there is a close relationship between farm and forest management in Bhutan, especially when the community is involved in forest management (Carter and Oberholzer 2004). The use of trees on farm affects their use in the forest, and decisions about grazing are affected by land ownership and forest tenure

In Bhutan, with its long tradition of community use of both forests and trees on farms, there is clearly great potential to apply the ideas of participatory research in the different ways described above. This is already being done in some ways. For example, farmers experiment with *sokshing* (trees managed to produce leaf mold) management, so that in some places they have more success with oak regeneration. It would be interesting to work with those farmers to find out why they are more successful, and then to test their recommendations with other farmers. Another example is the introduction of new community rules about mushroom harvesting. Community members will monitor the effects informally, but if they introduce a more formal approach they will be able to make clear decisions about the effectiveness of the rules, and support their decisions to outsiders. One more example where much interest is expressed by farmers and foresters alike is in the management of cane. Designing and conducting experiments together means that the management techniques are more likely to be

appropriate to the community, and adopted by them. We hope that the framework presented above encourages further experimentation and helps to link these ideas with the methodology of participatory research.

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Appendix 1: community forestry terminology

Community forestry		Generic term. Specifically in Nepal
Indigenous forest management		Areas within specific countries, under indigenous or tribal management
Village forestry		Laos
Participatory forest management	PFM	Generic
Collaborative forest management	CFM	Generic
Joint forest management	JFM	India. Also some donor-funded projects in Laos.
Community based forest management	CBFM	Philippines
Community based natural resource management	CBNRM	Donor funded projects, particularly IDRC, WWF
Traditional Forest Management	TFM	Areas within specific countries , especially in Bhutan; Traditional forest boundaries
Adaptive collaborative management	ACM	Projects supported by CIFOR

Good governance as a precursor for equity, social capital building and outcome realizations in participatory forest management strategies - A case analysis of the *Attappady* Wasteland Comprehensive Environmental Conservation Project, Kerala, India

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Abstract

Inclusive approaches are widely regarded as arrangements with potential to deliver in the context of sustainable utilization and development of natural resources. Participatory Forest Management (PFM) strategies in different formats have been actively promoted in many countries in the SAARC region since last two decades, as dynamic arrangements to connect society with sustainable forest resource development, management and utilization. The current paper is based on a case analysis of the Joint Forest Management (JFM) activities undertaken under a unique eco restoration project implemented in the biodiversity rich Western Ghats landscape in the Kerala State, India. The case analysis explores as to how integration of good governance framework facilitates the realization of equity concerns, social capital building, in the overall realization of PFM strategies, goals and outcomes. The project is observed to have recorded high efficiency as it could realize the objectives and outcomes as envisioned. The case project in consideration is an exemplary instance of harnessing the synergy of people's participation in the development of social capital and institution building with the support of good governance arrangements to deliver eco restorative services while promoting inclusive development. The availability of such validated models strengthen strategic interventions for restoration, sustainable use of vast extent of ecologically valuable yet degraded landscapes in the country and overseas, especially in the SAARC member countries which share similar scenarios. Besides, the model also provides validated scope to integrate the much evident regional requirements of climate change adaptation and mitigation interventions, due to the high vulnerability of the SAARC region to adverse impacts of climate change. We also observed that the model possess potentials for embedding participatory monitoring, verification and reporting tools in the context of implementation of REDD + projects in the SAARC regional context as well.

Key words: *Participatory Forest Management, Good Governance frameworks, equity, case analysis, AWPCP*

1. Background

Inclusive approaches are widely regarded as arrangements with potential to deliver in the context of sustainable utilization and development of natural resources. Participatory Forest Management (PFM) strategies have been actively promoted in many countries in the SAARC region since last two decades, in different formats as dynamic arrangements to connect society with sustainable forest resource development, management and utilization. The PFM approaches over several years of implementation have been emerging as potential arrangements for inclusive development at landscape level. The PFM as a strategy, essentially involves, mobilizing local people for group action in managing specific forest areas adjacent to their settlements and ensuring socio-economic development of communities to reduce biotic pressure on forests, while sharing responsibilities and benefits according to well defined and mutually agreed set of rules and regulations[1]. The development and implementation of dynamic frameworks to synergize interactions between people, society and forest resource dynamics, in the context of sustainable forest management predisposes operation of good governance arrangements which inter alia entails recognition and reconciliation of a range of ecological, economical, social, cultural, ethical values of forest systems vis a vis stakes held by different actors, stakeholders etc [2, 3]. The participatory arrangements for natural resource management are found to succeed in a plurality of circumstances, generally characterized by a) institutional frameworks to adapt with multi sectoral dimensions and challenges in the decision making process, b) presence of enabling legislation, policies, guidelines and other implementation arrangements at national, sub national and regional levels, c) fast expanding awareness level among the actors and stakeholders and d) availability of mechanisms for benefit sharing. Nevertheless, the recent domain reports exhort for streamlining various enablers to the whole schema of PFM; such as devolution of power to local communities, development and strengthening of effective community based institutions, inclusion of disadvantaged groups, transition from protection to active management, from subsistence approach to commercial production etc[4],. The current paper is based on a case analysis of the Joint Forest Management (JFM) initiatives undertaken under a unique eco restoration project implemented in the biodiversity rich Western Ghats landscape in the Kerala State, India. The Attappady Wasteland Comprehensive Environmental Conservation Project (AWCECP) supported by the Japan International Cooperation Agency (JICA) aimed at ecological restoration of degraded wastelands in Attappady as well as development of replicable models of participative eco-restoration promoting sustainable livelihood with special emphasis on tribal population in harmony with resource base. The instant project was considered for the current case study owing to its exemplary success in realizing its objectives, outputs as well as outcomes. The project has also received accolades from both the Government of India and Japan International Cooperation Agency, Japan, as a best model and it has been recommended for replication elsewhere in the country as well.

The case analysis explores as to how integration of good governance framework helps to realize the equity concerns, social capital building, in the overall realization of PFM strategies, goals and outcomes. Case project in consideration signifies a remarkable instance of unlocking the synergy of people's participation, social capital and institutional building supported by good governance arrangements to deliver eco restorative services while ensuring sustainable inclusive development. The availability of such validated models offers new dimensions in restoration, sustainable use of vast extent of ecologically sensitive yet degraded landscapes, especially in SAARC member countries which share similar scenarios.

2. Programme Activities

Attappady Block, a constituent of the Nilgiri Biosphere Reserve landscape falling in the State of Kerala recorded severe ecological degradation due to loss of natural resource base with consequential effects on ecological as well as livelihood securities of the indigenous people and other forest dwellers in the area. The project was launched with the objective to recover the wastelands in the landscape as well as to help develop a society that sustainably uses the natural resources by resorting to afforestation and other ancillary activities with the active involvement of local people in balance with environmental conservation requirements of the Attappady landscape. Besides the project also emphasized on recovery of environmental quality well as to reduce poverty among the indigenous people[5]

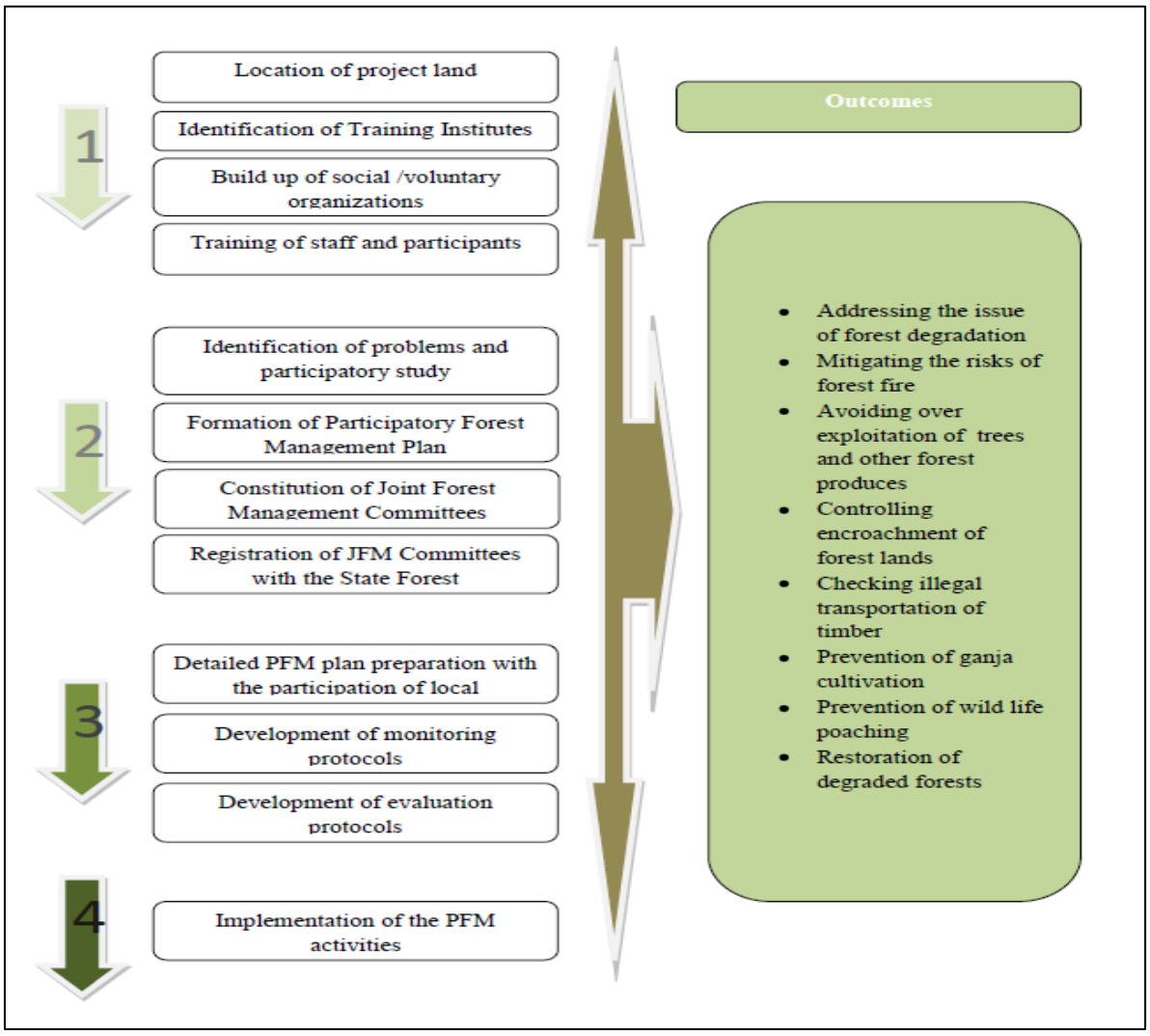

Figure # 3. Implementation model adopted in the project for the Joint Forest Management (JFM) activities [11]

The project area located between 76^0 27' - 76^0 43' E and 10^0 15' N in the major landscape of Western Ghats is spread over 745 km^2 in the tribal block of Agali in the Palakkad District, Kerala State . The project was implemented by a special purpose vehicle called Attappady Hills Area Development Authority (AHADS) from 1996-2010 with a total outlay of INR 2190 millions. The project implementation philosophy centered on grass root level governance approach for development and governance of common pool resources. The

activities were identified, comprehended and implemented by following watersheds/micro watersheds delineated in the project landscape. The people's participation was secured through well structured governance frameworks and institutionalized through democratically set up local institutions called Watershed Committees, Joint Forest Management Committees, Hamlet Development Committees with defined mandates, roles, responsibilities and supported by resources. The detailed activity profiling was structured through micro plans developed at micro watershed levels with strong focus on eco restoration and livelihood security. The whole scheme of implementation strategy was formatted with capacity building and capacity enhancement interventions to ensure effective translation of the micro plans[6]. The principal strategies considered in the implementation of the project were i) soil and biomass management including afforestation, land development, agroforestry, agronomy etc, ii) development of water resources and iii) ecologically compatible income generation schemes. The general model for planning, implementation of the JFM activities under the project is depicted at figure # 3 above.

2.1. Forests and Society in the Project Area

The project landscape is bestowed with rich assemblage of tropical forest types such as Tropical Wet Evergreen Forest, West Coast Tropical Semi Evergreen Forests, South Indian Moist Deciduous Forests, Southern Tropical Dry Deciduous Forest, Sub Tropical Hill Forest, Southern Montane Temperate Forest and Grass Lands. However, these forests were under different administrative regimes during the pre and post independence periods of India and presently are administered by the State Forest Administration under the Kerala Forest Act 1962 and Kerala Private Forests (Vesting and Assignment) Act 1971. The prevalent pattern of distribution of extent of forests in the project area is depicted at Figure # 1. As could be observed from the figures, the project landscape is dominated by Reserve Forests and Vested Forests as the major land use and forest was therefore the cynosure of the project activities to realize the project objectives/outcomes. The project area is historically known for inhabitation by indigenous people presents a dynamic socio-scape scenario. The tribal populace is represented by indigenous communities such as Irulas, Mudugas, and Kurumbas, etc. However, vibrancy as well as operation of conflicts in the socio-scape has been escalating with the increased emigration of settlers from the plains of the Kerala as well as from the adjoining States of Karnataka and Tamil Nadu. The pattern of demographic transitions in the socio-scape over half a century is depicted in the figure # 2. It is much imperative that there has been a substantial reduction in the percentage of tribal population to the overall population though the latter has increased several folds over time. The project area was also assessed for the various socioeconomic indicators to depict the socio economic profiling, especially from the point of view of operation of equity considerations. The general demographic pattern revealed; a sex ratio of 981/1000 as per the 2001 census; average family size of 3-5 persons per family; literacy rate of 54%.

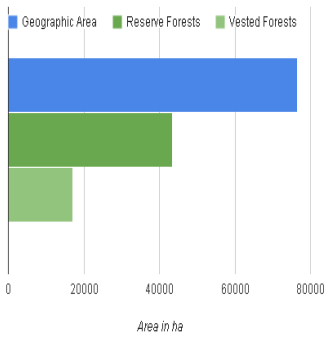

Figure #1. Pattern of distribution of forests in the project area[7]

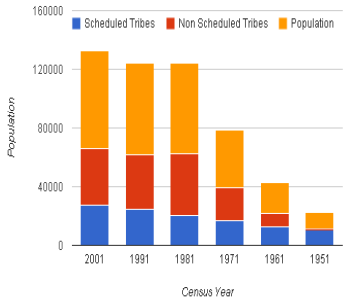

Figure #2. Pattern of demographic constitution in the project area[7]

Besides, the labor population in informal sector constituted 63% while that in the formal sector was represented at 14 percent. The land holding pattern analysis revealed that 49% of the inhabitants held a holding size of 0.5 ha. As regards the biomass based avocations such as livestock, diary, sheep rearing and poultry, the percentage social engagement were found at 32%, 20% and 44% respectively [7].

3. Results

The importance of social capital, networks in sustainable development of natural resources is much emphasized in the recent times with high expectations to address the messy and wicked problems operating in the domain[8]. The development of networks based on participatory process, supported by good governance, facilitates synergy enhancement across the stakeholders belonging to different socio and economic sectors leading to the realization of individual goals and common objectives. As evident from the discussions, the project landscape is abounding with diversity in terms of resource holding, socio economic reflections as well as access to resources. These factors are linked strongly to operational efficiency of equity considerations and expectations in the landscape for the actors, stake holders and other influential power groups in the socio-scape. In order to address these issues as well as to position the equity considerations to ensure the efficient functioning of the JFMCs as well as other project implementation sub entities; several elements of good governance were built in the scheme of implementation. The elements considered for the good governance framework analysis included, sustainable global development, efficiency, effectiveness, participation, transparency, accountability and capacity[9]. In the study these factors have been analyzed with respect to the project and are presented in the good governance framework matrix identified for the project in Table # 1 below. The major outputs of the JFM activities under the over arching schema of interventions under the project were considered for the assessment of the results. The main parameters considered include, spatial extent of coverage under the JFM activities, number of JMFC members participated in the programmes, spatial extent of the ancillary activities such as biomass conversion, afforestation etc, which were undertaken in the non forest area under the project landscape.

