Progress Report

On

Public Land Agroforestry for Biodiversity Conservation, Livelihood Support and North-South Conflict Mitigation in Nepal Terai

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Abbreviations

AF	Agroforestry
CF	Community Forestry
CFUG	Community Forest User Group
CFUGEC	Community Forest User Group Executive Committee
DFO	Division Forest Office
EC	Executive Committee
FAO	Food and Agriculture Organization
FECOFUN	Federation of Community Forests Users Nepal
HHs	Households
LSU	Livestock Standard Unit
PLAF	Public land Agroforestry
PLMGs	Public Land Management Groups
PMC	Project Management Committee
UNDP	United Nations Development Programme

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Summary

The report presents the update on the accomplished activities, planned activities and learning's of the project on public Land Agroforestry (PLAF) for Biodiversity Conservation, Livelihood Support and North-South Conflict Mitigation in Nepal Terai. This study aims to introduce agroforestry technology to the users of the Community Forest (CF) to minimize the pressures on the forest, improve the local people's livelihoods, conserve the biological diversity and resolve the conflict between southern and northern forest users on forest resources distribution. It emphasized the positive effects that public land management can bring to the southern community from the Terai region of Nepal, far from the forest, near the Indian border. The study adopted participatory action research, adaptive learning processes and field-based activities, involving community forest user groups, and monitored and evaluated by the program management committee as a key methodological approach. It examined the socioeconomic and environmental benefits of agroforestry technology and also its challenges. Results show that agroforestry practices contribute to the livelihood of the forest users and conserves biodiversity. However, due to the lack of technical know-how, quality seeds and capital, some farmers are reluctant to adopt the new agroforestry practices. The users perceived that the provision of necessary training and subsidies, by establishing tree nurseries accessible to distant users to improve the production of quality seeds will increase agroforestry adoption. The learning and recommendations of the study are discussed.

1. Covid -19 and Project Context

The COVID -19 crises affecting the world at the level that goes beyond the capacity of any country. The COVID-19 pandemic in Nepal is part of the worldwide pandemic of coronavirus disease 2019. The first case in Nepal was confirmed on 23 January 2020. As of 6 January 2021, the Ministry of Health and Population (MoHP), Government of Nepal has confirmed a total of 263,193 cases, 256,161 recoveries, and 1,899 deaths in the country.

The continuity of project work was completely affected by the Covid-19 crisis. Due to complete lockdown from January 2020 to June 2020, the planned project works had to be entirely stopped. Even after loosening of the lockdown, the cases of infection were increasing therefore the field activities were difficult to continue. However, verbal communication with the Project Management Committee (PMC) and Community Forest User Groups (CFUG) executive committee on the possibility of starting the project activities was regularly done. The project communicated with the PMC and CFUG committee on distributing the seedlings to the users.

In this time of the pandemic, we are now planning to start with the remaining project activities following the safety measures as indicated by the government of Nepal. All the concern stakeholders will be strictly requested to follow the safety measures before participating in the project activities in the future.

2. Project Background

This project promotes agroforestry practices in public land for biodiversity conservation, livelihood support, and mitigation of north-south conflict on forest use. It will emphasize the positive effects that public land management can bring to the southern community from the Terai region of Nepal, far from the forest, near the Indian border. The project will use participatory action research, adaptive learning processes and field-based activities, involving community forest user groups, and be monitored and evaluated by program management committee. It includes discussion series, establishment of nursery, demonstration plot and formation of public land management groups and dissemination of community conservation efforts.

The project aims to increase awareness and preparedness of the southern community for PLAF development among poor, excluded, especially women; enhancing social cohesion, security, and social identity. The project will also empower communities through participatory learning, multiple discussions and motivate and prepare them for PLAF development and adoption. The participatory learning and reflections will be documented and shared through meetings, general assembly, local and national media. The project aims to establish PLAF as the sustainable means to support forest resource needs of southern people and to aid north-south conflict management. It will also increase the institutional capacity and scope of CFUGs.

The project area covers Chisapani Community Forest User Group in Bardaghat Municipality of Nawalparasi District; the flat lowland Terai region of western Nepal (Figure 1). The Chisapani CFUG was registered in 2009 with 3,350 household and 495 hectares of forest including the distant users (60% of total households) up to 20 km south to the Indian border. The CFUG

comprise of seven wards in Bardaghat Municipality. Similarly, the study area lies in the Chure region which the government has declared as the ecologically fragile and threatened area (Chure Board, 2016). The project will directly contribute to the conservation of Chure forest through the development of agroforestry outside the forest, increasing the biodiversity in barren southern flat plans and decreasing conflict and pressure on Chure forests.

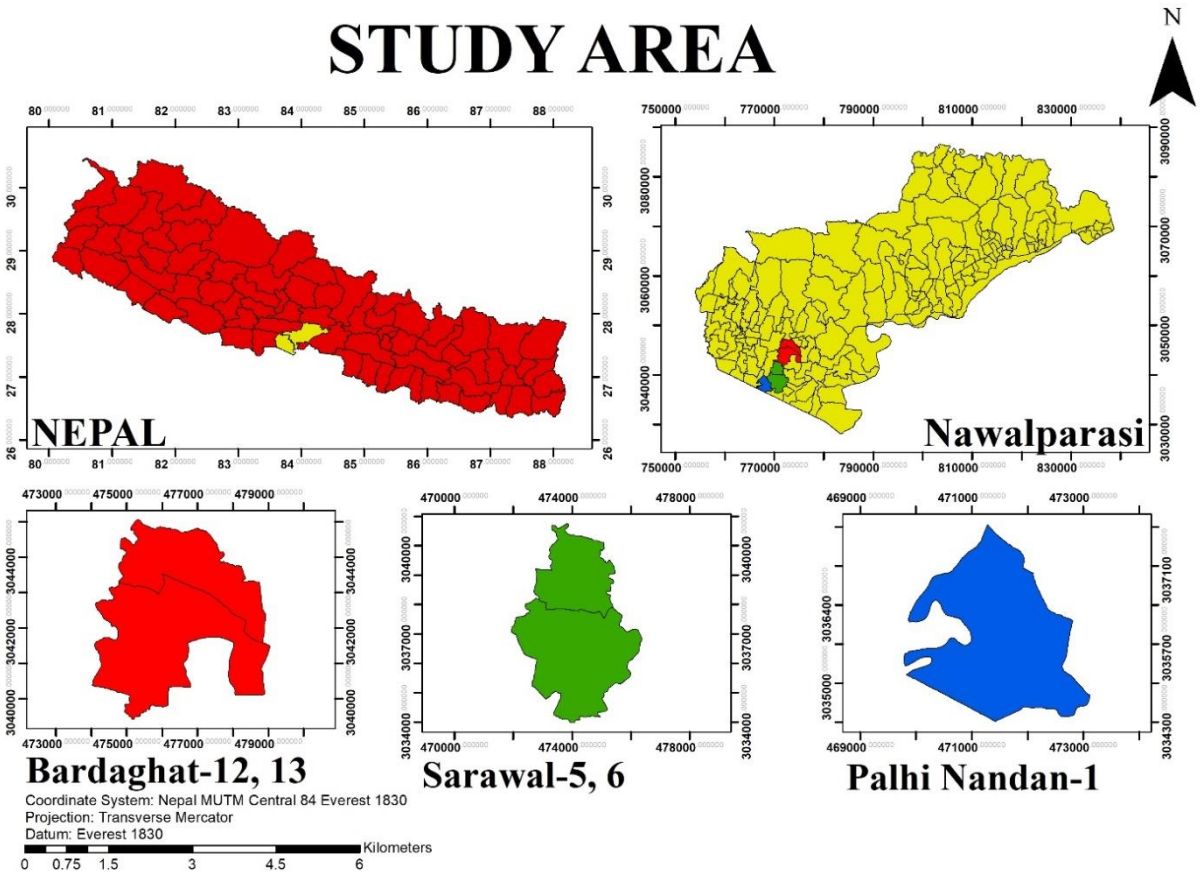

Figure 1: Map of study area

3. Description of Accomplished Activities

3.1 Formation of Project Management Committee (PMC):

The PMC was formed in January 2020. The nine member PMC comprised of the executive committee members of Chisapani CFUG including the member from northern and southern communities, chairperson of Sarawol Rural Municipality ward 05 and ward 06, FECOFUN chairperson and assistant forest officer from Bardaghat Sub-Division Forest Office. The project activities, its need, outcomes, and their responsibility were discussed in the meeting. The committee acknowledged the project aims and objectives and agreed to implement project through participatory process. Equally, the PMC agreed to carry regular monitoring and facilitation of project activities.

