Australian Government
Australian Centre for International Agricultural Research

Final report

Contents

1 Acknowledgments

The EnLiFT leadership team is very grateful for the trust ACIAR Forestry Programme Manager Tony Bartlett showed in us to undertake this project. Tony conceived the potential of this project and contributed to every stage of the proposal and its progress over the past five years. We are very grateful for the time he could spend with us in the field, and the fact he could speak Nepali do not go unnoticed by our participating farmers. He provided substantive conceptual and scientific contributions as well as administrative guidance; and any successes of this project he can rightfully claim as his own achievement.

Don Gilmour was instrumental in partnering with Tony to raise the concept of this project with the Government of Nepal. Don is still well-remembered and highly respected as the long-term leader of the Nepal Australia Forestry Project. The legacy of the NAFP is not only in the restoration of forests in the once denuded hills and the development of community forestry institutions across the country, but also in the regard that stakeholders at all levels have for the Australian project. Indeed, the local media still refers to EnLiFT as if it were an extension of NAFP. NAFP may have been a tall shadow for EnLiFT to grow under but it has provided very fertile ground for it to grow in. Switching metaphors, Don and Tony have been the giants upon which this project stood. Together, they led the mid-term review which provided an essential course re-set.   Don has also been an invaluable mentor of the leadership team as well as research students throughout the project.

We also thank the leaders of Nepal's forestry administration who facilitated and encouraged the project. The Director Generals of Department of Forests were: Braj Kishor Yadav; Bishwa Nath Oli; Rajan Pokhrel; Resham Dangi; Gauri Shankar Timila; and Krishna Prasad Acharya. The Secretaries of the Ministry of Forest and Soil Conservation were: Nabin Ghimire; Krishna Chandra Paudel; Ganesh Raj Joshi; Sharad Chandra Paudel; Shankar Adhikari; Uday Chandra Thakur; Krishna Chandra Paudel; Prakash Mathema; Yubak Dhoj GC and Bishwa Nath Oli

We are also very grateful for the generous advice of Bill Jackson and Mahendra Joshi, who were the end-project external reviewers. Their recommendations and candid reflections were invaluable for the design of the follow-on project EnLiFT2

We would also like to thank Tavata Riches, ACIAR, and Chelsea Dubois, University of Adelaide, for their administrative support, which was always prompt, efficient and cheerfully delivered.

2 Executive summary

The Middle Hills region of Nepal are home to 44% of Nepal's population, 66% of whom derive their livelihood largely from a combination of agriculture and forest products. The forests and agricultural lands are closely linked systems, providing food, fodder, fuelwood, grazing, timber, and non-timber forest products. Over the last 35 years, under the purview of a national community forestry program, about 30% of the forest lands have been handed over to local communities by way of more than 19,361 Community Forest User Groups (CFUGs). However, the management of community forests and subsistence agricultural systems in the Middle Hills is sub-optimal and livelihood outcomes remain limited and inequitable with the result that food insecurity is widespread.

Factors that impede the ability of community forestry and agroforestry systems to provide adequate livelihoods are complex and manifold, and are situated in social, cultural, political, economic and ecological domains. Some of the critical factors include: low productivity of agricultural lands; sub-optimum management of community forests; persistent inequity and marginalisation of some community members; limited marketing opportunities for community forestry and agroforestry products and centralised planning and service delivery, limited uptake of research findings in policy making and implementation processes.

This aim of this project, known locally as EnLiFT, was to enhance livelihoods and food security from improved implementation of agroforestry and community forestry systems. It set out with the objectives to:

1. To improve the capacity of household-based agroforestry systems to enhance livelihoods and food security;

2. To improve the functioning of community forestry systems to enhance equitable livelihoods and food security of CFUG members;

3. To improve the productivity of, and equitable access to, under-utilised and abandoned agricultural land.

In the *agroforestry domain*, participating households immediately benefitted by the increased incomes from the horticultural cash crop components of these interventions. They learnt nursery skills for further development of their on-farm fodder trees, and business management skills to more efficiently engage in commercial farming. The capacity to promulgate this knowledge and skills has been captured in a suite of extension products. Impact monitoring of project interventions has shown that it is possible to reduce poverty and increase food security with relatively simple agroforestry interventions on private land within a relatively short period of time.

To reflect the principle that active and equitable forest management is a pathway to food security, EnLiFT1 produced a bioeconomic model that integrates the farm-forest interface. It can be used to project likely impacts on food security from agroforestry and community forestry interventions. With this model we also learnt that not all farmers will benefit from the horticultural commodity interventions and those without regular off-farm income (e.g. through remittances) will have better opportunities in livestock systems with intensive on-farm fodder systems and/or woodlots of high value trees on currently under-utilised land.

EnLiFT1 articulated the institutional, regulatory and policy barriers to further development of timber production on private land, finding that the regulatory process for selling timber from private farms is so complicated and time consuming that there is little incentive for farmers to participate. In 2015, following an EnLiFT policy lab on this topic, the government amended the Forest Regulations to enable farmer to harvest and sell 23 commonly grown tree species from private land, after undergoing a one-time registration

and transport permit process. The project has laid the foundations enhancing farmers' livelihoods and food security based on privately-grown timber.

In the *community forest domain* EnLiFT1 demonstrated improvements to the functioning of community forest systems, through adoption of a new framework   that integrates biophysical disciplines with the participatory silvicultural practices of Active and Equitable Forest Management (AEFM); and the social disciplines via the process of Strategic and Inclusive Planning (SIP).

AEFM, by providing striking visual examples of well-managed forests, had a powerful impact on perceptions of all stakeholders. Over the five years of the project we witnessed a shift from resistance and reluctance to actively manage community forests to enthusiastic engagement and encouragement to up-scale the activity.

The SIP activity developed a strategic consultative process in the renewal of community forest operational plans that significantly reduces time and resource demand without compromising critically needed inputs and ownership of CFUG members. Women and disadvantage groups are actively engaged so that it is truly inclusive. It is an activity that includes significant capacity building of CFUG members. It is the foundation for further consultative planning process that need to occur as federalism is instituted where there will be new layers of government involved in forestry planning and management.

EnLiFT1 also produced a comprehensive foundational knowledge base of the current status of community forest markets and the attendant problems. The project enabled the reactivation of a community sawmill at Chaubas through the establishment of a community-private partnership, that enabled 330 local households to obtain sawn timber to use in house reconstruction following the 2015 earthquakes. We also learnt that there needs to be a rethink on modes of collective management of community forest enterprises, and that a community-private partnership has provided early promising results.

In the *domain of under-utilised and abandoned land* (UUL) EnLiFT1 was not able to achieve on-ground examples of bringing UUL back into production. Unfavourable currency exchange fluctuations and the unexpectedly high costs of labour (compared with the usual in-kind partner commitments in other ACIAR projects) meant that we had very limited resources for this objective. Nevertheless, EnLiFT1 delivered two high-quality and complementary accounts of the drivers and dynamics of UUL that is currently informing policy: e.g. inputs into the 14th Plan of National Planning Committee.

Overarching the three objectives was the highly successful EnLiFT Policy Labs (EPL). The EPLs proved to be an integral component of our action research process. By creating real-time research-policy interface, EnLiFT team has been able to translate scientific insights into ongoing policy cycles covering the three project objectives, thus escalating EnLiFT impact on enhancing livelihoods and food security from agroforestry and community forestry.

EnLiFT also generated important conceptual and methodological contributions to the literature on mountain forest development, such as: 1] pathways approach to link forest and food security; 2] modelling the farm-forest interface; 3] silvo-institutional model for sustainable forest management; 4] AEFM for participatory silviculture; 4] Rapid Forest Appraisal for participative assessment of forest quality; 5] Strategic and Inclusive Planning processes; 6] Community-based entrepreneurship; and 7] EnLiFT Policy Labs to foster the science-policy interface.

The Government of Nepal has recognised the success of EnLiFT by encouraging a more focussed phase 2 project, EnLiFT2, which aims to enhance forest management in

community forests and private land to improve livelihoods, social equity and environmental impact. That project will do this by: 1] enhanced adoption and benefits from AEFM and improved private forestry practices; 2] developing community forestry planning, governance, and gender equity frameworks within the context of new local government system; and 3] designing and facilitate the establishment of pro-poor small-scale forest enterprises.

Acronyms and abbreviations used in this report

AFO	Assistant Forest Officer
ARPM	Action Research Planning Meeting
BBN	Bayesian Belief Network
CF	Community Forestry
CFD	Community Forest Division of the Department of Forests
CFUG	Community Forest User Group
cft	cubic feet
CSO	Civil Society Organisation
DFO	District Forest Officer
DLCC	District Level Coordination Committee
DOF	Department of Forests
EnLiFT1	Enhancing Livelihoods and Food Security from Agroforestry and Community Forestry in Nepal. This project
EnLiFT2	Enhancing Livelihoods from Improved Forest Management in Nepal FST/2017/037
EPL	EnLiFT Policy Lab
FAN	Forest Action Nepal
FECOFUN	Federation of Community Forest Users Nepal
FGD	Focus Group Discussion
HH	Household
IUCN	International Union for Conservation of Nature, Nepal
KII	Key Informant Interview
LG	Local Government
LRG	Local Research Group
LRP	Local Resource Person
MoFSC	Ministry of Forests and Soil Conservation
MTR	Mid-Term Review
NAF	Nepal Agroforestry Foundation
NAFP	Nepal Australia Forestry Project
OP	Operational Plan
PAC	Project Advisory Committee
PRA	Participatory Rural Appraisal
RPS	Research Paper Series
RSA	Rapid Silvicultural Appraisal
SIP	Strategic and Inclusive Planning
SFM	Scientific Forest Management
UUL	Under-Utilised Land
VDC	Village Development Committee

3 Background

3.1 Development issues and priorities

Nepal is a landlocked country with agriculture as the main livelihoods base of its nearly 30 million people. At the commencement of this project Nepal ranked as the 17th poorest country in the world at 157th out of 187 countries on the Human Development Index. This position has slightly improved to the rank of 144 in 2017 (UNDP, 2018). It has three geographic regions – high mountains (bordering China), Middle Hills and low-lying Terai (bordering India), and five climatic zones from tropical to arctic, in an area just less than twice the size of Tasmania. Sixty-six percent of the population derives its livelihood from agriculture supported by food, fodder, fuelwood, grazing and non-timber forest products gathered from trees and forests, both on and off farm. Infrastructure is limited in the Middle Hills and the productivity of agriculture is reportedly declining over time. Food insecurity is pervasive with 41 percent of the population under-nourished and 30 of the country's 75 districts are reported to be food insecure (Khatri et al, 2017). Over 3.5 million people are experiencing "moderate to severe" shortages with insufficient food to stave off hunger, or obtain sufficient calories to work, and get through the day (WFP, 2012).

Agriculture in the Middle Hills is characterised by bunded irrigated land (*khet*) in lowlands growing a rotation of wheat, rice, maize, potatoes, and rainfed terraces (*bari*) growing maize and millet. Home-gardens and pasture land are part of the system with a close relationship with trees and forests (both on-farm and off-farm) that are sources of fodder and bedding for stall-fed livestock, which in turn provide draft power and manure. In many areas multi-purpose trees providing fuel and fodder (e.g *Alnus nepalensis, Albizzia spp*) are allowed to grow on the *bari* risers and non-cultivated patches in the agricultural landscape. While there is a recognised decline in agricultural productivity, it cannot be assigned to any single factor. Many agricultural crops rely on farm manure for fertility because of lack of access to affordable, quality inorganic fertilisers. About 50% of households are essentially 'organic' (Hobley, 2013) with strong nutrient links with surrounding forests. There are problems of increasing costs and declining access and timely availability of essential inputs. Significant cultural and demographic changes, resulting in males seeking employment abroad, are leaving a feminised rural workforce and labour shortages. One clearly visible consequence is the substantial increase of abandoned or under-utilised agricultural land (Paudel NS et al, 2012; Paudel KP et al, 2012; Ojha et al 2017).

Even after Nepal emerged from the 11-year Maoist insurgency (1995-2006) and a People's Revolt against the Monarchy in 2007, it took a further 8 years of political struggle to agree on, and have the political stability to enact its new constitution in 2015. The new federal model comprising of 7 states is only now being instituted at the time of writing this final report. As the government has been distracted for two decades from fully attending to the critical socio-economic and environmental issues it faces, non-government and community-based organisations have emerged as significant actors in rural development, especially in the forestry sector.

Notwithstanding the political problems over the past two decades, Nepal has made significant strides in implementing a national community forestry program, particularly in the Middle Hills. Under an enabling policy framework local people are empowered to manage their local forests to meet their subsistence needs and, in some cases, generate income from the sale of forest products, much of which is used for community development. Forest condition across the Middle Hills has generally improved, and large areas of previously degraded forest are now reaching the stage where increased utilisation is possible. This is despite a 55 percent increase in population since 1990 (18.8 to 29 mill). Community forests now cover 1.8 million hectares (nearly 30 percent of the

national forest estate) and reach over 1.6 million households who are members of over 19,361 Community Forest User Groups (CFUGs). Seventy-two percent of the CFUGs are in the Middle Hills (Hobley, 2013). However, while community forestry has been a success in empowering communities to manage their common pool forest resources, management tends to be sub-optimal and the contribution to livelihoods and food security could be substantially increased (Adhikari et al, 2004).

The under-performance of community forests in contributing to improved livelihoods is partly a governance problem: there is a reluctance by government officials to approve the cutting of timber prescribed for harvesting in Operational Plans and a ban on harvesting greenwood was imposed by the government in 2010 (Tamang et al 2012). Furthermore, many forest-based enterprises struggle to survive because of ineffective value-chains. Nevertheless, many studies have documented the positive, although limited, contribution of community forestry to livelihoods. There has also been significant emphasis during the past decade on redressing social exclusion and reducing poverty, but questions remain on how the forests can be best managed to deliver livelihood benefits (Ribot et al 2010).

Nationally, each household has access to an average 0.7 ha of community forests, but there is still a 51% gap between supply and demand for forest products in the Middle Hills (Hobley 2013). Access to these products is also inequitably distributed. Nepalese society has entrenched patterns of discrimination and disadvantage along lines of ethnicity, caste and gender. Intra-community equity in decision-making and benefit sharing remains skewed in favour of local elites (Shrestha, 2009). Land holding size also varies greatly, with the poor and disadvantaged having limited access to land. Malla et al. (2003) reported that, on average, the wealthiest households own more than four times as much land as the poorest ones. So-called untouchable people (*dalits)* are among the most marginalised people, both socially and economically. For example, 48% of people belonging to *dalit* castes are below the poverty line, compared with 19% for the Brahmin/Chhetri castes.

Agroforestry is the practice of integrating trees into farming systems on private land (as opposed to community forestry on public land). It is poorly understood in Nepal and has received little research attention in recent decades even though there is evidence of its potential to improve livelihoods (Pandit et al, 2012). While agriculture, food security and community forestry are given high priority in all major policies in Nepal, there is no overarching policy instrument for agroforestry (Tamang et al, 2012); it has "fallen through the cracks" (Gilmour & Shah 2012; Gilmour 2016). With reported declines in agricultural productivity there is a need for better understanding of crop-tree-livestock interactions leading to the design of appropriate agroforestry systems to enhance both food security and livelihoods.

3.2 Project justification

The Australian Government has invested in Nepal's forests since 1966 through various agencies; initially as development assistance from AIDAB, then AusAID, through five phases of the Nepal-Australia Forestry Project (NAFP), the Nepal Australia Community Resource Management and Livelihoods Project (NACRMLP 2003-2006), four phases of Micro Enterprise Development Program (1998-2018). The NAFP in particular contributed greatly to the development of community forestry in the country. It also left a substantial legacy in terms of capacity, potential study sites and goodwill towards Australian development assistance.

In 2012 ACIAR funded a Small Research Activity (C2011/054) to scope the research for a new forestry project in Nepal. This SRA was in the form of commissioned background papers and a workshop. The five papers prepared by Nepalese NGOs covered topics of: national policies and strategies (Karanjit et al, 2012); existing knowledge on agroforestry

and community forestry (Pandit et al, 2012); drivers of agrarian transformation (Paudel et al, 2012); constraints and gaps in knowledge (Tamang et al, 2012); and mapping of institutions (Paudel et al, 2012). These were later synthesised in (Gilmour and Shah, 2012). A 3-day open workshop held in Kathmandu was attended by 50 government, research and civil society stakeholders in agriculture and forestry. Many of the senior participants in the 2012 workshop were involved in the NAFP. This workshop delivered the following research questions that informed the design of this project:

1. How can agroforestry systems be improved focusing on the interactions between forest, livestock and agriculture to enhance livelihoods and food security, particularly of the poor and women?
2. How can community forest management systems be improved to improve livelihoods and food security of local communities, particularly the poor and women?
3. How can forest and agroforestry products be better marketed to increase cash incomes for the local communities, particularly the poor and women?
4. How can agroforestry and community forestry institutions[1] and organizations be reoriented to catalyse enhancement of livelihoods and food security?
5. What are the critical policy and regulatory constraints to effective management of community forestry and agroforestry resources? What changes should be made to enable innovative resource management, utilisation and marketing?
6. What are the drivers affecting the expansion of fallow land, and how could this land be better utilised?

These researchable issues aligned directly with four out of six of the goals stated in the ACIAR Corporate Plan 20011/12; viz. the aim to 'increase food and nutrition security' by 'raising productivity and build crop, livestock and forestry systems' will enhance smallholder and community livelihoods'. Finally, the social capital generated by collaboration across government, education and NGOs was seen to 'build individual and institutional R&D capacity' that would last beyond the project. The three interactive themes of the ACIAR 2012-13 Annual Operational Plan were: agricultural productivity growth in smallholder systems; market integration and supply chain access to improve smallholder livelihoods; and human and institutional capacity building. All three themes were directly addressed in the objectives of this project.

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[1] In this report the meaning of " Institutions" generally refers to "custom, practice, relationships'. The word 'organisations' is use to refer to other meaning of the word; i.e. ' social and management structures'

4 Objectives

The overarching **aim** of this project was to enhance livelihoods and food security from improved implementation of agroforestry and community forestry systems in the Middle Hills of Nepal. The structure of Objectives and Activities to achieve this aim underwent significant change as part of the Mid-Term Review in 12-22 January 2015 under the guidance of ACIAR Forestry Program Manager Tony Bartlett and external expert Don Gilmour. The Objective structures of both phase of the project are presented here with an explanation for the revision.

4.1 Original Objective Structure

Objective 1. To improve the capacity of household-based agroforestry systems to enhance livelihoods and food security

Activities
1.1. Identify baseline conditions and drivers of agroforestry practice and opportunities to improve productivity and increase income generation
1.2. Analyse the markets and value-chains for products from agroforestry systems
1.3. Analyse policy, institutional and governance issues associated with improving livelihoods from agroforestry systems
1.4. Develop functioning models to inform improved interactions between farm and forest systems
1.5. Plan, implement and evaluate participatory action research of innovative agroforestry systems and market opportunities at six sites

Objective 2. To improve the functioning of community forestry systems to enhance the livelihoods and food security of CFUG members.

Activities
1.6. Analyse the status of community forestry systems and constraints to improving livelihoods and equitable benefit flows
1.7. Identify innovative community forestry institutions and management practices
1.8. Analyse markets and value-chains for products from community forests.
1.9. Analyse policy, access, tenurial and institutional limitations of community forestry
1.10.   Plan, implement and evaluate participatory action research to enhance capacity and equitable benefit sharing from community forestry systems

Objective 3. To improve the productivity of, and equitable access to, underutilised and abandoned agricultural land

Activities
3.1 Conduct key informant survey at district and village levels to identify the status of abandoned and under-utilised land in the study districts and sites complimented by GIS based information
3.2 Generate in-depth case studies (8 different household/farm level cases) of land abandonment and underutilization to understand how multiple drivers cause underutilization and abandonment
3.3 Analyse policy and legal issues associated with equitable access to under-utilised and abandoned land.
3.4 Plan, implement and test management options to bring under-utilised and abandoned land back into production and equitable use

4.2 Revised Objective Structure as response to Mid-Term Review

As a consequence of the Mid-Term Review the project was restructured as six research themes across the previous three objectives, and an overarching policy theme. Here are the revised activity statements with some further explanation of their specific aims. A summary of the changes is presented in Table 1.

Objective 1 To improve the capacity of household-based agroforestry systems to enhance livelihoods and food security

Research themes

1 Market-oriented field interventions: To improve our understanding of the institutional environment affecting markets of agroforestry products. It also concerns the practical implementation of agroforestry interventions, which include both growing systems and commodity markets, at the 6 priority sites

2 Impact of agroforestry interventions: To gather and analyse both quantitative and qualitative information to determine the impact of interventions in the farm-forest system. This includes biophysical data of agroforestry production systems and qualitative information of the impact of interventions on women on the 6 research sites. The modelling activity will integrate biophysical and social (e.g. from *Inclusive CF* sub-theme) information to estimate the potential impact of EnLiFT innovations further field in the Mid-Hills

Objective 2 To improve the functioning of community forestry systems to enhance the livelihoods and food security of CFUG members.

Research themes

3 Inclusive community forest planning: To explore the link between regulatory framework and community forest planning practices and understand dynamics of inclusive forest management and local level planning in the changing contexts.

4 Active and equitable forest management: To catalyze active and equitable forest management and silvicultural practices through the establishment of demonstration plots and contribute to participatory silvicultural technology by gathering data from community forest management trials. This will also provide information that will be used in the EnLiFT model in the *Impacts* sub-theme.

5 Market-responsive community forest institutions to explore and catalyze market-responsive community forestry institutions by experimenting the collaboration between the private sector and community forest user groups; and to facilitate participatory market appraisal and business-readiness with CFUGs

Objective 3 To improve the productivity of, and equitable access to, underutilised and abandoned agricultural land

Research theme

6 Understanding Under-Utilised Land. To disseminate our understanding of drivers and dynamics of UUL and to develop a typology of different types of UUL and management options for their productive and equitable use. The UUL activity was the most heavily reduced from its original plan**.**

Overall

7 EnLiFT Policy lab

Regular engagement with senior policy makers conveying evidence-based recommendations for forest policy. This was particularly important as part of response to the 2015 earthquakes.

Table 1 Evolution of core activities in a response to the Mid-Term Review.

Pre Mid-Term Review	Post Mid-Term Review
Innovative agroforestry systems with market opportunities	**Market-oriented field interventions** To find best-bet agroforestry interventions to improve livelihoods from private land
Policy, institutional, and governance to improve agroforestry	**Agroforestry impact** To measure the impact of AF & CF interventions with a model of the farm-forest interface
Models to inform improved interactions between farm and forest	**Inclusive planning & governance** To demonstrate inclusive operational planning processes
Innovative community forestry management practices with market opportunities	**Active & Equitable Forest Management** To stimulate active silvicultural management through participative processes
Policy, institutional, and governance to improve community forestry	**Market-oriented Community Forestry** To facilitate market engagement from community forests
Development and demonstration of functioning innovative models of community forestry systems	**Under-Utilised Land** To find pathways to bring under-utilised land back into production.
Household or farm level cases and evidence of land abandonment	**EnLiFT Policy Lab** To initiate and contribute to a science-informed policy formation.
Maps and knowledge of drivers of under-utilised and abandoned land	
Innovative options for use of under-utilised and abandoned land	
Policy, institutional, and governance options for managing under-utilised land	

Even after the new suite of 7 research streams were established as results of the mid-term review, the *Market-oriented Community Forestry* stream further evolved into the *Market-responsive Community Forestry Institutions* stream to reflect the limitations and opportunities that arose in the action research process.

5 Methodology

5.1 Research partners

Ten organisations were engaged as formal research partners about six other organisations engaged at various stages in stakeholder consultations (see Table 2). As it was an interdisciplinary project, the core partners contributed to and have ownership of all research activities, even though their specific inputs were focused along disciplinary lines. It is not possible to count the number of individuals involved, if we were to count all the casually employed survey enumerators etc, however at the project completion 72 individuals were listed on Basecamp, the in-house online communication platform. In reality, while there were 34 active researchers nominated in the original proposal at project completion this had reduced to about 15.

In the field a far greater number of individuals were involved in participative research partnerships in the form of the LRPs, LRGs, >300 farmers participating in agroforestry interventions and seedling distribution. A total of 5,080 households from 35 CFUGs participated in silvicultural training, silvicultural demonstration and inclusive planning, and business skills training workshops.

Table 2 Partner and stakeholder organisations and roles

Organisation	Role
Core partners	
University of Adelaide	Commission organisation. Project management. Biophysical discipline lead: agroforestry, silviculture, modelling
University of New South Wales	Collaborating organisation. Social discipline lead: institutional and policy work
World Agroforestry Centre, Bogor Indonesia	Collaborating organisation. Bioeconomic modelling and market and value chain analysis. Only years 1-4
IUCN-Nepal	In-country secretary and coordination UUL research
ForestAction Nepal	In-country lead and coordination organisation. All research domains with focus on community forest institutions
Nepal Agroforestry Foundation	Agroforestry interventions Market research
Search Nepal	Baseline surveys market research and UUL
Institute of Forestry, Tribhuvan University	UUL research GIS contributions
Community Forest Division, Department of Forests	Policy and regulatory frameworks. Field access via District and Assistant Forest Officers
Federation Community Forestry Users, Nepal (FECOFUN)	Representation, coordination and extension activities with Community Forest User Groups.
Field partners	
Kavre District	DFO, Assistant Forest Officers (3 sites); District FECOFUN 6 Local Resource Persons; 6 Local Research Groups totalling ~ 150 farm households, 12 CFUGs
Lamjung District	DFO, Assistant Forest Officers (3 sites); District FECOFUN 6 Local Resource Persons; 6 Local Research Groups totalling ~ 150 farm households, 12 CFUGs

Stakeholders	
Federation of Forest Based Industry & Trade (FenFIT)	
District Agriculture Development Officer (DADO)	Member of District Level Coordination Committee (DLCC) of EnLiFT, linkages with farmers in the sites, resource person in trainings, interviewees
District Livestock Development Officer (DLDO)	Member of District Level Coordination Committee (DLCC) of EnLiFT, linkages with farmers in the sites, resource person in trainings, interviewees
District Development Committee (DDC), and Village Development Committee (VDC)	Member of District Level Coordination Committee (DLCC) of EnLiFT, linkages with farmers in the sites, resource person in trainings, interviewees
Ministry of Agriculture and Cooperatives	Member of Project Advisory Committee
Dept of Forest Research and Survey (DFRS)	Member of Project Advisory Committee

5.2 Research Sites and Communities

While the original proposal set five physical criteria for site selection, a three-stage process of partner and stakeholder consultations resulted in nine criteria as follows: elevation; forest type; resource potential; accessibility; willingness, preparedness and political environment; inclusiveness; migration status; possibility for major development intervention; community forest area, group size and maturity of the group. The process of site selection is fully described in Paudel et al 2014 (RPS 2014-01).