Table#1. Good Governance framework identified for the Joint Forest Management Interventions under the project.

Good Governance Principle	Description
Sustainable Global Development	Conservation of biodiversity, eco-restoration, improvement of livelihood options, development of local institutions for sustainable resource development and utilization, considerations cross cutting in the sphere of activities, social capital building, realization of equity in opportunities, socio cultural development etc.
Efficiency	Even use of allocated resources, adaptive capabilities in terms of institutional configurations and resource utilization challenges, accurate and precise measurement of monitoring parameters, flexible arrangements for accommodating realities, effective translation of investment to outputs.
Effectiveness	Realization of sectoral targets and outcomes, efficient utilization of various resource (monetary and non monetary) development of social capitals, deliverables as scheduled, interdepartmental co ordination, tandem action with local self organization.
Participation	The stakeholders and actors in the project boundary vis a vis the project objectives were brought on board under the democratic institutional arrangements such as User Associations, Joint Forest Management Committees/ Tribal Hamlet Development Committees. These institutions were constructively participating in resource development through capacity building, enhancement and institutional capacity development.
Transparency	Instruments for documentation, technical, financial, social and internal auditing, periodic monitoring and verification, placement of information on public domain, participation of external stakeholders, defined procedures, for implementation, monitoring and evaluation, quality Assurance and quality control measures, etc.
Accountability	Local organizations/institutions were configured under legal arrangements supported by bye laws, transparent and accountable mechanisms for resource allocation, use and accounting , presence of continuous monitoring and periodic evaluation protocols, social auditing, financial auditing, etc.
Capacity	Presence of highly motivated and efficient professionals, intensive capacity building through interactive training, participatory learning, multidisciplinary team work, build of local resource development and management capabilities

These above mentioned parameters were selected with the considerations that they represented the volume, and spread of the equity consideration in terms of participation, access to resource presence and utilization.

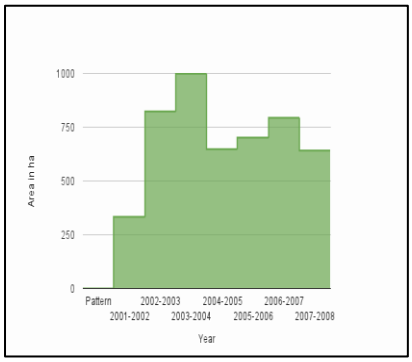

Figure # 4. Pattern of expansion of agroforestry under the project[5]

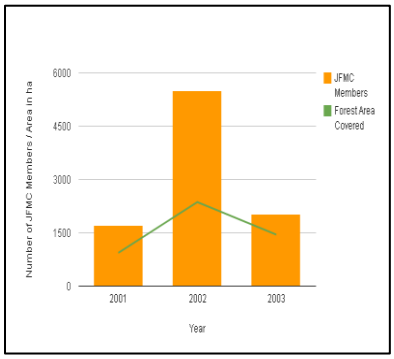

Figure # 5. Pattern of expansion of JFM membership and area under JFM[5]

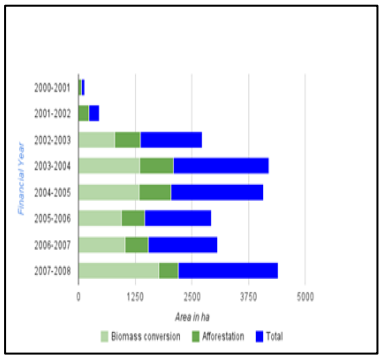

Figure # 6. Pattern of expansion of afforestation and biomass building in private areas[5]

The details of the outputs on the spatial extent of JFM coverage, participation levels and the spatial extent of ancillary activities were also analyzed and represented in the figure # 3, 4 and 5. As obvious, the prevalence of sound mechanism for implementation of JFM activities enabled the project to cover great extent of areas under the JFM scheme of implementation. Thus, the efficient delivery of the project deliverables as well as realization of the equity dimensions could be attributed to the continued functioning of the good governance framework over the project life cycle. As could be observed from the figure # 5, there has been substantial response from the participants in implementing the JFM activities, as the pattern of interaction between the increasing number of JMFC members and the extent of forest areas covered reveals strong positive linkages to this dynamics. The operation of such dynamics in the ancillary activities also shows more or less the same pattern also. The various influences of these project outputs on the equity dimensions have been presented in the next sub section.

4. Evaluation

The tropical forest system integrity and functionalities are reported to be severely impacted, disrupted by several forces of disintegration across the world. As we have discussed, these forces do not operate in isolation, but in vicious circles with synergy derived from dynamic multipliers operating in the landscape[11, 12]. The impacts of these interactions are observed to transcend across different sections of the dependent communities, which cause serious concerns about equity aspects related to access and use of various ecosystem services and products provided by such forested landscapes. The PFM approaches are currently practiced in more than 60 counties and provide potential scope for realizing sustainable forest management and livelihood security[10]. However as we have seen form the results of the instant project, there exists threshold requirement to build in good governance frameworks to ensure realization of various equity concerns, benefit sharing and social capital building under the participatory forest management activities are concerned in both spatial and temporal dimensions.

As evident from the pattern of expansion of the forestry activities carried out under the JFM window of the project, there exist validated potentials for integrating community participation and forestry activities under good governance frameworks. Although the spatial extent of the

JFM interventions, indicate the success of the participatory mode of engagement in resource restoration and building process; the continued deliverance demonstrated by the JFM under the current project could be strongly ascribed to the presence of good governance arrangements as it ensured equity in participation, resource access. The availability of equity realizations are empirically observed to have significantly influenced the creation, conservation and development of the forestry assets created through the JFM by tuning down conflicts. It is also much evident that the project could, not only cover substantial areas under JFM but also could successfully secure the survival, growth and development of the plantations created over the years. The temporal and spatial patterns of expansion of the JFM actives under the project is depicted at figure #5 and 8. As mentioned before, the forestry interventions have not only the direct impact in terms of green cover expansion and forest cover density improvement, but also on the augmentation of the outflow of various ecosystem services and products which have significant influence on equity and livelihood security in the socioscape around

The multiple dimensions of evidences for the impacts of the project were also examined in the context of the various forest based ecosystem products and services generated through the participatory forest management activates. In this regard, it is highly relevant to investigate the direct impacts of the expanding forest density and crown area coverage in the project area, on the ground water recharge and water table level in the area. The outflow of one of the forest based services i.e. the ground water recharge has been measured and the observations are represented at figure #7. The analysis of the observations strongly convey that, there has been positive influence of the expansion of forest cover, canopy density on the ground water level in the local wells due to the implementation of the project. Besides, the impacts related to the enhanced and continued supply of the other related ecosystem services were also considered for evidence based assessment of the various impacts and outcomes of the project.

As could be interpreted form the figures # 9 and # 10, d unprecedented enhancements in the expansion of the area under cash crops such as Coconuts, Areca nuts and Spices in the project area paving way for equity realizations cross cutting the socio economic profile of the project landscape. On the similar lines, appreciable expansion in the area under water intensive food crops such as paddy, vegetables and beans have also been recorded in the project area. All these evidences, while hailing the success of the project in terms of its deliverable and outcomes; strongly indicate the realization of equity to resource access across the socio economic scape. The direct indices of the success of the impacts of the project could be also ascribed to the strong good governance framework that was provided by the project all through its life cycle. Therefore good governance framework in the project could be clearly construed as the basic precursor which contributed to the realization and maintenance of equity considerations and social capital building throughout the project life cycle and beyond.

In the above context, it could be much clearly appreciated that the project could address the issues of forest degradation and deforestation through JFM window of operations as well as to ensure continuous building of social capital with realizations of equity aspirations under a good governance framework.

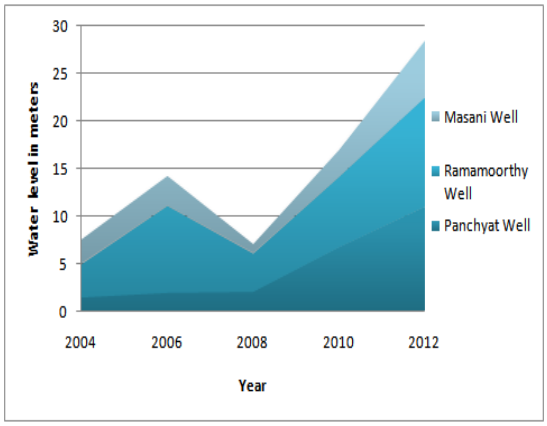

Figure # 7. Pattern of water level changes in the wells in the project area[5]

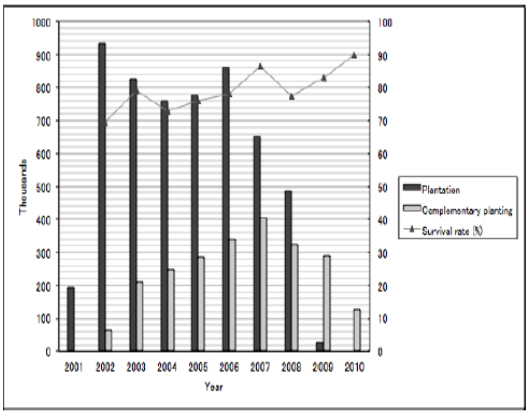

Figure # 8. Pattern of expansion of plantation and maintenance under the JFM in the project area[5]

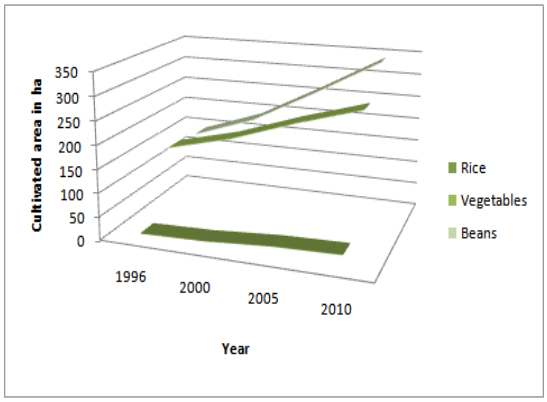

Figure # 9. Pattern of expansion of water intensive food crops in the project area[5]

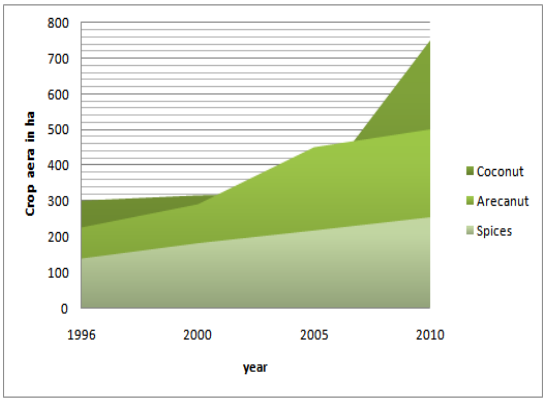

Figure # 10. Pattern of area under cash crops in the project area[5]

The availability of such validated implementation models offers tremendous scope to address the eco restoration requirements of vast extent of degraded forests in several member countries in the SAARC region; with required local adaptations. Besides, the model also offers further scope to integrate, the much evident requirement of climate change adaptation and mitigation interventions, due to high vulnerability of the region to negative impacts of climate change. The development of skills, assets, technical knowledge and social capital in the participatory engagement in the context of forest development and conservation, further underlines enhanced scope for effective development of participatory monitoring, verification and reporting tools in the context of implementation of REDD + projects in the region while addressing the cause of inclusive sustainable development in the region.

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The views expressed in the paper are based on professional experience and need not reflect the views of the Government under which the authors are/were employed with.

Biodiversity Conservation through Community based Natural Resource Management (CBNRM): A success story on supporting livelihood of forest dwellers through Micro-Enterprise of Mahul Leaf in Katghora Forest Division in Chhattisgarh, India

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Abstract

*Government of India has executed a project entitled "**Biodiversity Conservation through Community based Natural Resource Management**" with support from United Nations Development Programme (UNDP) in four states of India- Arunachal Pradesh, Chhattisgarh, Jharkhand and Orissa. The project in Chhattisgarh aims at achieving the objectives set out in the state's forest policy by specific interventions that aim at conserving floral and faunal diversity of forests at three selected sites (Habitats) through In-Situ and Ex-Situ conservation measures, involving forest dwelling communities. Livelihood of these communities is supported by strengthening their capacities to sustain traditional Non Wood Forest Produce (NWFP) based activities and promote Non-forest Bio-diversity activities. Keeping in mind the salient features of the Biological Diversity act (2002) includes conservation and sustainable use of biological diversity, benefit sharing with local people as conserves of biological resources and holders of knowledge and information relating to the use of biological resources, involvement of institutions of state governments in the broad scheme of the implementation of the Biological Diversity Act through constitutions of committees etc. project has been executed in the state. The present success story based on Mahul leaf micro enterprises established in the project amid to provide fair returns to the collectors for their collection and exploitation by the middlemen/ local traders.*

1. Background

India is one of the 12 mega bio-diverse countries of the world accounting for 7.8 % of the global recorded species and is also rich in traditional and indigenous knowledge. Being one of the parties to the convention of Biological Diversity (1992) recognizes contributions of locals and indigenous communities to the conservation and sustainable utilization of biological resources through traditional knowledge and practices for equitable sharing of benefits with those who utilize their knowledge, practices and innovations. The National and the State Forest policies equally emphasize the need for conserving the natural heritage of the country by preserving the remaining natural forests with many varieties of flora and fauna, which represent the remarkable biological diversity and genetic resources of the country. While the principal aim of the forest policy is to ensure environmental stability and maintenance of ecological balance including atmospheric equilibrium for sustenance of all

forms of life i.e. human, animal and plant, the derivation of direct economic benefit is subordinate to this.

The salient features of the Biological Diversity Act (2002) includes (i) regulating access to biological resources of the country with the purpose of securing equitable share in benefits arising out of the use of biological resources and the associated knowledge, (ii) to conserve and sustainably use biological diversity; (iii) to respect and protect knowledge of local communities related to biodiversity; (iv). To secure sharing of benefits with local people as conservers of biological resources and holders of knowledge and information relating to the use of biological resources ; (v). Involvement of institutions of state governments in the broad scheme of the implementation of the Biological Diversity Act through constitutions of committees, etc.

Chhattisgarh has 44% of geographical area under forest and its 32% population consists of tribals. A large population of the country especially the tribals, residing near the biodiversity rich forests are traditionally dependent on the forests for their socio-cultural and economic needs. About 13 lakh families are involved in Minor Forest Produce (MFP) collection as a livelihood option in Chhattisgarh. Tendu leaves, Sal seed, Harra and gum of Kullu, Dhawda, Babul and Khair are Nationalized. The nationalized species are purchased by the Primary Forest Produce Cooperative Societies of the collectors at the rate fixed by the state government at fixed collection centers. So there is no exploitation of the tribals. The profit from the trade is also distributed as incentive wages to the collectors. There are many more NWFP which are non-nationalized but are collected and traded in considerable quantities. The collection and trade of non- nationalized NWFP i.e. Chironji, Mahul leaves, Tamarind, Lac, Nature grown Raily Tasar Cocoons, Honey, many medicinally important produce such as Aonla, Harra, Behda, Arjun bark, herbs like Ashwagandha, Sarpagandha, Safed Musli, Kala Musli, Satawar, Giloe, Kalamegh, Baibidung, etc. is unorganized. The three important problems of NWFP collectors are where to sell, to whom and at what rate. The collectors generally sell the produce to middlemen at exploitative rate mainly due to lack of bargaining power and capacity to withhold the stock.