3.2 Inception Workshop (January 2020):

One-day inception workshop was organized in the chairmanship of Chisapani CFUG chairman. The participants of the workshop were CFUG committee members, Federation of Community Forests Users Nepal (FECOFUN) representative, ward chairman and forest official. The project aim, activities and its outcomes were discussed. Similarly, context, issues and need for PLAF (agroforestry) development were shared. The workshop was facilitated by me, the project leader: Prabin Bhusal.

3.3 Surveys and Biophysical Analysis (February to March 2020):

With specific focus on the following objectives, various surveys and biophysical analysis at the household and community level were carried out.

- Analyze the Southern community's perception on AF development.
- Understand the current AF practices adopted by the Southern community.
- Identify the benefits, issues and challenges in AF development in Southern Terai.

3.4 Reconnaissance Survey

Before going into detailed survey, reconnaissance survey was carried out in the study site. In this activity, we discussed with the CFUG members, southern community about agroforestry interests, needs, options, and possibility of adoption and development. We also built rapport in the study communities with thorough understanding of their concerns. Similarly, field observation of AF practices in the southern part of the study area was completed.

3.5 Focus Group and Hamlet Level Discussion

Six focus group discussions were conducted at the hamlet level. The discussion was conducted in different wards of Bardaghat municipality i.e. Bardaghat - 12, 13, Sarawal - 5, 6 and Palhi Nandan – 1. These are the sites where the major actions such as demo plantation and nursery will be developed. CFUG members including different ethnic groups, southern community, women, men, social leaders, local representatives participated in the discussion. We aimed one person from a household to be present at the hamlet level discussion. The checklist was prepared for the discussion to understand the impact of discussion. The discussion was primarily focused on community understanding, practices and their knowledge on agroforestry practices, the issues and challenges of applying AF system in the area and the suggestions to resolve those challenges in a community level. Furthermore, the discussion was also supplemented with the community level actions taken to mitigate the issues and challenges faced by the households to timber and fodder extraction from forest. We also conducted one discussion meeting with the executive committee members of the Chisapani CFUG. It was primarily focused on their understanding and initiatives on agroforestry development in the southern communities to minimize the timber and fuelwood scarcity.

3.6 Key Informant Interviews

To develop further idea of the study site, informal discussion and interview with key informants were taken to profoundly unearth some issues which might have not been openly discussed in the focus group discussions. The checklist was prepared for this. From each focus group discussions a key informant was chosen and unstructured interview was conducted with Mr. Hom Bahadur Gurung (Chairperson of Chisapani CFUGEC) and Mr. Kamal Pariyar, Mr. Krishna Jiwan Tiwari (Vice-Secretary of Chisapani CFUGEC) representing Sarawal and Mr. Chulahi Yadav (Member of CFUGEC) from Palhi Nandan for the collection of the general information on the implementation and effectiveness of AF system and the issues and challenges the AF practitioners are facing and what the CFUGEC has done or is doing in order to moderate those challenges. Also the community level activities that each ward did in order to bring awareness to the local people about the Agroforestry practices, their benefits, issues and challenges were also discussed.

3.7 Household Survey

Questionnaire survey was conducted on each household of the Southern community, developing a set of structured, unstructured, semi-structured and contingency questions in order to achieve the research objectives. The questionnaire was designed through the literature review and the questions were area focused regarding the potential, issues and challenges of agroforestry. One household was taken as a single unit in which all of its family members live under the same roof, cook and eat together. The Chisapani CFUG has a total of 3350 user households including the distant users (60% of the total HHs). Household surveys of the Southern community i.e. the distant users was done with 10% sampling intensity i.e. 200 households of the Southern Terai area of the Bardaghat Municipality and Sarawal and Palhi Nandan Rural Municipality was done. The questioner focused to understand and analyze the existing level of awareness and knowledge, the current practices and issues, threats and socio-cultural challenges of Agroforestry in the area and the suggestions to lessen those issues and challenges faced. However, prior to the field interviews, the survey questionnaires were pre-tested to ascertain the reliability and validity of the instruments being used.

3.8 Direct Field Observation

The involvement of users in different forest management activities and agroforestry practices were directly observed during the field visits.

3.9 Review of Minute, Records and Operational Plan

Operational Plan, Constitution and minutes of the meetings and discussions in Chisapani Community Forest User Group were reviewed for gaining the information on the participation of the Southern community members in meetings and decision making. The information obtained was triangulated with the data collected from primary data collection methods. Equally, research papers, dissertations, journals, published and unpublished articles, and other literatures published

by Ministry of Forest ad Environment, USDA, ICRAF, DFO and others were also reviewed for the collection of the relevant information on the issues and challenges of agroforestry development.

3.10 Nursery Establishment and Seedling Production (February to June and ongoing):

The Nursery at the Chisapani CFUG was strengthened to produce fruits, fodder and medicinal plants seedlings. Selection of species was based on the previous studies carried out across the country in terai region: compiled as one book that has been produced by Nepal Foresters' Association, Nepal. The major species that were planted in the nursery were *Eucalyptus, Tectona grandis,* and *Leucaena* as tree species, *Bauhinia* and *Leucaena* as fodder species, and *Cinnamomum tamala* and *Azadirachta indica* as medicinal plants. The selection and plantation of these species was based on three factors: rotation age for harvesting, dry matter content for the livestock, and importance on livelihood improvement. We did not select *Dalbergia* species for nursery because of its weak resistance to pathogens and dying back phenomenon. The one hector nursery was established and 20,000 seedlings were produced and distributed to the users in 2020. For this year about 40,000 seedlings production and distribution is planned. Moreover, the seedlings produced from the nursery will also be used in demo-plot and distributed to each of the user's households to develop agroforestry at household level.

3.11 Formation of PLMGs and Identification of Area for Demo Plot (February 2020):

The surveys and observation was carried out in the southern part of the Chisapani CFUG to identify the appropriate area for demo-plot establishment. Prior to the survey a consultation meeting with ward chairman, local leaders and community was carried out followed by collective observation and discussion in the sites. Similarly two PLMGs were formed, one comprised of the users from Sarawal and Palhi Nandan Rural Municipality and another from Bardaghat Municipality ward 12 and 13. The major aim of PLMGs is to encourage households on the adoption of PLAF within the southern community.

3.12 Activities Carried During COVID-19 Pandemic Period

Due to COVID-19 Pandemic, the physical activities were completely stopped from April 2020 to December 2020. However, regular online meetings (whenever possible) and discussion conducted with the PMC were focused on the initial outputs of the project activities, nursery management and seedling production, the possibility of vitalizing project activities after COVID-19 and preparations and planning of implementing remaining project activities.

4. Key Results

This section presents the key results on the socio-economic context of the users, analyze the southern community's perception on AF development, understand the current AF practices adopted by the southern community and identify the benefits, issues and challenges in AF development in southern Terai.

4.1 Socio- Economic Context:

4.1.1 Demographic Characteristics of Respondents (Users)

Most of the respondents[1] were found male (82%) with 18% female. The household head of most of the respondents were also male (93%) with only 7% female household head (Table 1). Due to the traditional patriarchal society the household head are male. This also implies that the males have the access and control over the household resources as well as the property rights. And this gender disparity is also caused since majority of the respondents of the area belonged to the ethnic group of Terai region (37.5%) like Beldar, Jaishwal, Gaund, etc.