The resultant sites selected were the villages of Jita Taxar, Nalma and Dhamilikuwa in Lamjung District and Chaubas, Methinkot and Dhungkharka in Kavrepalinchowk district. These are shown in Figures 1 & 2 below and described in detail at various points in this report.

Of the total 3,517 member households of 24 CFUGs in six Village Development Committees (VDC), 300 were targeted for agroforestry action research intervention and 1,200 households targeted to work as clusters for action research activities related to community forestry.

Engagement with communities in agroforestry activities was relatively evenly spread across all sites. In contrast, engagement with communities in community forest activities was not evenly applied across all sites. Chaubas is the site of one of the two sawmills that the original Nepal Australia Forestry Project established. There was a strong focus on this site because of this legacy. The mill was not in operation at the beginning of the project, so understanding and successfully rectifying this situation became a focus activity.

Also, the original plan was to establish silvicultural demonstration plots in each of the focal CFUGs in the six research sites. However, demonstration plots were only established in three of these sites (Chaubas, Dhunkarka and Mithinkot) due to following reasons. In Mithinkot (Kavre District) and Dhamilikuwa (Lamjung District), the internal conflict of the executive committee and local groups obstructed implementation of silviculture demonstration plots despite initial agreements and provision of training. In Nalma (Lamjung District), the focal community forest was generally far from the village on steep slope which are not suitable for demonstration and extension activities. Despite these challenges 12 demonstration plots were established in the three sites.
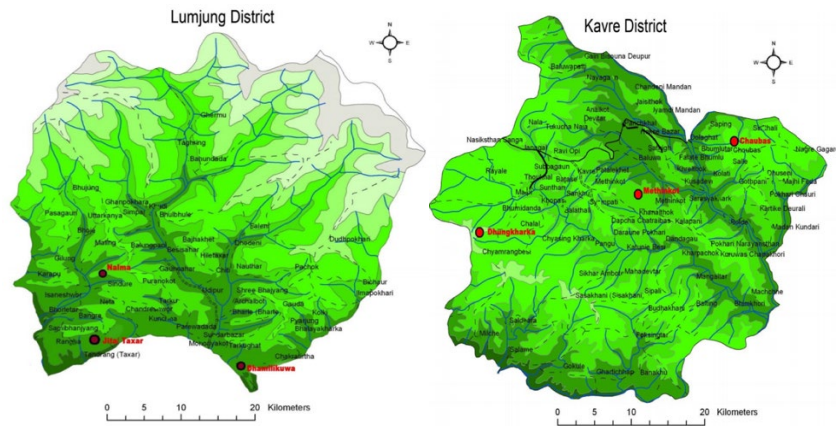
Figure 1 Research sites (in red) in Lamjung and Kavre districts
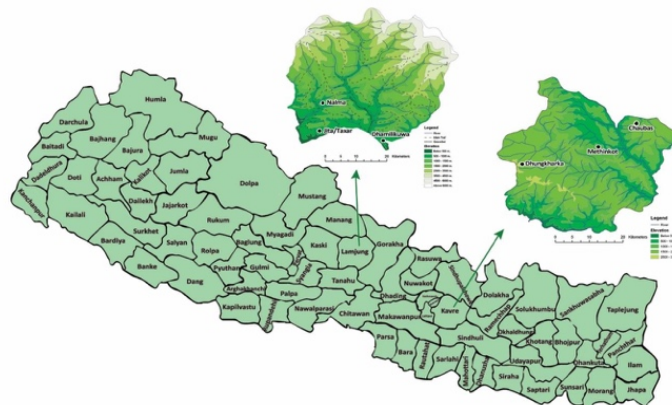
Figure 2 Kavre and Lamjung districts and research sites within context of Nepal

5.3 Research Process

This project followed an adaptive action research approach with mixed quantitative and qualitative methods reflecting its interdisciplinary nature. This allowed triangulation within and across research themes for rigor and integration of the overall research aim. The overarching interdisciplinary framework is represented in Figure 3
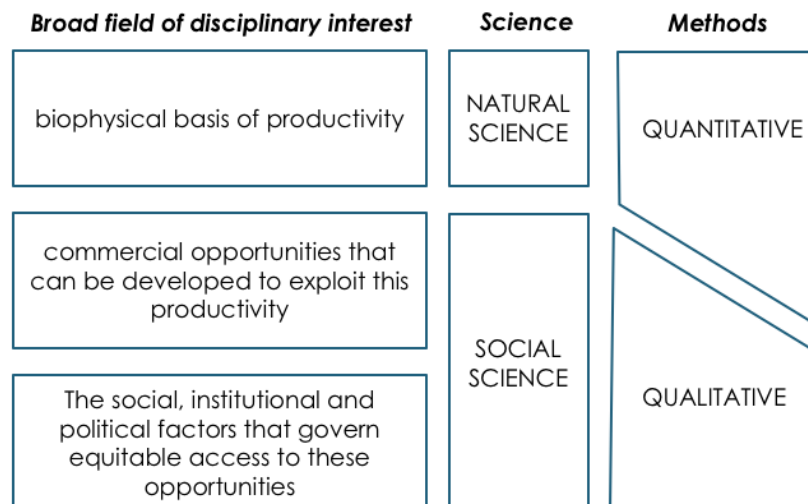
Figure 3 Interdisciplinary framework of EnLiFT

The action research cycles operated at 6-monthly intervals and were formalised as Action Research Planning Meetings held usually in June-July and December-January. Figure 4 provides an example of how these action research cycles provided the operational framework for the silviculture activity.
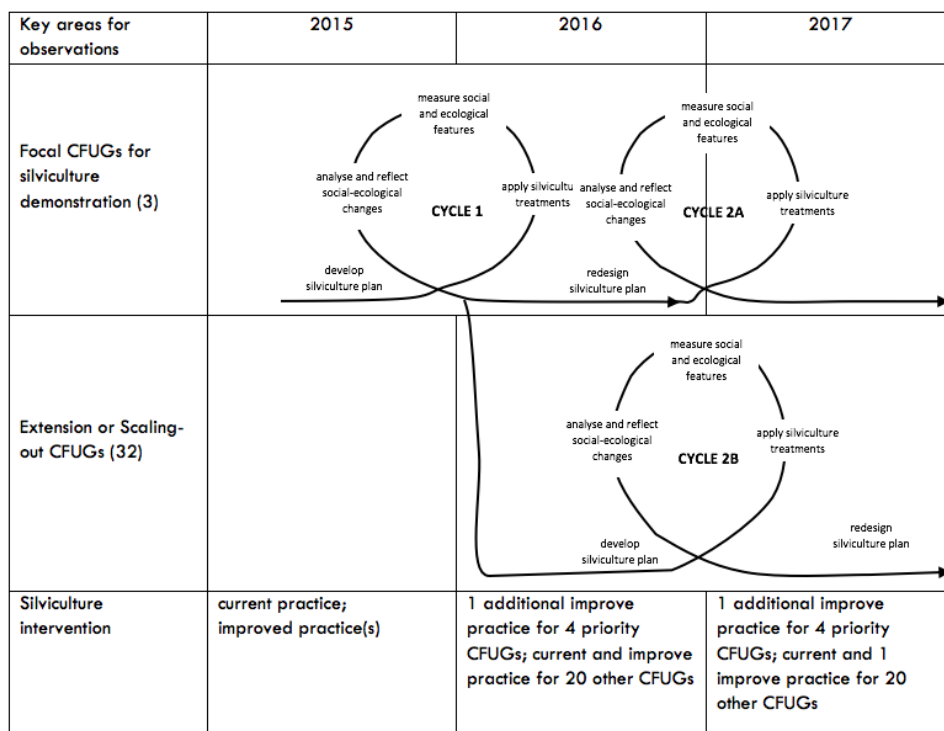
Figure 4 Operational framework for EnLiFT Silviculture Action Research (RPS 2016-6)

5.3.1 Baseline surveys

The first year of EnLiFT was occupied with a series of baseline surveys. These are reported in full in the following papers in the Research Paper Series (RPS).

- Tamang et al (RPS 2014-02) Baseline Household Profile on Agroforestry, Community Forestry and Under-utilised Land in Six Selected Sites in Kavre and Lamjung Districts, Nepal
- Paudel et al (RPS 2014-03) State of art in linking community forestry with food security in the Nepalese hills: *Cases of Kavre and Lamjung districts*
- Pandit et al (RPS 2014-04) Qualitative Baseline Study on Agroforestry in Kavre and Lamjung Districts, Nepal
- Malla et al (RPS 2014-05) Qualitative Baseline Study on Underutilised Land in Kavre and Lamjung Districts, Nepal

The overarching questions for all these surveys were:

- How can agroforestry systems be improved focusing on interactions between forest, livestock and agriculture to enhance livelihoods and food security particularly of the poor and women?
- How can community forest management systems be improved to improve livelihoods and food security of local communities particularly the poor and women?
- How can forest and agroforestry products be better marketed to increase cash incomes of the local communities, particularly the poor and women?

- How can agroforestry and community forestry institutions be re-oriented to catalyse the enhancement of livelihoods and food security?
- What are the critical policy and regulatory constraints to effective management of community forestry and agroforestry resources? What changes should be made to enable innovative resource management, utilization and marketing?
- What are the drivers affecting the expansion of fallow land and how could this land be better utilized.

Tamang et al (2014b) is a quantitative survey with a randomized cluster sampling method based on "probability-proportion-to-size" (PPS) at the range post level, village and ward/hamlet level. The sample size was 670 households, representing 4,092 individuals, selected from 24 participating CFUGs. This survey collected data on: household demographics, education and economics; rural assets, farming system structures, inputs and production levels; financial activity and land tenure; off-farm income and expenditures; decision-making hierarchies; livelihood problems; awareness and participation of community forest activities, regulations and institutions; and reasons for land abandonment.

Paudel et al (RPS 2014-03) used mixed qualitative and quantitative methods to establish the baseline status of community forestry and its constraints to improving equitable livelihoods. This was used to identify priority researchable areas in the sites forming the basis of subsequent action research interventions. The methods employed were: 1] document review; 2] 30 key informant interviews (KIIs); 3] 24 focus group discussions (FGDs); and 4] other participatory rural appraisal methods such as transit walks, observations, and case studies of institutional processes of 6 core CFUGs.

Pandit et al (RPS 2014-04) is a qualitative survey to establish baseline agroforestry information at: 1] national level policy, regulations, processes for farm tree registration and sale and constraints on agroforestry promotion; 2] district level tree species on private lands, current best-bet agroforestry options, and institutional support for agroforestry; and 3] site level descriptions of agroforestry systems, problems and perceived opportunities. This survey also employed participatory rural appraisal methods such as: document review, KIIs; FGDs; and field transits.

Malla et al (RPS 2014-05) is a qualitative survey to describes the current state of under-utilised land (UUL) at the 6 study sites, the extent of underutilization, the socioeconomic characteristics, and the drivers of UUL. It describes: the biophysical characteristics and current land use and practices; livelihood sources of land owners; tenure systems and land use institutions; status of out-migration from the 6 sites, and its impact on landuse; perceptions of UUL. It gathers data from national and site level, and engaged in 12 KIIs and 30 FGDs.

5.3.2 Market-Oriented Field Interventions (agroforestry)

There were three parallel activities within this research theme: identification and implementation of best-bet agroforestry interventions; participatory market chain appraisal of agroforestry products; and agroforestry business literacy training workshop.

Identification and implementation of best-bet agroforestry interventions

The core aim of this activity was to determine the best agroforestry options suitable for addressing local needs and priorities in the changing context. The focus was on finding which commodities could improve the commercial productivity of the agroforestry system. At the beginning of the EnLiFT project we undertook an extensive baseline survey of over 670 households across the six communities (Tamang et al 2014b). This characterized not only household economies but also the nature of the CFUGs these households belong to.

From this population we directly engaged in participatory action research processes with over 300 farming households for specific agroforestry interventions. A suite of best-bet agroforestry options was developed and implemented. At the project end we undertook surveys to determine the changes in overall household economy, poverty level and food security.

Full details of this method are found in Pandit et al (submitted to Agroforestry Systems 2018)

There were six action research steps: 1] research need assessment; 2] organizing Local Research Groups (LRGs); 3] training of Local Resource Persons (LRPs); 4] Business planning for nurseries and market; 5] implementation of agroforestry improvements on farms; and 6] monitoring and survey.

Early project survey work included: FGDs to understand the existing best bet agroforestry options, social issues including gender differences of the action research communities and groups, food security situation, preliminary vegetable marketing and value chain system; and KIIs to determine local communities' interest in agroforestry interventions. The end project survey was a simple socio-economic household survey questionnaire administered to 289 households (out of 1200 households within 24 CFUGs) in May 2016; The initial scoping exercise evaluated 16 commodities which included several tree crops, but the final evaluation settled on the commodities listed in Table 3. All interventions were accompanied with enhancement of on-farm tree fodder resources because of the great potential from goat and milk production.

Table 3 Priority species and site characteristics

VDC	Priority species	Site characteristics in terms of scope of marketing
Dhamilikuwa	Banana	Traditional part of the farming system, available land, good soils, cash culture already present, motivated women's group promoting banana value chain, close to 50% of families already growing banana on a very small scale. Proximity to banana market centers (Bhotewadar and Dumre). Some farmers also can sell to regional market (Narayangad)
Jitataxar	Banana	Available land, proximity to key market (Damauli), many organizations promoting activities (Agriculture service center, cooperatives), scope to grow banana as cash crops, banana traditional to region due to good soils and good climate (tropical).
Nalma	Round chili	Dry area, sandy soils, distant from markets, Round chili and lapsi only grown by a few farmers, active women's group raising goat for meat production. Only a few farmers grow banana, but climate is not suitable.
Chaubas	Cardamom	Hilly terrain with many competing crops especially cardamom grown with *Alnus* tree as shade trees mostly for cash generation and few farmers growing banana but priority given to other crops, poor transport, few promoters, not feasible for growing banana.
Dhungkharka	Tomato	Small land holdings, poor transport, distant from markets, few promoters, small sloppy terrace, rainfed, irrigation priority given to tomato not to banana.
Mithinkot	Ginger	Close to district headquarters and markets, many other competing crops, farmers' focus on ginger and buffalo milk as a livelihood strategy. Few farmers growing banana, but not for commercial purpose, very dry region, not suitable for banana growing.

Participatory market chain appraisal of agroforestry products

The aim of this work was to assess the market chain and trend of all agroforestry products of the project sites. Specifically: to identify the existing and potentially marketable agroforestry products of the project research sites; to assess the market chain of the full range of agroforestry products harvested in the project site; to explore the factors responsible for changing agroforestry products market chain and trends, its barriers and constraints, opportunities and limitations exist in the project research sites.

This activity used the conventional range of Participatory Rural Appraisal (PRA) tools: literature review; KIIs and FGDs with CFUG executive committee members, LRPs, local teachers, and line agencies supporting LRP and LRG members for agroforestry intervention in the project sites and traders of agroforestry product. Direct observation of marketing places of agroforestry products at the local, district and national level was also conducted during the field visit with LRP and LRG members and other research team members.

In total 93 person were involved in the study, in which 80 persons were purposively selected LRP and LRG members and 13 persons were randomly selected local, district and national level traders. The participation of women in study was 43%.

Full details of this study are provided in Amatya et al (2018).

A 3-day agroforestry business literacy training workshop was delivered in Kathmandu to representatives from all 6 research sites. Training participants were from different ethnicity with 26 participants, of which 14 were female and 12 were male.

The objective of this training was to enable participants to develop their own business plans for selected agroforestry species for income and employment generation, and food security. It included a field trip to view different agroforestry options (e.g. fodder hedgerows) in action.

Full details of this workshop are provided in Joshi and Dhakal (2015).

Private forest value chain analysis

Two complementary studies into the barriers on sale of private timber were undertaken: those of Amatya et al 2016, and Pandit (2014).

Four different types of tools (key informant interviews, group discussion, expert consultations and direct observations) were used in collecting the information for this study besides the review of literatures. Review of literatures, particularly Forest Act- 1993, Forest Regulation- 1995 Private Forest Development Directives 2011 and Environment Protection Regulation- 1997 was the main data collection source for investigating the barriers of marketing of private forestry products. However other literature review also provided an idea on which factors are affecting private forest marketing.

5.3.3   Agroforestry Impact

EnLiFT model of the farm-forest interface

While the previous activity (MOFI in section 5.3.2) measured the actual impact of agroforestry interventions on participating households, the core aim of this activity was to estimate the potential impact of any agroforestry intervention in mid-hill agroforestry systems, and in particular to investigate how changes to community forest systems may impact households. This activity produced a bioeconomic model of the farm-forest system. The conceptual framework for this model is presented in Figure 5.
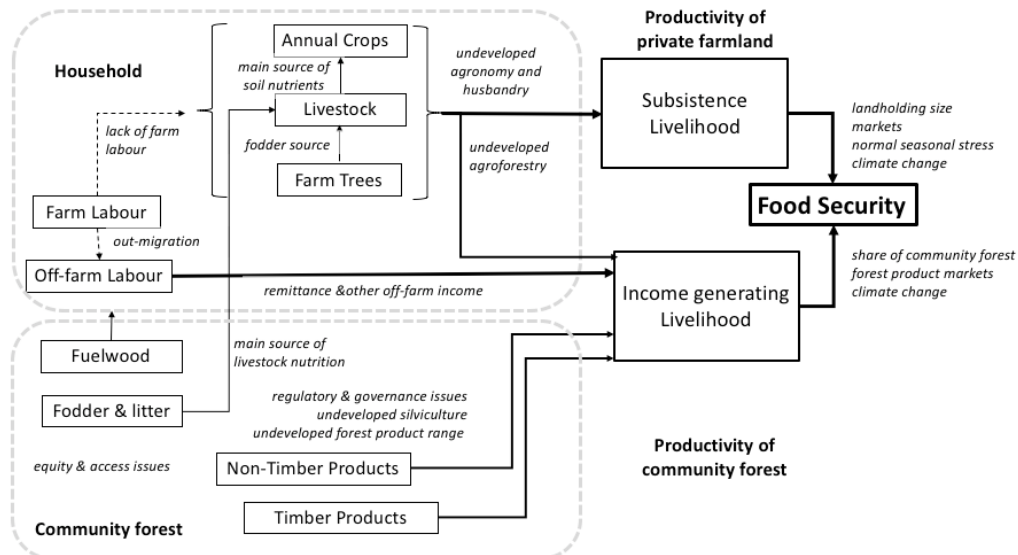
Figure 5 Conceptual framework underlying the farm-forest interface

The development of this model is described in Juita et al (2013), while the full details of this model and its application are provided in Cedamon et al (2016a), Cedamon et al (in process 2018), and a working manual provided in Mulia et al (2017).

The EnLiFT model is written in Stella™ which is a dynamic system modelling platform with a graphical user interface. Figure 6 illustrates the 6 core system component modules that together produce a Food Security Index. There are over 500 sub-components underlying this structure.
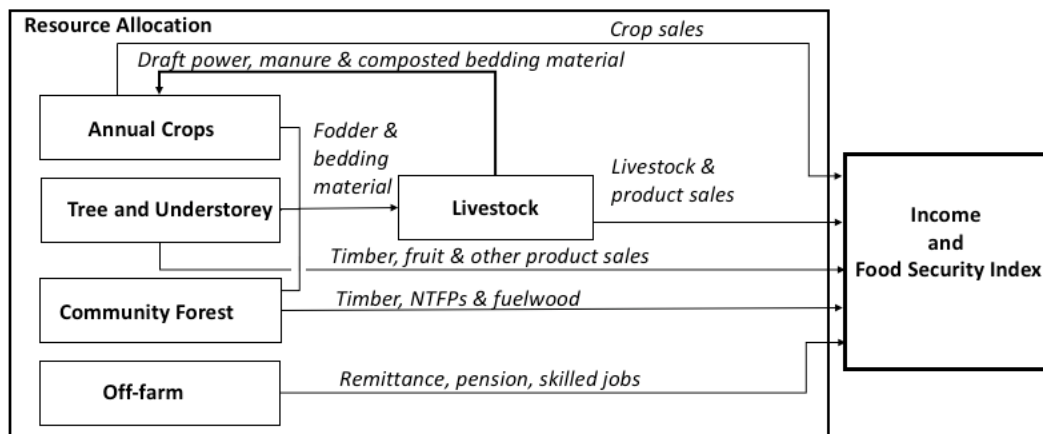
Figure 6 Module structure of the EnLiFT Model 1.0 written on Stella™ platform.

The model allows change in land allocation for components of the agroforestry system and product price (e.g. price of yield or fertilizer) across the year. The yield of tree and understorey components in the system varies across time depending on the growth stage. The model allows different plot areas, product prices and yields of perennial plants across 25 years (i.e. rotation for timber production). This dynamic aspect in the model allows users to design different scenarios related to land allocation, market mechanisms and plant productivity.

Household typology

The capacity of a household to respond to agroforestry interventions is strongly dependent on its physical, financial and human resources. An important strand of research that underpinned the EnLiFT model was the development of a typology of

households within the rural population of our research districts. The method for this work is reported in Cedamon, Nuberg & Shrestha (2017b).

This work used data from the quantitative baseline survey of Tamang et al (RPS 2014-02) which surveyed 0.54% of the population of the two districts. A typology of 6 household types was derived using cluster analysis—a multivariate technique that classifies a sample of subjects using sets of measured variables into a number of different groups such that similar subjects are placed in the group. The variables used for classifying the sample households were caste/ethnicity, whether or not the household has a member working abroad, annual household income, landholding, under-utilised land holding, livestock holdings (using standardised units over all livestock classes), labour force (≥15 years old) and relative tree density.

Women's Voice

Another critical impact of the EnLiFT project is how it affects the perceptions of participating communities. While perceptions and opinions are well documented in the numerous FGDs and KIIs recorded in baseline surveys and later action research, these tend to be strongly biased to represent views of male community members. A parallel activity which exclusively involved women researchers talking with women farmers to 'hear their voice'.

This research activity cuts across both agroforestry and community forestry domains. It identified and assessed the perceptions and opinions of participating women on EnLiFT's approaches, interventions and its demonstrated effects. The intention of this activity was to: identify challenges and barriers of women; encourage positive action to promote the full participation of women; and ensure project benefits both men and women equally.

This research activity employed focus group discussions (FGD) with the same groups of women over the period of 2 years of the project life. Additionally, the assessment also undertook interviews with the women researchers from the project sites. The focus group discussions and interviews were conducted mainly with Local Resource Person (LRP). The FGDs was guided by checklist prepared by the research team. The checklist was developed and finalized after consultation with each thematic research team.

Three series of focus group discussions were conducted in the year 2015 and 2016 in three research sites of Kavre district which were; Fagarkhola of Chaubas VDC, Kalapani of Dhunkharaka VDC and Sa.Pa. Ru. Pa of Methinkot Kashi Phant Nagar Palika.

Another method of information collection is through individual interviews. The interviews were conducted using questionnaire. The interviews were conducted amongst 60 women individuals involved in six CFUGs (Lampata, Aapchaur, Fagarkhola, Kalapani, Saparupa, Methinkot and Langdihariyali) where EnLiFT interventions were conducted. The collected information was transcribed, and processed using descriptive analysis in Xcel as well as Nvivo™. A literature review was also written on women's participation and women's perception in agroforestry and community forestry activities.

5.3.4   Inclusive community forest planning

As community forestry program has been implemented across the country, many social groups are now part of the program. As a result, the issues of who are included (or excluded), how and why has become a critical issue in the way community forestry plans are made and implemented. This research activity sought to answer the following questions:

This research activity sought to these questions:

1. How is community forest planning currently practiced?;
2. What are the local dynamics that shapes community forest planning?;
3. How does authority overlap between community forest and forest officials?;
4. What are the key challenges and opportunities for improving community forest planning?;
5. What is the existing capacity of the CFUGs and DFOs to get engaged in effective community forest planning?; and
6. How does planning accommodate equity/access issues?

As an action research, specific actions and engagement with stakeholders were planned according to the analytical framework illustrated in Figure 7
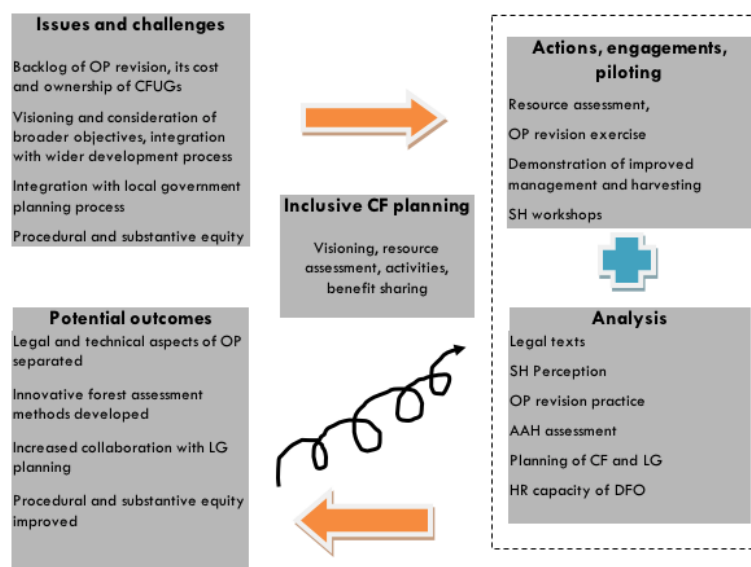
Figure 7 Analytical framework for Inclusive Community Forest Planning research

There are five issues underpinning research on community forest planning.