2. Program activities

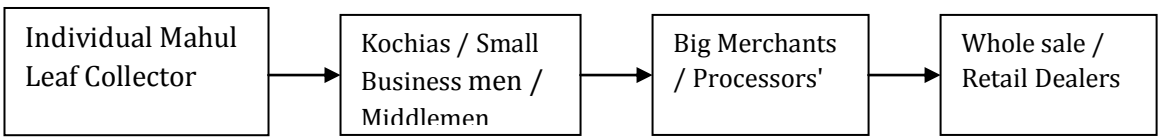
The Chhattisgarh State Minor Forest Produce (Trading & Development) Cooperative Federation Ltd., (CGMFP Federation) with its head quarters at Raipur has 32 Forest division and 915 Primary Cooperative Societies spread in all the 6 forest circles across Chhattisgarh State. The Federation works for the trade and development of both the nationalized and non-nationalized Minor Forest Produce (NWFP) in the state. Besides, economic upliftment of the forest dwellers, mostly Scheduled Tribes, involved in collection, processing and marketing of the NWFP in the State social care is also taken of by the Federation. The Federation has implemented projects associated with the Biological diversity and NWFP collection, processing and marketing mainly to enhance the income of forest dependent communities. The CGMFP Federation has implemented Government of India and United Nations Development Programme assisted "Biodiversity conservation through Community Based Natural Resource Management (CBNRM) Project" under Country Cooperation Framework II in three forest divisions viz. Jagdalpur, Katghora and North Kondagaon.

Katghora forest division in Korba district under Bilaspur forest circle is one of the selected project sites. Out of the 4187 sq km total area under forest in the district, 2835 sq km is

protected forest and 1352 sq.km is unclassified forest which is rich in diverse biological resources. Initially, five villages- Hathibari, Bariumraon, **Surka,** Pahadgaon, Saplawa were selected and later six more villages- Raha, Ramakachar,Telsera,Sasarpera, Jomnipara and Hirvandoli were included in the project. The *Meejhwar* community living in the villages of Katghora Forest Division has traditionally been cultivating one crop a year. Besides, they are engaged in collection of NWFP like Mahul and tendu leaves, Sal seeds and herbs etc. Many of these villages have limited access to basic amenities – clean drinking water, schooling, health and sanitation etc . Some of the villages are located in the interiors and not connected by proper road communication warranting the villagers to walk a long distance to catch a bus to travel to nearby by small towns like Pali, Katghora etc.

Bauhinia vahlii Wight & Arnott, locally known as Mahul, is a perennial woody climber abundantly growing in the forests of the state. The indigenous communities used to harvest the leaves of Mahul, ***Bauhinia vahlii*** Wight & Arnott, since ancient times for both household use and as a source of income. "Mahul leaves" is one of the important NWFP collected from forest and used as fodder and dried leaves are stitched and moulded into plates and cups. The seeds of this climber are edible and have medicinal value. The foliage of the climber is used as green manure to replenish the soil.

Traditionally women, after finishing their household work, walk up to 10-12 km into the forest to collect the Mahul leaves during October to December. On an average, a woman collects 18-20 kgs of leaves, makes bundle and brings home daily. Collected Mahul leaves are primarily processed by drying them in the sun by spreading the leaves on the ground or sew the fresh leaves into a garland and hang to dry for about 4 to 7 days. The dried leaves are tied in bundles of about 50 kgs weight and sold to the small business men / trader/ middlemen (kochiya) at the rate of Rs 4 per kg. They in turn sell these leaves at to the big merchants/processors earning huge profit.



Women collecting *leaves of Bauhinia vahlii* locally called as Mahul



Sun drying, Bundling & Transportation of Leaf to storage House

3. Impact of the project intervention

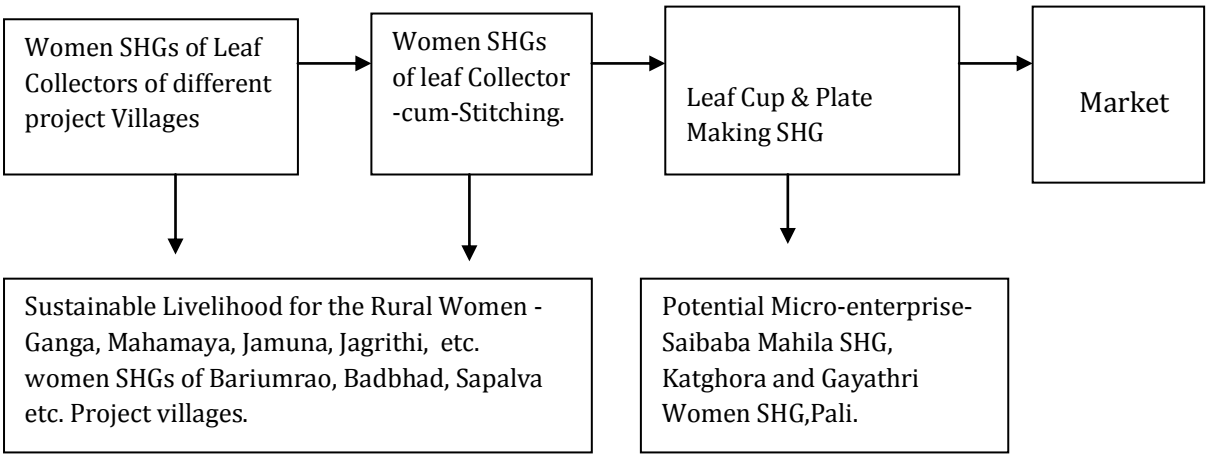
The good Innovative practice of adding value to *Bauhina vahlii* (Mahul leaves) through this project, capacity of tribal communities-including women and their institutions of decentralized governance to access, share and benefit from conserving bio-resources along with sustenance of NWFP based livelihood activities, has been enhanced.

The women Mahul leaf collectors from Hathibari, Bariumraon, Surka, Pahadgoan, Saplawa of Katghora Forest Division formed into Self Help Groups and supported to enhance their skills for non-destructive harvesting of Mahul leaves and encouraged to take up value addition by stitching and molding into cups, and plates, which are traditionally used across India for serving and packing food materials. Seeing the scope for improving the process of collecting, stitching and molding Mahul leaves and the income it generates, financial assistance was extended to procure and supply sewing machines to stitch Mahul leaves and molding machines to press the leaves into firm shapes of cups & plates. The moullding machines like sewing machines are easy to be handled by women. From this value addition process, women of Hathibari, Bariumraon, Surka, Pahadgaon, Saplawa villages of Katghora District Union with support from the project have been keen to explore their entrepreneurship and managerial skills. They collectively formed Self Help Groups engaged in selling and buying of collected leaves, stitching of leaves and operating the unit to press and mould the leaves into cups and plates.

3.1 Benefits of adopting improved processing methods of Mahul Leaves

Women in the project area were explained about the adverse effects of destructive harvesting on annual production and were engaged in non-destructive harvesting practices of the leaves. They were also guided to collect seeds whenever possible and scatter in the jungle during rainy season at appropriate places to increase the regeneration of the climber and thereby would have more climbers growing in the area. More women self help groups adopt sustainable harvesting practices to collect the Mahul leaves, dry them carefully so that leaves are sufficiently dried to avoid fungus growth but not over dried to become brittle, and store the dried leaves in bundles in the store house. The Mahul leaves of suitable size are cut and stitched together into flat leaf plates on a sewing machine during their leisure time in their

houses. These stitched and unstitched leaves are then supplied to the cup & plate making units. While making the cups & plates, required quantity of leaves is taken out, dipped in water for a few minutes and wiped out with clean cloth to remove dust and dirt. Cups and plates are molded by taking individual leaves and pressing the leaves in a moulding machine. The machine produces shallow leaf plates and cups (donnas) of different sizes. The leaf of required size placed on the wax coated side of the paper is placed on the lower dye plate, the pedal pressed down and released after a few seconds. During this single machine operated process, the wax melts due to the heat generated by a coil and both the paper and leaf are stuck together, folded, pressed and trimmed into cups of size 5", 6", and 7" locally called as donas. In place of wax paper, 2-3 leaves are also pressed together to make donas of required size as per the market demand. Similarly the stitched leaves are molded into plates of 13" size. However, in the case of plates wax paper is used invariably and only one stitched leaf is pressed. Through the project's intervention, the earlier system of only selling un-processed Mahul leaf has changed to sale of value added Mahul Leaf i.e. cups and plates. Self help groups have benefited with increased earnings from this intervention under the project since women are able to earn at each stage of processing of Mahul leaves.



Training of women of the SHGs in stitching Mahul Leaves. Mahul leaf plates & cups ready for sale

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Challenges in community based forest bio residue resource utilization for bio briquetting in the western Himalayan region of Uttarakhand : A real case study.

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Abstract

This paper deals with a real experiment conducted in the state of Uttarakhand. Under this experiment forest bio residue, especially dry and fallen Chir Pine needles were given to the entrepreneur for bio briquetting. The whole process was designed under private public partnership with active involvement of the nearly villagers. This partnership picked up perfectly in the initial years but gradually deteriorated and finally disappeared. Paper critically examines all the development during the advancement of this tri partite association in which the local forest department, the villagers and an entrepreneur were the main stakeholders. Paper reveals the potential barriers for such type of relationship as well as suggests few important enablers for the successful implementation of a community based forest bio residue resource utilization program.

Key Words: *Pine needles, Community involvement, Briquetting, Forest fires.*

1. Background

Uttarakhand is predominantly a forest rich area of Indian Himalayan Region which came into existence on 9th November 2000 as the 27th state of Republic of India with an area of 53483 square km and a population of little less than ten billion (MOHA 2002). The terrain and topography of the state is largely hilly with large areas under snow cover, dense forest and steep slopes. It's sex ratio is 963 with the density of 189 persons per square kilometer and a literacy rate of 79.63%.

The major wealth of the state is it's forests which consist very rich biodiversity. The state ranks sixth among the other states in terms of percentage of recorded forest area. The total forest area under various classes of the state is 37999.53 square km, which is 71% of the total geographical area. Forest area under the control of forest department is 24418.67 square km and rest other forest area is under the control of forest panchayat, revenue department, municipalities or the cantonment boards. The per capita forest area of Uttarakhand is 0.37 ha which is much ahead of India's average of 0.064 ha and almost half of the world's average of 0.64 ha (Planning Commission 2012). Chir Pine is a major plant species found in the middle of the western Himalayan belt of Uttarakhand State starting from about 1000 meters to 2000

meters elevation (Saxena 1984). Pure Chir Pine constitutes about 4000 square km of reserved forest area with many other large tracks of Pine trees invading into nearby mixed forest, Oak forest or Deodar forest. Under a gross estimation over half a million hectare of reserved forest area in Uttarakhand is predominantly shadowed with Chir Pine trees (UFD Report 2012-13). Forests of this area are used variously for fodder, fuel wood, timber, leaf litter, construction and several others non timber forest produce (Ram 2004).

Chir Pine tree has a tendency of shedding it's leaves every year in the months of January to May every year. These dry and fallen pine needles are highly inflammable and it contains 18-20 Mega Joules of energy per kg of its mass which is higher than that of wood, saw dust and fuel oil (Safi 2002). in an estimation by forest Research Institute, Dehradun over a million ton of dry Pine needles fall every year on the forest floor, (UFD Letter 2010) which are extremely combustible and repeatedly causes hazardous forest fires in the summer months .Pine needles Burning works as a big source for the atmospheric carbon. This also leads to soil erosion, land degradation, dryness loss of young plantations and damages to life and property of the human beings.

Photo of real fire in Pine forest

Women collecting Pine needles

Pine needles are abundantly available in the hilly region of Himalayas. On thermal decomposition they generate gases such as light volatiles, carbon monoxide, carbon dioxide, hydrogen and other organic vapors. Since Pine needles poses serious threat to forests from forest fires, their collection and disposal for energy recovery is a very attractive proposition (Safi et al.2004).

In order to lessen the chances of forest fires initiated through burning of needles, state of Uttarakhand through it's government order dated 18th August 2010 and government order dated 1st January 2008 allowed use of dry and fallen pine needles through private public partnership mode (GOU 2008). This arrangement was further generalized over the state by the order of the principle chief conservator of forest, Uttarakhand in the year 2010 (PCCF Order 2010). under this arrangement four entrepreneurs were initially chosen to collect dry and fallen pine needles from the reserved forest areas for the purpose of bio briquetting. Collection was permitted under the strict control of the forest department and with the participation of local communities and institutions situated in and around the area. As an initial set back to the program, work could be really started by only one entrepreneur out of the total four selected for pine needles bio briquetting. Suyas Udyog private limited, work-468, village kishanpur, Tehsil Kicha, District Udham Singh Nagar, Uttarakhand was allowed

to collect 20,000 tons of dry and fallen pine needles per annum from the reserved forest areas of District Nainital and Almora(CCF Order 2010).

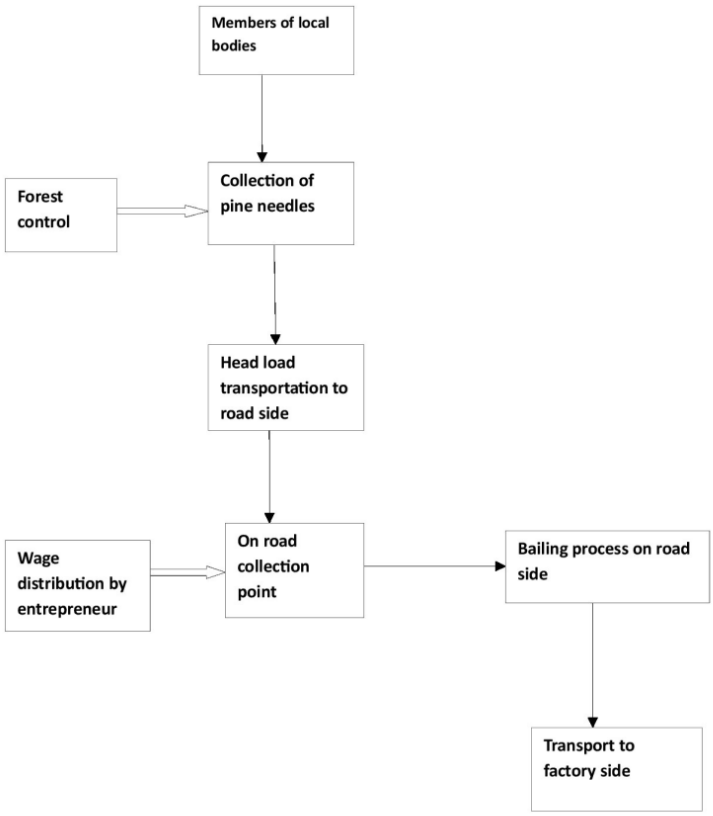
2. Program Activities

The program activities aimed at adding economic value to a waste forest residue named as dry and fallen pine needles. This was a well apprehended program to address climate change on one hand and providing economic benefits to the local villagers on the other. Pine needle bio briquettes have enough potential to mitigate adverse effects of use of fissile fuels. It may provide direct monetary gains to the local villagers from the nearby forest areas and have strong likelihood to improve the forest-forest user relationship for future. With the above mentioned twin objectives the following activities were marked to launch the program in the state.

1. The selected entrepreneur will purchase the dry and fallen pine needles from the collectors at a rate of 1 rupee per kg (about 15 to 16 USD per ton)
2. Collectors should mandatorily be a local villager or a member of local non government organization, self help group, women group or the forest panchayat.
3. Entrepreneur will procure transit permit to transfer dry Pine needles from the collection site to the factory site after paying a royally of 2 rupees per 100 Kg of needles.(about less than a half USD per ton of Pine needles)
4. Transit permit shall be issued by the forest department under the strict vigil and provisions of the forest produce transit act.
5. The entrepreneur will manufacture pine needle briquettes at it's factory site and shall be free to sale these briquettes in the open market.
6. All such activities shall be carried out after a memorandum of understanding is signed between the local forest officer and the entrepreneur.

   Program activities for collection of pine needles may be summarized in the following chart no 1.