Table 1: Respondents' Demographic Characteristics

S.N.	Variables	Response Categories	Frequency	%
1.	**Age (years)**	16-35	74	37
		36-55	86	43
		56-75	38	19
		>76	2	1
2.	**Gender**	Female	36	18
		Male	164	82
3.	**Household Head Gender**	Female	14	7
		Male	186	93
4.	**Ethnicity**	Brahmin/Chhetri/Thakuri/Sanyasi	13	6.5
		Dalit	26	13
		Janajati	72	36
		Terai	75	37.5
		Other (Muslim + Other)	14	7

[1] The respondents are the southern users of Chisapani CFUG

5.	**Education**	Able to count only	49	24.5
		Able to read and write	23	11.5
		Primary Level	74	37
		Secondary Level	35	17.5
		Over Secondary Level	19	9.5
6.	**Household Size**	<5	52	26
		5-10	104	52
		11-15	34	17
		16-20	9	4.5
		>20	1	0.5
7.	**Income Source**	Agriculture	154	77
		Business	12	6
		Government/Private Service	10	5
		Labour/Wages	18	9
		Foreign Employment	6	3
8.	**Wellbeing Ranking**	Well off	93	46.5
		Medium	40	20
		Poor	41	20.5
		Pro-poor	26	13
9.	**HH representation in EC**	No	196	98
		Yes	4	2

Generally, agroforestry practices are mostly done by men because of the traditional patriarchal society and the cultural values and responsibilities of men in the region. Women tend to be more interested in cultivating crops for food consumption rather than cultivating tree crops.

According to the age distribution, the majority of the respondents (43%) were in 36-55 year category, suggesting that they are more likely to adopt new farming and cultivation technologies than the older generation, since most of them had some form of primary level education.

According to the results, majority of the respondents have the household size within the range of 5-10 (52%), with the mean household size of about 7, which is higher than the national mean household size in Nepal. Agriculture, in this area, is the major income source with 77% of the respondents depending on it for their daily living after which comes labour with 9% of the total respondents reliant on it. Larger dependency of peoples on agriculture and daily wages is due to low literacy rate and traditional approaches on each activity regarding households in the community. Least percentage of the household i.e. 3% had foreign employment as the major income source.

Most of the respondents have been ranked 'well off' in the wellbeing ranking i.e. 46.5% in the community forest plan. This was due to three factors: education rate, farm size, and livestock numbers. The poor and pro-poor households are 20.5% and 13% respectively. Only 2% of the household had their representation in the Executive Committee of the CFUG while the remaining 98% of the respondents never had household representation in the EC of the CFUGs till date.

We observed an average landholding size of the sample farm households was 0.81 hectares (ha) which is faintly above the national average of 0.8 ha (FAO, 2015). The livestock herd size was measured in terms of Livestock Standard Unit (LSU). Among the 200 respondents, 141 i.e. 70.5% owned livestock and among those who own the livestock, the average livestock herd size was 1.93 LSU.

4.1.2 Agroforestry and Farmer's Income

We asked the respondents to rank their views on whether adoption of agroforestry is/will increasing the household income. 60% of households perceived that agroforestry would increase their income source in medium level, while only 5% of the respondents thought agroforestry would not bring any changes to their current income level (Figure 2).

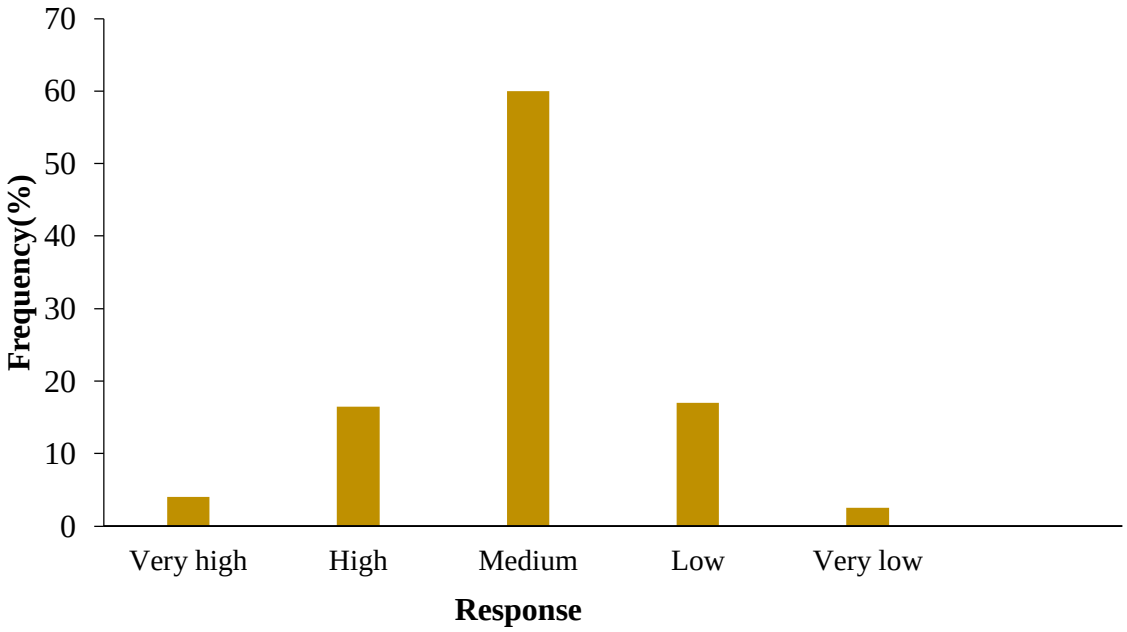

Figure 2: Respondents' perspective to whether AF increases their income

4.2 Users Perception on AF Development

4.2.1 Respondents Knowledge on Agroforestry

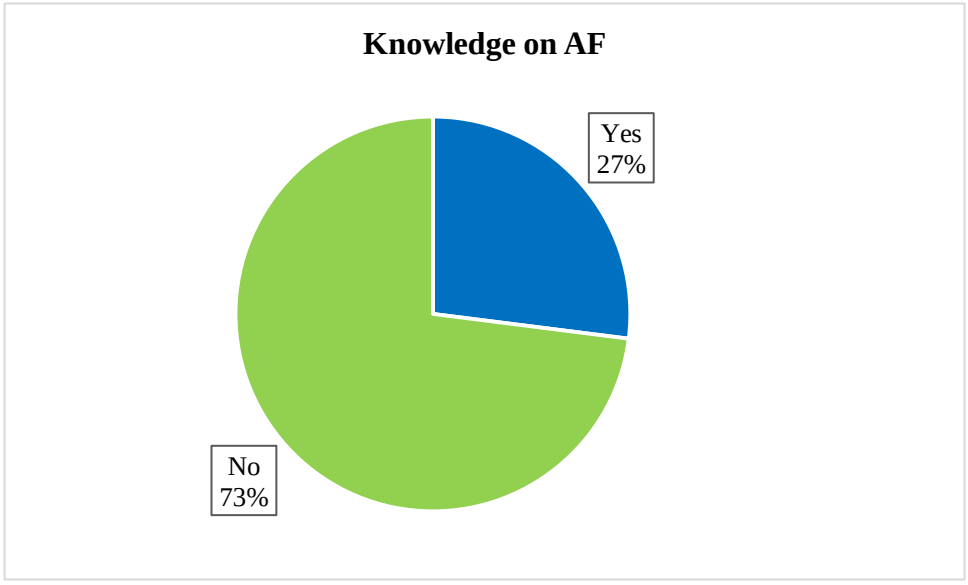

Figure 3: Respondent's knowledge about agroforestry

The respondents were asked whether they had any knowledge about the practice of agroforestry in the area to which 73% of the respondents responded with a “no” while the remaining 27% had some basic idea about what agroforestry meant (Figure 3).