1. While the Operational Plan (OP) and user group constitution are the primary legal documents ensuring tenure rights through contractual basis, the backlog of OP renewal has put thousands of CFUGs in limbo. The expected technical services from the DFO and other agencies are often inadequate and the whole OP renewal is delayed and costly to the CFUGs, especially ones with the low income. This has created significant uncertainty and confusion in the fate and future of community forestry in many locations. This has created significant uncertainty and confusion in the fate and future of community forestry in many locations.
2. Most of the current planning is focused on conservation and strict protection of forests and there is little consideration of active use, biodiversity, water sources, ecotourism opportunities and expanding market for forest products and goods.
3. There are weak and almost no linkage with the local level development planning led by the local governments.
4. There have been critical challenges in understanding, appreciating and addressing procedural and distributional equity within community forestry.
5. Community forestry planning process still considers the homogeneity of local communities whereas the local communities have experienced an unprecedented social, cultural, economic and political changes.

The methods used in this action research were: review of the planning framework and policies, OP content and process review of all six sites; 10 training sessions on CFUG leadership and governance; 50 interviews with forestry officials; 90 interviews with CFUGs and 450 individual CFUG and executive committee members, informal interaction with women groups, Dalits and disadvantaged, interactions with local government officials; reflections on several CFUG general assemblies; support of the renewal process of 10 OPs; and facilitation of pro-poor allocation of community forest resources. This research has been fully documented in Karki et al (RPS 2015-05).

5.3.5   Active and Equitable Forest Management

As research progressed, it was evident that community forestry faced challenges in two critical fronts: a) how to manage forests actively beyond a subsistence focus, and b) how forestry management process is more equitable. These findings informed the research to become responsive and frame research activities around the theme of Active and Equitable Forest Management (AEFM).

At the initial phase of the silviculture trials and demonstrations, it became clear that we required information on the timber stock, forest structure and CFUGs' silviculture preferences. A rapid silviculture appraisal (RSA) method was developed and employed to allow participation of forest users in the tree measurement, stand structure assessment, and ranking of silviculture system or practice that the CFUGs had tried. The steps of conducting the RSA are provided in Cedamon et.al. (2017a).

Following the RSA, several consultation meetings were held with the 6 core CFUG executive committees and General Assembly to Kavre and Lamjung to get CFUG endorsement on establishing trial plots of silviculture systems or practice they have selected. A total of 11 trial plots where established in three sites – five plots in Chaubas (Kavre District), 3 plots in Dhunkarka (Kavre District) and 3 plots in Jita Taxar (Lamjung Districts). The trial plots in three other sites (Mithinkot in Kavre, Dhamilikuwa in Lamjung and Nalma in Lamjung) did not eventuate due to intra-CFUG politics that hamper timely establishment of the trial plots. A requirement for the demo plot establishment in these CFUGs was revision of operational plans indicating the timber volume that will harvested from the plots. EnLiFT Project provided all the technical assistance and carried out the fieldwork required in preparing a new operational, approval of the plan and approval of harvesting permits.

All trees on the demo plots were measured (diameter at breast height, total and merchantable heights, crown radii, stem maps) and seedlings were counted before, one year and then 2 years after silviculture treatments. Natural regeneration count, crown cover development and tree sizes were remeasured 3 years after the silviculture treatments. Initial results of seedling growth, crown cover and tree growth are reported in Cedamon et.al. (2018a). A guideline for single tree selection based on Q factor was also developed as guide in the establishment of selection systems trial plots. This guideline was presented at the National Silviculture Workshop 2017 and published in Banko Janakari (Cedamon et al 2018b) the Nepal Forestry Journal.

Building capacities of forest users, foresters and forest technicians was at the core of the AEFM theme. This was achieved through the series of field days within CFUGs during the tree measurement, tree harvesting and trial plot monitoring. In addition, two multi-stakeholders' field days were conducted in Chaubas and Jita Taxar where political party leaders of the district, district and national media representative, other district level government line agencies and District Forest Officers and technicians visited the trial plots and made discussion in the field on active and equitable forest management. In-depth interviews were held with key informants in 2017 to gather perceptions of CFUG members

on implementing AEFM. This work is reported in Cedamon et al (in preparation for Forest Policy & Economics, 2018)

Following the success of silviculture practice in the 3 demonstration CFUGs, 2-day trainings where conducted to 18 other CFUGs in Kavre and 14 other CFUGs in Lamjung on how to implement silviculture systems on community forests. The location maps of participating CFUGs and the number of households reach by AEFM implementation is provided in Figures 8 and 9.
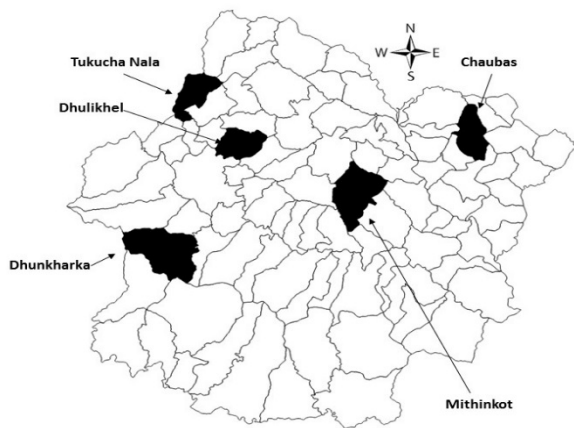
CFUG Name	Forest Area (ha)	Number of Households
Chaubas		
Chapani*	83.5	117
Dharapani*	41.23	62
Racchma	53.25	84
Fagar Khola	41.55	58
Thople Kamere	48.91	125
Lakuri Bhulbhule*	39.2	88
Mithinkot		
SaPaRuPa	297.8	302
Lapsi Ban	105.14	157
Charuwa Ban	253.9	147
Mithinkot Ban	112.5	219
Dhunkarka		
Kalopani Ban	168.75	278
Narayansthan Ban*	209	112
Janajagriti	217	147
Khahare Ban	91.6	146
Gel Khola	7.42	80
Tukucha Nala		
Dhunge Pakha Bahal Ban*	104	251
Hile Jaljale Ban 'Ka'*	104	223
Hile Jaljale Ban 'Kha'*	180	300
Dhulikhel		
Phaskot Sundar*	95.49	251
All Kavre Sites	**2157**	**3135**

*These CFUGs were supported by EnLiFT in revising their operational plan whereby silviculture-based management are introduced in their new operational plan. All the new plans are now operational

Figure 8 Map of Kavre showing the locations of CFUGs participating in the EnLiFT Silviculture Action Research
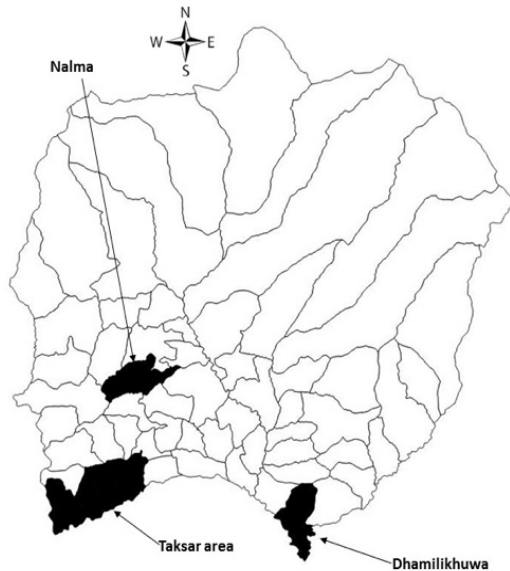
CFUG Name	Forest Area (ha)	Number of Households
Taksar Area		
Lampata*	84.27	260
Kirtipur	66.45	154
Naag Bhairav	58.42	52
Sathimuri	30.05	78
Sunepani	54.65	147
Jyamire	63.6	97
Deurali	80.73	40
Dhamilikuwa		
Aapchour*	122.53	230
Lupugaun	143.19	137
Garambesi	23.55	152
Simalchour	61.84	218
Gaulitar	28.14	103
Nalma		
Langdi Hariyali	275.91	164
Sunkot Devi	133.02	42
Kagro Devi	62.55	27
Khundru Devi	158.43	44
All Lamjung Sites	**1447.33**	**1945**

*These CFUGs were supported by EnLiFT in revising their operational plan whereby silviculture-based management are introduced in their new operational plan. All the new plans are now operational

Figure 9 Map of Lamjung showing the locations of CFUGs participating in the EnLiFT Silviculture Action Research

Institutional Arrangements for Conducting Silviculture Demonstrations

There were many challenges confronting the implementation of silviculture action research including: slow process of government approval for conducting silviculture research on community forests; high turn-over of government personnel; internal CFUG politics and general lack of support for tree felling; and the 2015 earthquake. Additionally, the general conservative ethos among CFUGs raised concerns at the initial stages that active forest management may result in forest degradation and denudation. To address these challenges, EnLiFT adopted a step-wise process in implementing the silviculture action research (Figure 10). While the process below provides generic steps taken in all research sites, there were some minor variations in specific sites based on varied socio-ecological characteristics. This process is described in detail in Paudel et al 2018, in Banko Janakari.
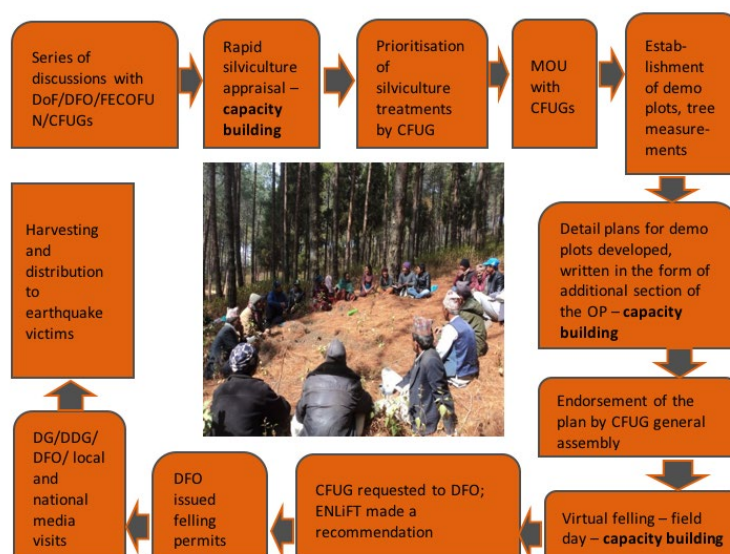
Figure 10 Adaptive action research in silviculture demonstrations

5.3.6 Market-responsive Community Forestry Institutions

In parallel with the AEFM outlined above, we explored activities that could foster stronger market orientation of community forestry. This can be broadly split across three activities: community forest value chain analysis; participatory market analysis and business literature workshops; and facilitation of the revival of the Chaubas sawmill.

Community forest value chain analysis

Forest value chain analysis examines the structure, actors, and dynamics of value chains that connect farm and forest products through the various stages of processing and other value-added activities. Specifically, this study analyzed critical policy and regulatory constraints to effective management of community forestry and agroforestry resources, and the possible changes to enable innovative resource management, utilisation and marketing. The aim was to identify and expand community involvement in the management of community-run forests, focusing on the following objectives:

1. Provide a list of researchable market opportunities in six CF research sites together with the primary stakeholders, i.e. CFUG members and the local resource persons, (LRPs) and Local Resource Groups (LRGs), as well as secondary stakeholders such as DFO's staff of the two districts, FECOFUN, FenFIT, and wood depots.
2. Increase the capacity of farmers and CF users on market research concepts and skills, and simple value chain assessment (VCA), based on active orientation sessions at local, district and national level with market team members and subject matter specialists (SMS).

3. Identify what are the critical policy and regulatory constraints to effective management of community forestry resources?
4. Recommend positive and market responsive changes to enable innovative resource management, utilisation and marketing?

The methodology integrated both primary and secondary information to identify the community forest product chain, existing marketing practices, market access, and its problems and opportunities. The study involved literature review to identify best practices in commodity selection and value chain assessment, and focus group discussions (FGDs) to systematically gather information on selected commodities from community forest users. These FGDs were undertaken at the district level with forest officials and local research groups in attendance (about 15 people in each session).

This activity is described in full in Tamang et al (RPS 2015-03).

Participatory market appraisal and business literacy workshops

The aim of this activity was to enable community forest leaders, local entrepreneurs and individuals interested in forest-based enterprises understand and analyze value chains of various forestry products and help them to enhance their marketing expertise. This was applied as two district level workshops engaging 112 participants across the 6 research sites. These workshops were designed to build the business capacity of CFUGs for identifying, prioritizing marketable community forest products and services and help them enhance economic benefits from community forests. They provided training in identifying markets for community forest products and product value addition; provide instruction on the legal requirements of running small forest-based businesses; and facilitated participants to develop their own business plans for forest-based enterprises.

This activity is described in full in Paudel G and Basyal (2015)

Facilitating the revival of the Chaubas sawmill

The Chaubas Bhumlu Community Sawmill, established in 1995 in Kavre district was supported by the Nepal-Australian Forestry Project. The sawmill experienced gradual financial loss and ceased its operation completely in 2012. The mill was a symbolic identity of community initiative of green economy and carried a strong Australian legacy in Nepal. The EnLiFT project adopted a participatory action research approach that brought it back to full operation in 2014. The key steps and rationale in this process are outlined in Table 4. The full story is narrated in Paudel G et al (submitted International Forest Review)

Table 4 Action research process to facilitate revival of Chaubas sawmill

Key steps	Rationale
Meeting with four Community forests	Develop better understanding of the sawmill context and local expectations and identify potential areas for intervention
Diagnostic analysis of failure	Dig out the reasons for failure of sawmill, sketch the strengths and weaknesses of previous institutional options
Presentation and discussion with CFUGs	Share the findings of the diagnostic analysis, seek views of CFUG members on the type of partnership modality, build consensus among all members on engaging private actors as share holders
Agreement on partnership modality	Agree on the partnership modality, finalize the shareholding between community and private
Presentation and endorsement at the general assemblies	Endorsing through the highest authority, build ownership and ensure compliance during the sawmill operation
Potential investors invited	Ensure transparency on investment, increase the scope for potential investors to invest in sawmill
Partnership re-negotiated and established	Possible alternative investment modality explored, flexible options to increase the chances of investment

5.3.7 Under-Utilised Land

Under-Utilised Land (UUL) was the research objective that was most reduced in scope following the Mid-Term Review. Nevertheless, a significant foundational understanding of the problem was developed in the UUL Baseline Survey (Malla et al RPS 2014-05) and a set of 6 Case Studies for each of the research sites (Subedi et al RPS 2015-02). Following these studies, and reflecting the interdisciplinary makeup of the EnLiFT team, we undertook two complementary modelling approaches to further explain the drivers and dynamics of UUL: 1] the qualitative approach in Ojha et al 2017; and 2] the quantitative approach of Cedamon et al (2018 for *Land Use Policy* journal) using Bayesian Belief Networks.

Qualitative approach: Causal relationships of factors underlying UUL

This work is fully explained in Ojha et al (2017). It incorporates data gathered over the period of action research between 2012 and 2015. This included a baseline survey in 2013 , covering 111 and 106 respondents in Methinkot (Kavre district) and Nalma (Lamjung district) respectively (Malla et al RPS 2014-05). These were selected using simple random sampling method from among the total households of four CFUGs in each of the study sites. In 2014, 2015, we considered the 111 and 106 households of the two sites as a population, and purposively selected 20 households (at Nalma) and 17 households (at Methinkot) for in-depth study of land underutilisation, considering diverse attributes of households with parcels of underutilised land, and also covering various wealth groups and locations in the village.

In addition to such strategies of household focussed data collection, various stakeholders involved in agriculture and rural development were interviewed during 2014-2015. Five FGDs where held with district and village level stakeholders in each district, along with repeated field visits and observations, and participatory land use mapping to collect data. To synthesise socio-environmental pathways behind land underutilisation, we developed causal diagrams for each case study site using Vensim® software.

Quantitative approach: Bayesian Belief Network model

This work is fully explained in Cedamon et al (2018 in preparation for *Land Use Policy*). This work analysed the network of variables for UUL and examined the interaction of these variables in order to simulate measures to reduce land abandonment at the household level and its consequences on rural food production and livelihoods. As Bayesian Belief Networks (BBN) represent probabilistic relationships between variables, they can be used to estimate the probabilities of an outcome, in this case land become under-utilised, given certain fundamental conditions.

The BBN model was developed on GeNIe®, a free Bayesian network processing and simulation software implemented on C++. The BBN model for UUL in Nepal defines variables as nature nodes in which 'states' or conditions for each node are parameters based on empirical (both quantitative and qualitative) data. The BBN model was developed using the influence diagrams produced from the UUL case studies (Subedi et al RPS 2015-02).

5.3.8 EnLiFT Policy Labs

The work on EnLiFT Policy Lab (EPL) is fully explained in Ojha et al (under review, Forest Policy and Economics). EPL emerged as an innovative approach to strengthen science-policy interface where stakeholders could engage in an inquiry to explore, identify and facilitate appropriate policy options for contemporary policy issues such as those identified above. The EPLs engaged in policy debate largely concerning community forestry, but also included policy on agroforestry and UUL. EPLs were formulated by blending the work conducted at Harvard and Stanford Universities as "Policy Labs" and the recent

experiments in Nepal around Ban Chautari, Policy Discussion Forums, Nepal Policy Research Network and also drawing on the personal experience of various researchers over the past three decades in Nepal policy process.

The main objectives of EPL were:
- To systematically engage policy actors in the research process,
- To identify and generate policy relevant data and evidence drawing on the rich experience of the policy actors,
- To generate thick descriptions of the ways in which key policy actors understand and interpret policy problems, including the contested views and interpretations of problems and solutions,
- To create opportunities for collaborative inquiry between researchers and policy actors, and
- To identify potential policy solutions to the problems.

The conceptual framework guiding the EPLs is given in Figure 11
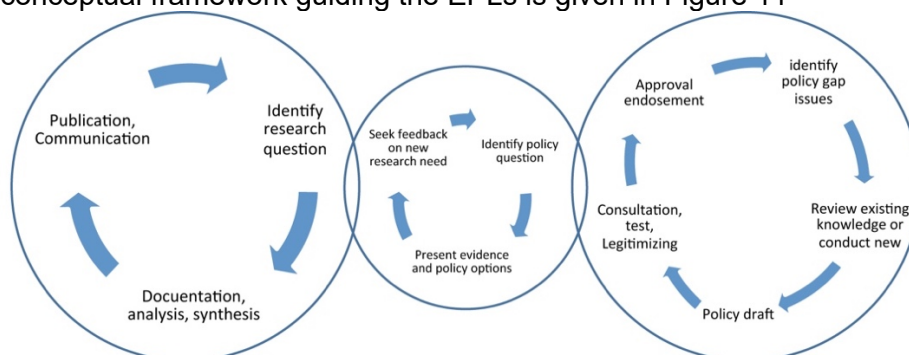
Figure 11 Conceptual framework for EPLs

The EPL was designed following specific operational guidelines:
1. **actors:** representing at least three different perspectives covering government, civil society, private sector, researchers, development professionals, conservation agencies, political parties and the like;
2. **number of participants:** minimum 6 and maximum 10 (plus 2 researchers);
3. **duration:** 2-3 hours;
4. **rules of participation:** moderated but open dialogue free from any perceived threat, every argument supported by concrete evidence, views will remain anonymous if taken for publication.

The specific policy issues for research and communication were identified based on baseline survey, group level meetings and district stakeholder meetings. DFO and FECOFUN, the key support institutions for CFUGs, also the partners in this research, further scrutinised the issues, were reframed and recommended as requiring policy response. The researchers in the team having their long experience in community forestry programme used their good judgment to frame the policy questions. Required data on natural and social-institutional aspects were gathered, analysed and rectified at the local, district levels. Some of the key policy issues for policy lab included:
1. legal and contractual value of community forest operational plans and ways to simplify these;
2. creating regulatory environment conducive to private forestry;
3. regulatory and institutional support for active silvicultural operation in community forests; and
4. facilitating timber supply for post-earthquake reconstruction, etc.

6 Achievements against activities and outputs/milestones

Objective 1: To improve the capacity of household-based agroforestry systems to enhance livelihoods and food security

[A] Original Research Activity	Original & Completed Outputs	Planned &*Actual* Completion Date	Titles of output documents / comments
Activity 1.1: Identify baseline conditions and drivers of agroforestry practice and opportunities to improve productivity and increase income generation	O1: Workshop proceedings including a list of 'best-bet' innovations in agroforestry practice	[Y1:Q1] *July 2014*	**Survey of Agroforestry Systems of Kavre and Lamjung Districts of Nepal** Authors: SA Amatya, BH Pandit, I Nuberg, E Cedamon& YR Subedi,
	O2: Report of baseline information for developing pilot sites for use in Activity 1.5.	[Y1:Q3] *May 2014*	**Research site selection report** Authors: K.Paudel, YR Subedi, S.Tamang **Quantitative Baseline Household Survey Report** Compiler: Deepak Tamang **Qualitative Baseline Report: Agroforestry** Coordinator: BishnuHariPandit Paudel K, Subedi YR, Tamang S, Nuberg I, Shrestha K. (2014), Milestones in Selecting Field Sites for Participatory Action Research, *Research Paper Series on Agroforestry and Community Forestry in Nepal*, 2014-01:1-56, Tamang D, Cedamon E, Nuberg I, Shrestha K. (2014), **Baseline Household Profile on Agroforestry, Community Forestry and Under-utilised Land in Six Selected Sites in Kavre and Lamjung Districts, Nepal**, *Research Paper Series on Agroforestry and Community Forestry in Nepal*, 2014-02:1-79
Activity 1.2: Analyse the markets and value-chains for products from agroforestry systems	O4: Report with short list of researchable existing and potential innovative market opportunities from both inside and outside Nepal that can be incorporated into agroforestry on private lands	[Y1:Q4] *June 2014*	**Value Chain in Lamjung District** Coordinator: BH Pandit **Value Chain in Kabhrepalanchok District**Coordinator: BH Pandit **Agroforestry Nursery and Value Chain Training at Bode and Saraswoti** Authors: MR Joshi, SS Neupane& BH Pandit **Why cannot local communities do forestry business? Analysis of barriers in the value chain of private forestry products in Nepal** BH Pandit, KK Shrestha, HR Ojha, I Nuberg.
Activity 1.4: Develop functioning models to inform improved interactions between farm and forest systems	O7: Report of model design workshop	[Y1:Q1] *July 2013*	**EnLiFT Modelling workshop report Bogor 25-29/11/13** Compiled by: RenyJuita, Avniar N. Karlan, Lisa Tanika and BethaLusiana
	O8: Model of decision-making processes in land use	[Y1:Q4] *Sep 2014*	All the modelling attention has been directed to quantitative ENLIFT model. That model has been presented to the project's social scientists to solicit their input on how to measure the impact of institutional and policy innovations. Developing a formal construct of farmer decision-making processes will become a part of that task.
	O9: Model of nutrient and energy flows in farm-forest system	[Y3:Q2] Oct 2015	Current status described in **EnLiFT Modelling Concept** Authors: R.Mulia&B.Lusiana The model evolved from a 'nutrient-energy flow' model to a model of an 'index of food security' so that it can more effectively integrate with other research streams in the project.
Activity 1.5: Plan, implement and evaluate participatory action research of innovative agroforestry systems and market opportunities at 6 sites	O12: Report of proposed participative research designs and value-chain enhancements	[Y2:Q2] *Dec 2014*	**Value Chain in Lamjung District**: BH Pandit **Value Chain in Kabhre District** BHPandit **Agroforestry Nursery and Value Chain Training at Bode and Saraswoti**Authors: MR Joshi, SS Neupane& BH Pandit **Monitoring and Evaluation of Agroforestry Nursery and Seedling Distribution as Part of Action Research Activity1.5- Outputs 12 and 13** Authors: R.Niraula& BH Pandit

	O13: 6 pilot sites of improved commercial agroforestry systems for demonstration purposes	[Y3:Q4] *Apr 2016*	Outline demonstration trials being undertaken as part of this activity in **Fodder Lopping Trial protocol.** Authors: SM Amatya, ED Cedamon, BH Pandit, I Nuberg **Loth Salla Harvesting demonstration** Authors: ED Cedamon, SM Amatya, BH Pandit, I Nuberg **Fodder Hedgerow trial** Author: ED Cedamon	

[B] **Research sub-theme**	**Activity**	**New Outputs**	**DUE DATE**	**Comments**
1] **Market-oriented field interventions**	Institutional mapping of AF	O1: Publication on "Drivers of farming systems adaptation, farmers' existing agroforestry practices, and perceptions of limitations to their livelihoods across six agro-ecological settings in the Middle Hills region" = KPI for 2014/15	JUN 2015	Cedamon et al 2017. "**Adaptation factors and futures of agroforestry systems in Nepal**" *Agroforestry Systems*
		O2: Report of Participatory Market Chain Appraisal of the full range of AF products (includes market trends and growing markets , and an appendix of EPL notes on regulatory constraints to marketing of AF products)	JUN 2016	Amatya SM, Nuberg I, Cedamon E, Shrestha K, Pandit B, Aulia P, Joshi M, Dhakal B (2018), **Participatory market chain appraisal for the full range of products including market trends and growing markets**. Banko Janakari 27(2) online bankojanakri.gov.np.
		O3: Report of training and outputs of participatory business plans of priority products for each of 6 sites	DEC 2015	Report posted on Basecamp by SM Amatya • Training to 26 farmers over all research sites on Business Plan preparation • Six business plan prepared in Nepali Language • Field verification of these Business Plans in all six sites • Finalization of Business Plan and provided support (seeds, seedlings and expert technical support)for their implementation • Translation of six business Plan in English Language
		O4: Scientific paper characterizing AF formal & informal institutions that can catalyse AF products marketing and their change over time.	DEC 2015	Amatya et al 2015 "**Removing barriers to the commercialis-ation of agroforestry trees in Nepal**" Small-Scale Forestry Conference, Sunshine Coast.
	Priority product implementation	O5: 1st cycle report of commercial plantings	DEC 2015	Report posted on Basecamp SM Amatya: • Provided nursery materials and technical support • Nurseries establish by LRP and LRG's • Seedling distributed to LRG's • Hedge Row demo plot established • Data collection format developed and applied
		O6: 2nd cycle report of commercial plantings	DEC 2016	Delivered as Section 4.1 in this Annual report
		O7: Farmer-to-Farmer training of improved agroforestry systems O8: Extension package to facilitate expansion of innovations	JUN 2017 JUN 2017	**Agroforestry System and Entrepreneurship Development : A Training of Trainers Manual**; on website top menu/publications/other materials/manuals
		O9: Recommendations for institutional and policy	JUN 2017	Agroforestry EPL report. SM Amatya June 2017

		arrangements to enhance livelihoods through agroforestry O10: Report describing results, benefits and lessons from implementation of market-oriented agroforestry systems, O11: Scientific paper AF interventions to enhance livelihoods and food security	SEP 2017 DEC 2017	Report already published in Banko Jankari, journal Nepal April 14, 2018 Pandit et al (2018) **Impacts of market-oriented agroforestry intervention on farm income and food security: A case study from Kavre and Lamjung districts of Nepal**
	AF research-policy interface	O12: Scientific Paper on land policy and food security (UNSW leads, PC and UniADEL contribute) O13: Policy brief on constraints and options for enhancing market oriented agroforestry	DEC 2017 DEC 2017	Ojha et al (2017), **Agricultural land underutilisation in the hills of Nepal: Investigating socio-environmental pathways of change**, *Journal of Rural Studies* 53: pp.156-172. Khatri D et al (2017), **Reframing community forest governance for food security in Nepal**, *Environmental Conservation* 44(2): pp.174-182. Karki, R., et al (*2018*), **From forests to food security: pathways in Nepal's community forestry**, *Small-Scale Forestry*

[B] Research sub-theme	Activity	New Outputs	DUE DATE	Comments
2] **Impact of agroforestry interventions** **Impact of agroforestry interventions**	Agroforestry trials	O14: Progress report of agroforestry trials (NAF)	DEC 2016	AF trials on fodder biomass growth and Taxus baccatta were discontinued as focus necessarily shifted to AF product interventions.
		015: Extension sheets in Nepali on 6 priority product interventions (NAF) O16: Scientific paper(s) on performance of 6 priority product interventions for change in livelihood and food security (NAF lead, UniAdel contribute)	JUN 2017 DEC 2017	**Agroforestry System and Entrepreneurship Development : A Training of Trainers Manual**; in Nepali on website: top menu/publications/other materials/manuals Pandit et al (2018) **Impacts of market-oriented agroforestry intervention on farm income and food security: A case study from Kavre and Lamjung districts of Nepal** Booklet of 6 priority products already published in Nepali
	EnLiFT Model	O17: Scientific paper quantifying factors determining an index of food security in the farm-forest system. (UniAdel lead/ ICRAF)	DEC 2016	Cedamon, Nuberg, Pandit Shrestha (2017), **Adaptation factors and futures of agroforestry systems in mid-hills of Nepal**, *Agroforestry Systems*
		O18: Scientific publication(s) establishing the biophysical and institutional bases for sustainable agroforestry innovations (ICRAF/UniAdel contribute)	DEC 2017	Cedamon et al 2017 **How understanding of rural households' diversity can inform agroforestry and community forestry programs in Nepal**, *Australian Forestry*
	Women's Voices	O19: Paper on Women's perspective on agroforestry research for development (including appendix of EPL notes on gender issues in AF policy) (IUCN lead/UniAdel contribute)	DEC 2017	Shah, Bhattarai et al (2018) In preparation for Research Paper Series 2018-01

Objective 2: To improve the functioning of community forestry systems to enhance equitable livelihoods and food security of CFUG members.