Chart 1: Activities of raw material movement



Bailing process of Pine needles at road side

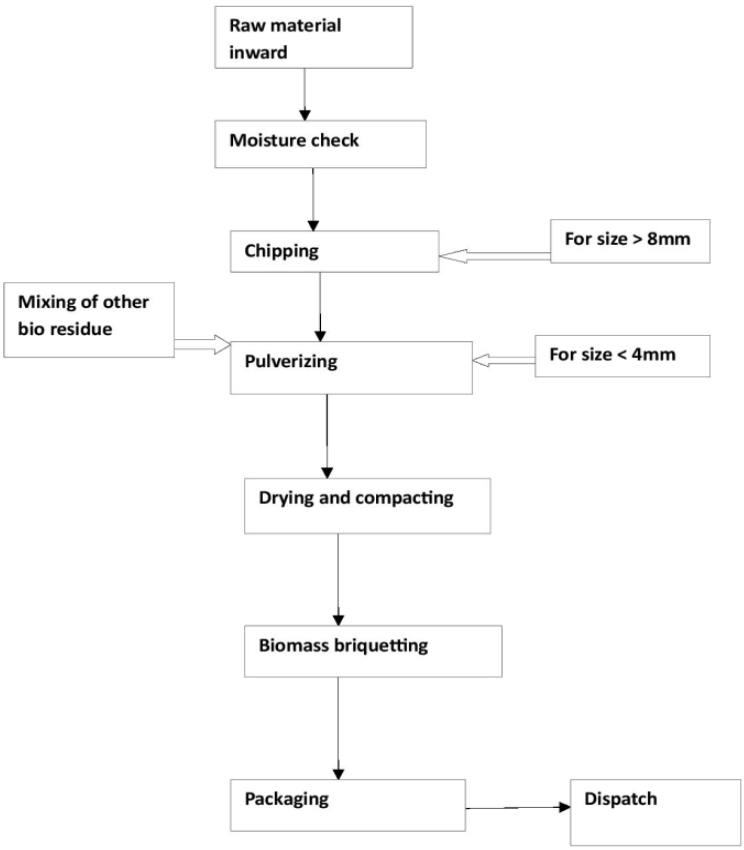
In the year 2011 and 2012, Suyas Udog private limited collected about 15000 tons of dry and fallen pine needles from the reserved forest areas of Nainital and Almora forest division. The collection was done by the local villagers and the entrepreneur received the collected material on the road head after paying an amount of 1 rupee per kg to the collector. The real collection of the Pine needles took place in the months of April, May and June of 20011 1nd 2012. Dry and fallen pine needles were processed at the factory site which was situated about 150 to 200 Kms away from the collection point depending upon the situation.

Chipping and pulverizing

Compacting and briquetting

All the activities in the process of Pine needle briquetting manufacturing may be summarized in the chart no2.

Chart 2 Activities for bio briquette manufacturing



3. Results

The only working entrepreneur for pine needle briquetting could collect about 1500 tons of pine needles from the allotted reserved forest areas of Nainital and Almora district during the period of 2011 to June 20112. Pine needle collection period is highly limited to the months of March, April, May and June only i.e before the start of first monsoon shower and with the beginning of leaf shedding season. The whole material was transported to the factor site and bio briquettes were made.

The main technical result of the whole process was to convert a low bulk density biomass into a high density, energy concentrated fuel briquettes. The bulk density of loose biomass ,which is typically about 40-120 kg/cubic meter can also be increased to densities as high as 600-800 kg/cubic meter (Pandey et al.2013). The biomass briquettes so created has following major properties as compared to wood and coal.

Particulars	Biomass briquettes	Wood	coal
Calorific value (Kcal/Kg)	> 4000	3500	3000-5000
Moisture content	<5%	35-40%	10-25%
Ash Content	<5%	10-15%	30-35%
Sulphur Content	Nil	Nil	Yes

Table 1. The biomass briquettes so created has following major properties as compared to wood and coal (Experiment conducted by the entrepreneur)

The various other socio-economic and environmental results of the activity may be summarized as below.

1. Over 15, 000,00 rupees (about 25,000 USD) were distributed among villagers as collection charges of the dry and fallen pine needles.
2. An area of about 250 hectares was protected from the danger of forest fires.
3. Safety to nearby broad leaf forests from fire as forest fire often reaches these areas from the adjacent Pine forest.
4. Economic advantage to the entrepreneur as after value addition Pine needle briquettes found a good demand in the industry.
5. Control of green house gas emission because otherwise there was complete chances of burning of these dry and fallen pine needles in the event of forest fires.
6. Availability of high calorific fuel to the industry thus reducing dependency over the fossil fuel.
7. Employment generation.
8. Improved credibility of the department and the government as the reserved forest could provide some direct economic gains to the villagers.

These results were highly encouraging for all the stake holders as they simultaneously addressed the issue of social entrepreneurship and climate change mitigation. But this could not be sustained. Though the whole process in the initial year looked as socially accepted, economically viable and environmentally appropriate but in the very next year things reversed. In the year 2013 only few hundred kilograms of dry and fallen Pine needles were collected and handed over to the entrepreneur making the whole process of briquette making highly uneconomical and a non viable venture for him to operate. The only entrepreneur selected for the bio briquette making could hardly manufacture few tons on Pine needle briquettes in the year 2013. In the very first month of 2014, the owner stopped manufacturing the bio briquettes and sold the whole unit to someone else. The Entrepreneur

wore heavy losses in abandoning the manufacturing unit and the whole process of community based forest bio residue resource management in the western Himalayan region of Uttarakhand came back to square one.

पिरुल एकत्र कर जंगल भी बचाया और 15 लाख रुपये भी कमाए महिलाओं ने

दुश्मन पिरुल बन रहा रोजगार का साथी

विजेंद्र श्रीवास्तव

हल्द्वानी। पहाड़ों में मुसीबत माने जाने वाले पिरुल ने नई संभावनाओं के दरवाजे खोले हैं। एक साल में ग्रामीणों ने जिसमें अधिकांश महिलाएं थी, पिरुल बेचकर 15 लाख की आय अर्जित की है।

पर्वतीय क्षेत्रों में वनाग्नि भड़कने का एक कारण पिरुल ही होता है। ग्रामीणों के अनुसार जहां पर पिरुल गिरता है, उस जगह पर कोई दूसरी वनस्पति भी नहीं उगती। इसकी खाद भी नहीं बनती है और इस पर फिसलने का खतरा बना रहता है।

इससे बचने के लिए वन विभाग ने पिरुल के इस्तेमाल की योजना बनाई है। इसमें एक प्लान निजी संस्था सुयश उद्योग प्राइवेट लिमिटेड ने कोयले की तरह ज्वलनशील बिक्रेट बनाने की योजना का प्रस्ताव दिया। तय हुआ कि पहाड़ों से वन विभाग पिरुल ले जाने की अनुमति देगा, जो भी ग्रामीण इसे करेंगे उन्हें एक रुपये प्रति किलो के हिसाब से भुगतान होगा। अब इस योजना का शुरुआती लाभ दिखने लगा है। करीब एक साल में इस निजी संस्था ने ओखलकांडा, शीतलाखेत, रानीखेत, पैठान, बल्दियाखान से 15 हजार कुंतल पिरुल एकत्र किया। इसके बदले महिलाओं को 15 लाख का भुगतान किया गया है। संस्था के एमडी कुमार काबरा कहते हैं कि अगर वनाग्नि में पिरुल जला नहीं होता, तो करीब 40 हजार टन पिरुल के इस्तेमाल का लक्ष्य था। हमारे काम में करीब 400 लोग जुड़े हैं। वह औसतन प्रतिदिन 250 से 300 रुपये एक दिन में आय कर लेती हैं।

इस्तेमाल

लालकुआं स्थित स्लीपर फैक्ट्री से लेकर रुद्रपुर, हरिद्वार की फैक्ट्रियों में ब्रिकेट की डिमांड है। जहां पर ब्रायलर हैं, वहां इसकी खपत है। अपर प्रमुख वन संरक्षक शोध एवं प्रबंधन कहते हैं कि वन विभाग ने भी इस प्रोडक्ट को बढ़ावा देने के लिए कई कदम उठाये हैं।

ठंडा प्रस्ताव

वैकल्पिक ऊर्जा के लिए पिरुल से बिजली बनाने की योजना बनी। वन विभाग और उरेडा ने इस प्रोजेक्ट के लिए मेहनत भी की। इसके बाद पांच कंपनियों ने डीपीआर भी शासन को सौंपी थी। लेकिन, बाद में योजना ही ठंडे बस्ते में चली गई।

कैसे बनता बिक्रेट

पिरुल को जंगल से एकत्र कर महिलाएं रोड तक लाती हैं। जहां पर मशीन ब्लाक बनाकर ट्रक पर लोड कर किच्छा स्थित फैक्ट्री में पहुंचाते हैं। यहां पिरुल में धान की भूसी, बुरादा आदि को मिला कर कंप्रेसर मशीन में डाल दिया जाता है। इसके बाद एक निश्चित आकार में बिक्रेट तैयार होकर मिल जाता है।

Results highly appreciated during initial years in the eyes of local news papers

4. Evaluation

To evaluate the agenda of pine needle bio briquetting in the state of Uttarakhand is provocative because of its excellent initial up rise followed by an immediate decline. This all happened within a short span of two years only. In order to do the true assessment of happenings, detailed discussions with the forest officers and the entrepreneur were done by the author over the subject. Following enablers and the barriers for the program are shorted out which on one hand truly accelerated the activities but many other invisible hands simultaneously retarded the impetus of motion bringing it to the level of cessation.(Personal communication 2014).

Enablers

1. Addressing an issue of utmost importance for the ecology of Uttarakhand i.e forest fires.
2. Community participation in forest bio residue resource utilization.
3. Abundance and sustainable supply of dry and fallen pine needles in the forests of Uttarakhand
4. Enthusiastic entrepreneur
5. Good demand for the value added product i.e. bio briquettes, by the industry.
6. Government and department support for the program.
7. Encouraging attitude of the subordinate field staff as removal of dry pine needles from the forest eliminates chances of forest fires and ensures a trouble free working during summer season.
8. Easy availability of other types of bio residue like rice husk, saw dust and crushed sugar cane in the nearby area thus ensuring continuity of production in case of non availability of pine needles.

9. Easy technical method for bio residue briquetting process requires locally available unskilled or semi skilled labor.
10. Pride of addressing a social responsibility like climate change issue among all the stake holders of the program.

Barriers

1. Additional expenditure by the entrepreneur in purchasing costly bailing machines as transport of pine needles in loose was technically and economically not feasible. One truck transported only 1-1.5 tons of loose pine needles which could be increased to 3-3.5 tons under bailed conditions.
2. Heavy cost of transportation as the price of diesel increased to almost double within the three years.
3. Unavailability of transportation directly to the factory site. Pine needles were collected from hills and transported to the foothills first and after unloading and reloading the raw material on some other transport medium the same was brought to the factory site situated at plains. It involved heavy additional cost to the briquette manufacturer.
4. Serious procedural problems in transporting the raw material in night hours as Pine needles are regarded as forest produce and forest produce transit act does not allow movement of forest produce after sun set and before sun rise. This caused heavy demurrages to the manufacturer as quite often the loaded trucks remained halted at forest barriers overnight.
5. Lack of proper subsidy for bio briquetting process in Uttarakhand.
6. Lack of government policy to ensure use of fixed percentage of bio residue fuel by the industry sector.
7. Non flexible mechanism in the memorandum of understanding between the forest department and the entrepreneur causing redresser of slightest problems at the highest levels.
8. Demand by the villagers to increase pine needle collection rates gave birth to various intermediary defying the vary motive of community participation.
9. Weak or no consultation with various stakeholders before, during or even after the program on pine needle bio briquetting i.e. in planning and implementing. Strongest among them are the local villagers whose grievances or suggestions need to be seriously addressed along with that of the entrepreneur.
10. Availability of comparatively cheap bio residue briquettes from other parts of the country like Haryana and Rajasthan.
11. Various climatic features like early rains, landslides, natural calamities, road blocks and forest fires worked as a strong retardant for sustained supply of dry and fallen pine needles to the manufacturer of bio residue briquette.

This program has really strong enablers as it imbibes climate change, community participation and economic gain to all of its stakeholders but somehow barriers remained either unnoticed or unaddressed causing a set back to the process. Based upon the author's first hand working with the program as a conservator of forest Nainital in the year 2010, 2011 and 2012 it is strongly believed that this program could be certainly revived if in future more emphasis is given on the strengths of the process and barriers are addressed with a little more decentralized and truly participative way of executing the things.

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Equity, Production-Factors, Income Distribution and Well Being In Community Forestry: Lessons From Nepal

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Abstarct

The concerns on equity, production factors, income distribution and well being of society become important in forestry discourse with recent emphasis on consolidation and further expansion of Community Forestry for community and rural development.

Community Forestry Programme in Nepal is being implemented with twined goals of environment conservation and poverty reduction. In this context this paper explores on welfare aspects of Community Forestry by focusing on the issues of equity, income distribution and well being of society. The paper takes a stock on studies related to financial and economic aspects of equity, distribution and well being in Community Forestry. The paper also suggests way forward particularly on pro-poor inclination to the programme.

Introduction:

Community Forestry (CF) has evolved as a management process for last two decades with gradual shift from resource focus to institutional development. The latter enables villagers to assemble into groups and assume management and regulatory responsibilities. There is recent emphasis on consolidation and further expansion of Community Forestry for community development. Thus, concerns on equity, production factors, income distribution and well being of society become important in forestry discourse.

Initial alarm on equity in CF rose in connotations to the complementary resource endowment and consequently equality based distribution practice was depicted as inequity in Nepal. Nepal Government adopts a policy of handing over forest to be managed at local level as community forests, widely known as Community Forestry Programme. The policy is expected to have a long-term impact on well being of the society as the transfer of resource can substantially change the pattern of income distribution. The paper explores on welfare aspects of Community Forestry by focusing on the issues of equity, income distribution and well being of society. In equity, the discrepancy associated with differences in spatial and temporal dimensions in terms of access, contribution and benefit, regarding the handing over of community forests is discussed. Equity is depicted as the fairness, social justice, and acceptability of provisions towards fair distribution of rights, responsibilities and benefits among interacting entities within a sphere. It is defined as a situational exchange among rights, benefits, and advantages with obligations, burdens, and disadvantages respectively. Using the concept, negative externalities due to the exclusion of seasonal and de facto usufruct rights cognate equity issues in Community Forestry. The concern becomes significant as Community Forestry gears for a challenging role in national development. The paper takes a stock on studies related to financial and economic aspects of equity, distribution and well being in Community Forestry. This paper is divided into four sections as follows:

1. Challenging 3 Es;
2. Production factors;
3. Distribution aspects, and;
4. Well being: Societal perspective

The first section deals with equity, efficiency and exclusion issues in Community Forestry. The second section concentrates on land, labour and capital as the production factors and the returns on these factors in Community Forestry. A hypothetical relationship identifies limiting factors in production function in CF. The third section deals with the distributional issues, focusing on income distribution and distributional weights in Community Forestry. The fourth and final section discusses on 'Well being in Community Forestry' taking a societal point of view. Under this section marginal utility, base level consumption and social well being is also included. The paper justifies the need of including Pro-poor concern while simultaneously intensifying management in CF to contribute in broad-based economy.

Under the mentioned framework, the paper also highlights on an epidemic, associated with Community Forestry, in one of the remotest area of Nepal and consequent human tragedy. The intention behind the story is to emphasize the importance of equity during planning and management of Community Forestry. Another inevitable phenomenon associated with the tragedy is the Exclusion. The latter is defined by the accessibility determined by physical, social, political and economic parameters. Exclusion is also a constraint in institutionalization of resource regime under the given natural condition or technology. The paper also dwells on several studies on equity at spatial, institutional, and individual levels to familiarize the readers with various aspects of equity.