In-depth investigation to the ones who had knowledge about agroforestry was carried out. We investigated the knowledge source and kind of knowledge they attained through such activity. Most of the respondents (65%) knew about agroforestry from the CF through the trainings and the group meetings, while 22% gained the idea about AF by learning themselves, and 4% heard about AF somewhere, 3% learned through their neighbors, 4% knew about AF through their own observation and 2% through visiting different places.

4.2.2 Farmers' Willingness to Adopt AF

The respondents were asked whether they were willing to adopt agroforestry practices in their own farmlands. 83.5% of the total respondents asked were happily willing to implement agroforestry practices in their farmlands realizing the benefits they could achieve through the combined farming technique of crops and trees in the same land management unit. But the remaining 16.5% of the respondents did not want to apply agroforestry techniques to their farmlands (Figure 4).

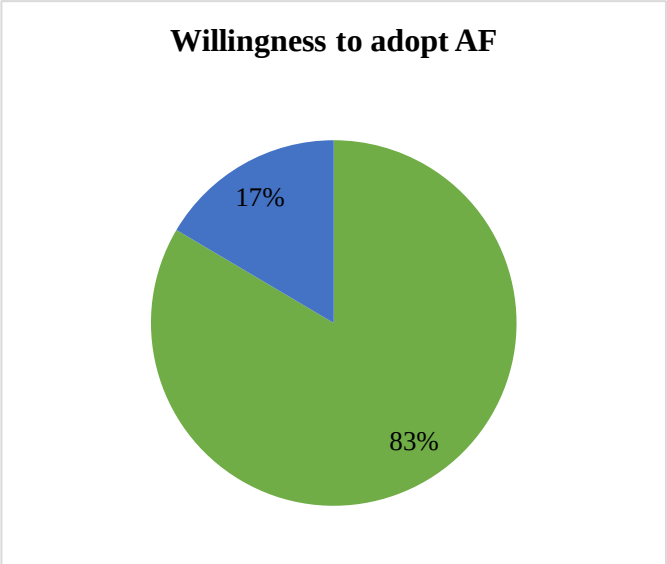

Figure 4: Willingness to adopt the agroforestry

The reasons for non-adoption were previous application of agroforestry practices in the farms, fake knowledge about planting trees on farms. Most of the respondents who said no did not believe in new techniques and innovations of farming. Some lacked enough land to cultivate the crops alone and thus were unwilling to plant trees in the limited land they possess, while some did not possess any land at all. Most of the people of Palhi - Nandan – who are annually affected by flood during the monsoon season, said they were unwilling to adopt AF because even if they applied the technique in their lands, flood would sweep away all their hard work and investment.

The respondents who were willing to adopt AF practices in their lands were further asked a question about which AF techniques would they apply. Among the 167 respondents who said "Yes" to the first question, 61.677% were inclined towards adopting Boundary Technique in their own lands, followed by Home Garden (12.575%), Woodlots (11.378%), Alley Cropping (6.587%), Improved Fallows (5.389%) and lastly Scattered Trees (2.395%) (Figure 5).

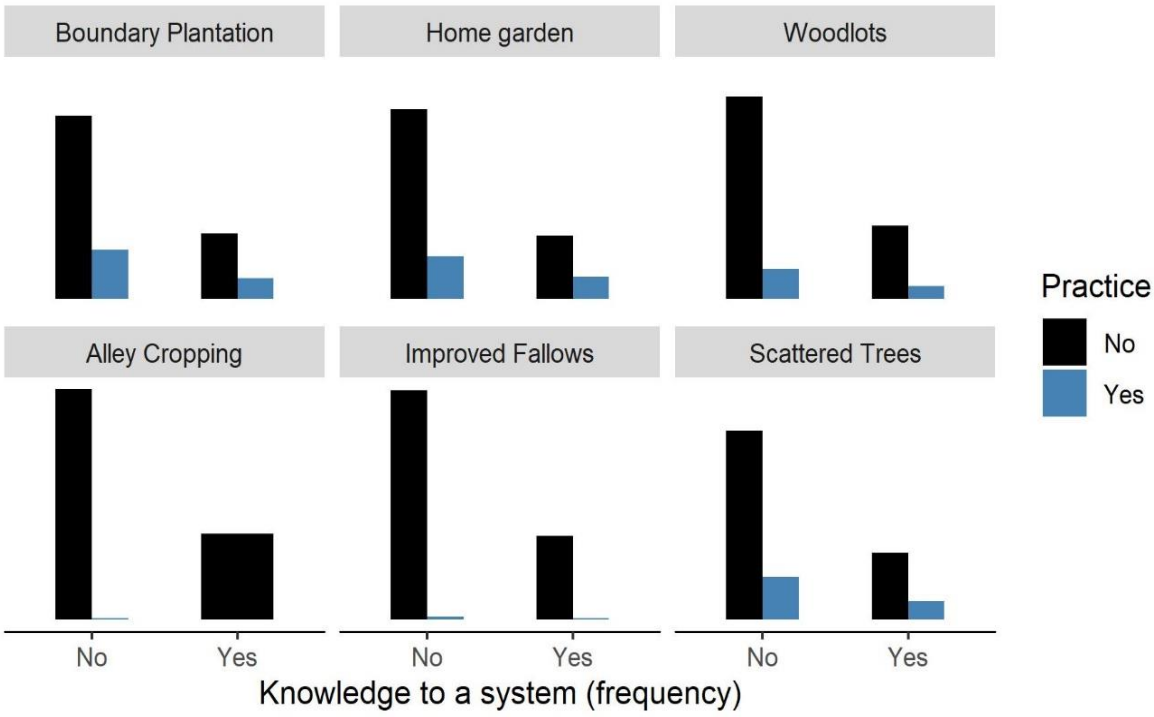

Figure 5: Agroforestry technique farmers were ready to adapt

4.2.3 Public Land Agroforestry Concept

During the field survey, the respondents were also asked whether they had any idea about Public Land Agroforestry (PLAF) to understand the potential of PLAF in the area, especially to the distant users of the Chisapani CF i.e. the Southern Community people. Among the 200 people asked, 69% of the respondents said that they knew or had a general idea about PLAF (Figure 6) and had seen it being applied along the riverbank (63.636%), and they had participated in the afforestation programmes organized by the CF in the public lands (28.788%) (Figure 7). And 31% of the 200 respondents asked had no idea about PLAF in the study area.