[A] Original Research Activity	Original & Completed Outputs	Planned & *Actual* Completion Date	Titles of output documents / comments
Activity 2.1: Analyse the status of community forestry systems andconstraintstoimprovinglivelihoodsandequitable benefit flows.	O19: Report of baseline information for developing pilot sites for use in Activity 2.5	[Y1:Q4] *Apr 2014*	Quantitative Baseline Household Survey Report Compiler: Deepak Tamang **State of art in linking community forestry with food security in the Nepalese hills: Cases of Kavre and Lamjung districts** Coordinator: Naya S Paudel,
Activity 2.2: Identify innovative community forestry institutions and management practices	O22: Report summarising the innovative options for improved community forestry management for presented by three altitudinal zones	Y1:Q4 *Apr 2014*	**Community Forestry innovations Report** Authors: NS Paudel, R Karki, G Paudel, D Khatri, H Ojha and K Shrestha
Activity 2.3: Analyse markets and value-chains for products from community forests.	O26: Report with a short list of researchable market opportunities that can be incorporated into community forestry	[Y2:Q1] *Jul 2014* *May2015*	**Prospects in Marketing of Timber and NTFPs from Community Forestry in Nepal: List of Researchable Community Forest Tree Species** DD Tamang; SL Shrestha, BDS Dangol, DS Tamang **Researchable List of Trees Species in Community Forestry: Final Timber and Fuel-Wood Tree Preference Ranking** Author:DDTamang
Activity 2.5: Design, implement and evaluate participatory community forestry action research trials	O31: Report outlining research designs and agreements made with up to 6 CFUGs (PC) 031a: Evaluation report on results, benefits and lessons from participatory community forestry trials	[Y2:Q2] *Oct 2014* *DEC 2017*	Silviculture demonstrations trial Authors: ED Cedamon, et al. **Action Research on Community Forest Planning.** found on website top menu/publications/other materials/project reports

[B] Research sub-theme	Activity	New Outputs	DUE DATE	Comments
3] **Inclusive community forest planning**	Exploring link between regulatory framework and CF planning	O20: Process report on Inclusive community forest planning (FA leads, UNSW contributes)	DEC 2015	EnLiFT facilitated the timber sale process in Apchaur and conducted a series of meeting at different level to enhance the participation of Dalits and equitable benefits in Dhamilikuwa and Methinkot. The notes draft research reports have been shared through Basecamp.
		O21: Process report including preliminary discussion paper on Inclusive community forest planning (FA leads, UNSW contributes)	DEC 2016	Khatri eta l 2016 **Reframing community forest governance for food security in Nepal**, *Environmental Conservation*
		O22: Policy Brief: How regulatory framework and local level development governance shape CF planning in Nepal (FA leads, UNSW contributes)	DEC 2016	**Community Forestry and Local Level Planning for Food Security and Livelihoods** by A Adhikary, HR Ojha, NS Paudel, G Paudel, KK Shrestha & I Nuberg website top menu/publications/other materials/policy briefs
		O23: Scientific report: "Inclusive community forest	DEC 2017	Karki, Paudel Shrestha, Ojha 2017

		planning: How regulatory framework and local level development governance shape CF planning in Nepal" (UNSW leads, FA contributes)		**Community Forestry planning in Nepal: How regulatory framework and institutional practice undermine planning for sustainable development.** In draft stage
	Understanding interface between CF planning and local level planning	O24: Process report on how local level planning accommodates CF management (FA leads, UNSW contributes)	DEC 2015	1. EnLiFT researchers and LRPs participated, shared project updates and documented this years local government planning meetings held in all 6 sites 2. Local governments have allocated funds for CF activities in their annual plan in 4 sites 3. Bilateral meetings have been organised with Local Government officials in 4 sites 4. Interviews were organised with local government officials (12) and CF leaders (8) in Lamjung on CF-Local Government collaboration and notes have been documented for further analysis. We will do same in Kavre later this year.
		O25: Process report including preliminary discussion paper on how local level planning accommodates CF management (FA leads, UNSW contributes)	DEC 2016	Reported as Basecamp discussion threads leading to Output 27
		O26: Journal Paper: "CF innovation pathways for food security" (FA leads, UNSW contributes)	DEC 2015	Karki et al "**From trees to food security: pathways in community forestry in Nepal**" accepted in *Small Scale Forestry*
		O27: Policy Brief: on interface between CF planning and local level planning (FA leads, UNSW contributes)	DEC 2016	**Community Forestry and Local Level Planning for Food Security and Livelihoods** Authors: Anukram Adhikary, Hemant Ojha, Naya Sharma Paudel, Govinda Paudel, Krishna Shrestha and Ian Nuberg
	Empowering women and disadvantaged groups	O28: Report on the perspectives, initiatives undertaken and outcomes related to empowering women and disadvantaged groups through inclusive community forestry	DEC 2017	Shah & Bhattarai (RPS 2018) **Increasing women's voice in community forestry and agroforestry: lessons from EnLiFT Project in mid-hills of Nepal**
	CF research-policy interface	O29: EnLiFT Policy Lab report	JUN 2016	Policy Lap reports (various); Include them in the appendix (actual date of timber related EPL falls in previous Reporting period but the actual effects are in this year.
		O30: Report on EPL methodology/framework capturing learning from workshop reports (UNSW leads)	DEC 2016	**Innovation at the Research-Policy Interface: Applying the Policy Lab Approach in Nepal's Forest Policy Process** Authors: Hemant Ojha, Krishna K Shrestha, Naya S Paudel, Udeep Regmi (2017)
		O31: Report describing the policy issues addressed under the EPL approach with recommendations to address the identified policy constraints. O32: Overall scientific paper on science-policy interface (UNSW leads, PC contributes)	DEC 2017 MAR 2018	Ojha, H., Shrestha, K. K., Paudel, N., Nuberg, I. **Improving Research-Policy Interface: Developing a Policy Lab Approach for Nepal's Community ForestGovernance** Ojha H Regmi U, Shrestha KK, Paudel NS, Amatya SM, and Nuberg 1 (2018) **Can Research Inform Public Policy? Policy Lab Experiments in Nepal's Community ForestGovernance**

[B] Research sub-theme	Activity	New Outputs	DUE DATE	Comments
4] **Active and Equitable Forest Management**	Silviculture demonstration, monitoring and measurement	O33: Silvicultural demonstration plots established on 3 sites in Kavre and 3 sites in Lamjung with a series of extension activities (UNi Adel leads, FA and UNSW contributes)	MAR 2016	Silviculture Workshop papers Cedamon et al 2017 Paudel G et al 2017 etc
		O34: Process report on silvicultural research report #1 (FA leads, Uni Adel contributes)	DEC 2015	Combined report in Research Paper Series #
		O35: Process report on silvicultural research report #2 (FA leads, Uni Adel contributes)	DEC 2016	
		O36: Policy discussion paper summarising key lessons from the active and equitable forest management action research highlighting key policy recommendations; including an appendix of EPL notes. (Uni Adel leads, FA and UNSW contributes)	JUN 2017	Proceedings National Silviculture Workshop 19-21/02/2017
		O37: Resource book for active and equitable community forest silviculture (FA leads, Uni Adel and UNSW contributes)	DEC 2017	In preparation and translation into Nepali. DoF leading this work.
		O38. Journal paper: Silvicultural innovations for food security (Uni Adel leads)	DEC 2017	Cedamon et al 2016 **Rapid silvicultural appraisal to characterize stand and determine silviculture priorities of community forests in Nepal**, *Small-scale Forestry,*
		O39. Journal paper: Catalyzing active and equitable forest management: Practices and lessons (UNSW and UniAdel lead)	DEC 2017	Published 3 papers in Banko Janaki

[B] Research sub-theme	Activity	New Outputs	DUE DATE	Comments
5] **Market responsive CF institutions**	Rapid market appraisal & business literacy workshops	O40: Research report analyzing timber market value chain, regulatory constraints opportunities and challenges facing the Chaubas sawmill. Includes EPL notes on regulatory challenges and solutions for Chaubas sawmill operation (SN leads, FA, UNSW and UniAdel contributes)	JUN 2016	Paudel, et al *"***Making community forest management active and equitable: a framework and lessons from the mid-hills of Nepal"** Paudel et al "**Can community forestry groups run enterprises? A case of Chaubas timber processing company in Nepal***"* Paudel et al "**Institutionalizing Community-based Enterprises in Nepalese Community Forestry "**
		O41: Report on RMAs and business literacy workshops held at 6 priority research sites	OCT 2016	Paudel G & Basyal M (2016) En1_36_PR_Report on PMA and BLW in CF.docx
		O42: Scientific paper based on the review of lessons on community-private sector partnership in natural product business from Chaubas and other relevant cases (UNSW leads, UniAdel, SN and FA contributes)	DEC 2016	Paudel G, Perdana A, Krishna K, Nuberg I, Ojha O, Paudel N (under preparation) Khatri et al (2017) in Environmental Conservation.
		O43: Report on the benefits from market responsive community forestry institutions	DEC 2017	
		O44: Short illustrated handbook on how to compile business plan or make your own CFUG business scheme.	DEC 2017	Not delivered, but extended over to EnLiFT2 project, under Objective 3

Objective 3: To improve the productivity of, and equitable access to, underutilised and abandoned agricultural land

[A] Original Research Activity	Original & Completed Outputs	Planned &*Actual* Completion Date	Titles of output documents / comments
Activity 3.1: Conduct key informant survey at district and village levels to identify the status of abandoned and under-utilised land in the study districts and sites complimented by GIS based information	O39: Preliminary key informant survey supported by GIS-generated maps of land use, tenure and access of 6 study sites with a focus on under-utilised and abandoned agricultural land	[Y2:Q2] *Oct 2014*	**Quantitative Baseline Household Survey Report** Compiler: Deepak Tamang **Qualitative Baseline report: Under Utilised Land.** Coordinator: Yam Malla
	O40: Report on Training opportunity for Institute of Forestry students	[Y2:Q2] *Dec 2014*	This activity stalled when we realised that there were not enough funds in pay period 4 to fund IOF student projects. However, 3 sessions of training in silviculture tech
Activity 3.2: Generate in-depth case studies (8 different household / farm level cases) of land abandonment and underutilization to understand how multiple drivers cause underutilization and abandonment	O41: Report describing the drivers and dynamics of land use in the Middle Hills	[Y1:Q4] *Jul 2014*	Partially fulfilled by **Transforming land and livelihoods: Analysis of agriculture land abandonment in the mid hills of Nepal** K.Paudel, S.Tamang, K.Shrestha, R.Shah

[B] Research sub-theme	Activity	New Outputs	DUE DATE	Comments
6] **Under-Utilised Land**	Understanding UUL	O45 A scientific paper explaining genesis of under-utilised agricultural land & Household case studies of land access, use and abandonment (UNSW leads, UniAdel and UUL team contributes)	DEC 2015	Ojha et al 2017. **Agricultural land underutilisation in the hills of Nepal: investigating socio-environmental pathways of change,** *Journal of Rural Studies*
		O46: National UUL workshop to communicate EnLiFT knowledge; gather other UUL research; debate national UUL policy and strategy	JUL 2016	**Proceedings of National Workshop on Land Management and Food Security: Addressing Underutilised Agricultural Land Issues in Nepal** (28-29/04/2016) Summary in Appendix 2 2015/16 Annual Report
		O47: Scientific paper modelling land-underutilisation in Nepal mid-hills through Bayesian Belief Network	JUN 2017	Cedamon et al 2018 02, **Modelling pathways for reutilisation of abandoned agricultural land in mid-hills Nepal** Nuberg et al (2018)
		O48: Discussion paper integrating knowledge gained from AF & CF themes as it applies to bringing UUL back into production	DEC 2017	**Pathways to forest wealth in Nepal**
		O49: Policy brief on options for bringing UUL back into production	DEC 2017	Recommendations to 14th Plan of the National Planning Commission

7 Key results and discussion

The EnLiFT project has made significant contributions to Nepalese agroforestry, community forestry and understanding of under-utilised land, in terms of new conceptual frameworks, scientific knowledge, on-ground impact and influence in the living policy conversations on these domains of landuse.

This discussion section will present the key results of the seven research streams developed from the mid-term review, along with brief mentions of the associated capacity building activities (which are later described in Section 8). Some research streams were more successful than others, at least to the extent that they achieved the original aims. The reasons for the relative successes will be discussed in a section on Lessons Learnt. The perspectives of our stakeholders will also be presented as this is considered an important 'result'. The section will then conclude with an over-arching narrative linking EnLiFT1 and EnLiFT2, and highlighting some of the key conceptual contributions.

7.1 Market-Oriented Agroforestry Field Interventions

EnLiFT's main agroforestry objective was to improve livelihoods and food security of people of the study area in order to respond to declining productivity and food insecurity due to a range of factors such as long term monocropping and also from abandoned agricultural lands. The process, scale of engagement, problems encountered and details of results can be found in these the 2016-17 Annual Report. The work reported here is field work of implementing agroforestry interventions and the institutional work to understand barriers to marketing of farm-grown timber.

7.1.1 Agroforestry interventions

The agroforestry interventions that emerged from the market research are listed in Table 3 in Section 5.3.2. This report describes the results survey of the impact of implementing these interventions. This survey was undertaken by NAF. It was a before-and-after survey of 289 households out of 363 who were involved in agroforestry action research activities as LRGs of farmers including FGDs and KIIs.

Change in income level

We investigated the productivity and livelihood impacts of five agroforestry systems including (1) banana based fodder and livestock (2) ginger based fodder (3) tomato, fodder and buffalo (4) Alnus and cardamom and (5) round chili and fodder trees on private lands.

Farmers benefitted most by the banana-based, high-yielding fodder system followed by alnus-cardamom system, tomato fodder and buffalo, ginger fodder and chili fodder system due to high value cash crops. The banana-based system contributed more than other systems where the income is highest ([2]NPR 30,725/ year/household) at Dhamilikuwa. This is more than triplefold of Nalma village (NPR 9,878). This is also justified from the facts of Jita taxar (banana system) where the under-story crop was also banana. After banana based AF, Alnus-cardamom system came in front from Chaubas and Nalma.

The motivation to engage with the agroforestry interventions is influenced by the extent that a household already has some off-farm income. Among all off-farm sources, income from remittance was most important. Households in Nalma used to receive the highest remittance (41%) in 2013 and now it is dropped to 34%. Dhungkharka has the least remittance record (10% in 2013 and 7% in 2016). Accordingly, Nalma households were not so keen to adopt the innovations and Dhungkharka households were more motivated

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[2] *Average exchange rate 2013-2018: NPR 1,000 = approx. AUD 12.50*

to engage in the tomato cash crop. Farmers of Chaubas were also motivated to grow cardamom under Alnus trees because of increasing benefits that they are receiving.

Over all sites, the reliance on off-farm income slightly decreased over the course of the project from 63% to 54%.

Change in poverty level

According to the Nepal Living Standard Survey (NLSS), the index to measure poverty is 2,200 calories consumption per person per day and access to essential non-food items. Based on market prices, a person needs an income of at least NPR 19,450 a year to manage food equivalent to 2,200 calories per day and other essential non-food items (NLSS 2013). Accordingly, an individual earning less than NPR19,450 per year is considered below the poverty line. The national average household size is 4.77 and therefore below poverty line income per household is NPR 92,777 (4.77 HH size x 19450) as indicated at the bottom of the Table 5.

Overall, the study found that the percentage of households below the poverty line dropped from 48 % in 2013 before project implementation to 34 % after the project in 2016. The highest level of poverty shift was observed in Dhamilikuwa, which is from 62 % to 28 % (Table 5). Chaubas have had the highest incidence of poverty, but changed positively over time (67% to 53%). The overall change in reduction in poverty level is significant between the project periods (p<0.01). The reduction in poverty is attributed mainly due to promotion of priority understory crops such as banana in Dhamilikuwa and Jita Taxar, cardamom at Chaubas, ginger at Mithinkot and tomato at Dhungkharka. The difference in overall change in reduction of poverty is 14% (48% to 34%).

Table 5 Poverty level 'before' and 'after' EnLiFT project

District	Village	n = 289 **	Poverty level before 2013		Poverty level after 2016		% change above poverty line	
			Below poverty	Above poverty	Below poverty	Above poverty		
			%	%	%	%		
Lamjung	Jita Taxar	58	48	52	29	71	**19**	
	Nalma	25	56	44	44	56	**12**	22%
	Dhamilikuwa	53	62	38	28	72	**34**	
Kavre	Mithinkot	48	31	69	29	71	**2**	
	Dhungkharka	50	26	74	22	78	**4**	7%
	Chaubas	55	67	33	53	47	**14**	
	Total	289	48	52	34	66	**14% average**	

**t is significantly different at the 0.01 level.

Change in food security level

To ascertain the role of agroforestry interventions in reducing poverty and meeting food requirement of a person, Nepal's per-capita income was taken as a standard (i.e. 2,200 calorie food can be purchased for NPR 19,450). So, the average household needs NPR 92,777 for sufficient food for 12 months. That is, one person's food is enough for 2.5 months for a family of 4.77 size. For three months, NPR 23,340 is needed.   Three months food sufficient household is considered as 'ultra-poor'. For six months sustenance, (or NPR 46,680) is required for a 'poor' household. Similarly, for nine months sustenance, NPR 70020 is required for a 'medium poor' household per year and a household with access to NPR 93,360 is considered 'relatively well off'. Above this line is considered to be 'no' poverty (NLSS 2013). Food security level 'before' and 'after' is presented in Table 6. Before project intervention, 146 households (52%) out of 289 were food sufficient, but now

after the project was implemented, this increased to 192 households (69%). The change in food sufficiency level is highly significant (p<0.001).

Table 6 Food security 'before' and 'after' project

		Food security level				
Village	Project period	Up to 3 months	4-6 months	7-9 months	9-12 months	More than 12 months
Jitataxar (n = 58)	Before	3	9	6	10	30
	After	0	6	4	7	41
Nalma (n = 25)	Before	1	3	5	5	11
	After	1	0	4	6	14
Dhamilikuwa (n = 53)	Before	2	8	7	16	20
	After	1	4	6	4	38
Mithinkot (n = 48)	Before	3	3	5	7	30
	After	2	2	4	6	34
Dhungkharka (n = 50)	Before	4	4	3	2	37
	After	2	2	2	5	39
Chaubas (n = 55)	Before	4	17	7	9	18
	After	2	16	6	5	26
Total Before		**17**	**44**	**33**	**49**	**146****
Total After		**8**	**30**	**26**	**33**	**192****

Conclusion

After three years of piloting and experimentation EnLiFT found that household income was increased by 37 to 48% mostly due to agroforestry innovation, which can provide up to additional six months of food to the poorest households. This intervention could potentially release the majority of households (63%) out of poverty trap with no danger of food shortage during the year.

The implication of this research is that farmers must diversify their production through agroforestry innovations and achieve better returns from their production in order to escape subsistence poverty and improve their livelihoods. The out-migration of rural youth resulted in fallowing or abandonment of large tracks of fragile landscape in the study area. This land if utilized effectively through expansion of agroforestry, which would contribute to both carbon sequestration and farm income in the hill slopes of Nepal, and it is expected to reduce the trend of migration that results on the impact of sustained village economies and environment conservation.

The **'bottom line' result** of this research is that it is possible to reduce poverty and increase food security with relatively simple agroforestry interventions on private land within a relatively short period of time. The caveat on this is that it still required a level of direct financial incentives (conditional grants) to get effective engagement with farmers. It also required training in fodder tree nursery management and business management. The modality of working with individual farmers through a LRG facilitated by a LRP effectively marshalled peer pressure to perform, but it is expensive. Further to these caveats, the modelling work reported next suggests that horticultural based interventions on their own do not have the greatest potential for improving food security.

7.1.2 Barriers to marketing agroforestry timber

This work has been reported in Amatya et al (2016) and Amatya, Cedamon & Nuberg (2018). The **main message** is that the regulatory process for selling timber from private farms is so complicated and time consuming that there is little incentive for farmers to participate.

Middle-men or contractors play a vital role in procuring timber from private forests (see Figure 12). Generally, mill owners contact the local supply contractor It is the contractor who facilitates the process for landholders, who have no choice but be price-taker rather than price-maker. The contractors are local agents without any institutional identity. Currently, almost all saw mills and forest-based entrepreneurs procure round logs from private forests (both registered and unregistered) rather than other sources.
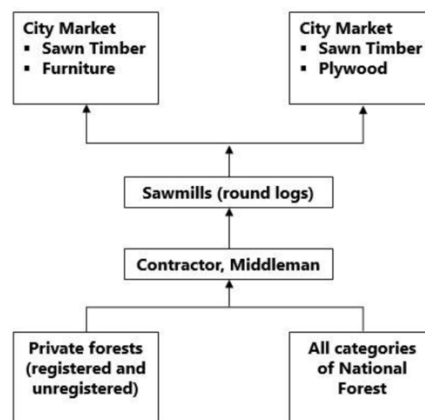

Figure 12 Timber supply mechanism
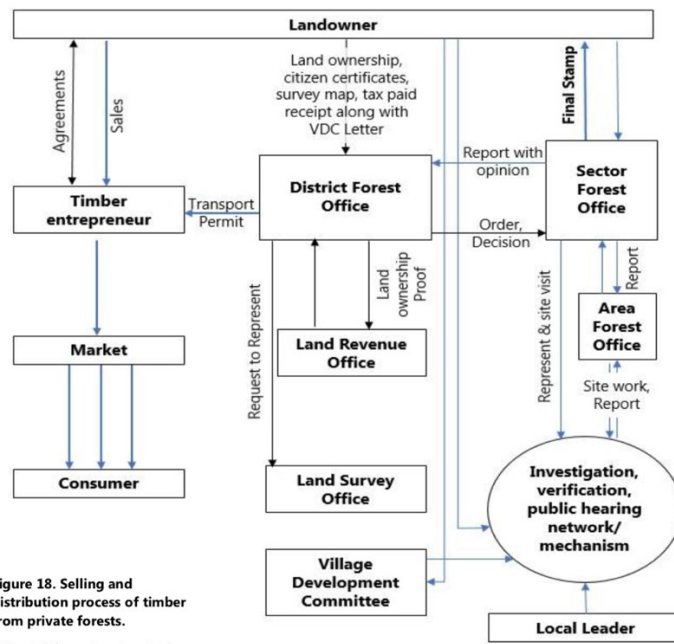(source: Amatya, Cedamon & Nuberg 2018)

Figure 13 Complexity of the process in selling farm timber
(source: Amatya, Cedamon & Nuberg 2018)

There are many barriers for individual farmers or community groups to engage in the timber trade. The complexity of this process is illustrated in Figure 13 There are more than fourteen steps that private tree owners have to fulfil before stepping up for harvesting and selling of trees planted on their registered private land. Cumbersome regulatory procedures, additional tax burden (Local bodies, donation to various clubs in route to destination) and high transaction costs for harvesting and trade are considered the major constraints of the private forestry development in Nepal.