The paper stresses on the need to include second-generation issues, associated with user identification, subsequent exclusion and equity, in designing Community Forestry Programme. A mechanism for the equitable distribution of benefits within the limits of productivity and sustainability of the resource has been identified as essential factor for the success of CF management. However, the paper also reiterates that the equity in distribution of benefits is mainly governed by social structure, dependence on forest resource and magnitude of utilization. The paper attempts to answer, why successful management of Community Forestry prevails even with significant inequities yet the deprived group remains as a major constituent in collective actions? By examining group structure and assessing value systems, social and economic situations in the different regions of Nepal. The power relations in the group along with other local factors are also considered. The paper also deals with equity arising due to the spatial distribution of Community Forestry by ecological regions, information access and consequent conflicts. The spatial distribution of forest resource is evident as an ecological region, relatively affluent than the rests, represent only 12% of the total groups in the Country. However, these groups capture almost 46% of the total income accrued from Community Forestry. Nepal Government made a decision for levying a tax on CF income for equitable income distribution by ecological regions. However, the decision was legally challenged at the Supreme Court. The latter prohibited the government to institute taxation mechanism in CF under prevailing Act/Regulation. Now the

dilemma is how CF income contributes towards well being of society without an appropriate mechanism to ensure equitable income distribution?

Community Forestry can only be successful if it institutes a proper mechanism of distributing benefit and income on an equitable basis. However, any such mechanism should reflect the realities of community structure, and provide benefits as per interests of the affluent as well as resource dependent poor. Nevertheless, the mechanism should unlikely ensure equal returns to all, or act as a vehicle for redistribution favoring the poorest section of the society. The relevance of equity in CF is also discussed in the context of efficiency. The latter is defined as the best possible outcome collectively available to all under CF management and in fact is the maximization of total net benefit generated from the resource. Thus, the term often overshadows equity while it is reasonable to deal the terms simultaneously for social well-being. The paper emphasizes that equity and efficiency are two facets of CF that involves considerable trade-off and dealing both facets together is a challenge. The economic efficiency in CF increases with larger forest and group size but the increment is also at the cost of equity. Increased efficiency leads to a heavily-monetized distribution system and the poorest of the poor are often the loser of such market reforms.

The paper also questions on the rationale to adjust the Net Present Value (NPV) of CF in order to accommodate efficiency and social value against redistribution of income and de/merits goods produced due to the Programme.

Production factors

Production factors i.e., land, labour and capital, in CF are discussed to understand major factors by ecological regions and to enhance productivity and maximize the return. The paper outlines on the limiting factors to decide the best production strategy among the available options by ecological regions. The paper considers forestry a suitable form of land-use only if the land to labour ratio is higher and cites it as a reason, why only the larger farmers having off-farm jobs are attracted towards the tree farming on farmland? Land to labour ratio is higher in the mountain area of the country, and for that reason the labour is considered as a limiting factor. In such areas introduction of NTFP (herbs/mushroom) and high land pasture management can contribute to increase production of community forests. Moreover, labour saving technology under such circumstances can substantially increase the production level. In the case of Community Forestry in the hilly areas of Nepal, both land and labour are not the constraints in the production function while capital can be a limiting factor. The paper explores the possibility of mechanization and capital subsidy to increase the productivity of forests in such areas. However, lack of capital has compelled management of Community Forestry to remain at passive scale. The passive management has not only reduced the sustained supply of forest products but also adversely affected equity with no change in pattern of income distribution.

Distribution aspects

The paper also raises difficult question grilling the policy makers regarding the distributional weight. It suggests ways to determine numeracies through marginal income tax, weight postulated by decision-maker and past government decisions.

Another equally important question in regard to Community Forestry is, 'Who receives benefits of the Programme?' A specification that needs to be added to the numeracies as the government is seriously interested in an equitable distribution of income that may not be achieved through taxation and subsidy policy. The additional income gained or lost within the society needs to be measured for assessing the impact of any development initiative in local economy. The gains and losses are assumed here to be equal to the distortion between shadow and market payments to each input or output in the case of forest resource or the distortions between price paid and value received in financial transactions. In order to assess the impact of the Programme, the difference between the shadow and market price of inputs and outputs are considered. For example, the distortion between shadow and market wage is considered as the impact of Community Forestry on wage earner's income. The paper also highlights on the impact of community forestry on income distribution and its significance particularly on reducing the 'poor –rich' gap. The paper also emphasizes on the need to undertake such analysis on regional basis through the sub-groups. As the country reels under Maoist uprising, income distribution among the rich and poor households within a specific region (most affected region: the

Mid-Western) can also be of considerable concern. An efficient way of handling income distribution in the appraisal of Community Forestry can be the identification of "basic or subsistence needs" of targeted group and application of a suitable "adjustment premium".

Well being: Societal perspective

In this section, the paper sheds light on marginal utility of income and pattern of consumption in Community Forestry. Some households may suffer loss due to no access or restricted grazing under Community Forestry. While others may gain from increased availability of forest products. Will there be a net loss for the society if compensation does not take place? As the households are heterogeneous in income levels, the marginal utility of income of the gain or loss can make poor yet poorer. It becomes dubious for a researcher: whether to use distribution weight or the marginal utility to internalise such situations.

A more convenient term is 'base level of consumption', an income level equal in value to the government income. At this level government income can be added directly to appropriately valued income from the Community Forestry without further adjustment. For income going to those groups that are below the base level, the adjustment factor should be positive. The groups have higher value for such income and usually use it for generating collective goods/services such as road, culvert and teacher's salary. While the adjustment premium for the income going to the higher income groups should be negative, as the income will be mostly subjected to mis-use and corruption.

A fair distribution of benefit from Community Forestry is a prerequisite for the sustainability of the Programme while the seclusion threatens its institutional and ecological sustainability. Moreover inequality in a non-egalitarian society is aggravated if the linkage of Community Forestry with the poorest of the poor households is not strengthened.

Conclusion and Reflection

Ensuring equity in the Community Forestry is critical not only for achieving social justice but also for ensuring the success of the Programme. Adequate representation of the poor, women and disadvantaged on the executive committee and their effective participation is a must for enhanced equity.

The arrangement of equal benefit sharing marginalizes the poor and disadvantaged people due to unequal ownership of private resource endowment. Therefore, Programmes such as Pro-Poor Community Forestry and provisions, directly benefiting the poor and disadvantaged households, have to be devised.

An insight on production functions is essential to understand management-related issues in Forestry. Moreover, knowledge of limiting factor is important in any production function because it opens avenues for enhancing productivity and maximizing return. It applies in management field where production can be increased by maximizing the returns to the factors i.e., land, labour and capital. However, we have to get insights on limiting factors for deciding the best production strategy among the available options. A low ratio of land /labour puts land as limiting factor – as in the case of the plain areas of Nepal yield increasing technology will increase productivity. Handing over of forest resource alone may not contribute to enhance production and reduce consumption in such areas. However, we believe that leasing or handing over land alone may not be an appropriate option in hilly and mountain areas because capital and labour are the main limiting factors in production and distribution.

Hence, any policy decision towards relaxing hurdles in handing over of national forests as community forests can effectively increase the productivity of forests in the plain areas of Nepal. However, in the hilly and mountain areas, the hand over should be accompanied with subsidized capital and labour saving technology respectively. Then only Community Forestry in hills and mountain areas can contribute to increase productivity of the forest resource.

Nepal Government should impose taxes in Community Forestry (preferably of progressive types that increases with income level) only in areas with above base level of consumption. Moreover, Government should exempt subsistence forestry from taxes with a consideration that additional income going to the households of communities at the base level of consumption is more valuable than the additional income going to the central treasury itself.

Policy guidelines towards inclusion of poorer sections of society in CF process should be in place for wider inclusion while monitoring and implementation at the group level should stress on the need of assessing the impact of Community Forestry on non-members (excluded people) from a broader societal point of view.

Way Forward

Community Forestry with its complementary Pro-poor programme can effectively target the poorest of the poor section of the society. The strategy is to allocate part of the community forests to the sub-groups of poorest households with package comprising of skill development and capital support. It can be an effective instrument for ensuring equity in the Programme. Nevertheless, there should be serious research on mentioned aspects rather than a bandwagon on equity issues even without a slightest consideration on what equity means in the domain of development discourse

Ecological and economic transformation of Forests in Nepal: a case study from eight community forests of central Nepal

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Abstract

The study was conducted in eight community forests of Kavrepalanchok district in Nepal. The main aim of the study was to assess impacts of transformation on ecological and economic aspects of forest. The community forests were selected by the expert judgment under the given selection criteria. All the forests were categorized in the four substructures: ***pure pine****,* ***species enrichment, structuring*** *and* ***continuous forest c****over. Biophysical data (tree height, diameter, species, soil type and nutrient, etc) were collected from the nested forest plot laid inside each substructure whereas social data were gathered from the structured questionnaire survey and key informant survey.*

Forest structures such as height distribution, diameter at breast height distribution, volume, basal area, biomass, carbon, density, species diversity, soil nutrients were analyzed and shown in different charts and diagram. Similarly, social data was also analyzed based on benefit cost ratio that helps determine the efficiency of Community forest management and comparing them.

There was wide variation in biophysical variables (volume, biomass, density, carbon etc) among the sub-structures. Most of the variables were high in sub-structure IV while minimum in sub-structure II. Both height and diameter distribution followed normal distribution to inverse-j shaped curve along with the transformation process. Some variable such as seedling/sapling density, tree diversity, seedling/sapling diversity had linear relationship with successive sub-structures while other had not (such as volume, tree density, basal area, above ground carbon, above ground biomass, soil carbon). Monetary value of forest products in each sub-structures based on government tax and local market price was varied widely. Moreover, benefit cost ration was more than one in all sub-structures except 2nd. Among four sub-structures, no one seems to be solely superior to all based on the computed variables. Relatively, continuous cover forest (4th sub-structure) is structurally sound than others because most of the variables are high. Choice of sub-structures depends on the objectives of forest management. However, continuous cover forest is able to ensure both ecological stability and economic sustainability of forest. In the context of Nepal, community based management is undoubtedly focused towards transforming prevailing monoculture forest into continuous canopy cover forest to guarantee ecological and economical sustainability of the forest.

Introduction

Monoculture plantation forests represent positive contribution towards the land degradation problem, but there is concern that the biodiversity value is under-estimated. Both the plantation and continuous forests do have advantages and disadvantages. While some of the issues of pure and mixed species stands remained inconclusive (Jactel et al., 2002), there is a growing concern on the sustainability of planted forests (Powers, 1999). Mixed forests are assumed to be ecologically more stable and resilient (Gartner and Reif, 2004; Jactel, 2009; Chauvat et al., 2011). Management of mixed forests by increasing tree species diversity and vertical stand structure with different age classes and strata coexisting within a given stand is one popular management strategies to fulfill the demands of multi-functional forestry (Chauvat et al., 2011). Transformation is the process of changing forest stand structure from a regular to an irregular structure characterized by different age and species (Malcolm et al., 2001). The study was conducted in eight community forests of Kavrepalanchok district in

Nepal. The main aim of the study was to assess impacts of transformation on ecological and economic aspects of forest. The community forests were selected by the expert judgment under the given selection criteria. All the forests were categorized in the four substructures: pure pine, species enrichment, structuring and continuous forest cover. Biophysical data (tree height, diameter, species, soil type and nutrient, etc) were collected from the nested forest plot laid inside each substructure whereas social data were gathered from the structured questionnaire survey and key informant survey.

Method and Materials

Kavrepalanchowk district lies in east-south from the Capital city (Kathmandu) of Nepal. Few decades ago, most of the land of this district was in a degraded condition. To restore degraded land, the district was then heavily planted with Pine (Pinus Roxburghii) sps with the financial support of Australian Government. This pine has become by far the most widely planted tree species to restore the degraded forest lands in Nepal. FAO has also reported that Tropical forest plantations are dominated by Pinus and Eucalyptus species (FAO, 2005). The potential distribution of pine in Kavrepalanchowk district is shown in Fig.ure 1.

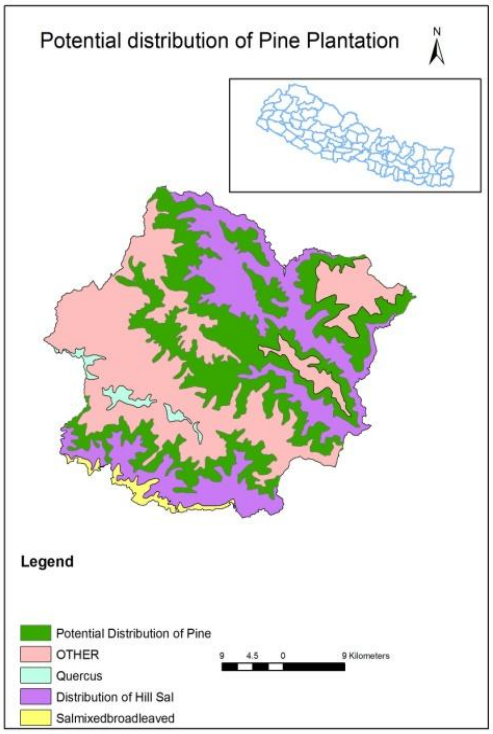

Figure 1: Potential sites for pine distribution in Kavrepalanchowk

Site selection process

During site selection, secondary source like reports, maps were studied. Elevation map of the district was overlaid on the forest cover map of the Kaverpalanchowk district in order to know the distribution of pine forest. Similarly, series of consultation with district forest officials was done. It was impossible to find all the study sites having exactly homogeneous condition. Finally four sub-structures of forest, having similar climatic and topographic conditions, in eight CFs (2 CFs having one sub-structure) were selected for this study (Table 1).

The sub structure of forest was identified under certain criteria as follows.

- Pure even-aged single storey Pinus (plantation or heavily degraded pine forest only with few remnants) with no other species (Sub-Structure I),
- Pinus dominated plantation stand at above-storey with few other species at under-storey of a two strata stand (Sub-Structure II),
- Pinus dominated with mixed layer of other species consisting of two to three storey forest stand (Sub-Structure III) and
- Continuous forests of Pinus and other species forming multi-storey forest stand of several distinct classes (Sub-Structure IV).

Table 1: Sub-structure wise selected Community Forests and its general characteristics

Sub Structure	CF	Forest type	Slope (%)	Aspect	Altitude (m)	Plot Location
I	*Deurali CF*	Pine forest	20	SW	1580	Upper hill
	Bhuteko CF	Pine forest	25	SW	1450	Middle hill
II	*Chaleswori CF*	Pine dominated	30	ES	1535	Middle hill
	Palekoban CF	Pine dominated	35	ES	1520	Middle hill
III	*Swargia Human CF*	Mixed forest	30	SW	1530	Middle hill
	Basuki CF	Mixed forest	25	SW		Middle hill
IV	*Dhaneswari CF*	Broad leaved dominated	30	SW	1486	Middle hill
	Dhansingretimure CF	Broad leaved dominated	40	SW	1528	Lower hill

Inventory Design for Biphysical data

A square plot of 50m X 50m in cardinal direction was laid out using vertex and compass in each CF for forest inventory. Altogether two plots were employed for each sub structure. Within the plot, all the trees having DBH >5 cm were taken into measurement. Tree variables such as diameter at breast height (DBH), height and species; and plot variables such as slope, altitude, aspect, topography were recorded. Diameter tape and Vertex were used for recording DBH and height of the trees respectively. During the measurement, white chalks were used to mark the trees once measured to ensure that no trees would get omitted.

However, seedlings (<1.3m height) and saplings (DBH <5.0cm and height >1.3m) were counted in the nested plot of size 2m X 2m located at the four corners of the outer plot. For soil sample collection, a soil pit was made at the cardinal direction from the centre. Soil sample was taken and weighed from three different soil layers i.e. 0-10 cm, 10-20 and 20-30 cm with the help of corer and weighing machine. Lastly, wood debris (pencil size to <5cm diameter branch fragments) and loose litter were also collected and weighed from four cardinal sub-plots located at 15 m apart from the centre, using a circle of 56.4 cm radius (area= 1 m^2). The plot design for the forest inventory as follows:

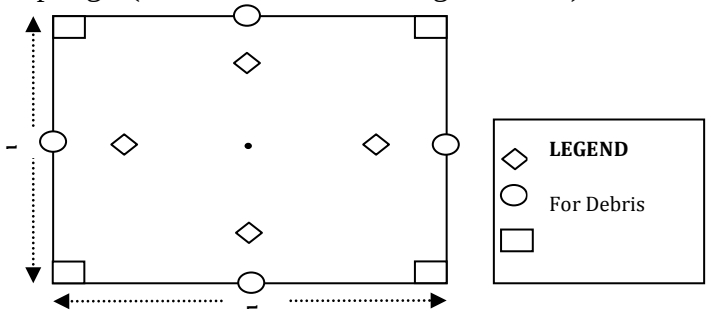

Figure 2: Plot design used in forest inventory

Socio-economic data

Structured questionnaires were used for household survey to assess socio-economic impact of forest during transformation process. All the households (belonging to community forest user group) were stratified into three groups based on distance from the forest (i.e. < 1km, 1 km - 2 km and >2 km). In each CF user group, 75 households were selected systematically with random start. Altogether 600 households were surveyed. Similarly, key informant survey was also carried out in each CF user group. Basically, committee members of CF user group committee were involved in this survey. A check list was used for this purpose.