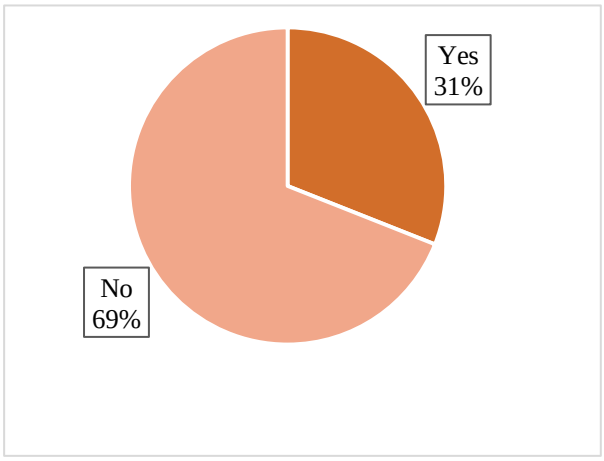

Figure 6: AF Practiced in public lands

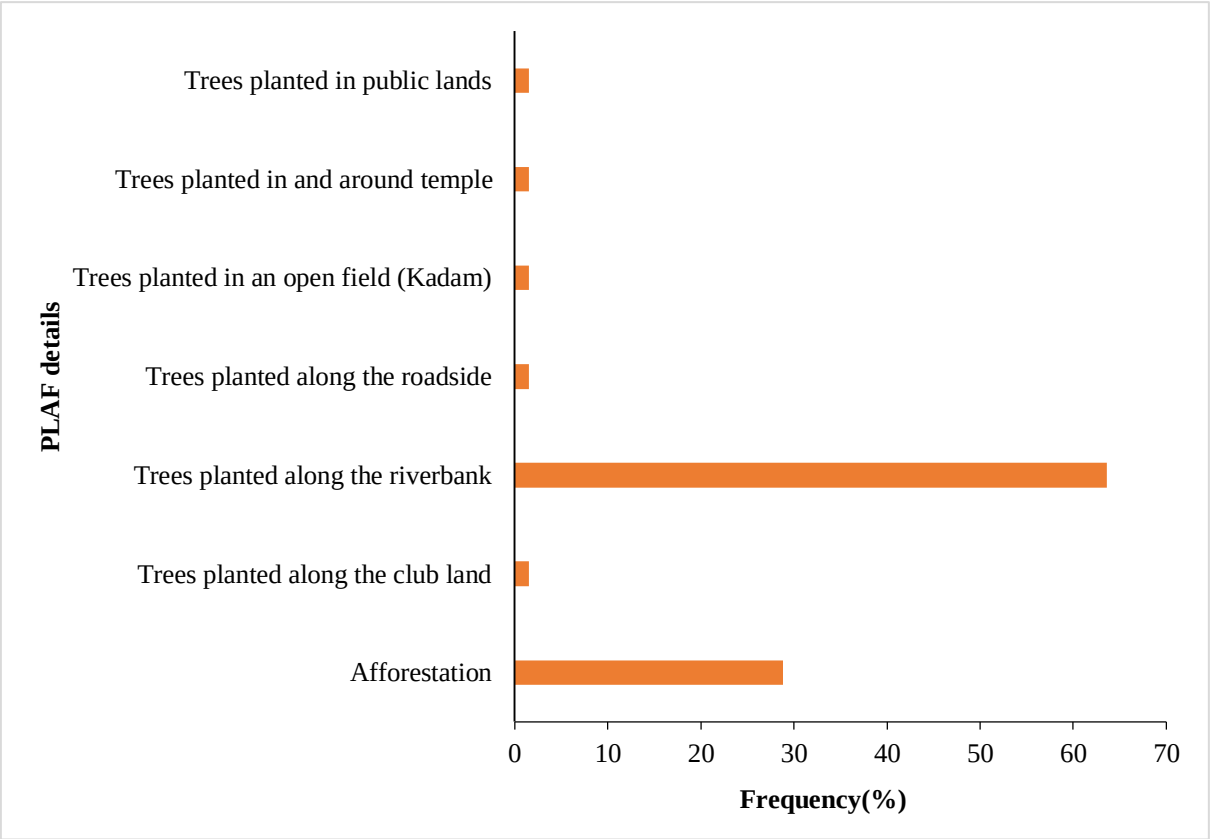

Figure 7: Details on PLAF in the study site

4.3 AF Practices Adopted by Southern Community:

4.3.1 Agroforestry Practices Adopted

This study identified the agroforestry practices being employed in the study area i.e. the Southern community of Chisapani CFUG. The respondents were asked whether they had adopted any agroforestry practices in their farmlands to which 69% of the respondents responded with a "yes" while the remaining 31% had not applied any sort of agroforestry techniques in their farmlands. The predominant agroforestry practices include the Boundary Technique with 28.39% of the respondents adopting it, followed by Home Garden (26.45%) after which comes the Scattered Trees (25.16%) which is further followed by Woodlots (17.42%), Improved Fallows (1.94%) and finally and surprisingly Alley Cropping (0.65%).

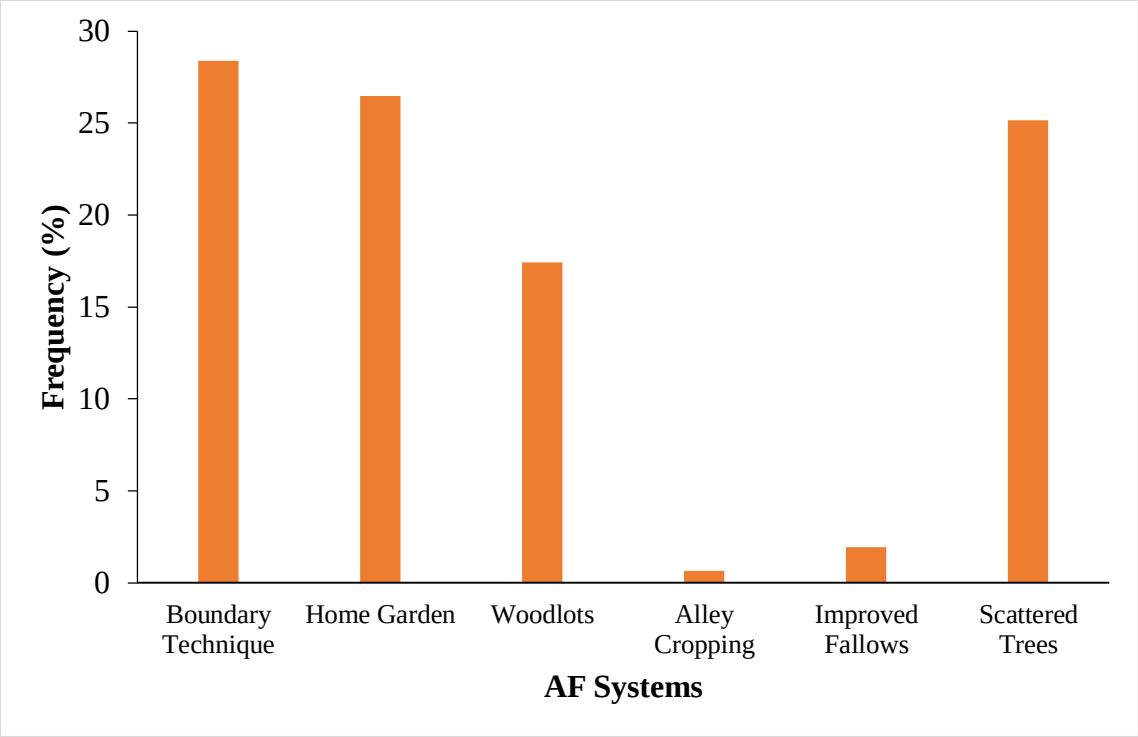

Figure 8: AF Techniques Practiced in the Study Area

Mango (*Mangifera indica*) was one of the major tree species that have been planted in almost every house that had adopted agroforestry followed by Sissoo (*Dalbergia sissoo*), Kadam (*Neolamarckia cadamba*), Teak (*Tectona grandis*), Bakaino (*Melia azedarach*), Badahar (*Artocarpus lacucha*), Litchi (*Litchi chinensis*), etc.

The non- adoption respondents were asked for non-adoption of agroforestry practices. Several reasons like knowledge of agroforestry, agroforestry is looked as single entity, enough farmland for agroforestry application, destruction from natural disasters like flood was the major issues of households. The households were hesitant to put investment when it would loss without providing any return.

We categorized all these reasons and several others from literature review into five categories viz. Social, Economic, Biophysical, Technical and Other reasons (figure 9). We asked households to categorize these factors based on their perception on having the optimum reason for not investing on agroforestry systems in their farmland. Biophysical (58%) category was the most prominent for not adopting the agroforestry techniques in their farmlands. Technical reasons (32%) followed them. In this category, the reasons provided were access to the required trainings for practicing agroforestry, lack of enough knowledge within communities and amongst the technical officers, technical skills for reducing the attacks from pests and further improvement on the tree and crops, and the lack of qualified seeds suitable for practicing agroforestry. We also observed the dying back phenomenon in many *Dalbergia sissoo* trees in the VDC that were healthy. While none of the households perceived economic reasons for non-

adoption, 10% of the respondents thought the social reasons are hindering the adoption of agroforestry in their farmland. The reasons were traditional approach and rural setting of village confining the households from accepting the new techniques for better livelihood. They also mentioned about demotivation from neighbors on adoption of agroforestry systems. Even if some households have started agroforestry system, neighbors have either stopped plantation or harvested the trees by saying that the planted tree species have been shadowing their crops and accuse the adopter to be deliberately suppressing the growth, development and productivity of their farm.