In 2015 an amendment to the Forest Regulations 2051 (BS) (i.e. AD 1994) made the process more simple and private forest friendly. For the 23-tree species which are mostly grown in private land, farmers can directly harvest. It is now necessary for individual farmer growing these species to visit the concerned forest office only once so as to register and endorse the stock and take the transportation permit.

However, restrictions imposed by government notifications have been the major constraint in planting and raising high value tree species on private land. For example, the Government has banned harvest, transport and export of Chap (*Michelia champaka*), Sal (*Shorea robusta*), Satisal (*Dalbergia latifolia*) and Vijayasal (*Pterocarpus marsupium*). Similarly, for commercial transportation and export of two non-timber forest products such as Panchaule (*Dactylorhiza hatagiera*) and Okhar (*Juglans regia*) has also been banned.

There is no separate policy for agroforestry in Nepal. There are conflicting sectoral and cross-sectoral policies, Acts and Regulations. Initial Environmental Examination or Environmental Impact Assessment based on several criteria has serious implication in developing private forestry in Nepal. The National Agroforestry Policy formulation process has been initiated in Nepal.

7.1.3 Private forestry value chain analysis

Various aspects of this work has been detailed in Amatya et al (2018) and mainly Pandit (2014)

Nearly 1 million out of about 3.4 million private agricultural holdings have planted forest trees. Of these, about 166 000 holdings have compact plantations. Therefore, the area of private forest is almost five times less than other forests in Nepal. Nevertheless, the volume of timber sale from private forests is almost double than community forests and government forests. See, for example in Table 7, the difference in private vs community forest extractions in our research districts

Table7 Comparison of timber, fuelwood and NTFP marketed by forest regimes and districts
(source Pandit BH 2014)

District	AF Products	Community forest		Government forests		Private forests	
		Volume (Cft)/ Chhata/kg	Royalty/ VAT in NPR	Kg	Royalty/ VAT in NPR	Volume Cft	Royalty/ VAT in NPR
Kavre	Timber	29505	640608	-	-	126680	2481260
	Fuelwood	6.5	-	-	-	137	-
	NTFPs	-	-	10000	50000	-	-
Lamjung	Timber	4966	536160	-	-	23909	535465
	Fuelwood	5.95	-	-	-	336	-
	NTFPs	2783	-	13416	315750	-	-

For this reason, we were encouraged to analysis the private forest value chain. Some of the problems outlined in this study are the same expressed in the previous research activity in Section 7.1.2, however it goes further provide several policy recommendations.

1. **Need for simple private tree registration guidelines.** Despite the provision for private tree registration, farmers are not able to register their agroforestry trees grown on private lands. There needs to be a standard mechanism for private land tree registration so that the owners can easily sell their products harvested from their farmlands and also the decision doesn't change with the change in the DFO officials thereafter.

2. **Formulate a different royalty system for forest based and farm-based products**. There is a need to have separate provision of royalty collection between forest based and farm-based products. Paying VAT to the Government for agroforestry products sale is not appropriate, so we recommend revisiting this rule, so the private tree growers get more incentives and less tax burdens.

3. **Simplify en-route checking and limit product verification at the site of origin.** The practice of endorsing the products en-route has become a cumbersome process, leading to high transaction costs in the marketing process. Farmers and traders have lodged many complaints against this rule. Therefore this rule should be simplified by suspending en-route checking requirement. It is sufficient to have a provision of inspecting a product at origin and destination.

4. **Amend environmental regulations to waive IEE and EIA requirements for private forestry products.** The amended version (2009) of Environment Protection Act and Regulation 1997 are still ambiguous and not clear, particularly in terms of area of collection or harvest, quantity of specific product to be harvested, and time of collection. Therefore, there needs an amendment in Environment Protection Act and Regulation. The amendment of Forest laws and Regulation is needed so that private land AF species do not need to fulfill the requirement of IEE and EIA.

5. **Remove land taxes for private forestry.** It is obvious that the private land AF trees cultivation have certain environmental values which have not been legally considered by any of the forest related laws, policies and rules in Nepal. The Department of Land Survey charges some fees to the private land tree growers for verification and counting of trees grown or cultivated in private lands. In order to encourage farmers to grow AF tree species in their private farmlands, the Department of Land Survey is suggested to exempt or avoid such fees and taxes (Land Survey Regulation-2001 Rule 33 and Guidelines-3).

6. **Revise Annex 24 of Forest Regulations 1995 with clear differentiation of trees, shrubs and herbs.** Application format as shown in Annex 24 of Forest Regulation1995- Rule 61 (sub-rule 1) is not complete for listing various types of AF species. There should be separate column for tree based, shrub based and herb-based products so that listing could be easier and well documented.

7.2 Agroforestry impact

7.2.1 EnLiFT bioeconomic model

One of the key conceptual contributions EnLiFT has generated is that the farm on private land cannot be separated from access to community forest resources on public land when we are considering all contributions to livelihoods and food security. This is represented

graphically in Figure 5 (in section 5.3.3) from Cedamon et al (2018). The concept is also developed elsewhere within EnLiFT from perspective of the four pathways to development in community forests (Karki et al 2018)

1. Forests as a source of income and employment, providing means for managing food.
2. Forests as inputs (leaf litter, fodder), increasing food production.
3. Forests as a source of direct food, providing means of daily diet.
4. Forests as a source of readily available renewable energy, converting food into consumable forms.

The EnLiFT bioeconomic model is an important methodological innovation because, not only does it incorporate this farm-forest interface, it also incorporates a typology of rural households based on their resource base and ethnicity. As such it will be very useful tool for designing development programs, specifically for identifying which groups to target with which interventions. It will be further developed in the EnLiFT2 project to estimate the potential impact of silvicultural interventions in community forests on household food security. While we are delighted with the outcomes of the MOAFI activity reported in Section 7.1, the EnLiFT Model already allows a more nuanced understanding of the potential relative impact of improving the silviculture of community forests and trees on private land. A full description of the results of this work is given in Cedamon et al. (Australian Forestry special issue 2018).

The results of household typology derived through cluster analysis of 521 respondents across the 6 research sites is presented in Table 8. All household types except Type 3 exist in all survey villages albeit at varying distribution indicating intrinsic social differentiation or ethnic diversity (or homogeneity) of a village. The relative proportions of these household types will of course vary beyond the two districts in which they were surveyed.

Table 8 Six rural household types as defined by resource base and ethnicity.

Type	Description	proportion of sample %
1	resource-poor Brahmin/Chhetri	17.3
2	resource-poor Janajati	18.0
3	resource-rich mixed-caste households	3.3
4	resource-rich Brahmin/Chhetri	24.0
5	resource-rich Janajati	23.2
6	resource-poor Dalit household	14.2

The EnLiFT Model is very flexible and can be set up to simulate the impact of a wide range of interventions on the farm and community forest. Following our interests in potential interventions the model was run for 42 simulations for the 6 household types over the following 7 scenarios.

1. Baseline
2. High-value cash crops
3. High-yielding fodder trees for livestock holding at baseline scenario
4. High-value market-oriented timber production
5. High-value timber plus market-oriented NTFPs
6. High-yielding fodder trees for commercial goat production
7. Baseline with remittance income from household member working abroad

The aim of these simulations was to identify which scenario is best for each household type and the leverage that scenarios 2 to 7 may bring to each household type. There are many ways to represent output data from this model, but Figure 14 is perhaps the easiest

to grasp. The outwardly radiating contours on the chart represent different levels of a Food Security Index where food insecure < 1, and food secure >1.

There are two important initial observations: 1] how differently each household type responds to each intervention; and 2] that the horticultural-based intervention (#2) did not perform well.

As simulation #2 represents the type of activity implemented in our MOAFI work reported in section 7.1, an explanation is required. The MOAFI survey concluded that 17% of households became food secure because of a 58% increase of farm income. Their calculations of overall household income and food security included off-farm income. In contrast, the EnLiFT Model which did not include off-farm income in the estimation of food security, estimated relatively low net income from intensive horticulture scenario because of the high costs of production. Pandit et al (2018 , in press *Agroforestry Systems)* confirm that farm income alone from intensive horticulture production is not sufficient to improve household food security. Moreover, given that nearly half of rural households relies on off-farm work and remittances for their livelihoods, it is important to note the EnLiFT model baseline scenario represents the food security context of the other half of rural households that do not receive off-farm income or remittances.
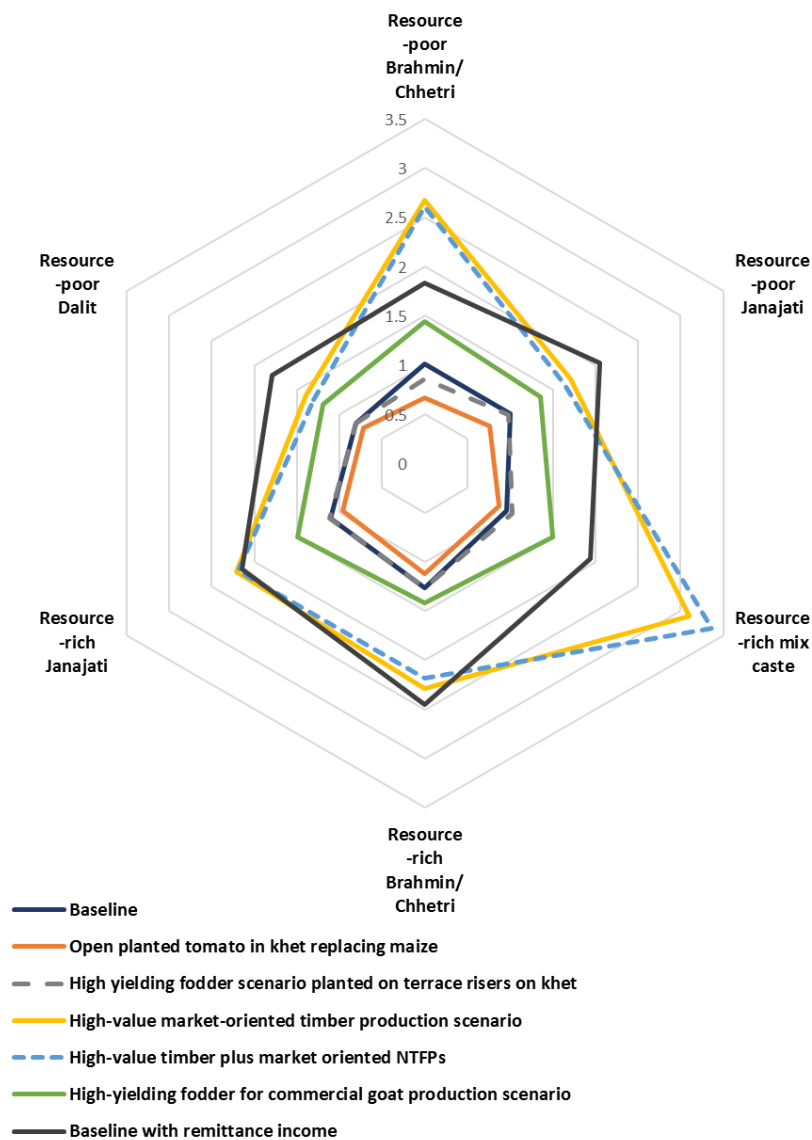

Figure 14 Radar chart of food security indices of household types for 7 livelihood scenarios

Conclusions

The **main messages** that can be drawn from the current use of this model are that:

1. *market-oriented timber production* shows the strongest potential to increase food security across all household types with greater benefits accruing to land-rich households. For land-poor households, remittances from household members working abroad remains the strongest route to their food security despite the underutilisation of agricultural land due to male labour outmigration.

2. A drawback of market-oriented timber production is the long-term nature of timber production. As EnLiFT assumes that timber can only be harvested from year 9, *complimentary livelihood interventions* are required to address food security in the short term.

3. Complimentary agroforestry interventions with strongest potential to improve food security include *combined high-yielding fodder production and commercial goat production, and production of non-timber forest products*. Improved vegetable production does not improve food security for households without remittance or other off-farm income because of the high input costs.

Currently, farmers in Nepal cannot yet fully achieve the financial benefits of agroforestry due to the complex and unsupportive forestry regulations surrounding harvesting and marketing of planted timber.

The results of this work has strongly informed the design of EnLiFT-2 activities, with our focus on high-value timber production systems on private land and furthering policy dialogues.

7.2.2 Womens' voice:

This work is fully described in Shah, Bhattarai et al (2018)

The Women's Voice research activity provided valuable insights into the extent to which women from the participating villages engaged with and understood the project activities. These insights have been built into the design of EnLiFT2.

The study revealed that women had very limited understanding of any of the research interventions in the initial phase of EnLiFT project. For active and meaningful participation of women in agroforestry and community forestry research activities, the intervention need to consider complimentary capacity building activities to overcome the knowledge and skill gaps of women. This will help to ensure active women's participation as they will be able to understand, comprehend and respond during discussions and decisions.

For example, research interventions should include special provisions to ensure active participation such as focused meetings with women, in-situ trainings and workshops, increasing quota or number of participants per household in order to increase women's representation and participation in the research and development activities. Additionally, meaningful women participation can be ensured only when women are able to voice their opinion and inputs in meetings and their voices are reflected in the decisions made by those meeting.

Women attendance in the meetings increased as EnLiFT progressed, and they increasingly voiced their opinions and provided inputs during such meetings. Yet despite the apparent good turn-out of women in community meetings and trainings (Table 9), there are still gender gaps in involvements and benefits sharing from silvicultural works.

We found that only a few of their concerns or inputs were reflected eventually in community decisions. Table 9 shows that with exception of Langdihariyali and SaPaRuPa other research sites women indicated that women's responses and feedbacks were not incorporated in the meeting decisions.

Table 9 Level of participation of women in EnLiFT interventions

Core CFUGs at each Research Site	% Women interview who attended community meetings & trainings	% of attending women participating actively: provided inputs and feedbacks on the agenda	% of attending women ensuring that their inputs are noted in the minutes	% of attending women ensuring that the decisions made considered / reflected their inputs (%)
Kalapani	67	80	100	0
Lagndihariyali	100	73	82	56
Sa.Pa.Ru.Pa	90	44	75	25
Lampata	100	71	60	0
Kalapani	100	21	100	0
Aapchaur	89	75	67	0

The response of women to community forestry interventions is very positive in later phase of women's voice consultation, which might be the result of their active participation on community forest interventions through on site demonstrations such as; Forest Inventory, Plot Separation, Thinning, Pruning, lopping, chopping . They are convinced that they can perform the activities as well as men do if they are given proper skill development training in forest management. They indicated that they would be very interested to build their skills in silvicultural work despite the hardships and general perceptions that only men can do such things; the higher incentive (wage rate of such work) is additional benefit. The silvicultural work conducted has encouraged and increased the interest of women in basic technical silvicultural knowledge and skill, with improved convictions that their acquaintance and experience of the forest is an asset for them to develop their capacity in this area despite the fact that all of them have limited formal education.

A limitation to involvement in EnLiFT were justifying the extra time commitment to their families, and the need to overcoming their capacity gaps such as ability to read and write properly, ability to understand the complicated language stated in community forest documents etc.

7.3 Inclusive Community Forestry Planning & Governance

Community Forestry planning encompasses range of issues dealing with defining objectives of CFUGs, assessment of opportunities and available resources, plan for mobilizing the human and natural resources, benefit distribution arrangement and plan for enhancing forests and ecosystem services. The aim of this stream of research was to improve inclusive practices in community forest planning, and it achieved this well through an action research process where we worked alongside CFUGs in the revision of the Operational Plans (OPs).

The ICFP research activity sought to answer some pertinent questions of planning. These include: How current community forest planning is practiced? What are the local dynamics that shapes the community forest planning; how authority overlaps between community forest and forest officials? What are the key challenges and opportunities for improving community forest planning? What is the existing capacity of the CFUGs DFOs to get

engaged in effective community forest planning?; and How planning accommodates equity/access issues?

As the action research process itself is a result that can be replicated in further work in this arena, it is presented in Table 10, while Table 11 lists the ten CFUGs supported in their OP revision

Table 10: Steps towards inclusive preparation of Operation Plans

Steps	Rationale
Inception Planning: Visioning exercise; develop goals, working approach and feedback.	Build local preparedness; ensure active CFUG involvement; understand EC and CFUG concerns; set common targets; validate through local backing.
Social/Resource assessment: Boundary survey and resource inventory; social benefit analysis.	Gain precise knowledge; estimate forest resource supply; calculate equitable benefits
Draft Preparation: Prepare a full draft based on resource inventory and inputs from previous assessments and considerations.	Ensure the plan is based on appropriate science; increased legitimacy
Executive Committee (EC) and Tole meetings: Discuss key provisions; receive feedback from Tole members and sharing management concerns	Ensure CFUG members are adequately informed, accommodate priority and concerns of CFUG in OP; ensure local ownership
Endorsement and Approval: Finalise draft; present OP features; conciliation on disagreeing provisions; DFO approval and General Assembly.	Acquire full ownership of EC; adjust conflicting schemes; endorse through DFO; ensure compliance during its implementation; attain legal procedure during finalization.
Implementation and monitoring	Effective implementation; periodic assessment; identify space for OP improvement.

Table 11: Community Forest User Groups supported in Operational Plan revision

CFUG name	location	CFUG name	location
Lampata	Tandrang Taksaar, Lamjung	Rakchhama	Chaubas, Kavre
Aapchour	Dhamilikuwa, Lamjung	Hile Jaljale 'Ka'	Nala Tukucha, Kavre
Dharapani	Chaubas, Kavre	Hile Jaljale 'Kha'	Nala Tukucha, Kavre
Lakuri Bhulbhule	Chaubas, Kavre	Dhunge Pakha Bahal	Nala Tukucha, Kavre
Narayansthan	Dhunkharka, Kavre	Faskot Sundar	Dhulikhel, Kavre

Operation Plans were revised with broader and intensive consultation with diverse social groups and accommodating emerging agenda – food security; climate change adaptation; inclusive forest management and livelihood activities for income generation. Generating pro-poor livelihoods activity through participatory approach was updated in each OP to address equitable benefit sharing.   An example of how this progressed is given in Figure 15

Figure 15 Pro-poor livelihoods in OP revision process.
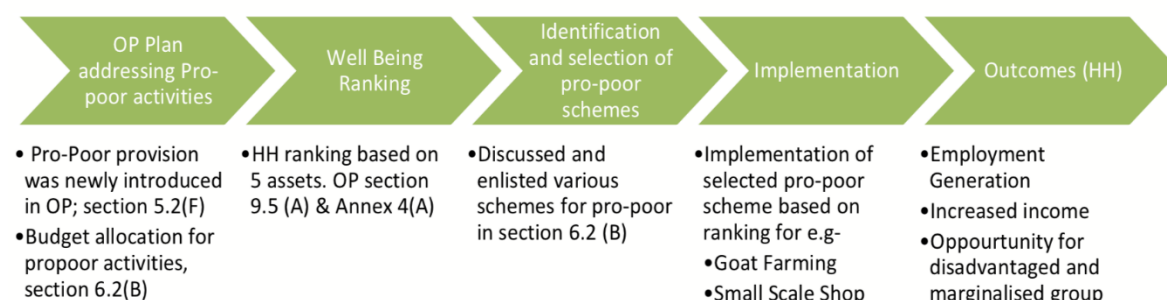
Engagement with women and marginalized group in various activities was some of the strategies adopted under ICFP. Some of the activities involved leadership trainings, capacity building programs, exposure visits, Tole meetings and discussion forums has transformed these groups with informed knowledge and decision-making ability with active participation (Table 12).

Table 12. Training activities in Inclusive Planning and Governance

Training title	Place	Date
Training on women leadership	Fagarkhola, Kavre	2-3 June 2017
Training on forest management and governance	Lampata, Lamjung	1-2 June 2017
Leadership for women	Lampata, Lamjung	18-19 May 2017
Leadership training for EC members	SAPARUPA, Kavre	10-11 March 2017
Training on forest management and governance	Dhamilikuwa, Lamjung	30-31 December 2016
Training on forest management and governance	Nalma, Kavre	27-28 December 2016
Leadership training for EC members and local leaders	Dhunkharka, Kavre	28-29 September 2016
Governance training for EC members and local leaders	Fagarkhola, Kavre	19-20 May 2016
Governance training for EC members and local leaders	Dhunkharka, Kavre	16-17 May 2016
Governance training for EC members and local leaders	SAPARUPA, Kavre	13 May 2016

Conclusions

CFUGs hardly follow the OP development process suggested by the existing policy guidelines mainly due to lack of time and resources. Changing rural livelihoods have changed people-forest relations and forest management priorities.

The **key result from this work** is that EnLiFT work has developed a strategic consultative process that significantly reduces time and resource demand without compromising critically needed inputs and ownership of CFUG members.

The revision of a whole OP (that have 5-year or 10-year duration) for any new intervention is costly. Over the course of this process new OPs were completed in just 3 sites, but we clearly demonstrated how it could be more inclusive. In these CFUGs we have more inclusive representation of women and disadvantaged groups in committees and annual general assembly and in executive committees.

EnLiFT OP work introduced and institutionalized a practice where provisions on specific interventions (for example establishing silvicultural demonstration plots) can be annexed to the existing OP, get DFO approval and implemented.

This stream of work helped institutionalize the inclusive process in community forest planning, and prioritizing livelihoods and food security outcomes from forest management. Traditionally, these were seen as opposite, but EnLiFT work showed that livelihoods can be enhanced from community forests without compromising environmental aspects**.**

7.4 Active and Equitable Forest Management

Half of Nepal's forest has prospects for active forest management and is estimated to generate around 1 million full time employments, and to generate 60-120 million cft/annum timber. Unfortunately, Nepal has been importing around 5 million cft timber due mainly to lack of proper silvicultural interventions. The policy environment and socio-institutional contexts too need some adjustments in order to benefit from silvicultural interventions in Nepal.

The **key result of this research stream** is that it has been highly influential in directing the debate about Scientific Forest Management by providing direct visual example of what scientific forest management can look like, and evidence that it does not damage forest ecological integrity.

7.4.1 Better understanding the structure of community forests

Before we could work in the community forests we had to better understand their nature. We developed a Rapid Silvicultural Appraisal (RSA) technique where forest users were involved in tree measurement and ground cover assessment, and instructed them in he significance of these measurements. This process helped forest users to understand their forest and facilitated their decision on silvicultural interventions that fits the needs of their groups. A participatory ranking exercise was employed to select silviculture interventions that fits the need of the forest user groups (please see Cedamon et al 2017a for more details).

The RSA conducted on selected community forests in Nepal's Mid-hills region shows that forests are largely comprised of dominant crowns of one or two species. The majority of studied community forests have tree densities below 500 stems per hectare as a consequence of traditional forest management practices but the quality and quantity of the trees for producing forest products are low. Results of the participatory scoring and ranking of silviculture options showed that shelterwood and selection harvesting are preferred in the participating community forest groups. Most forest users preferred planting of fodders trees and other high valued timber on selectively harvested stands..

7.4.2 Silvicultural demonstrations and changing perspectives on forest management

A participatory process involving various stakeholders was adopted in order to facilitate forest management interventions in the research sites. Apart from facilitating timber harvesting, the process was equally crucial in terms of supplying timber to the earthquake victims during reconstruction. Twelve demonstration plots (see Table 13) were established in our sites with the objective to have a better learning on the various silvicultural prescriptions. Based on the learnings, silvicultural interventions were scaled out to other sites with prospects of implementing forest management activities.

Table 13 Demonstration plot treatments

Community forest	demo plot	treatment
Chapani	1	Selection system to create uneven age mixed forest
	2	Negative thinning to improve forest quality
	3	Selection system to convert Pine stand to Pine-fodder forest garden
	4	Regular shelterwood system for new forest crop
Fagarkhola	1	Planting cardamon following thinning of mixed forest
Kalapani	1	Selection system for creating uneven age Thingre salla forest
	2	Selection system for creating a Loth salla and Thingre salla forest garden
	3	Regular shelterwood system for new forest crop
	4	Kasru fodder tree management plot
Lampata	1	Negative thinning to improve forest quality
	2	Selection system with planting of Amriso and ground cover crops
	3	Selection system to develop well-stocked uneven age Sal stand

An important follow-on activity was to organize workshops with forestry officials, FECOFUN, media and local political leaders to showcase and discuss these forest management interventions, on the site. Several visits of policy actors were organized in

course of EnLiFT project (see Table 14). These visits became a kind of on-site policy dialogue where policy actors, researchers, practitioners, communities and their federations collectively discussed the problems and prospects of silvicultural based forest management. This was crucial for favourably influencing the perceptions of those key stakeholders who may previously have been either non-committed or opposed to scientific forest management.

Table 14 Influential visits of demonstration sites

Date	Participants and site	Number of participants
3 January 2015	DOF officials including DG. Chaubas	11
16 May 2015	DOF officials including DG. Dhungkharka	10
22 January 2016	DFO, DFSCC member, media personnel. Chaubas	25
19 February 2016	DOF officials including DG, FECOFUN, FENFIT, media. Chaubas	28
22 April 2017	DOF officials including DG & silviculture working group. Chaubas	17
12 August 2017	Community Forest division head & forest officials. Lampata	5

One of the important outcomes of these visits was the realization of knowledge gap in silviculture-based management in Nepal. The need for organizing a National Silviculture Workshop was thus conceived during one of these visits. Following this EnLiFT organized a series of meeting with DG and Silviculture Division Head at the Department of Forest. It was later formalized by the MoFSC and a National Silviculture Workshop was held in Kathmandu during 19-21 Feb 2017. EnLiFT played important role in organizing and follow up actions. This was the first of its kind in Nepal, therefore drew strong enthusiasm among the policy makers, foresters, media and civil society.

Following the success of silviculture management interventions in the research sites, the EnLiFT team were formally approached by DFOs and adjacent CFUGs (of the research sites) to extend their support to other community forests. Apart from the core research sites (24) silviculture management interventions were carried out in additional 11 CFs in Kavre and Lamjung districts. These are all listed along with the maps in the Methods section 5.3.5

Summary of outcomes of AEFM

1. Enhanced awareness on silviculture techniques among participating forest users, particularly women and marginalized groups.
2. The earthquake victims benefited through supply of timber for re-construction.
3. Silviculture demonstration plots were the foundation for initiating the National Silvicultural Workshop.
4. Enhanced forest management ensured equitable sharing and distribution of natural resources among CFUGs.
5. Transition from passive to active silviculture management leads to increased timber production, revenue and generate employment opportunities.