Valuation of timber, branch and foliage

Valuation (in terms of monetary value) of timber was done on the basis of government norms (Forest Regulation, 1995). In this regulation, volume of timber in cubic feet (cft) is the basic unit to value it. Similarly, valuation of branch and foliage was also done on the basis of local market price. It is easy to convert biomass of branch and foliage in terms of *Bhari*. One *bhari* equals to 40 kg. This unit is normally used in preparing forest operational plan of community forest in Nepal. After converting it into monetary terms, it was put into the tabular form showing that how it varied in different sub-structure

Benefits of CF management

In general, benefits of CF management are multifaceted. Most of them do not have monetary value such as regulatory services and cultural services generated from the conservation and management of CF. In this analysis, benefits from CF management were restricted to locally important forest products those were being used and collected by local forest users. Here, benefits were divided into two groups─ forest products and support from CFUG. As mentioned in forest products collection cost section, local forest user collects timber, fuelwood, fodder (foliage, grass), bedding material/leaf litter and Sal leaf. Among these products, timber, fuelwood and Sal leaf had market price as they were traded in local market, but bedding and fodder did not have market price. We estimated the price of fodder and bedding based on the time spent to collect these products. Another category of benefits was support from CFUG. Support may be in the form of providing forest products such as fuelwood for religious purpose, and timber for natural hazard victims.

Cost estimation: The costs associated with the time contribution of forest users were converted into monetary value using shadow value of wage rate.

Benefit estimation: Time value of forest products including fodder and bedding, in terms of benefits, is the conversion of the forest products collection time based on labour wage rate. The assumption of calculating benefits based on wage rate, not by shadow value of time as per in the cost estimation, is that if forest users had to buy forest products, the market rate would be at least the cost of collection, which would be calculated by wage rate.

Results and Discussion

8.1 Forest structure

Generally, diameter (dbh) distribution in even-aged (planted) forest follows normal distribution because the average diameter growth is similar. In the 1st sub-structure (monoculture pine plantation), the diameter distribution was found normal though not exactly normal. Heavy competition and high variation within site might be the reason for going slightly away from the normality. In the 2nd sub structure, the diameter of trees varied significantly. Before reaching this stage, some pine trees are removed to create canopy openings for the regenerations to come. Thus, the sub-structure includes large number of small trees compared to big trees resulting wide range of diameter class of trees within the sub-structure. Therefore, distribution of diameter goes away from normal distribution (non-normal) and tends to become inverse-J shaped curve. In the course of transformation process, 2nd sub-structure reaches to 3rd stage where there is presence of two or three clear vertical strata. In this case, previous seedling/sapling reaches to pole size and new seedling/sapling appears to come. As a result, tree density is accumulating towards the tree having smaller diameter. Therefore, diameter distribution is tending towards inverse-J shaped curve. In the last sub-structure, there is presence of all diameter class sized trees. But, the density of trees increases as diameter of trees decreases. Consequently, diameter distribution of trees become uneven-aged natural forest i.e. inverse-J shaped curve.

Similarly, height distribution followed normal distribution in 1st sub-structure as it happens in even-aged forest. Majority of trees were accumulated around the average height. As transformation process proceeded, height distribution tended towards inverse-J shaped curve in 2nd sub-structure due to the presence of many trees having smaller height compared to bigger height. Unlikely 1st and 2nd, the height distribution of 3rd sub-structures neither followed normal distribution nor inverse-J shaped curve. In this sub-structure, large numbers of stands (i.e. 71.12%) are under pole sized (dbh>10 to <=30 cm) and mean height of the stand of this sub-structure is significantly different (using t-test) between sapling and pole and; pole and tree. Mean height of the sub-structure is nearly equal to the mean height of the pole. Thus, majority of mean height is concentrated on pole-sized tree. High competition among the undergrowth attaining pole size could be a reason of following this type of curve. However, last sub-structure tended to follow inverse-J shaped curve. In this sub-structure, tree density increases as height class of the tree decreases. It justifies that the forest does have uneven-aged naturally regenerated trees.

Total stem volume went up and down at every successive stage (i.e. zig-zag trend). From 1st to 2nd sub-structure, it became considerably low as some of the pine trees were cut as a part of forest management. Surprisingly, it became high when reached to the 3rd because seedlings and saplings in the 2nd sub-structure started to become pole sized trees. But, stem volume went slightly down in the 4th sub-structure from the 3rd due to substantial decrease in mean diameter of tree (Table 3). It is clear that stem volume of tree depends on diameter and height of the tree. Within diameter and height, small change in diameter has significant effect in total stem volume.

Above ground biomass (AGB) accumulation started increasing from 2nd sub-structure until to the last sub-structure during the transformation process. However, it went down from 1st to 2nd sub-structure. The 2nd sub-structure was formed after removing some of the pine trees to make favorable condition for up-coming regeneration. This is a clear reason for bearing less

AGB in the 2nd sub-structure compared to the first. Afterwards, regenerations started growing and attained certain height to make the vertical stratum visible in the 3rd sub-structure. Similarly, growth of stands continued increasing until the last sub-structure. Unlikely to stem volume accumulation, AGB increased from 3rd to 4th sub-structure. This is due to the presence of large number of broad-leaved trees. Conifer tree has low branch to stem biomass ratio than the broadleaved tree due to its branching pattern (MPFS, 1988). Baral et al (2009) also reported higher above ground biomass in broadleaved forest compared to pine forest. However, equation used in their study estimates lower than the equation used in this study.

Similarly, above ground carbon (AGC) followed same trend like AGB in each successive sub-structures but only difference in the total amount. Since AGC has been calculated based on some portion (0.47 of AGB) of AGB, its distribution is proportional to AGB. Hence, it follows similar trend like AGB. However, SOC did not follow the trend like AGC. In the 1st sub-structure, it was found maximum followed by 2nd, 4th and 3rd. Reforestation was done three decades ago in the study area by *Pinus roxburghii* (as pioneer sps). Just before reforestation, the area was degraded and denuded. This pine sps has remained long time in the 1st sub-structure without human disturbance. Moreover, debris and litter collection was very low in pine forest because amount of debris and litter were found high in that forest. This could be reason that SOC was more in 1st sub-structure compared to others. But in the other sub-structures, removal of pine sps and lately presence of broadleaved sps coupled with removal of litter and debris could be reason of low amount of SOC. Forest floor carbon (FFC) was found maximum in 1st sub-structure and minimum in last sub-structure. Normally, Litter and debris extraction is high in broadleaved forest as per the need of local people compared to conifer forest. Baral and Katzensteiner (2009) reported 3.2 ton/ha litter extraction from broad leaved forest annually.

Tree density (number of trees/unit area) followed zig zag pattern. Trees were bigger in size but low in number in the 1st sub-structure which made this sub-structure to have the lowest density. In the 2nd sub- structure, density became considerably high due to the presence of large number small sized trees resulting from the removal of pine trees in the 1st sub-structure. However, the density became low in the 3rd sub-structure. The majority of trees were in the pole sized. High competition between seedling and saplings in the 2nd sub-structure to reach pole-sized trees could be a reason for decrease in density. Finally, tree density turned out to be maximum in 4th sub-structure. Large numbers of small sized trees were present in this sub-structure compared to big trees. Presence of all sized diameter class trees and following inverse-J shaped curve by these trees is the reason of having highest density among all. Similarly, density of seedling and sapling increased along the successive sub-structures. Once the canopy was opened in the 1st sub-structure, favorable condition was made for seedling/sapling to come out and it accelerated constantly till the last sub-structure.

Basal area was highest in 1st sub-structure and it became lowest immediately to the 2nd sub-structure. But it continuously increased from the 2nd till last sub-structure. It is a fact that basal area of trees per ha depends on both mean basal area of tree and number of trees (density). The product of mean basal area and density of trees determines the basal area per ha of the forest. In the 1st sub-structure, mean basal area of trees was highest though density was low. Oppositely, mean basal area of trees was lowest in the 2nd sub-structure though its density was high. From 2nd to 3rd sub-structure, basal area increased due to increase in mean basal area despite decrease in density. Similarly, basal area also increased in the last sub-structure and became almost equal to the 1st sub-structure because of presence of many trees despite small mean basal area .

Tree species diversity and seedling/sapling diversity (both Shannon and Simpson index) increased as transformation process continued. In the course of forest transforms from pine monoculture (planted pine) to continuous canopy cover forest (uneven-aged natural forest), some new species got conducive environment to grow and it resulted increase of both tree and seedling/sapling species diversity. Gartner and Keif (2004) also found increasing structural diversity in the transformation process in their study.

The ph value of soil in pine forest was higher than continuous canopy cover forest. It could be explained due to excessive removal of bases in base rich hardwood leaves during litter collection. Feigl (1989) also found similar result in his study in chir pine plantation forest in Jhikkukhola watershed. Carbon content and Macronutrients in soil had inverse relation with the depth of the soil. As depth increases, amount of carbon and macronutrients decreases. Presence of litter and debris is high in the top of the soil (forest floor). The amount of carbon and macronutrients in the litter/debris leaches slowly down to the soil. Therefore, it remains always high in the upper soil profile unless other disturbance occurred in the past such as soil erosion.

The range of transaction cost was between 12 percent and 54 percent of the total CF management cost. In other midd-hills part of Nepal, estimated transaction cost of CF management was 14%, 24% and 26% for rich, middle wealth and poor households (Adhikari and Lovett, 2006). Only three CFUGs ─ Basuki (sub-structure III), Paleko (sub-structure II) and Dhasingre timure (sub-structure IV) ─ had similar transaction costs compared to the CFUGs in other parts of Nepal. Therefore, transaction cost does have linear relationship with successive sub-structures and in turn total cost does it. The relationship between sub-structures and total cost might depend on demographic characteristics of CFUGs and effective implementation of operational forest plan. This could be the reason that total cost varied according to sub-structures. Total benefit from successive sub-structures was increasing in nature. Basically, forest users received benefits from Community forest in terms of forest products. Benefit from FUG support (other than forest products). During the transformation process, diversification of forest products gets higher due to increase in species diversity. As a result, it helps increase in getting total benefits from the forest. The benefit-cost ratio didn't follow linear trend with successive structure. It was more than one in all sub-structures except in sub-structure II. It means that CFUGs has allocated their forest resources efficiently. However, CFUGs in sub-structure III had the highest CBR followed by 4^{th}, 1st and 2^{nd} respectively. The difference in BC ratio among the different sub-structures might be due to how actively people get involved in forest management activities, their demographic characteristics and forest conditions.

Diversity indices of trees varied in each successive sub-structure suggesting that the species diversity was different in different sub-structure. Simpson index was found to be decreasing as transformation of forest passed through 1^{st} sub-structure until the last sub-structure. Oppositely, Shannon index was found to be increasing in the entire transformation process. Both the indices came into same result and thus confirmed that species diversity increased along the forest transformation. Similarly, diversity indices of seedling and saplings were also found different in each sub-structure. Simpson index was found decreasing while Shannon index was found increasing at each successive sub-structure. Both indices showed that the diversity of seedlings and saplings increased in the transformation process.

8.2 Economical transformation

Valuation of tree *(stem, branch and foliage)*: There was wide variation in stem volume price in different sub-structures. The price of stem volume started from $2853 to $4335/ ha. The price of stem volume was based on government tax and its market price would be many folds high. Total price of the stem volume of the trees was found maximum in 3rd sub structure and was followed by 1st, 4th and 2nd respectively table 2.

Table: 2 Valuation of timber in monetary term based on the government tax

S.S	Species	Volume (m^3)	Volume (Cft)	Price/cft (NRs)	Total price ($)	Total price/sub structure ($)
I	*Pinus Roxburghi*	205.48	7256.32	50	3943.65	**3943.65**
II	*Pinus Roxburghi*	139.56	4928.42	50	2678.49	**2853.33**
	Schima wallichi	9.11	321.71	50	174.84	
III	*Pinus Roxburghi*	208.65	7368.26	50	4004.49	**4335.44**
	Schima wallichi	17.23	608.46	50	330.68	
	Fraxinus floribunda	0.0176	0.621	40	0.27	
IV	*Pinus Roxburghii*	72.42	2557.43	50	1389.91	**3797.57**
	Schima wallichi	38.74	1368.06	50	743.51	
	Alnus nepalensis	82.75	2922.23	40	1270.53	
	Syzygium cumini	0.576	20.34	110	24.32	
	Others	24.053	849.40	40	369.30	

Note: 1$ ~ 92 NRs

S.S= Sub-Structure

Similarly, price of branch and foliage (other than stem) also varied in different structures ranging from $328 to $1001/ha. Price was fixed based on weight of the biomass of branch and foliage. Locally, it is valued as "*Bhari*" that equals to 40 kg. Total price of the branch and foliage was found maximum in 4th sub-structure followed by 3rd, 1st, and 2nd.

Table 3: Valuation of fuel-wood and fodder in monetary term based on local market price

S.S	Total weight (Ton)		Total weight (Bhari)		Price/Bhari (NRs)		Total Price ($)
	Fuel-wood (ton)	*Fodder* (ton)	*Fuel-wood* (Bhari)	*Fodder* (Bhari)	*Fuel-wood* (NRs)	*Fodder* (NRs)	
I	32.01	8.58	800.46	214.73	50	10	**458.37**
II	22.70	7.46	567.63	186.51	50	10	**328.77**
III	36.74	9.40	918.72	235.04	50	10	**524.85**
IV	71.53	10.87	1788.49	271.86	50	10	**1001.55**

Note: 1 Bhari = 40 Kg

Estimated cost of CF management: The estimated cost of CF management is reported in Table 7. The table depicts that forest product collection cost dominates the CF management cost followed by transaction cost. The range of transaction cost was between 12 percent and 54 percent of the total CF management cost. Low level of forest management cost supports the critiques of CF approach that management of CF mainly concentrated on social issues compared to scientific management of forest. However, both CFUGs in sub-structure-I have higher transaction costs; we didn't see discrimination in cost distribution by the sub-structure of CFUGs.

Forest users receive benefits from CF management in terms of forest products. Only three CFUGs provided support to their users. Support in Basuki from sub-structure III was very tiny, which shared only 0.34 percent of the total benefits from CF management. In two CFUGs, which provided support to their users were from sub-structure I, forest users received considerable amount of support as benefits. Unlike other rural parts, where fuelwood, pole and fodder are major forest products harvested by local communities from communal tress management (Gausset et al., 2007), here, bedding material/ litter are the major benefits from CF.

In this estimation, we assumed that costs and benefits throughout the period remained same. However, there was change in cash flow particularly in costs. For instance, farmers replaces knife in every three years, hence, purchasing cost of knife was added in every three year. Similarly, operational plan preparation cost borne by CFUG in every five year. Table 5 reports annual cost and NPV of the costs of CF management for a five-year period by sub-structure. The estimated cost showed that cost per hectare forest and per household increased with the sub-structure of forest. This indicates that forest users have more input in the higher sub-structure compared to the lower sub-structure (see table 4).