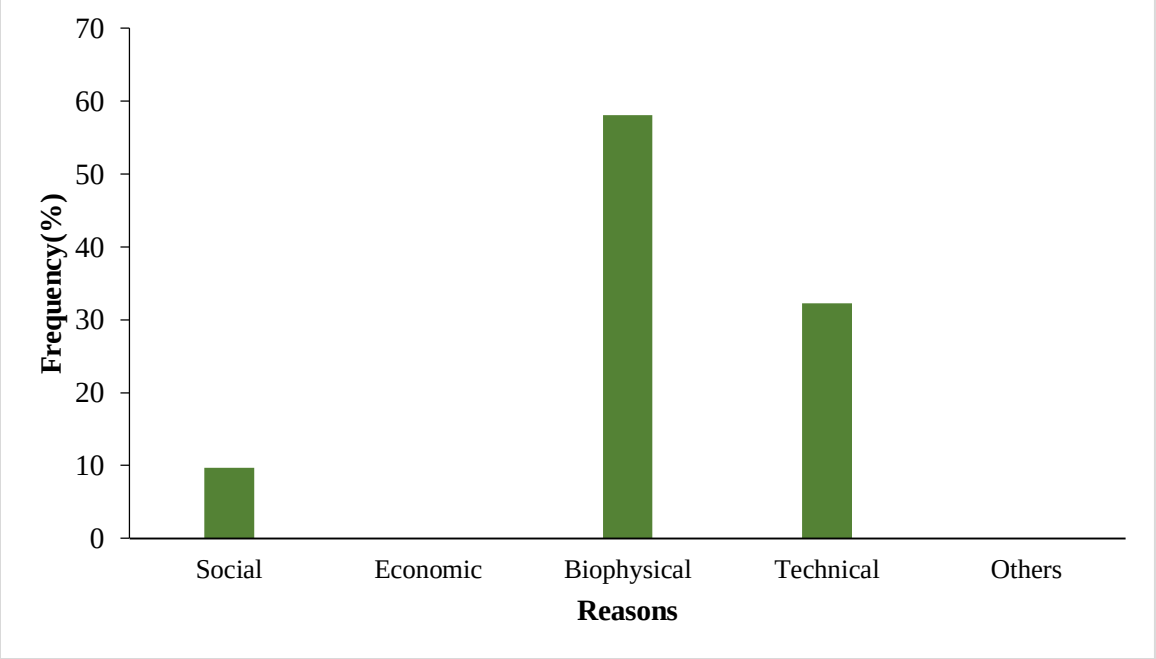

Figure 9: Reasons for not adopting AF

4.3.2 Agroforestry Benefits

We also asked the respondents about the benefits that the agroforestry system provided (Figure 10). All the respondents agreed to one benefit that agroforestry provided and that is Biodiversity Conservation. Since there is less forest in the South, the AF trees provide corridor and connectivity to the wildlife there and thus biodiversity is conserved through agroforestry. 96.5% of the respondents agreed to the statement that agroforestry helps in livelihood improvement while the 3.5% seemed to disagree. Agroforestry makes the forest products like fuelwood and fodder easily accessible to the farmers. Thus time is saved on fodder and fuelwood collection and that time can be invested on other livelihood activities. In addition, 85.5% of the respondents agreed to the fact that agroforestry helps in North-South conflict mitigation while the remaining 14.5% did not agree to it.

The conflict can be resolved by making the forest products easily accessible to the distant users thus reducing their dependency on the forest. Some of the respondents also added some more benefits from agroforestry like agroforestry saved time in fuelwood and fodder collection, since

the CF is far from the area; it is usually tedious and time consuming to go to the forest to collect fodder and fuelwood. Other benefits included reduction in deforestation, reduction in crop failure, etc.

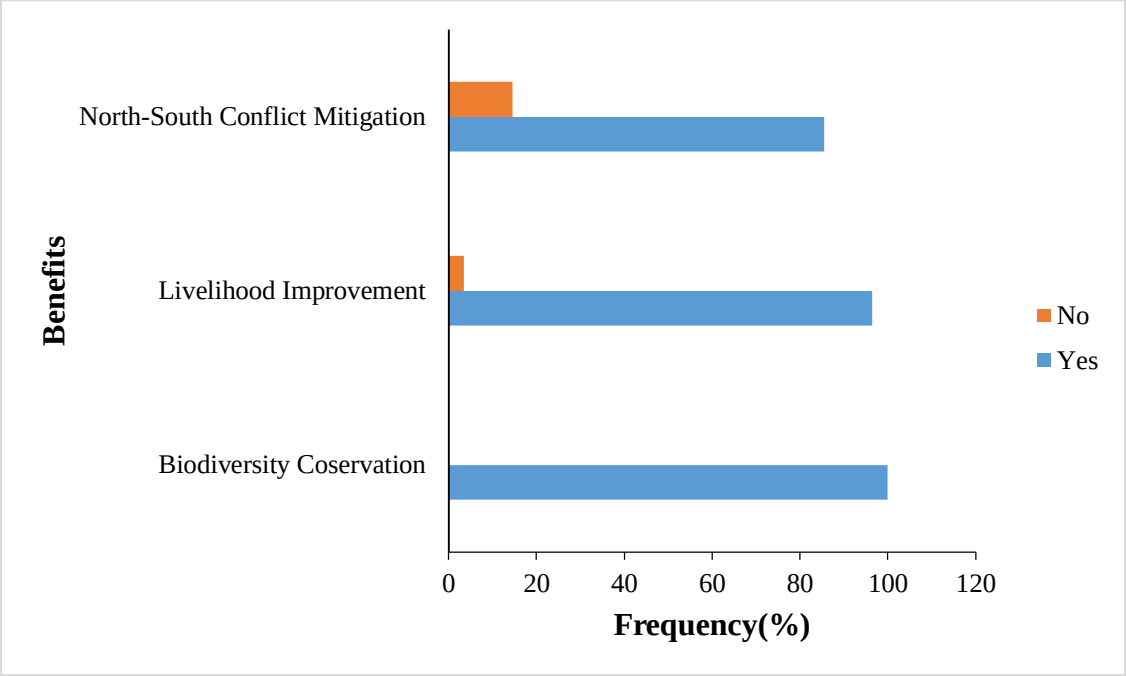

Figure 10: Benefits of AF

4.4 Issues and Challenges in AF development

4.4.1 Issues on Agroforestry Development/Implementation

The respondents were asked to rank the issues given to them on a scale of one to five; one being the lowest rank and five being the highest. The highest ranked issue was given five points and the lowest ranked (one) was given one point in order to calculate the score of the issues to be ranked. On ranking and calculating the final ranks of the issues presented to the respondents, the first ranked issue for the agroforestry development and implementation in the area was found to be land and tree tenure/rights with the total score of 872, followed by no appropriate measure of AF being the second ranked issue with the total score of 818. The third ranked issue was lack of knowledge on AF practice with the total score of 815 followed by tree protection / open grazing being the forth ranked issue scoring the total of 792. The issues, social acceptability, direct potential outputs, unclear policy / unfavorable policy, social beliefs and practices and gender and age of the farmer ranked 5^{th}, 6^{th}, 7^{th}, 8^{th} and 9^{th} issue respectively with the total scores of 691, 679, 664, 581 and 530 respectively (Figure-11). The respondents also mentioned other issues like the high cost of manures, high taxation, monsoon floods, and the problem of irrigation.