7.5 Market-responsive Community Forestry Institutions

7.5.1 Community forest value chain analysis

This work was reported by Tamang et al (2014a) and Tamang et al (RPS 2015-03).

The report details the historical changes of the timber industry in Nepal. Forest area has bounced back from a low of 29% in the early 1990s, to a high of approximately 40% currently. This development augurs well for Nepal. However, the revenue for the central government exchequer in the fiscal year 2012/13 was only just over USD8 million; clearly

the forest sector is under-delivering to the national economy. This paper makes a number of recommendations related to quality standards, green wood certification, packing and packaging, pricing structure and standardization of products. At the other end of the chain it points to the fact that enabling environment for market development in this sector can be enhanced through community and producer friendly regulations; availability of financial; technical and trade related institutions; trading intermediaries; storage and handling facilities and simple policies and rules pertaining to tariff, trade and initial tax-breaks inter alia.

The report also lists dominant species that could be further commercialised in our study sites (see Table 15).

Table 15 Dominant commercial timber, fodder species and NTFPs in our study districts

Common name	Scientific name
Commonly used for timber	
Saal	*Shorea robusta*
Chilaaune	*Schima wallichii*
Katus	*Castanopsis tribuloides*
Utis	*Alnus nepalensis*
Tooni	*Toona ciliata*
Champ	*Michelia champaca*
Sallo	*Pinus wallichiana*
Other timber and fodder species	
Dudhilo	*Ficus nemoralis*
Kutmero	*Litsea monopetala*
Sisso	*Dalbergia sissoo*
Bakaino	*Melia azaderach*
Thotne	*Ficus hispida*
Padke	*Myrsine spp*
Timilo	*Ficus auricolata*
Botdhyangro	*Anogeissus latifolius*
Lapsi	*Choerospondias axillaris*
Rudrakshya	*Elaeocarpus sphericus*
Paiyu	*Prunus cerasoides*
Bans	Bamboos, subfamily *Bambusoideae*
Bhimsenpati	*Buddleia asiatica*
NTFPs	
Neem	*Azadirachta indica*
Tejpaat	*Cinnamomum tamala*
Bojho	*Acorus calamus*
Allainchi	*Elettara cardomomum*
Timur	*Zanthoxylum armatum*

It explains how very wide range of existing uses of these species is currently observed for these species, from traditional to industrial uses. Some of the innovative uses that could be further developed in Nepal are: biomass production for bio-briquettes, bio-char and wood chips for co-generating electricity; and engineered wood products such as finger joints and medium density fibreboard. The review also identified numerous NTFPs and ayurvedic herbs that could be further developed as commercial crops, and the potential to grow exotic species such as paulownia, poplar, willow, Mexican pine, teak, Japanese black pine and eucalyptus to substitute timber imports.

As the current Forest Act 1993 and its accompanying regulations and by-laws are inimical to growing agroforestry products in community forest, the report advises to experiment incrementally with growing of fruits, flowers and honey bees. Asked what they would prefer to grows on agroforestry land, both private and common, the farmers said they would prefer to plant Suntala (*Citrus chyracarpa*), Kera (*Musa sapientum*), Mewa (*Carica papaya*), Bhogote (*Citrus maxima*), Nibuwa (*Citrus spp*), Aap (*Mangifera indica*), Katahar (*Ananas comosus*), Aaru (*Amygadalus persica*), Amba (*Psidium guajava*), Naspati (*Pyrus communus*), Litchi (*Litchia chinensis*), Khurpani (*Prunus armeniaca*), mushrooms and keep bee hives for honey.

The study outlines the constraints for growth, development, conservation, utilization and benefit sharing of community forest products. Some of the perceptions that the farmers articulated were severe limits on the use of forest products from community forest; no clear rules and regulations on extraction and harvesting from forests and cumbersome procedures for obtaining permits, among others. These constraints in turn create market distortions such as rent seeking. undue influence and abuse of authority on the part of contractors, forest officials and CFUG office bearers. An overwhelming majority of households reported are unable to sell the community forest products due to: overly restrictive regulations; inability to produce adequate amounts of products; difficult transportation; and lack of know-how and technology for easy harvesting. Furthermore, the CFUGs themselves have either not envisioned commercializing their forest products in their operational plans.

Conclusion

The current national revenue from forest products is well below its potential and many species and potential markets have been identified. The main restrictions on the development of these markets are regulatory.

Unfortunately, the review could not identify the best-bet forest product value chains for community forest products within our study sites.

7.5.2   Participatory market chain analysis and business literacy workshops

This work is reported in Paudel G & Basyal (2016)

While the study reported above in Section 7.5.1 took a bird-eye-view of community forest markets, Paudel & Basyal's work showed the perspective of the participants who included timber producers, CFUG members, LRPs, timber traders and other middlemen, regulating officials, and wood processors. The specific problems in marketing timber from community forests are too numerous to list here, but they fall into three categories.

Enterprise registration is a difficult job

The procedure for registration of a forest-based enterprise is complex and time consuming. This is the overriding reason why many enterprises are running informally without registration. Specific reasons include the restrictions on the minimum distance between the forest and any forest enterprise; and difficulty and cost of arrange joint field inspections by the authorities.

Unregistered enterprises are always legally vulnerable. Authorities can shut down the enterprise at anytime. They are weak in terms of maintaining business viability, and therefore lack prospective to growth. Unregistered enterprises cannot issue VAT bills and therefore cannot supply products to buyers which require VAT bills. Such enterprises are deprived of taking bank loans or insurance.

Raw material supply is uncertain

There is no certainty of continuous supply of raw materials to the furniture houses or saw mills. Even the registered furniture houses cannot legally cut the logs of any kind and they are not allowed to install the trolleys. When the laws are strictly implemented, the furniture factory cannot even cut logs taken from an individual farmer or community forest. People have to depend on manual operation of saws which is costly. In the hills, it is practically not feasible to buy sawn timber from saw mills located hundreds of kilometers away.

This situation allows big contractors to threaten small entrepreneurs or even CFUG leaders and control the open tender process in the CFUGs. Therefore, local entrepreneurs cannot take timber supplies from nearby community forests. Furniture factories can make use of deformed logs, leftover or rejected branches, stumps or roots in the forests. However, CFUGs cannot sell such products without the tender process. In reality, there would be no tender for such deformed branches or stumps and they are left unused in the forest. The *Sal* trees of private land cannot be sold out in markets, even the transport of them for household use is difficult.

Conflict between rules

The rules as stated in various departmental circulations are in conflict. For example, a set of government rules published in Nepal Gazette on 2071- 06-06 says that the minimum distance standard is not applicable to enterprises located in Kathmandu valley, district headquarters and municipalities. However, 112th meeting of Industrial Promotion Board decided that the enterprises located in municipalities other than the original 58 municipalities must comply with the minimum distance standards. Such controversial legal requirements confuse both the authorities and the entrepreneurs.

The implication of such rules is far reaching. The entrepreneurs located in newly declared municipalities required to maintain the minimum distance from the forest, leading to unregistered enterprises in those municipalities. Despite legal provisions that allow furniture houses to upgrade to saw mill, furniture factories have not benefitted from it.

7.5.3   Revival of Chaubas sawmill

This work is reported in Paudel G et al (in preparation 2018)

The Chaubas Bhumlu sawmill, which was established as part of the NAFP, has had a difficult history as illustrated in Figure 16
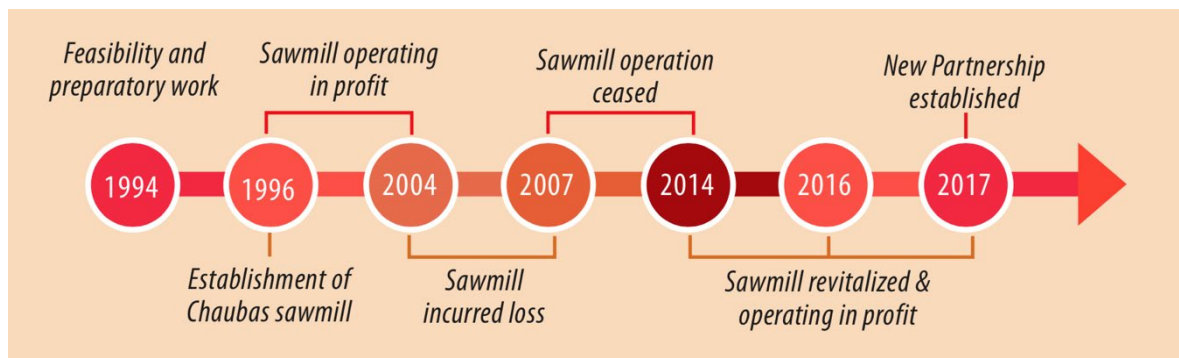
Figure 16 Timeline of Chaubas sawmill

The sawmill ceased to operate completely in 2012. The closure of the mill is attributed to:
  o   Internal governance problem of the CFUGs
  o   Maoist insurgency and associated extortion
  o   Government policy not supportive for community-based enterprise
  o   Collective decision-making process was not fit for the institution
  o   Corruption and embezzlement of financial resources

The action research with sawmill stakeholders took a long time and many cycles of deliberation (see method in section 5.3.6). However, it was highly successful in that now:

o The once idle sawmill is now operating with profit. The profit is invested in improving the machinery and equipment.
o About 330 households in four CFUGs in Chaubas benefited with sawn timber for post-earthquake reconstruction.
o Four full time and two part time employment has been generated.
o Community-private partnership has been established as a viable institutional arrangement. It can be a model in community forest enterprises in Nepal where many solely community led enterprises have failed.

7.5.4 Conclusions of Market-responsive CF Institutions

This research is fully described in Khatri et al. (2016)

The work undertaken in this research stream provided a **comprehensive foundational knowledge base** of the current status of community forest markets and the attendant problems.

While there are clearly opportunities to be exploited from forest-based enterprises to the benefit of CFUG members and the national economy at large, these are largely out of reach because of the complex and overly stringent regulatory environment.

We learnt that there needs to be a rethink on modes of collective management of community forest enterprises, and that a community-private partnership has provided early promising results.

This research stream has provided a strong foundation for further research and development of forest-based enterprises to be investigated in EnLiFT2.

The research shows that CFUG rules and forest management practices are restrictive and imposed by professional forest officers at the forest bureaucracy. These officers are graduates of forestry sciences. It can therefore be argued that such rules and practices are heavily influenced by the modernist forestry science in the CFUG rule making process and forest management practices. The CFUG rules are either protection-oriented or timber-oriented, meaning that they ignore the issues related to promotion of livelihood and food security. Such restrictive rules are not only determined by the policy and legislative framework but also due to the way CFUG rules are made at the local level. Studies showed that in many cases CFUG rules are determined through negotiation between local elites and forest technicians (see Giri and Ojha 2011, Ojha 2008). Hence, techno-bureaucratic influence has a significant role in determining forest management rules and practices, which are primarily driven by the interest of maximizing timber production or strict protection.

The research shows significant institutional divide in the way forest systems are managed (see Figure 17). The research also shows that significant institutional issues exist in forest management decision-making practices and role of the forest bureaucracy. The DFO staff continues to set objectives and prioritise a protection-oriented approach because their effectiveness is judged in terms of forest protection. This implies that practically, there is a decentralisation of responsibilities by which local people are required to manage the forest, but not devolution of power to make meaningful decisions. This is consistent with the argument that participatory natural resource management is often characterized by a limited devolution of power to communities. An important implication of this gap between the policy and practice is that the community forest policy has not transformed into a participatory process.
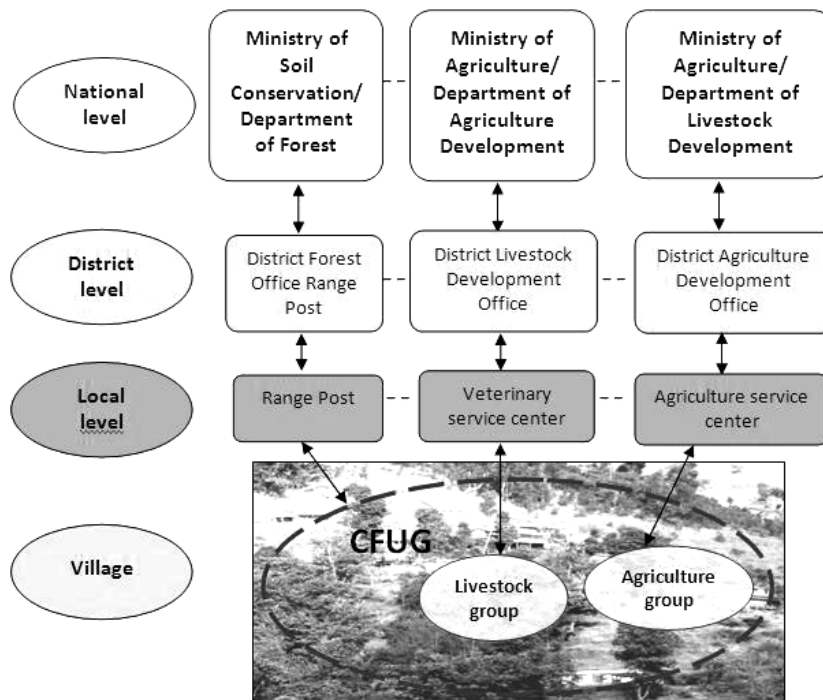
Figure 17   Parallel institutions managing forest systems in Nepal

7.6 Under-Utilised Land

Even though the UUL work was reduced as a consequence of the mid-term review, this research stream produced foundational knowledge that is contributing to the understanding of how to deal with UUL and to bring it back into production. This was achieved through complementary qualitative and quantitative modelling approaches.

Qualitative approach: Causal relationships of factors underlying UUL

This research is fully described in Ojha et al. (2017) from which the following figure and paragraphs are extracted and edited.

The primary Vensim™ graphic model outputs from this work are presented in Figures 18a & 18b. The relationships of among different factors and forces are shown by arrows with a positive (+) label indicating a positive influence of a parent variable to a child variable. This means that if the level of the 'parent variable' increases, the level of the 'child variable' also increases. The diagrams show the interconnectedness of the factors, which cut across multiple sectors of development and governance. These diagrams show the directions but do not aim to quantify relationships. Together these diagrams show the similarities, but also significant differences in drivers of UUL in the two case study sites.

Much of the research to date takes either a deterministic approach to explain land underutilisation and the agrarian change using an economic lens, or present ethnographic accounts of land use change, often as the direct effect of migration. This work describes the socio-environmental pathways to the UUL phenomenon. Such pathways emerge through complex, non-linear, cross-scalar and stochastic interface among a multitude of material, institutional, and discursive forces. From this perspective it would be naive to attribute one prominent driver to explain the land underutilisation outcomes - for example, it is problematic to presume that youth migration is the sole cause of land underutilisation.
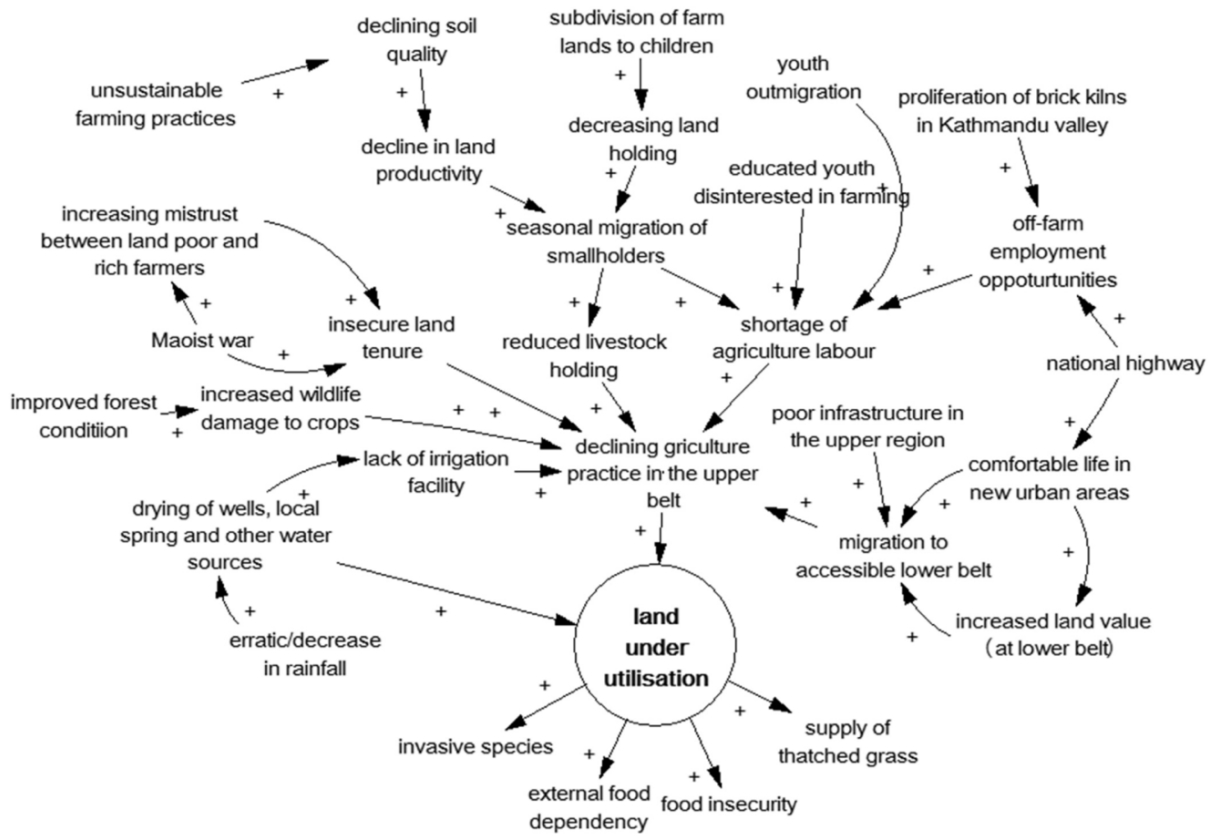
Figure 18a. Land utilisation pathways in Methinkot, Kavre District
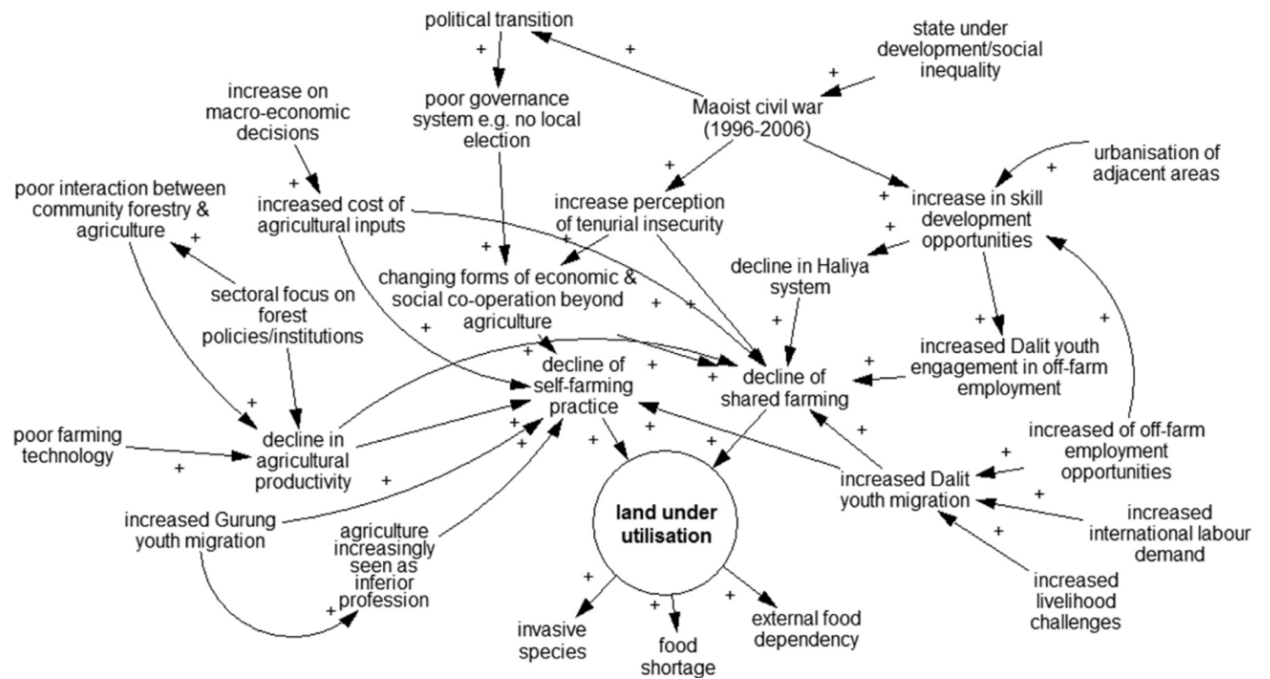

Figure 18b. Land utilisation pathways in Nalma, Lumjung District

Our interviews with landowners revealed that they no longer find it economically worthwhile to invest in farm cultivation, especially when they are facing labour shortages due to the out-migration of their economically active family members. Leasing out the land to others - a practice that existed in one of the study sites prior to the Maoist armed conflict - has become unattractive, not only because of a sense of increasing tenurial insecurity, but also because land- poor farmers have moved out of the village to find off-farm jobs providing better returns. Clearly, everyone is making new decisions in the light of unfolding opportunities (e.g. better jobs outside), or under impinging constraints (e.g. land owners leaving the land fallow short of labour), whilst the government has remained un- stable and non-responsive to the complex dynamics of agrarian change and migration. Due to civil unrest and the politics of transition, the policy system has remained silent - at best, a passive witness to the profound change occurring in rural landscapes in Nepal.

This study highlights at least **four important insights into policy reforms.**

1. The nature of the land underutilisation pathways means that no single and sectoral policy intervention can bring the land back to normal cultivation.
2. Within the wider policy question of agrarian development and migration, it is even debatable whether the solution is to bring every uncultivated parcel of land back into cultivation. Specific patches of underutilised lands are only a symptom of larger social dynamics and policy failures, and such land parcels are only tiny spots of problem in the larger nexus of rurality, migration and development. Given this, a possible entry point for tackling the problem could be creating context specific institutional spaces where communities, political leaders and researchers can bring voice, political visions and evidence to foster meaningful dialogue and forward looking planning of changing landscapes. The demand for stronger local governments and the creation of provincial level governance in Nepal could generate more decentralised spaces for the mapping and articulation of the problem and possible solutions.
3. The study highlights the difficulties of pinning down the intersections between migration and development, let alone shaping policies that are sensitive to these indeterminacies. While out-migration may lead to reductions in agricultural output and a loss of in situ production and associated livelihoods, and therefore a decline in food security, it is also evident that young people are not being capricious in leaving their homes. They are generating income, accumulating human capital and, they often hope, opening up the possibility of future upward social and economic mobility. Policies must not narrowly focus on driving the youth back home, but move the society forward by valuing the dreams of people who want to come out of difficult and marginally productive mountain terrain for more prosperous life elsewhere.
4. Any policy response itself should be grounded in the understanding of varied socio-environmental pathways that lead to land underutilisation in different localities. This requires encouraging interdisciplinary, action oriented and participatory research to explore context-specific socio-technical options that match ecology, local economy, and culture. Given the failure of the past four decades of 'land reform', what Nepal needs now is critical research and a politics that genuinely fosters a fresh approach to understand and manage the dynamic link between land and the society.

Quantitative approach: Bayesian Belief Network (BBN) model

The work developing BBN models of the same case studies as in the qualitative model allows us to infer the relative strength of different factors and likely outcomes from policy changes (see Figure 19). This work is described in detail in Cedamon et al (in preparation 2018). The overall structure is based on the Vensim™ diagrams presented in previous section. The drivers were updated after the consultation workshop with landholders in Methinkot. Three nodes were also added based on the UUL workshop to evaluate the possible UUL outcomes based on these three policies. These nodes are: - agriculture subsidy, agriculture program for youth, and forestry and agriculture university scholarship

The following inferences can be made from this model

- The chance of a household to have UUL is 43% and the proportion of the underutilised landholding is 19% (and that the proportion increases with increasing landholding size).
- Availability of irrigation facilities appears to have a huge impact in reducing the probability of UUL and the size of the UUL.
- The impact of improving land legal or regulatory provision impact on UUL is lower than making irrigation facility availability but having both intervention reduces the chance of UUL of the household by about 10 points.
- Agriculture subsidy could have both a strong impact on adopting better agroforestry practice and adopting to improve farming technologies, but it would have no effect on the change of the UUL at the household level. Agriculture subsidy however can improve the land productivity by about 20 points.
- Youth and Agriculture Program and Scholarship for Agriculture and Forestry degrees increase the interest of youth on agriculture as well reduce the propensity of youth outmigration, but it only has a small effect on UUL (1 point reduction).
- The influence of agriculture subsidy in improving farming practices and subsequently on land productivity is strong for households with smaller land sizes than those with larger landholdings.
- It has been determined that although in Mithinkot the probability of wildlife damage to crops due to improve forest condition, it has no effect on UUL (both in terms of chance of UUL and the size of UUL).
- Youth migration has stronger effects on UUL than season labour migration.
- Drinking water and social infrastructure also plays important role in keeping people in the village and thus in keeping land being cultivated.