Table 4: Annual costs and Net Present value of the CF management Cost (NRs)

Sub-structure	Year 1	Year 2	Year 3	Year 4	Year 5	NPV cost	Cost/ ha	Cost/ hh
I	584,532	539,833	539,833	545,532	539,833	2,300,009	17,813	3,802
II	963,347	957,814	957,814	960,763	957,814	4,001,704	46,941	6,603
III	853,002	817,701	817,701	818,502	817,701	3,445,607	85,393	15,382
IV	1,378,259	1,333,711	1,333,711	1,338,259	1,333,711	5,609,359	134,131	21,742

Annual benefit of CF management was estimated assuming constant benefits flow throughout the operational plan implementation period. This is because CF operational plan recommends constant amount of annual allowable harvest for the period of the plan. Like estimated costs, the estimated benefits also indicate that benefits per household and per hectare of forest increase with the sub-structure. This also implies that forest users produce benefits based on their inputs. Detail benefits estimation is reported in Annex IV (table 5).

Table 5: Annual benefits, net present value of the CF management benefits (NRs)

Sub-structure	Year 1	Year 2	Year 3	Year 4	Year 5	NPV Benefits	benefit/ ha	benefit/ hh	BCR
I	585,888	585,888	585,888	585,888	585,888	2,443,072	18,921	4,038	1.06
II	920,525	920,525	920,525	920,525	920,525	3,838,467	45,026	6,334	0.95
III	1,274,497	1,274,497	1,274,497	1,274,497	1,274,497	5,314,479	131,710	23,725	1.54
IV	1,744,905	1,744,905	1,744,905	1,744,905	1,744,905	7,276,021	173,984	28,202	1.29

Afterwards, benefit-cost ratio (BCR) was estimated of each CFUG to compare their performance in financial terms . The Higher the ratio better the CF management program. In general, benefit-cost ratio higher than 1 indicates CF management is good. The benefit-cost ratio calculation indicates that CFUGs in all sub-structures except in sub-structure II have the ratio more than 1, which means that these CFUGs allocate resources efficiently. CFUGs in sub-structure III have the highest BCR.

We re-estimated the NPV of costs and compared with the NPV of benefits . The estimated NPV of costs indicate that under this scenario, calculated monetary value of time based on market wage rate, there is no clear trend of increasing cost with the level of sub-structure. For instance, sub-structure II has higher cost compared to sub-structure III (see table 6). In all sub-structures, BCR is lower than 1 indicating that in full employment condition or if forest

forestry activities and meeting are carried out in agricultural period when people engaged fully, the CF program would be inefficient.

Table 6: NPV of benefits and costs, and benefit-cost ratio under Market wage rate

Sub-structure	NPV Benefits	NPV costs	BCR
I	2,443,072	4,679,889	0.52
II	3,838,467	8,061,586	0.48
III	5,314,479	7,119,418	0.75
IV	7,276,021	11,702,862	0.62

Conclusion

Forest structural changes (volume, height, dbh etc.) from one sub-structure to successive sub-structure vary both direction (ascending and descending order) and quantity (value). Height and diameter distribution of trees follow same trend passing from initial stage to final stage of sub-structures. Similarly, AGB, AGC and Basal area; species diversity of tree and seedling/sapling have same trend throughout the process. However, tree density, seedling/sapling density, soil carbon and stem volume follow different trends.

Among four sub-structures, no one seems to be solely superior to all based on the computed variables. Relatively, continuous cover forest (4th sub-structure) is structurally sound than others because most of the variables are high. Apart from this, it is more profitable to use multiple products (fuel wood, fodder, leaf litter).

Choice of sub-structures depends on the objectives of forest management. If the objective is to get timber or resin, obviously pure pine plantation (1st sub-structure) is most preferable. At the same time, there will be questions regarding stability of the forest and resilience of forest. Continuous cover forest is able to answer these questions. It does not only provide ecological stability of forest but also ensure economic sustainability of forest by providing diverse forest products.

In mid hills of Nepal, the main objective of forest management (community based management) is to fulfill the basic need (multiple products need) of people without deteriorating forest condition. Directly or indirectly, it focuses to transform prevailing monoculture forest into continuous canopy cover forest to guarantee ecological and economical sustainability of the forest.

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Social and Ecological Synergy: Two success stories of Community Forest Management programs in Puttalam district of Sri Lanka.

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Abstract

Before Community Forestry Management (CFM) program implemented in Sri Lanka, there were several participatory projects. Due to insecure land tenure, mistrust of local communities and lack of legal guarantee, those projects were not embraced by rural people of Sri Lanka. However, introducing of new regulations on community forest management, local communities receive the access right to government controlled forest area. Moreover, the CFM approach is accepted by the government as the national model to expand in all forest area in Sri Lanka. Mahahenyaya and Thalavilamodarawella two different scenarios, which are exemplary for successful stories in Community, forest management in Sri Lanka. In Mahahenyaya, there have been well-defined managements and benefit sharing arrangements in Agro forestry that show for increasing income at the village level potentially. As well communities in Thalavilamodarawella implement the eco-tourism project, but without the well defined benefit-sharing arrangement. Generally, it can be concluded that CFM program delivers multiple benefits and tangible incentives to the local people in both sites.

Keywords: Community Forest, benefit sharing, Governance, Ecotourism, Agro forestry

Background

As human societies have been developed, moreover having their conceptualization and usage of forests. Forests were historically used as extraction plots. In recent decades, forests around the world have been transformed from being solely used for timber or pulp to provide a plethora of resources to societies. These range from tangible products like fruits, medicinal plants, and firewood to more broadly understood social assets such as watershed benefits, conservation of biodiversity, and carbon sequestration and storage (FAO, 2011). The interaction between humans and forests, as it becomes more complex, also yields new challenges for forest management.

Effective conservation of forest areas is a very difficult task with the existence of pressures on forest resources by surrounding community in Sri Lanka (De Zoyza, 2001). The opportunity cost of conserving 10000 hectares of forest per annum was Rs45 million in 1986 (Pushparajah, 1986). Therefore, the conservation forestry programs have been recognized the importance of local community involvement and consultation in the process of planning and decision-making (Bandarathilleke, 1991).

As well, this transformation of forest use has been seen in Sri Lanka. National forest policy of Sri Lanka has been changed several occasions since the promulgation of first forest policy in 1929. The Forest policy promulgated in 1980 emphasized the great need for sustainable management of forest resources to supply timber and fuel wood and in the involvement of local communities in the development of private woodlots and forest farms through a programme of social forestry (Nanayakkara 1982). Moreover, a new forest policy drafted in 1995 promotes the formation of partnerships with local people, rural communities and other

stakeholders where appropriate (FAO and FD 2009). In the last two decades several projects have been undertaken with regard to participatory approaches for management of forest resource in Sri Lanka. However, earlier project-based that was introduced either community forestry or participatory forestry was based on woodlots, rather than natural forest, and had a limited participatory approach (Hunt et al. 2006).

However, in Sri Lanka, decentralized forest management is promoted as a route to the forest resource conservation and poverty alleviation in Sri Lanka from 2003 with the help of Sri Lanka, Australia Natural Resource Management Project (SLANRMP), which concluded in January 2009 (Dangal and De Silva, 2006). It was based on previous experiences in Nepal. After that, this modal becomes an accepted strategy of Forest department of Sri Lanka. The interest in using "participatory" approaches for forest management and development has also been increased as limited government resources to manage forests, unable to stop encroachment & illegal harvesting, examples of successful "traditional" systems, community "ownership" leads to be improved management and so on (Dangal and De Silva, 2009).

Present status of Community Forest Management in Sri Lanka

SLANRMP was implemented in five districts namely, Anuradhapura, Kurunegala, Matale, Monaragala, and Puttalam. These districts belong to dry and intermediate zones of Sri Lanka where deforestation and forest degradation are mainly being occurred due to the shifting cultivation. Based on the success of SLANRMP, "Community Forestry Programme (CFP)" funded by the Government of Australia has been implemented where SLANRMP was implemented, and expanded into 10 new districts including conflict affected North and East since 2012 as illustrated on figure 1.

Table 1. Existing and proposed community forestry sites.

	SLANRMP 2002-8	Forest Dept 2007-9	Expansion 2011-16	Cumulative Total
Number of districts	5	9	15	15
Number of sites	55	24	167	241
Area of forest (ha)	7,388	4,255	23,000	34,000
Participating households	3,719	1,680	10,000	15,000
Total beneficiaries	37,000	13,000	90,000	140,000

Source : UNDP, 2011

Table 1 illustrates the figures of different community forestry activities that have been implemented since 2002 in Sri Lanka. 55 Community Based Organisations (CBOs) have been registered in dry and intermediate zones of Sri Lanka under the SLANRMP. In addition, 55 Community Forest Management Plans have been developed and approved, 55 CBOs have entered into 25 years agreement with the Forest Department (Dangal and De Silva, 2009). From these arrangements, 2,500 households are engaged in management of more than 7,000 hectares of forestland (Activity Completion Report 2008).

After the phase 1 of SLANRMP, approximately 4,000 hectares of degraded forest areas have been improved and nearly 13,000 community members have been supported by forest department (UNDP, 2011). About 167 new CFM sites have been established since 2011

under the financial support of Government of Australia, benefitting approximately 10,000 households with the overarching objective of reducing deforestation and forest degradation in the dry and intermediate zones.

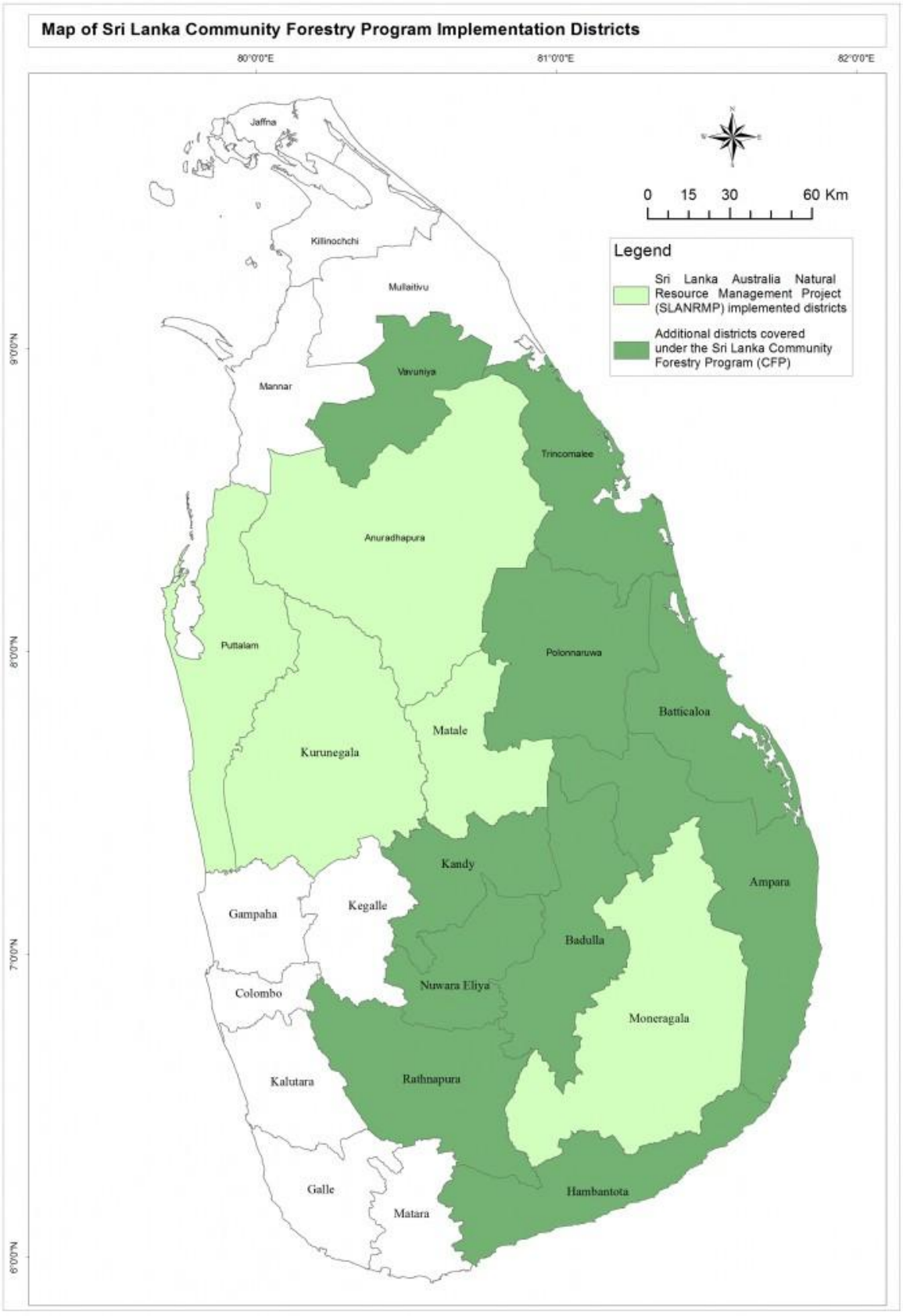

Figure 1. Map of Community Forestry Program implementation districts of Sri Lanka

Success stories on Community Forest Management In Sri Lanka

This paper focuses on two case studies in Puttalam district, which are situated near the west coast of Sri Lanka. A dry climate prevails in the area, where annual rainfall is 1000 -1100 mm and mean atmospheric temperature is 29-30 ^{0}C (Perera et al., 2013).

3.1 Thalavilamodarawella Community forestry project

The participatory forest management concept has not only been implemented in terrestrial areas in Sri Lanka. Currently, it has been implemented in five mangroves sites in Puttalam district. Out of these five, Thalavilamodarawella Community forestry project is exemplary site. This site is situated at Mahawewa Divisional secretariat area. The key approach of the project was to engage actively with the local communities in the management of Mangrove forest which extent is 229.048ha (Withana, 2014). This is a biodiversity rich place in west coast of Sri Lanka. Recorded mangrove species in site are *Rhizophora mucronata, Bruguiera gymnorhiza, Ceriops tagal, Sonneratia caseolaris, Sonneratia alba, Avicennia marina, Avicennia officinalis Aegiceras corniculatum, Acanthus ilicifolius, Excoecaria agallocha, , Acrostichum aureum, Lumnitzera racemosa.* Also this mangrove ecosystem provides essential spawning grounds for many spp of fish as well as increases the productivity of the lagoon fishery and off lagoon fishery. Before 1990, this mangroves area acts as fully functioning position. Due to the threatening by increased population pressure and industrial activities as well as unsustainable dependency on mangrove ecosystem, this area gradually becomes a " degraded mangrove" condition.

Local Community based organization (CBO) namely as "Santha Therasha" had reached for the legal contract agreement with the Forest Department for the management of 41.03 ha of forest area in 2008(Management Plan, 2008).

In total, the village has a population of over 2,095 people, with 334 households about 70% of them, which depends on fishing related activities. They are directly or indirectly reap the benefits of mangroves in the area (Management Plan, 2008).

3.2 Mahahenyaya Community forestry project

Mahahenyaya is situated in Karuwalagaswewa Divisional Secretariat area and adjacent to the Ipalogama forest reserve, which, extent is 2732.91ha. This forest is Dry Mixed Evergreen forest. No marked stratification is found in this ecosystem. It is comprised of species such as *Drypetes sepiaria* (wira), *Chloroxylon swietenia* (burutha), *Manilkara hexandra* (palu), *Berrya cordifolia* (halmilla), *Aleodaphne semecarpifolia* (wewarana), *Diospyros ebenum* (kaluwara), *Vitex altissima* (milla) and *Adina cordifolia* (kolon). These species are not uniformly distributed (IUCN Sri Lanka, 1999). Degraded forest is visible in this area.
Moreover, stem per hectare was recorded averagely low number due to several reasons such as manmade fire, illegal felling, and over-exploitation of non-timber forest products (NTFPs). Normally, this area has a dry period from May to September as well as temperatures go above 30^{0}C.Therefore, excessively frequent fires due to human activities degrade habitat quality and destroy forests. In 2011, community of Mahahenyaya and Forest department enter in to an agreement for the management of 150 ha of Ipalogama forest reserve. Land use of

adjacent forest comprises of thick forest 32%, sparse forest 40% grassland 17% and other 11%.