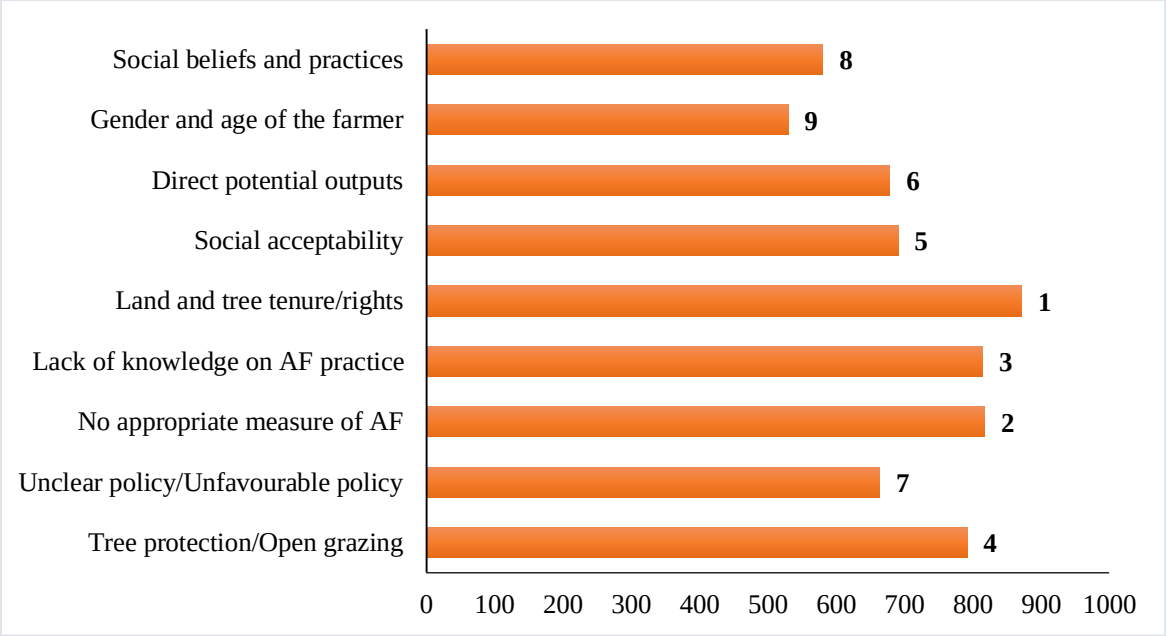

Figure 11: Issues Ranked

4.4.2 Challenges Affecting the Adoption of Agroforestry

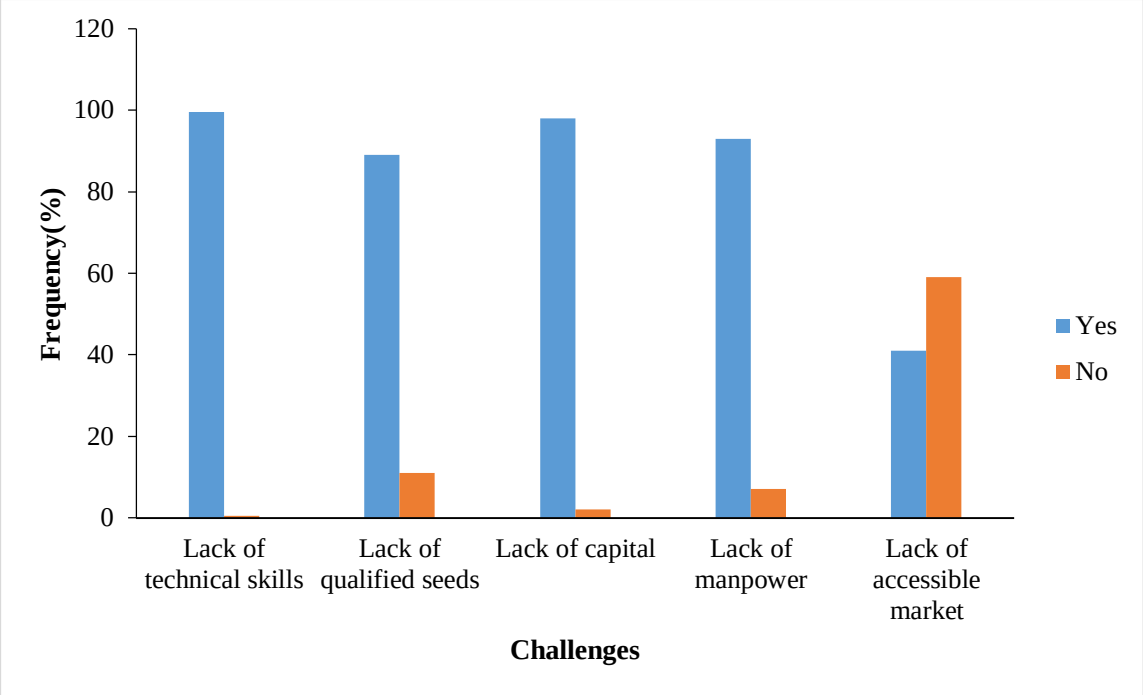

Figure 12: Challenges for AF Adoption

The imminent challenges to the development/implementation of agroforestry in the study area, respondent perceived the lack of technical skills that are required for agroforestry was the highest challenge (99.5%), followed by lack of capital (98%), lack of manpower (93%), lack of qualified seeds (89%) and lastly the lack of accessible market to sell the products from the practice (41%) (Figure 12).

4.4.3 Farmers' Suggestions to the Challenges Facing the Adoption of Agroforestry

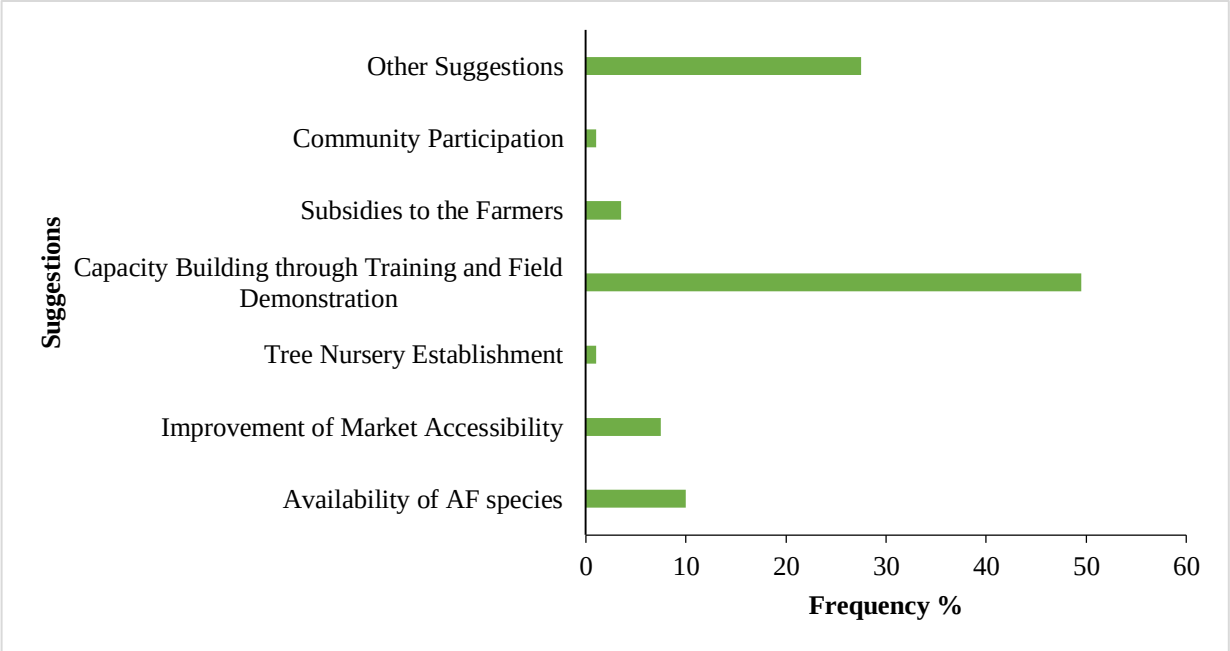

Figure 13: Suggestions to the Challenges of AF Adoption

Most of the respondents (49.5%) suggested capacity building through training and field demonstration to the farmers regarding the AF techniques and practices is important to increase the adoption rate of agroforestry technology, while 10% suggested that species that are suitable for agroforestry should be made available like they should be fast growing and multi-purpose. Furthermore, 7.5% of the respondents said that making the markets for agroforestry products more accessible can improve agroforestry adoption in the area since the practitioners of AF would be able to sell the products obtained. The results show that 3.5% suggested that giving subsidies to the farmers can play a vital role in agroforestry adoption, while 1% suggested that there should be a tree nursery establishment, and another 1% said community participation might help overcome the challenges affecting agroforestry adoption to help farmers feel part of the decision making process regarding agroforestry policies and programs (Figure 13). The remaining 27.5% of the respondents gave other suggestions to the challenges that the people face while developing and implementing the AF practices like provision of irrigation facility, controlling the flood and its after-effects especially in Palhi Nandan – 1, provision of appropriate facilitation by the government regarding the development and implementation of AF in the area, effective communication of the notices for the training and field demonstration programmes, etc.