From the above results, the **following policy recommendations ensue:**

1. Improving land regulation will improve trust between land owner and tenant and is important intervention in reducing UUL
2. Policies to improve irrigation facilities, drinking water and other social infrastructure such as school and health centers are important in reversing UUL. They are relatively more important than legal and regulation improvement.
3. Agriculture subsidies have an impact on agriculture productivity gains but only have a small impact on reducing UUL, and this impact is believed to be only for the short term.
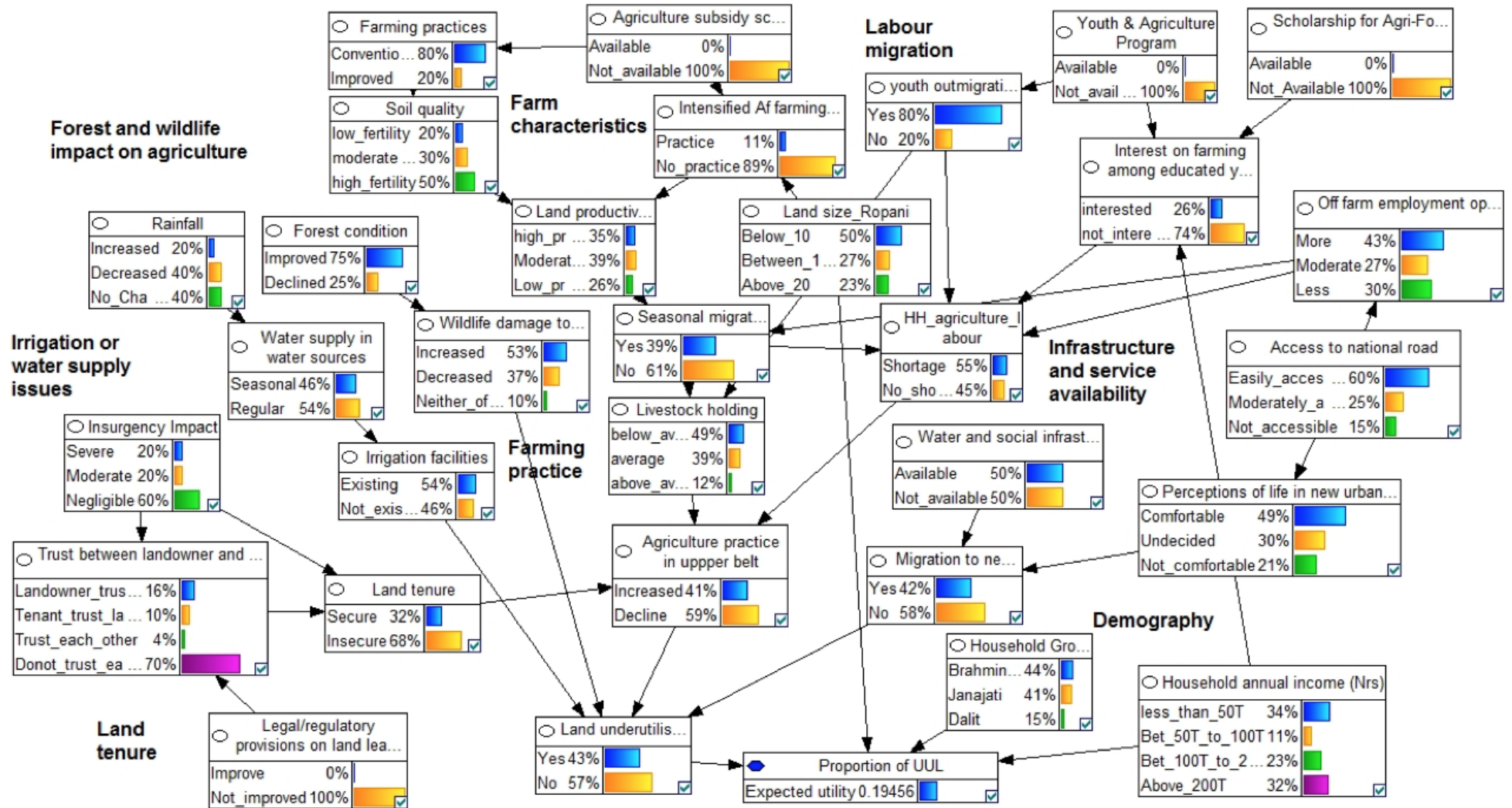
Figure 19 Bayesian Belief Network model for Methinkot

7.7 EnLiFT Policy Labs (EPL)

The **key results of the EPL work** were both methodological, i.e. the EPL method itself, and significant contributions to policy debate.

Prolonged political transition and frequent changes in the government have resulted in an ad hoc approach to decision making including policy decisions in Nepal. Major forestry donors who worked for a long time in Nepal emphasized on development interventions with little appreciation of research. Researchers have too often failed to communicate their findings to policy makers. Many of the existing mechanisms such as multi-stakeholder workshops, short-term working groups and task forces have also had little effect in connecting research with the policy process.

In this context, EnLiFT develop the EPL method to link research and policy processes to enrich both the quality of research and the impact of research on policy. The EPL was a significant methodological innovation in showing that a series of small meetings on focussed issues in an action research cycle is an effective alternative, or even precursor to larger policy consultations or workshops. Our EPLs led directly to two national conferences with policy outputs which have been institutionalised within the government formal policy process (summaries given in Section 11.1.6). A variety of strategies were used to enhance the link between these two isolated systems of learning and decision making.

Strategy 1: EnLiFT policy labs on specific policy issues involving a small team of policy actors representing the government, civil society, and the research community

We organized 12 EnLiFT Policy Labs (EPL) which we define as a researcher-convened forum of policy actors confronting a specific policy challenge, designed to foster meaningful dialogue between researchers and policy actors in developing a shared understanding of the policy problem and the possible solutions informed by research evidence. Five of these are summarised in Table 16. The full 12 are shown in Appendix Section 11.1.7 . The EPL bridges research and policy domain and forges effective dialogue between the two.

Table 16: Summary of selected EnLiFT Policy Lab events

Topic of Policy Lab	Participant Composition	Outcomes
Transforming State-Community Contract in Community Forestry; (15 January 2017)	Govt- 3; CSO- 2; Donors- 2	Recognition of the problem, commitment to develop a category of CFUGs with differential details for administrative requirement.
Scientific Forest Management (12 December 2014)	Govt- 2; CSO- 4; Private sector- 2	Recognized that a greater focus should be on governance aspects and in increasing the capacity of CF members
Regulatory hurdles in private forestry (8 March 2015)	Govt- 2; CSO- 1; Donors- 1; Private Sectors- 2	Exemption of 26 species of timber from regular administrative requirements, further work on promoting private forests
Land use planning and food security (19 January 2015)	Govt- 2; CSO- 1; Private sector- 2; Political parties- 2	Shared concern of the of the gloomy scenario, commitment to promote private forestry in those areas

Post-earthquake reconstruction and relaxing timber supply (19 June 2015)	Govt- 2; CSO- 2; Private Sector- 1	Immediate policy response in relaxing harvesting and transportation for timber from CF

CSO = Civil Society Organisation.

Strategy 2: Large workshops as open forum for knowledge exchange:

EnLiFT stimulated discussion that led to, and co-sponsored,

- the National Workshop on Land Management and Food Security: Addressing Under-utilised Agricultural Land Issues in Nepal (28th -29th April, 2016); and
- the National Silviculture Workshop (19-22 Feb, 2017).

In addition, we organized several workshops at district level in our research sites (e.g. forest-based enterprises, CF-LG relations).

Strategy 3: Using research through Working Groups and Task Forces

Even before EnLiFT started, senior team members have been contributing to the policy making process mainly through occasionally formed working groups and task forces. Due to their good research credibility and long-standing relation with the relevant sectors (SM Amatya and NS Paudel in forestry, and BH Pandit in agriculture), they served several missions during the EnLiFT period. In their commissioned work, they translated EnLiFT-generated research findings into reports that they produced for the government For examples: Swoyambhu Man Amatya reviewed agriculture and forestry based industries; Bishnu Hari Pandit worked on the revision of forest based policies; Naya Sharma Paudel worked on community forest enterprises; Shambhu Dangal has been involved in silvicultural technologies for different forest types; Murari Joshi worked on Agroforestry Policy.

Strategy 4: Informal but ongoing engagement

EnLiFT researchers made several formal and informal meetings with relevant officials as a part of policy discussion and have communicated their research generated knowledge. While such engagements are crucial in maintaining mutual trust, identifying and measuring actual output of such engagement is quite challenging.

EnLiFT policy engagement has significantly contributed to the following policy outcomes

1. It has stimulated silviculture-based sustainable forest management to achieve multiple objectives of forest management. Our engagement has strongly brought the concept of silvo-institutional approach to sustainable forest management.
2. The Government, especially the Ministry of Agriculture Development, brought schemes that encouraged land utilization through incentive structure, subsidies and stronger compliance of its rules.
3. The Government made a decision to relax administrative requirement in harvesting and transporting timber during the post-earthquake reconstruction period.

7.8 Lessons learnt

Many lessons have been learnt and have informed the design of EnLiFT2.

Interdisciplinary action research is hard, but more likely to have real-world impact

EnLiFT's interdisciplinary mix comprises biophysical quantitative, social quantitative, and social qualitative data, across the three domains of agroforestry, community forestry and under-utilised land.   Finding the balance of allocating resources and responsibilities across the six research streams in six research sites and among the nine project partners has not been easy. We haven't been successful in all areas; the market chain work (i.e. social quantitative), especially in community forestry, has fallen below expectation. The project leadership could not facilitate an effective partnership between the three organisations engaged in that work, and one of those partners was asked to leave the project. The lesson from this failure is that it would be better to have just one partner organization working on a specific research activity such as market research.

Despite this failure in one corner of the project, the successes in other corners of the project are even stronger because of the mutually supportive impact on each other. A project focusing on just silviculture demonstrations or just silviculture policy recommendations would not have the same impact in the realpolitik of the Nepali forest sector as our project did with both these activities.

Interdisciplinary projects don't necessarily need a large team

The early action research cycles of EnLiFT were pre-occupied with facilitating research teams and fund allocations across partner organisations. Despite the goodwill among all partners this was time-consuming, painful and not always effective. The group of partners was determined from the scoping workshop undertaken in 2012, but in retrospect we all agree there were too many partners. By the mid-term review the in-country leadership shifted from IUCN to ForestAction and one of the partners left the project.

In the early stages 33+ researchers were supposedly involved with the project; this does not include the 10 government officers, 3 FECOFUN representatives and 6 local resource persons or the many people employed on a casual basis by SEARCH for our baseline studies. By the end of this first phase, there were 14 individuals actively engaged in research (as measured by contribution to Basecamp, our communication intranet), noting that the three ICRAF members concluded their formal involvement at the end of last year. By project end we were working much more effectively than in earlier action research cycles. The lesson from this is we should strive for a lean team in any follow-on project (i.e. EnLiFT-2) with very specific roles and to minimize the requirement for cross-organisational collaboration in specific tasks.

Don't be limited by the status quo

At the beginning of the project the prevailing attitude, even among some project members, was that we would not be able to get into the community forests to establish silvicultural demonstration plots. The regulatory limitations on harvest and sale of timber is so complex and restrictive under normal conditions, why would a foreign-funded research project find it easier? Indeed, it took 18 months for the letter from the Director General giving us permission to work in the forests to get to the DFOs. Nevertheless, once CFUG members, government officials and the media saw that we weren't denuding the hills but improving the utility and environmental value of the forests, attitudes changed and we were invited by government to upscale our silvicultural demonstration activities.

Government partners need an incentive to be involved.

In other ACIAR projects, partner governments and collaborating organisations are expected to invest in-kind commitment of their staff. Such an arrangement is not feasible in Nepal. Nevertheless, the role of a government partner is crucial if research activities are to have relevance and wider impact. The Community Forest Division (CFD) of the Department of Forest was a logical partner in this project. The Department of Forest Research and Survey would also have been a good partner; but it did not seem feasible to have two different government departments involved. As it stands, there have been problems even in transferring of the $10,000yr^{-1} funds into the CFD account so there has been no way of accounting for the involvement of government officers. The amounts we were dealing with were embarrassingly small, given that government officers are used to large figure commitments from large development projects, not a relatively small research project such as ours.

At the field level, this played out in the DFOs and AFOs feeling that they weren't getting their due share for involvement in the project. One DFO openly, and repeatedly, asked why we were so stingy with our money. It is a testament to the native goodwill and generosity of the Nepalese that they did commit their time and effort to the project regardless of payment. So, obviously if we can't afford to have every government officer on the payroll, then we need to find other incentives to secure their commitment in any follow-on project. At this stage, it could mean either: providing opportunities of professional advancement through post-graduate qualifications associated with a Phase-2 project; and /or allocating a part-payment to a small group of government officers or specific services.

Facilitating community-based and market-oriented enterprises is challenging and requires higher level of input from external expert

The NAFP had envisioned that the Chaubas enterprise would function smoothly once it provided needed support in the establishment. However, this wasn't the case. While regulatory restrictions and Maoist civil war clearly created an unfavourable environment for business, our research shows that the structure of the enterprise was at the heart of problem. Communities are good at managing forests, but burdening them with the commercial work of running enterprise does not seem to work, and our action research to revitalise the enterprise has revealed two critical lessons: first, some form of partnership with the private sector is essential to catalyse a much need shift from subsistence mind-sets to more business oriented mind-sets; second, a clear forest management planning and silviculturally sound forest harvesting plan is needed to create confidence among communities, business groups, and the government agencies reluctant to allow market oriented management of forests. EnLiFT has made some modest progress towards this state but further research is need for a more nuanced knowledge of the timber market and community-based business governance.

An effective research-policy link is crucial for project impact

Review of EnLiFT's multiple strategies in linking research with policy decision revealed the following important lessons that may help future project design and wider research community in Nepal:

1. EPL can be an effective strategy in strengthening research-policy link to enrich and inform many policy agenda in the forest and livelihoods sector, if it is properly organized and facilitated.

2. Linking research and policy processes requires context specific, dynamic, flexible and interactive process which means that the researchers should adopt diverse strategies as appropriate.

3. Policy link should be an essential element of any research project to achieve wider and lasting achievements, and also to bring research results to scale.

4. Effective dialogue between research and policy actors help revise/refine research agenda and questions, and this benefits both research community and policy actors

7.9 Stakeholder responses

While as researchers we may be proud of our scientific results, we consider the opinions and perceptions of our stakeholders as a crucial measure of our success and an indication of where we need to improve in EnLiFT2.

EnLiFT1's action research operational mode created many opportunities for bringing in stakeholders' feedback and comments on its performance and achievements. Regular monitoring visit by DFO staff and FECOFUN leaders, field visit of district forest sector coordination committee and media people, regular meetings of district level coordination committees, regular meetings of project advisory committee, and final round of project wrap-up meetings as site level and district level provided such opportunity.

End of project wrap-up meetings

End of project 'wrap-up' workshops were held at district as well as research site level (Table 17). Around 30 and 15 participants representing diverse stakeholder groups including CFUG, DFO, media, FECOFUN, and private sector, from Kavre and Lamjung respectively, attended the end of project sharing workshop.

Table 17: Number of participants during end of project meetings at the site level

District	Site	Number of participants
Kavre	Saparupa	40
	Kalopani	25
	Fagarkhola	30
Lamjung	Lampata	35
	Langdihariyali	25
	Dhamilikuwa	25

Most of the stakeholders appreciated the integrated approach of linking agroforestry, community forestry and UUL work; linking micro level piloting with district level and national level policy dialogue (e.g. UUL workshop, silviculture workshop); and balancing immediate livelihoods benefits with generating long term policy lessons. In particular, initiating new ways of agroforestry practices, starting silviculture-based forest management, and bringing UUL into national debate was hailed as exemplary work.

They found that interventions on silviculture were comparatively more successful and therefore suggested to continue with it if there would be a next phase of the project. There were some suggestions to improve the performance and sustainable impacts. They questioned some activities that were started initially but were not continued afterwards: such as lopping trials on fodder, business development plan and market appraisal of key tradable products, and exploring options for bringing UUL into active use.

DFO staff in Lamjung suggested for a stronger collaboration with them during implementation. PAC members emphasised for more capacity building opportunity for DoF/DFO staff including short term training/exposure and co-authoring in project outputs. They also suggested for strong element of post-harvest support in planning and implementing schemes to ensure that both forests and poor members of the CFUGs are benefitted and risks of financial embezzlement and irregularities are minimized. DFO

Kavre suggested for adequate attention to protection from grazing and forest fire of harvested sites to ensure regeneration.

Representatives of local governments suggested for a stronger collaboration with recently elected municipalities for any follow up project. Responses from local communities, women groups, members of CFUGs, agroforestry farmers and forest entrepreneurs were particularly encouraging. They described how they had benefitted by the increased income, improved skill and awareness, well grown hedge rows and fodder trees, increased CFUG income, employment in forest management and improved connection with government officials and other outsiders. Many of them wished for continued engagement with the project.

Voice's of the people

Over the course of our meetings we have been able to record (and translate) verbatim the opinions of many stakeholders. Here is a selection related to just four of our activities.

Improved silvicultural practices through Active and Equitable Forest Management

o *"EnLiFT training helped us developing operational plan with active silviculture. Now we will be able to carry out forest management activities with little technical support of Ilaka Forest Office."* **Chandra Singh Lama, President, Dharapani CFUGs**

o *"The demonstration plots established in Chaubas has given us a good basis to carry out silviculture management in pine forests elsewhere."* **Assistant Forest Officer, Kavre**

o *"Next intervention in Nepal's forestry sector should be the promotion of active or scientific forest management for enhancing both the forest productivity and income of CFUGs. As a forester, I was always looking for opportunity to use my silvicultural knowledge and here I got it."* **Prem Khanal, DFO, Kavre.**

Action research on community forest planning

o *"...with new OP, we have various aspect improved.....most importantly we have openings for better inclusive working environment, we are happy with our new plan and diverse working scope..."* **Chairperson, Lampata CF**

o *"...two years before- all of the leaders of CF were males, since the formulation of new OP, the position of secretary is led by the women."* **Secretary, Dharapani Community Forest**

o *"How can any community forest harvest timber in a situation where huge number of OPs is backlogged. OP backlog is one of the important reasons behind the closure of Chaubas sawmill, which is an exemplary of community managed enterprise. The current OPs do not fulfill the sentiments and requirement of communities and therefore needs some rethinking."* **Rajan Pokharel, DG, Department of Forest**

Revival of the Chaubas sawmill

o *"This sawmill has come as a blessing for us, especially for the earthquake victims, to rebuild our houses. Without its presence here in Chaubas, re-construction would have taken forever".* **A local woman and earthquake victim of Chaubas**

o *"This sawmill had been struggling to operate even after a long time since its establishment. This new partnership modality might be a breakthrough which can revive an already dead institution".* **Chaubas Sawmill Manager**

o *"Chaubas sawmill was in a dire need of intervention to break the deadlock. The support from EnLiFT project has really been instrumental in bringing this dead sawmill to life. Not only has this sawmill been brought to life, it has re-created opportunities for the people of Chaubas."* **Newly elected chair of Bhumlu Rural Municipality**

- o *"Timber in our forests was growing old and useless after the cessation of this sawmill. Its revival has given us the opportunity to utilize our resources. Now it seems like we really have a purpose to manage our forest."* **Chair of Chapanigadhi Community Forest, Chaubas**

Strengthening the research-policy link
- o "It is the fact that a Public policy formulation approach based on strong evidence based research has always high level of acceptance, ownership and success rate compared to ad-hoc and incremental approach. In my personal view, our field visit was an excellent field laboratory policy dialogue. I am very much hopeful that it will definitely value add in drafting the forth coming Management guideline for established plantation community Forests." **Resham Dangi, DG, Department of Forest**
- o "Compared to large forums, EnLiFT policy lab is more focused and allows effective discussion" **Krishna P. Acharya, DG, Department of Forest**
- o "We often see a tensed environment and everybody seems to be struggling to establish their positions in large forums. But, EnLiFT policy lab is different in that sense where there is a cool environment and everybody seem to be appreciating each other." **Ganesh Karki, Chairperson, FECOFUN**

7.10 Overarching narrative and conceptual contributions

The following summary attempts to thread all the preceding results and reflections into an overarching narrative that links the success in EnLiFT1 with plans for EnLiFT2.

EnLiFT1 has been effective research-for-development. Its outcomes include an extensive knowledge base to generally better inform rural development in Nepal, while at the same time delivering immediate development impacts to the study region.

The work with agroforestry interventions showed that relatively small changes in the farming system can result in marked changes in livelihoods. However, our modelling work showed that these benefits may not accrue to all social groups, especially the approximately 50% of households not receiving remittances or other significant off-farm income. For these households, intensive tree-fodder livestock production offers better potential than horticultural commodities. Even much better and more widely enjoyed benefits are to be found in releasing forest wealth from both private and community forests.

Unfortunately, there are still significant institutional, regulatory and policy barriers to the easy and equitable access to wealth from forest products on both private and community managed land. EnLiFT1 has very clearly articulated these barriers and developed mechanisms to overcoming them in the form of inclusive community forest planning processes and ELPs. These will be further developed in EnLiFT2.

Active and Equitable Forest Management is an effective and politically feasible path to release forest wealth. The process of visibly improving forest condition, along with community participation and training, helped overcome the cultural resistance to the concept of Scientific Forest Management promoted by the Government of Nepal. The upscaling of AEFM will be a core activity of EnLiFT2. However, in the light of the fundamental constitutional changes afoot in Nepal, the parallel work on strategic and inclusive planning processes will be crucial to its success.

Further to this will be the need to better understand how to establish forest-based enterprises, both community and private, especially those favourable to disadvantage groups. The market and value chain work in EnLiFT1 delivered a comprehensive foundational knowledge base, including evidence of the possibility of community-private partnerships. However, it did not deliver practical, widely implementable results as intended. Therefore, this endeavour will be continued in EnLiFT2 taking a different approach.

EnLiFT1 has shown that there are clear pathways to unlocking forest wealth from both private and community land. One of those pathways on private land is the productive use of UUL. Private forestry on UUL has great potential for forest wealth generation, is compatible with the shortage of rural labour and provides options to disadvantaged groups. For this path to be fully open it requires multi-sectoral commitment to: educate and support youth to engage in agriculture; encourage investment of remittances into agriculture; and provide legal systems to provide confidence for landholders to invest in commercial agroforestry partnerships. We don't expect EnLiFT2 to achieve all this, but it will provide models of AEFM on UUL that will be accessible to some social groups under the current land tenure environment.

Unlocking forest wealth requires knowledge and institutional change at all stakeholder levels: household, community, local government and national policy. We are still finding that women are not fully engaged in in decision making and planning, and this will be addressed in EnLiFT2. We have articulated the problems with institutions, regulations and governance affecting forest products and have developed methodologies to further work with these at local, state and national level. We have shown how facilitating stakeholder ownership of science is an effective pathway to change, and we will continue on that path in EnLiFT2.

This narrative concludes with a simple listing of the innovative conceptual and methodological contributions, mentioned elsewhere in the report, that EnLiFT1 has made to international forestry development:

1. Pathways approach to link forest and food security.
2. Farm-forest interface and the EnLiFT Model
3. Active and Equitable Forest Management
4. Silvo-institutional model for Sustainable Forest Management
5. Community-based entrepreneurship
6. EnLiFT Policy Labs
7. Rapid Forest Appraisal

8 Impacts

8.1 Scientific impacts – now and in 5 years

The EnLiFT project has produced 17 scientific papers with 9 more in process, 11 conference papers,2 books and 1 conference proceedings. These are listed in Section 11.1 as the main project documents that can be accessed by anybody with internet access.

EnLiFT has permanent website http://EnLiFTnepal.org/ which hosts our *Research Paper Series on Agroforestry and Community Forestry in Nepal,* a bi-monthly serial publication of the project with ISSN 2208-0392. (see Figure 20). The Research Paper Series are internally peer-reviewed papers on key project outputs. Importantly, they have ISSN registered numbers so they are more easily found by bibliographic search engines and more likely to be cited. They will be continued in the follow-on EnLiFT-2 project.

The impact of these scientific outputs is certainly being felt within Nepal as EnLiFT has they have served to secure its scientific credibility within government, academe and civil society stakeholders in forest and rural development. As community forestry in Nepal has a strong international profile, EnLiFT publications will have a broad international reach.

This literature also forms the scientific foundation of the follow-on project EnLiFT2, and will influence the design future development projects in Himalayan region. The EnLiFT Model for example is flexible enough to be applied to any of the mid-hill districts in Nepal with relatively data input for local characterisation. The work on UUL has already informed a 3-year FAO project on under-utilised land in Parbat and Pyuthan districts that began in 2017.

Young and emerging researchers from partner organisations either led many of these papers or have made significant contribution to them, with significant mentoring support from senior researchers. In addition to written publications, Edwin Cedamon, researcher from the University of Adelaide, has also delivered lectures to undergraduate and graduate forestry students of Kathmandu Forestry College (Affiliated to Tribhuvan University) and Institute of Forestry, Tribhuvan University, Pokhara on sharing the findings from the EnLiFT Silviculture Research.

Figure 20 Two examples of covers of Research Paper Series

8.2 Capacity impacts – now and in 5 years

The capacity of stakeholders in the Nepal forestry sector has been improved through numerous tools and processes that are described elsewhere in this report. For now they are just listed:

- Agroforestry interventions, and associated trainings in tree nurseries and business skills have improved the capacity of farmers to generate agroforestry income.
- EnLiFT model has improved the capacity of researchers to project the potential impacts of interventions in the farm-forest system of the mid-hills.
- EnLiFT Policy Labs have created a new and more effective platform for policy makers and researchers to develop evidence-based policy.
- Strategic and Inclusive Planning process, and associated trainings, has given CFUGs and government officials an equitable, rational and inclusive process for re-negotiation of operational plans.
- Active and Equitable Forest Management process, and associated trainings, has given CFUG members and forestry officials the capacity to manage their forests in a way that releases forest wealth, encourages equitable access to forest wealth, and improves forest structure while maintaining forest ecological integrity.
- The results of the work on forest markets, institutions and regulations has provided a strong foundation for further improvement in this field to enhance livelihoods from forest-based enterprises
- The UUL research has improved the precision and quality of research-policy debate on under-utilised land.

All of these improvements will continue to be developed and further capacity impact in the second phase project, EnLiFT2.

8.3 Community impacts – now and in 5 years

8.3.1 Economic impacts

The economic impact of the agroforestry interventions has already been well described in Section 7.1. This section will focus on economic impact of the community forestry work.

Active silviculture practice on community forests resulted an increase of harvests volume creating substantial timber surplus. Table 18 shows that harvest volume per community forest has increased for about 9 to 16-fold where CFUG internal demand are fully met.