The communities with support from FD staff developed community Forestry Management Plan for the selected site. Village has 126 households with a total of 356 population. Agriculture is the major economic activity here and the account for about 70% of income for households (Management Plan, 2011).

Program activities

4.1 Thalavilamodarawella

Mangrove habitat's healthy condition of Thalawilamoderawella has been the reduction due to un-sustainable extraction of pole and firewood. This degradation causes to reduction of mangrove biodiversity as well as replenishing of fish population of lagoon fish industry. To arrest these causes, "Santha Therasha" community Based Organization (CBO) had taken several activities as follows.

Initially, CBO increases the public awareness to conserve the adjacent mangrove habitat and its unique biodiversity among the members. After that forest department, officials did the capacity building of CBO with regard to the mangrove ecosystem restoration. The main aim of restoration is removed stressors with regard to this area and the system of self-recovery. Due to this, mangrove habitat can be restored through natural regeneration. In addition, artificial restoration using planted 5000 seedlings was done. Apart from that a leading bank name as HSBC, sponsored to plant 2000 mangrove seedlings, displaying boards and a *theppama* which is a traditional small fishing craft used by fishermen for fishing by casting nets. In addition, as illustrated in table 2, several activities have been undertaken by CBO to the enhancement of living condition of villagers while conserving the mangrove. In addition to that, access to microfinance services through the relevant government institute, NGOs and private sector organization were facilitated by the forest department.

Table 2. Program activities of Thalavilamodarawella Community forestry project

Activity	Unit	2008	2009	2010	2011	2012	Beneficiaries	
							Female	Male
Enrichment planting with mangrove spp	Ha.	-	0.5	0.5	0.5	-	35	20
Home Garden development	No.	-	50	30	-	-	80 families	
Renovation of community building	No.	-	-	01	01	01	189	179
Income Generation Training	No. of programs	02	02	02	-	-	40	20
Poultry Mgt. Training		-	01	-	-	-	15	05
Leadership Training/Financial Mgt.		-	01	01	-	-	30	20

Further, CBO also initiate the ecotourism project in Thalavilamodarawella. Ecotourism is one of ecosystem services that out of twenty-four specific ecosystem services which were identified and assessed by the Millennium ecosystem assessment. Hence, this approach encourages the mangrove conservation and restoration effort among the community and exploration of payments for ecosystem services (PES) to generate incentives through conservation-based revenue streams for villagers. Forest department supplied boats and necessary knowledge relevant ecotourism activities. Currently, CBO maintains **a** bird watching hut and a summer hut located at Mangrove Island for tourist convenience.

4.2 Mahahenyaya

Frequency of forest fire is the main element to damage adjacent forest resource in Mahahenyaya in every year. Due to this, regeneration and pole-sized trees are destroyed. It emerges more questions of survival for saplings, which are threatened by cutting trees for building poles. Based on the approved management plan, the following forest conservation and management activities are being carried out by the CBO. Creating awareness in regard to the forest fire was done by CBO among the members. Firstly, villagers constructed and maintained the fuel breaking lines. Also, during dry seasons, community forest members are involved in regular patrolling to conserve the forest from fire, uncontrolled grazing and prevent illegal activities like encroachment, tree cutting, etc. Table 3 illustrates the activities that have undertaken from 2011 to 2013.

In Farmer Wood Lots (FWL) program communities were provided the land in FRU to plant trees under the 30 years lease agreements. Within a block of 37 hectares of degraded forestland, one-hectare plot was given to villagers. Farmers cultivate cash crops between teak trees (*Tectona grandis*) and they are entitled to the entire harvest from cash crops, user right of thinning, pruning, and 80% of final timber harvest. Rest of 20% of final timer harvest belongs to state.

Table 3. Program activities of Mahahenyaya Community forestry project

Activity	**Unit**	**2011**	**2012**	**2013**	**Beneficiaries**	
					Female	**Male**
Establishment of Farmers wood lots	ha.	25	12	-	5	20
Home Garden development	No.	-	50	-	48	50
Renovation of community building	No.	-	-	1	45	50
Irrigation reclamation	No.	-	-	1	25	20
Rural Road Development	km	-	-	1	110	135
Health Campaigns	No. of Program	-	-	1	190	150
Education Development program		-	-	1	23	17
Income Generation Training						
Sewing Cloth bags	No. of Program	-	-	1	11	-
Livestock Mgt.		-	-	1	2	6
Bee keeping Training		-	-	1	2	3
Poultry Mgt. Training		-	-	1	-	10
Leadership Training/Financial Mgt.		-	-	1	6	7

Impacts and Evidence

Accordingly, the effects of decentralized forest management should be assessed against the triple objectives of (i) forest conservation, (ii) improved rural livelihoods, and (iii) promotion of good governance (Lund and Treue, 2008). In the context of above-mentioned three objectives, both community forest projects have impacted on adjacent forests as well as livelihoods of villagers significantly where alternative situation if the community forestry projects had not been initiated. Consequences of the project, two forests in both villages have seen positive impacts on biodiversity landscape.

Due to lowering of incidence of forest fire as well as other form of forest disturbances in adjacent forest of Mahahenyaya , there is an increase in number of stems of native species in FRU indicating positive recruitments for the past few years. Moreover, according to the communities, local environmental conditions such as decrease of soil erosion within the forest, water availability in dry period especially during the June to the mid of September as well as raising the water volume in streams which flow through forest, increase of wildlife fauna and their abundance and forest greenery are visible impacts on forest ecosystem in Mahahenyaya.

Further, agro forestry program in Mahahenyaya is the result to reduce the need of deforestation because of chena cultivation. In addition, assigning the management of specific forest area in Ipologama forest reserve to CBO which has caused to control illegal felling and unsustainable harvesting of NTFPS.

Likewise, in Thalavilamodarawella, mangrove forest is recovered as mixed species forest. Profuse natural regeneration seems to be occurred. No incidence of cut poles freshly and withies are recorded after formation of CBO. According to the fishermen, there is evidence of increasing in the stock of fish, crabs. Now Thalavilamodarawella mangrove area is becoming nesting and migratory site for bird species. Overall, improvements of forest conditions of both sites are clearly observable with compare to adjacent forest.

The National forest policy in Sri Lanka emphasises tree growing on homesteads and other agro-forestry as main strategy to supply wood and other forest products to meet households and market needs (FSMP, 1995). According to some studies, home gardens have been identified as a significant source of timber and fuel wood (EAIP[10], 1998; Ariyadasa, 2002). It is estimated that the home gardens are the source for 41% of saw log production and 28%of the bio-fuel supply of Sri Lanka (FAO, 2009). Hence, both sites areas act important role in providing sources of timber.

Considering the impacts of community forest on livelihoods of local people, there are several livelihood benefits can be observed on both sites. The current benefits are in the form of Non Timber Forest products such as agricultural crops and fruits that have been grown under agro-forestry and environmental services such as water provision, biodiversity conservation, and recreation. Change in income level of direst beneficiaries and the change of serving level of communities are major evidence for the success of community forestry in both sites.

Selling environmental services like recreation brings benefit flowing to Thalavilamodarawella. At present the CBO in Thalavilamodarawella charges a fee from visitors, but so far there are no mechanisms to transfer part of these payments to Forest Department. According to the location of community forestry project, there is a good opportunity for villagers to have benefit from the expanding tourism in the area. Figure 2

illustrates the annual tourists' arrivals for recreation purposes such as bird watching, boat riding, photographing, and studying of biodiversity of mangrove ecosystem.

According to the observations of small- scale fisher folk in area, there is an evidence about the increase of income of small-scale fisher men due to the increase in catching fish and decrease efforts on fishing as a result of protection of mangrove areas, which are one of main grounds for small-scale fishing.

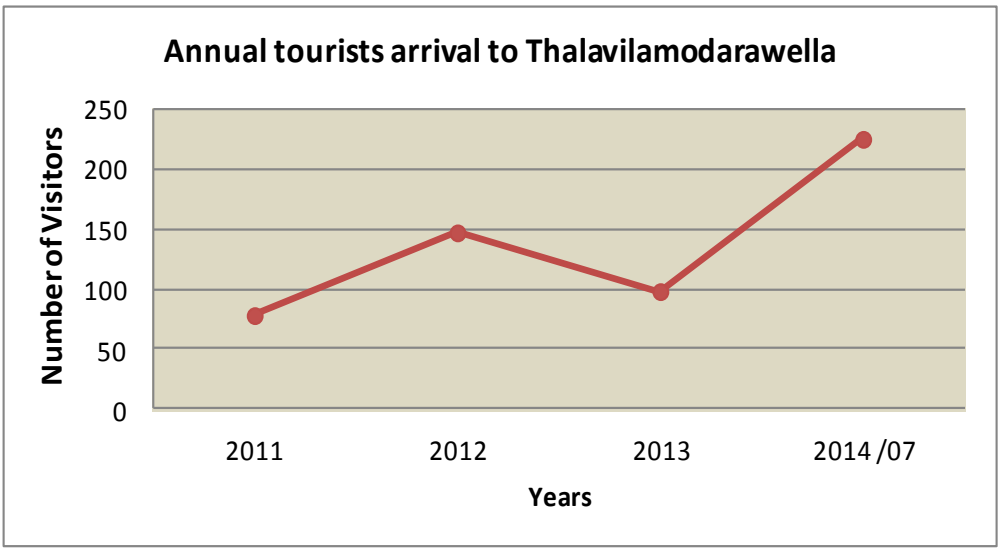

Figure 2: Tourist arrival statistic in Thalavilamodarawella

The communities involved in agro forestry woodlots program are allowed to harvest annual and bi-annual crops that are grown under teak as well as user right of harvest on thinning and pruning of teak. Benefit sharing of agro-forestry woodlots program would be 80% of final harvest of teak timber harvest goes to farmer while 20% goes to Forest Department.

According to the Farmers in Mahahenyaya, annual crops such as **Gingelly (*Sesamum indicum*), Finger Millets** (*Eleusine coracana*)**,** Groundnut (*Arachis hypogaea*) and Undu (Vigna mungo) are growing under agro forestry woodlots. Farmers selling their crop harvest earned averagely Rs 100,000 per hectare per annum. Hence, this is significant income flow to Mahahenyaya communities.

In both sites, communities received significant benefits by capacity building such as skill-development, co-ordinating livelihood support activities of different institutes. In addition, living standards of communities are improved due to physical capital such as road development, construction of community hall and water supply in Mahahenyaya and renovation of community hall in Thalavilamodarawella. Due to the saving of members of CBO in both sites, significant amount of funds have been accumulated. The trend of saving is illustrated in figure 3 and 4 after formation of CBOs in both sites. These funds are used for micro-credit particularly for small-scale enterprise development. According to the literature, social capital was a central feature of collective action (Sudtongkong & Webb, 2008). Formation of social capital causes to more effective co-operation in social problem solving. In addition, collective action of Thalavilamodarawella communities is the result to claim user rights to the mangrove resource as well as conservation actions. Also, this site received

external assistant such as HSBC fund due to demonstrate their power in the form of the group of action. Further formation of group action in Mahahenyaya causes to receive property right even for a limited period of time for the communities which is important for incentive on reforestation and sustainable land management.

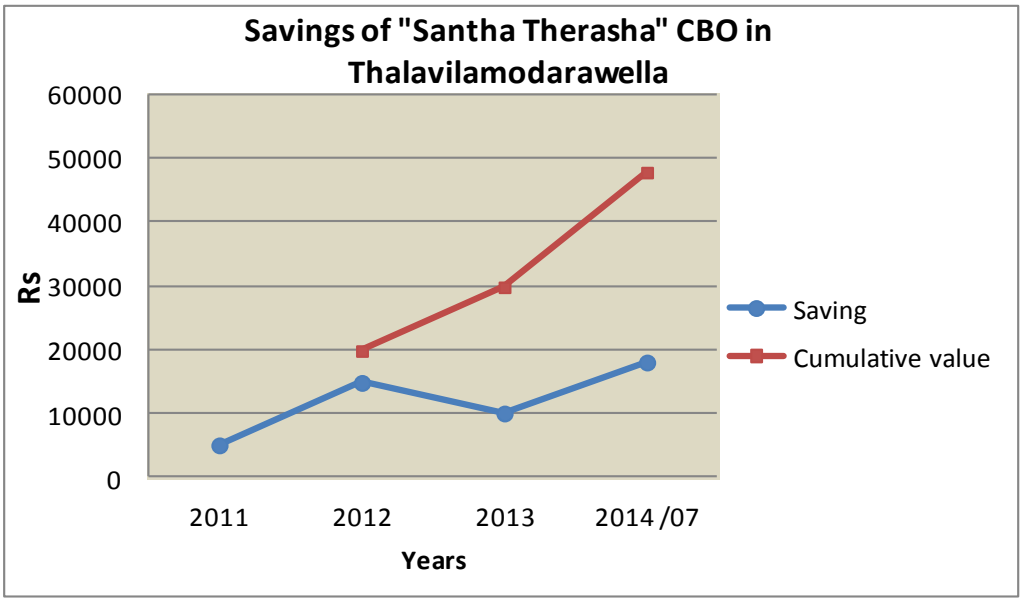

Figure 3: Saving level of CBO in Thalavilamodarawella

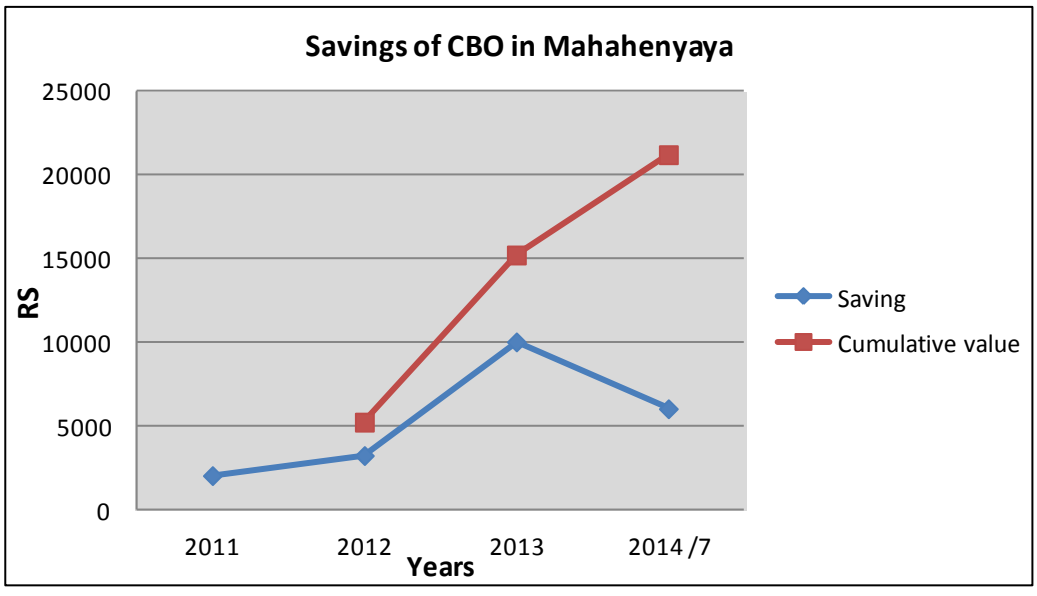

Figure 4: Saving level of CBO in Mahahenyaya

In the context of community forestry, forest governance enhances the capacity of forest dependent local communities to participate in meaningfully exercise their rights and represent their interests in forest related agenda-setting and management decision-making (De Zoysa and Inoue, 2008). Moreover, participation, accountability, predictability, and transparency of community forest management with equitable relations among government and all other

stakeholders are important factors with regard to the Forest governance (Menzies 2004; De Zoysa and Inoue, 2008). In both sites, similarity is observed with regard to above mentioned good governance attributes. Communities are active participation on village committees, monthly meetings, as well as general assembly meetings. as well as in effective decision making. No gender discrimination is recorded in elections and other related activities. Reports and records are especially on saving and revenues are available in both sites. In addition, there is a clear reporting system. Officials of CBOs are accountable to the general assembly. Furthermore, information dissemination is observable among CBO members. Ultimately, true community participation in forest governance is seen in these sites.

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