5. Outputs

5.1 Conservation Outputs

- Increased knowledge of the local community to choose and practice appropriate agroforestry techniques for better management of their public land and their agriculture lands.
- Initiatives like distribution of free seedlings to southern users from Chisapani CFUG, increased seedling demand from southern users and management of well-equipped nursery.
- Discussion among the CFUG leaders, local leaders and users on agroforestry promotion, development in public and private lands in southern Terai.
- Area for demo-plot established is identified and agreement between local government and Chisapani CFUG is done to establish demo-plot.

5.2 Learning Outputs

- Understanding of the context, issues and challenges of agroforestry development in southern Terai region of Nepal among the local southern community, local level government, local forestry institution(community forest users groups) and research institution (Institute of Forestry, Pokhara Campus)
- One bachelor level thesis work competed by a student from institute of forestry, Pokhara campus with the funding from the project.
- Three bachelor level students, five local leaders from southern community participated in field works during surveys and discussions.
- A paper manuscript is under preparation.
- Dissemination of learning's and reflections among the users and at institute of forestry.

5.3 Planned Activities

- Demo-plot developing is under preparation and will be completed by May 2021. The seedlings for demo-plot are planted and will be ready by April 2021.
- Capacity development training to users, PLMGs members and executive committee members will be carried in February 2021.
- School programs in the southern community will be completed in February 2021.
- Local and district level sharing workshop will be conducted in May 2021.
- One Journal article will be submitted by April 2021.

6. Learning's and Recommendations

Agroforestry system can prove to be one of the best alternatives to cope with the alarming problem of biodiversity loss, food security and lack of availability of the forest products for the distant forest users. Starting from a home garden, it can have its impacts on the global scale. The increase in the species richness due to agroforestry system is obvious and can contribute to the biodiversity enrichment. Similarly, food security is also addressed by this practice. Growing vegetables, fruits and fodder plants around the home garden or in any abandoned land helps to

meet the food requirements of a large number of people especially living in the rural areas. This helps in enhancing the living standard of the people.

Our learning shows that although most of the people in the southern region do not have scientific knowledge and idea on AF, they have been practicing it in a traditional way with the dominant practice being boundary technique and the preferred tree species mango. The conflict on forests distribution among the distant users in the southern region can be resolved through AF however there are several challenges that need prompt actions. For example the lack of technical know-how, the practice of open-grazing and the existing land and tree tenure has impeded the development of the agroforestry. There are several issues as well, like open grazing in Sarawal and monsoon flood in Palhi Nandan. Through this study, at least the 200 households involved in one to one discussions, about 500 household of community involved in group discussions, local government authority, forest officials, local leaders, CFUGs were made aware of the benefits of agroforestry and most of them even agreed to apply this tree-farming system in their farmlands and public lands. Equally, there are potentialities of AF adoption and promotion in southern Terai region of Nepal and this will be effective in promoting biodiversity, help reduce forest dependency and increase the supply of forest products.

Based on the learning's, the following recommendations have been made:

- The CFUG in the southern Terai region of Nepal should provide opportunities to southern users in CF management and help them promote and adopt agroforestry.
- Adding scientific and technological know-how on traditional farming could help AF adoption and to effectively harness its benefits.
- Most of the people, being illiterate, do not have the scientific knowledge about the way and importance of agroforestry practice. Thus, now is the high time to make the people aware about the benefits and importance of agroforestry practice so that large area of land can be utilized properly to cope with the global concern of biodiversity loss, food insecurity, climate change, etc.
- Increasing rate of degradation of soil and deforestation in the forest should be addressed by the implementation of strict laws and action. And simultaneously, the government should create new programs and ideas to make people aware and encourage them towards the practice of agroforestry.
- The people should be provided with various types of local and hybrid species of food value, fodder value, etc. so that they get attracted towards this practice.
- A committee must be formed in order to monitor and evaluate the progress of agroforestry in the area.
- A tree nursery should be established that is easily accessible to the people of the Southern community people.
- The queries and concerns of the people regarding this practice should be well noted and the local bodies of government should be responsible to solve them.

- There should be the provision of reward and punishment so that the local people get motivated towards the agroforestry practices.
- The Public Lands in the area that are prominent towards the Southern region of the study area must be effectively utilized to get the appropriate benefits of the forest through applying the practice of Public Land Agroforestry.
- Appropriate training and field observation activities should be organized in order to develop technical skills and also for the capacity building of the local people of the Southern community.

Annexes

I. List of Accomplished Activities

S.N	Date	Activities	Participants	Outcomes
1	September 2019	Meeting with EC of CFUG	EC members, researcher and CFUG officials	• Agreed on project idea and CFUG to take its ownership • Formation of 7 member PMC • Organizing Inception workshop in October
2	October 2020	Meeting with PMC	All PMC members, CFUG EC members and researcher	• Agreed to conduct participatory visits to project sites and carry discussions with the southern community leaders and distant users.
3	January 2020	Meeting with EC	Chisapani CFUG EC, PMC	• Developed and agreed on work plan
4	January 2020	Series of Hamlet level discussion with users from Sarawol rural municipality ward 5 and 6, Bardaghat municipality ward 12 and 13 and Palinandan rural municipality ward 01.	Southern users, PMC members, EC members and researchers	• Increased understanding on agroforestry context, issues, challenges and its adoption in their farm and public lands • Agreed to actively participate in project activities and initiate agroforestry in their private land and public lands around their community
5	February to March	Surveys and biophysical Analysis - Six Focus group discussion with southern communities and leaders - Discussion with key leaders and local politicians - 200 direct interviews with the households including both male and female head of the household - field observations and reflections - reviews of CFUG records, information's and minutes	Southern users, local leaders, CFUG committee members and local government members	• Analyzed the Southern community's perception on AF development. • Understood the current AF practices adopted by the Southern community. • Identified the benefits, issues and challenges in AF development in Southern Terai.
6		Nursery establishment and seedling production	PMC, CFUG	• 20,000 seedlings distributed in 2020 to all CFUG users including southern users • Technical and financial support to CFUGs
7		Formation of PLMGs and identification of area for demo-plot establishment	PMC, users and CFUG	• Two PLMGs formed • Agreed and identified the suitable area for demo plot establishment

II. Photos of Field Activities and Disseminations

Photo 1: Boundary Technique adopted by southern user

Photo 2: Mango Woodlot in southern Terai

Photos 3: Research Assistants doing household surveys and interviews

Photos 4: Participatory field visits and observation of the public lands

Photos 5: Series of discussions with CFUG members, southern community and leaders

Photos 6: Series of discussions with CFUG members, southern community and leaders

Photo 7: Piles of Guitha (Dry dung fuel) prepared for cooking and heating

Photo 8: Dry dung fuel prepared for cooking and heating

Photos 8: Dissemination of project results as a part of Bachelor project work from student of Institute of Forestry, Pokhara Campus

Photo 9: Flex used during hamlet level discussion