Table 18 Comparison of annual timber harvest volume without AEFM intervention (2011-2015) with AEFM interventions project in four CFUGs

CFUG	Average Annual Timber harvest Volume before AEFM intervention (2011-2015) (cft)	Harvested timber volume in 2016 with AEFM Intervention (cft)
Dharapani	457.8	7,252
Chapanigadhi	629.4	9,324
Rakchahama	848.8	13,050
Lakuri	622.4	5,484

The incremental economic benefits of active silviculture practice for plantation pine forest in Chaubas is on average NRs 129,000 per hectare to NRs 1.7 million per hectare derive for marketable timber surplus (Table 19). The total revenue from the 2016 timber sale was NRs 16.7 million, of which 3.3 million was directly paid by the timber buyers to labourers for harvesting and logging and NRs 11.4 million as CFUG income of which 35% will be allocated to pro-poor livelihood program in a form of soft loan. In addition to soft loans, households will benefit from the 25% of the CFUG revenue that will be allocated for forest management maintenance operations which will be paid as labour cost to CFUG members. This additional benefit ranges from NRs 5,000 to NRs 16,000 per year.

Table 19 Internal timber distribution

CFUG	Number of Household members	Timber (C.Ft.)	Rate	Total Amount
Lampata	260	881	45	39,645
Dharapani	64	600	25	15,000
Kalapani	296	1159	15	17,385
Fagarkhola	71	350	15	5,250
Chappanigadhi	105	500	25	12,500
Rakchhama	61	750	25	18,750
Lakuri Rukh Bhulbhule	88	475	25	11,875
			NRS	120,405

Table 20 shows that selection method yielded the highest revenue per hectare due to harvesting of larger and better-quality trees. Scaling the figure of financial benefit to whole Kavre District with a total of 18,995 hectare of community forest will likely yield a revenue of NRs 2.2 billion to NRs 30.4 billion. This is significant asset that can be managed sustainably and value-added by better silviculture management.

Table 20 Volume of timber surplus and revenue from timber sale

CFUG	Timber (C.Ft.	Rate	CFUG Revenue (NRs)	Labour charge	GoN royalties	Total amount	Remarks	Area (ha.)	Revenue per hectare
Rakchhama	8,475	305	2,584,875	847,500	446,209	3,878,584	Lot 1	8.6	450,998
Rakchhama	3,825	350	1,338,750	382,500	223,763	1,945,013	Lot 2	2.4	810,422
Dharapani	6,652	351	2,334,852	731,720	398,654	3,465,226	Lot 1	2.1	1,650,108
Chappanigadhi	6,086	401	2,440,486	608,600	396,381	3,445,467	Lot 1	8.5	405,349
Chappanigadhi	2,738	358	980,204	273,800	163,021	1,417,025	Lot 2	2.1	674,774
Lakuri Rukh	2,000	358	716,000	200,000	119,080	1,035,080	Lot 1	8.0	129,385
Lakuri Rukh	3,009	340	1,023,060	330,990	176,027	1,530,077	Lot 2	1.35	1,133,390
Total NRS			11,418,227	3,375,110	1,923,134	**16,716,471**			

Silviculture interventions
Lot 1 Racchma – removal of 4D trees

Lot 2 Racchma – Selection method
Lot 1 Dharapani –selection method
Lot 1 Chapani – removal of 4D trees

Lot 2 Chapani – removal of 4D trees
Lot 1 Lakuri – removal of 4D trees
Lot 2 Lakuri – selection method

In EnLiFT2 we will be scaling up the volume of timber being released into the market from CFUGs in Kavre and Sindhupalchok districts through our work with AEFM. In addition, we will develop better knowledge to be able to project what the broader scale impacts of AEFM will be when promulgated through other districts.

8.3.2   Social impacts

EnLiFT conducted in-situ trainings on forest governance, practical demonstration of silvicultural practices, and business skills training workshops. These positively contributed in building capacities of both women and men participants. All EnLiFT training activities had a strong, pro-woman, pro-poor agenda (e.g. see Table 22 in Section 8.4.3). Such capacity building activities complementing research activities or designed interventions were essential to bring the village-level participant researchers at similar level of knowledge so that all can equitably benefit from any interventions.

As outlined in Section 7.2.2 while women were well represented in all EnLiFT activities and received numerous trainings and other opportunities to further their gendered interests, there are still deep cultural influences that restrict the extent these interests can be furthered. Nevertheless, there was huge improvement in the baseline understanding of women involved in EnLiFT compared to their capacity during later consultations and interviews, and they expressed enthusiasm and gratitude for the skills acquired.   Women are now members of more representative, inclusie community forest institutions in which they can engage in decision making processes. Women and Dalits are in leadership positions, so they can ensure their views are not suppressed. They express an optimistic view towards community forestry.

8.3.3   Environmental impacts

The primary environmental impact of EnLiFT1 has been through change in community forest structure via the AEFM activity.   Its success in EnLiFT1 and proposed scaling up in EnLiFT2 will also have important environmental impacts.

The project has contributed significantly to positive environmental impact through demonstrating better and sustainable management of forests, enhancing economic incentives for conservation through better market linkages, plantation of agroforestry crops in the private land, promotion of natural regeneration in the forest, etc.
One of the major impacts is through the reformulation of operational forest management plans in a number of CFUGs, as shown in Table 21.

Table 21 Changes in operational plans of community forests

CFUGs name	Date of approval	Key improvements in forest management and realising the benefits
Lampata CFUG, Jita Taxar, Lamjung	2015	New Operational Plan (OP) has increased members ownership and active involvement, active forest management, equitable benefit sharing. Thanks to the new OP, poor members are allowed to manage small plots of CF-land for growing fodder and benefit from it, plantation in a barren land managed by a small hamlet, equitable pricing of timber.
Apchaur CFUG, Dhamilikuwa	2015	Identification of poor HH through well-being ranking, differential price of forest product to poor HHs, 35% community fund in poor focus activities
Dharapani CFUG, Chaubas, Kavre	2017	New OP based on scientific forestry guidelines has enabled them to harvest over 6000 cft of timber, earned about USD 30,000 and are now developing spending plans
Narayansthan CFUG, Dhunkharka, Kavre	2017	Wellbeing ranking to identify poor HHs, Poor HHs get forest products in reduced price, 35% of total community fund in poor focused activities.
Over 15 CFUGs in Kavre, Lamjung and Chitwan (outside designated research sites)	2016-17	Technical services were provided to develop new OP based on Scientific Forest Guidelines as requested by respective DFOs. Forest management of these community forests has improved and harvest has increased with substantial increase in CFUG income

While there was no measurement of environmental impact in EnLiFT1, the phase 2 project will examine these impacts through a socio-ecological lens.   The types of expected impacts are how AEFM:

- affects net forest biomass and carbon accounting for REDD+ implementation strategy;
- presents a trade-off between tree cover and catchment water yield;
- supports sustainable flora and fauna management; and
- helps to mitigate risks and community readiness to respond to disasters.

The topography of Nepal is extreme for human habitation. The mountains and hills interact with variable monsoonal rainfall patterns and earthquake risk to generate environmental hazards, and in association with small-scale, remote agricultural systems, facilitate persistent rural poverty and malnutrition. Numerous studies are revealing how climate change impacts are accentuating these socio-ecological risks (egs Aryal et al. 2014; Pandey and Bardsley 2015). Effective AEFM, especially when effectively integrated with local agricultural and socio-cultural systems will help rural communities to mitigate those risks, while also assisting to promote local biodiversity conservation and agricultural development. It will also link to broader policy goals of biosequestration through REDD+ and National Climate Change Action Planning, and to water management and the National Water Plan.

The Nepal Australia Forestry Project was partly predicated on opportunities for reducing risks of landslides and flash floods. Under-utilisation and poor management however has seen sub-optimal outcomes from forests both for hazard risk reduction, and commercial and community harvesting.

AEFM is a platform whereby local communities engage in more profitable and sustainable silvicultural practices. By generating management models for CFUGs that local communities see as valuable for natural hazard mitigation as well as for timber, local environmental risk mitigation will link to National Disaster Risk Management planning. A significant challenge remains that many Middle-Hills communities have been excluded from sustainable use of native forests by biodiversity conservation policy. AEFM affords communities the ability to reduce harvesting pressures on areas of high-value biodiversity and enables sustainable use of their forests for balanced outcomes

8.3.4 Policy impacts

EnLiFT has already had significant policy impact across a number of specific policy agendas in the area of forestry, agroforestry, land management, forest product marketing, and active and equitable forest management.   The specific results of this work are described in Section 7.7 and Appendix Sections 11.1.7and 11.1.8

While EnLiFT policy labs provided a key mechanism to forge dialogue between research team and key policy actors, we also produced and circulated a range of policy recommendation briefs. A notable example is land underutilisation policy workshop, which was organised by the National Planning Commission of Nepal, in which EnLiFT researchers provided sold recommendations for policy change. We are delighted to note that Nepal's apex level planning authority adopted some of our recommendations.

Other key achievements on policy fronts include the following:
- EPL which drew on the research findings of EnLiFT has informed timber supply strategy of the Nepal government for rebuilding houses in the earthquake affected areas.
- Agroforestry and modelling work have informed forest product marketing policy discussion in Nepal.

- EnLiFT has provided major policy inputs on silvicultural technology development in Nepal (as a member of scientific committee and organising committee)
- EnLiFT has pioneered a debate on linking community forestry with food security
- EnLiFT research has also been cited by and referred to in the wider policy discourse through the media and local level policy discussions
- EnLiFT has also empowered local communities to claim legislative rights over community forestry, which has contributed to effective implementation of the policy and regulatory arrangements favouring community based and market-oriented forest management
- EnLiFT works in Chaubas contributes to the local level policy reforms at CFUGs for exploiting new commercial opportunities through partnership between communities and the private sector
- EnLiFT works in Methinkot and Dhamilikuwa triggering policy debates on strategic and inclusive planning practice to address challenges of elite capture
- EnLiFT works is improving planning and policy processes of CFUGs to deliberate multiple voices at the local level as well as national levels
- Works in land underutilisation leading the debates on policies on land utilisation and food security by addressing social and institutional issues and devising pathways and strategies to bring back underutilised land into production as well as preventing the rise of land underutilisation
- Silvicultural workshop and publications influencing Nepal's public policy makers and their organisation's willingness and capacity to make improvements in policies relating to the management and administration of CF system;
- Empirical and scholarly works enhancing awareness, knowledge and skills of researchers, policy makers and communities related to policy development
- EnLiFT Policy Lab engaging and informing policy makers about potential economic, social, and environmental ramifications of diverse voices from the grounds being articulated in the policy circle, and recognising the value of continuous learning in policy development by identifying causalities that inform the review of policies.

There are both substantive as well procedural outcomes from these EPLs, though there are attributional challenges as multiple factors are at play. At least in two policy issues we observed more direct link to new policy decisions. On the private forestry issue, the EPL explored a few areas, which could ease private forest owners to get their timber to the market. Later the government decided to exempt 26 tree species from all administrative process so that farmers can now sell their timber without any hurdles in harvesting and transportation.

Similarly, EPL discussion facilitated increased harvest and supply of timber in the market especially in the earthquake hit districts. The Director General and Deputy Director General of Department of Forest among others participated in this discussion. Later the Department of Forest issued a circular, which significantly eased the administrative requirement for harvesting and transporting timber from private and community forests. In a third case, the issue discussed in EPL received attention by the authorities and stakeholders which later resulted in a National Workshop on under-utilised land and the issue now has been internalized into the National Planning Commission.

However, apart from these immediate policy outcomes, EPL helped develop appreciation of the role of research in making decision. There is an increased communication between policy makers, researchers and other stakeholders. And researchers also appreciated the value of constant engagement with policy makers as it would help make their research questions more relevant to the policy demand.

EPL induced open, honest and focused discussion on the policy issue in question. The quality of argument, role of evidence, and appreciation of alternative views counter arguments were much more different than usual multi-stakeholder consultation workshops. It is observed that EPL remained effective on those issues where there was a strong policy demand. In this case, discussion on private forests and timber supply for post-earthquake reconstruction resulted in good policy decision. Lastly, the EPL helped much the researchers to better frame the research question and articulate the findings through policy language that is appealing to the policy makers.

EnLiFT's research-policy interface activities which formally emerged since the mid-term review as the EnLiFT Policy Labs (EPLs) have had positive impacts, not fully reported in previous annual reports. The EPLs are a process to engage stakeholders in the process of collaborative inquiry with a view to explore, identify, promote suitable policy options for better linking forestry, agroforestry and underutilized land to food security and livelihoods of local communities in the hills of Nepal were carried out in the project sites.

Examples of some of the issues that EPLs discuss are as follows:

- How has the policies, laws and regulations (Forest Act 1993, Forest Regulation 1995, Environment Protection Regulation 1997, and Private Forest Development Directives 2011) promoted/inhibited registration, management, harvesting including timber marketing of private forest?

- How can implementing agencies such as DFO and Policy encourage private forestry development and marketing in the prevailing regulatory framework?

One of the classical problems of the consultation process is seeing 'how local issues are linked in policy'. Increasing the buffer of the scope of consultation and focusing on the major issues to be prioritized during consultation, the ways deployed to deliberate the findings to stakeholders, the appropriate filtration of the issues raised at local and thus address of the same in policy are key to consultation process. The followings are some of the issues that policy lab came to the conclusion.

- The policy provision is the major hurdles for major policy issues (for instance-inventory, OP revision and so on). The situation demands the revision of the current policy provisions.
- Lack of human resource (forest officials) at the grassroots level is the key problem behind increasing backlog of CF OP revision, poor DFO and CFUG relation and not being able to carry out inventory well on time.
- The national level workshop on 'Land use Policy and Practice in the hills of Nepal: implications on food security'
- The concept of EnLiFT policy lab is obviously very useful and will be continued in EnLiFT2

8.4 Communication and dissemination activities

Under this section is summarised trainings in agroforestry and community forestry silviculture, FECOFUN events, postgraduate research training, and briefly national workshops and website. Trainings in Inclusive Planning and Governance has already been discussed in Section 7.3. A list of scientific dissemination outputs is given in Appendix Section 11.1

8.4.1 Agroforestry training

Agroforestry training was in both system establishment and entrepreneurship development. As part of this effort a Train-the-Trainer manual (Figure 21 a) was

developed with two modules: 1] selection of agroforestry option, nursery and plantation establishment; and 2] agroforestry business enterprise plan development (Figure 22 b). The manual includes selection of high value commodities, nursery establishment and management, agroforestry products marketing, agroforestry business training focusing on high value commodities, policy and regulatory constraints, methods for preparing biochar based organic fertilizer and its use, and under-utilization of arable land.   It includes extension leaflets for five priority understory crops (Figure 21 b).

This manual includes a five days training course involving mostly practical sessions and extension materials in simple Nepali language based on the learning of agroforestry interventions for improved livelihoods and food security of the local people. Further quantitative details on number and timing of trainings, and attendance numbers etc available in the 2016/2017 Annual Report, and a summary tables of trainings are in Appendix Section ???.

a   b
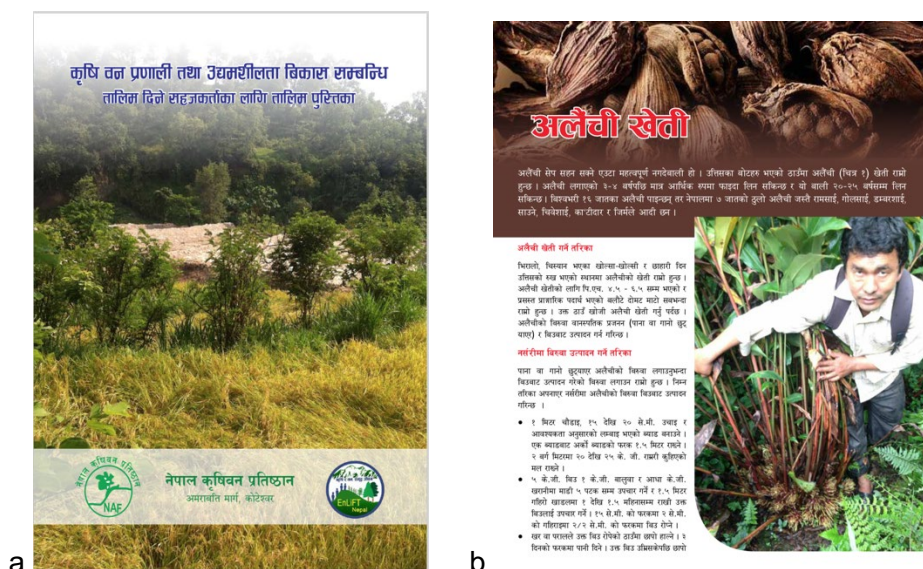
Figure 21 a] Cover of extension manual; b] extension flyer for cardamom

The training was delivered as part of the agroforestry action research by involving both members of CFUGs) and LRGs (> 300 farmers) in the six research sites with the active assistance of LRPs. 150 farmers (at least 30 participants /site) received training locally with backstopping support of the NAF trainers.

Figure 22 a] Nursery raining session Dhamilikuwa. b] Business training, Kathmandu

8.4.2 Silvicultural training

The silviculture dissemination activity in the early years of the project focused on field days to demonstrate forest inventory, silviculture management and forest management operations (eg Figure 23). The field days were held as joint activities of the District Forest Office and Ilaka Forest Office and EnLiFT project. For example, in 2015 a five-day training on Scientific Forest Management was organised in Chaubas in collaboration with Dept of Forest and Ilaka Forest Officers. Forestry staff and CFUG leaders were trained on the benefits of better silvicultural management and on specific skills to operate better silviculture within existing forest rules, laws and regulations. The field days also provided the Ilaka Forest Officers opportunities to refreshed forest inventory techniques with particular applications for improving silviculture. Joint field visits by international and national research team members also enhanced mutual learning and capacity of building of emerging Nepalese researchers. A two-day district level capacity building workshop was also organised in 2015 for the project staff, LRPs, LRGS and DFO staff in both districts. In parallel with field days there were many meetings and tours to view silviculture demonstration plots to share learnings from silviculture practice to local politicians.

Figure 23. Representatives of selected CFUGs in Kavre, Ilaka Forest Officers and DFO Foresters, Media personalities from Kavre and Kathmandu on a field day in Chaubas

In the second half of the project term, the core activity was on scaling-up and scaling-out of innovative silviculture practices trialled in demonstration plots. Silviculture boot camps were held in the six research sites covering 35 CFUGS covering 3,604 hectares of community managed by 5,080 households . Over 245 representatives from CFUGs across the 6 sites attended these boot camps All these CFUGs are now implementing varying levels of silviculture activities they learned from EnLiFT Project producing significant increase in volume of fuelwood and timber products from their previous forest operations.

In addition to the silviculture boot camp, EnliFT also held a training on Scientific Forest Management was attended by forest technicians of Kavre District Forest Office and representatives from four CFUGs in Nagarkot area and Chaubas. The training was held in Dhulikhel for four days where the board and lodging were covered with support from MEDEP and Kavre DFO.

8.4.3 FECOFUN events

FECOFUN, as the peak body representing all CFUGs across Nepal, has been an important partner contributing to action research planning meetings and community engagements. FECOFUN has mainly been in two fronts. Firstly, the critical engagement of EnLiFT researchers supported FECOFUN in organizing interactions on issues pertinent to forest-based enterprise both at the site and district level. The interactions mainly targeted enterprise owners, government officials, and local government representatives. A series of discussions on regulatory and institutional hurdles associated with registration, operation, and trade of forest products was held in Kavre and Lamjung. As a result, some of the new enterprises, who were struggling to seek legal permits, have now been registered. Furthermore, the understanding of the legal and administrative requirements for enterprise registration, among the enterprise owners has been enriched. Moreover, such interactions helped entrepreneurs in their access to concerned government line agencies and local government officials. The intermediary role of FECOFUN has been critical in this regard.

Secondly, FECOFUN's engagement with the local government has had positive impacts in various fronts. FECOFUN organized workshops and meetings with different line agencies and local government offices to discuss areas for integrating community forest priorities in local development planning process. Likewise, there was clarification on how CFUG members can access different support systems within the local line agencies. As a result, the CFUG members were able to get hold of information on various development projects and their existing schemes. Likewise, the access of CFUG members to local line agencies was enhanced as a result of their acquaintance with the officials during the workshops/meetings. A list of trainings and events organized by FECOFUN is provided in Table 22.

Table 22 List of trainings and events organized by FECOFUN

Date	Activity	Place	Total participants
Kavre			
18 / 11 / 2016	Women empowerment and entrepreneurship development interaction in CF	Chaubas	31
20 / 11 / 2016	Women empowerment and entrepreneurship development interaction in CF	Dhunkharka	33
22 / 11 / 2016	Women empowerment and entrepreneurship development interaction in CF	Methinkot	24
27 /12 /2016	Workshop on mainstreaming community forestry and agroforestry	Dhulikhel	33
23 / 01 / 2017	Forest product-based enterprise development workshop	Dhulikhel	41
8 /02 / 2017	Opportunities and challenges on timber sale from CF	Banepa	33
Lamjung			
13 / 12 /. 2016	District level interaction workshop on project progress	Beshisahar	18
23-24 /01/ 2017	Workshop on Women participants in CFUG	Dhamilikuwa	48
2-3 /02/ 2017	Workshop on Women participants in CFUG	Taksar	44
1-2 /03/ 2017	Workshop on Women participants in CFUG	Nalma	54
17 /04/ 2017	District level interaction workshop on forest-based enterprise	Besisahar	19
19/12/2017	Workshop on CF-LG relation at Municipality level	Dhamilikuwa	35
24/12/2017	Workshop on CF-LG relation at Municipality level	Besishahar	27
28/12/2017	Workshop on CF-LG relation at Municipality level	Taxar	60

8.5 Postgraduate research student training

The research students, and their projects, that have been engaged in EnLiFT are listed in Table 23

Table 23 Research student projects associated with EnLiFT

Research student	Award	Institution	Topic	Principal supervisor
Lila Puri	PhD JAF	Uni Adelaide	Spatial and social factors influencing management of community forests in Nepal	I. Nuberg
Sujata Tamang	PhD JAF	Uni NSW	Food security and feminisation of local communities in Nepal: Exploring pathways for inclusive agrarian transformation	KK Shrestha
Govinda Paudel	PhD JAF	Uni NSW	Political ecology of forest under-utilisation in Nepal's community forest.	KK Shrestha
Manoj Badu	PhD	Uni Adelaide	Hydrological Impact of Community Forrest in the Mid -Hills Catchment of Kavre District, Nepal	I. Nuberg
Prativa Sapkota	PhD	Uni Melbourne	Community, social marginalisation and adaptation to climate change: An analysis of community forestry system in the middle hills of Nepal	H. Ojha
Abbie White	PhD	Uni NSW	Climate change adaptation and social justice: A case study of a mountain community in Lamjung District, Nepal	KK Shrestha
Anisha Pradhan	PhD	Uni NSW	Social inclusion and local institutions in community-based climate change adaptation in Nepal	KK Shrestha
Hiroshi Endo	M.Phil	Uni Adelaide	Evaluating the importance of fodder trees to soil nutrition of farming systems in the mid-hills region of Nepal	I. Nuberg
Dinesh Bastakoti	M.Sc	Uni Bonn	Impact pathway validation for an agroforestry intervention in Nepal	E. Luedeling
Heather Feetham	B.AgSc Hons	Uni Adelaide	The Impact of Agroforestry Interventions on Food Security in the Mid-hills of Nepal	I. Nuberg
Chris De Ieso	B.AgSc Hons	Uni Adelaide	Informing Community Forest Management: A Retrospective Analysis of an Old Silvicultural Trial in	I. Nuberg

JAF = John Allwright Fellow

8.6 EnLiFT-sponsored workshops and conferences

EnLiFT was instrumental in supporting two national workshops and one international conference, by way of direct financial and organisational support:

- National Workshop for 14th Plan of National Planning Commission: 28-29 April 2016
- National Silviculture Workshop 19-21 February 2017
- International Agroforestry Conference 27-29 April 2018

Summaries of the outputs of these meetings are provided in Appendix Section 11.1.7

8.7 EnLiFT website

EnLiFT has a website housed within Forest Action's site (Figure 24). This will have continuity during EnLiFT2. It carries links to all research publications, our Research Paper Series, Policy Briefs, and extension materials in Nepali and English.
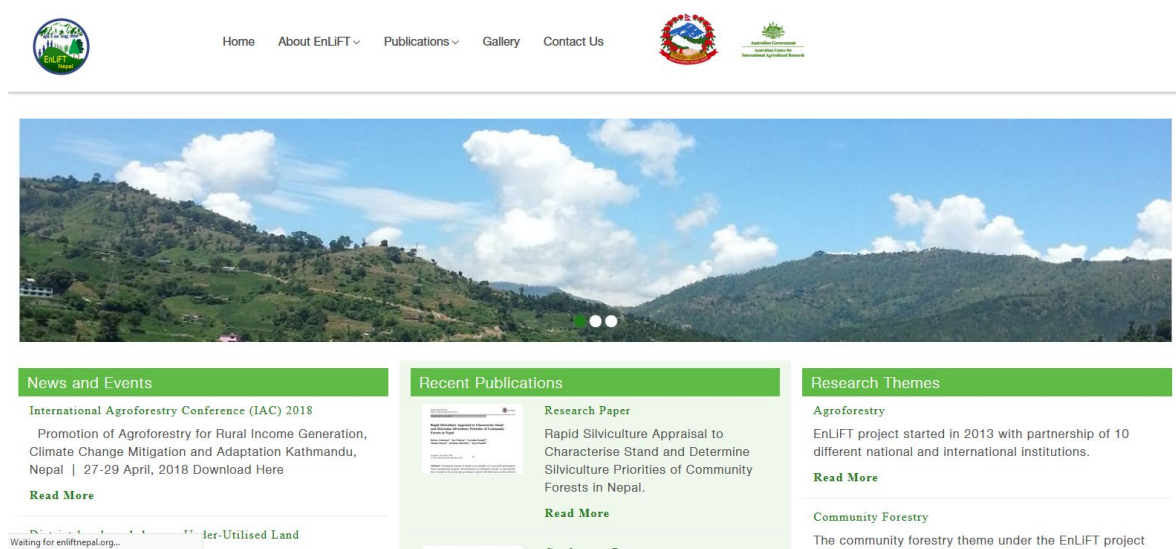

Figure 24 EnLiFT website http://EnLiFTnepal.org/

9 Conclusions and recommendations

9.1 Conclusions

The overall aim of EnLiFT1 was to enhance livelihoods and food security from improved implementation of agroforestry and community forestry systems in the Middle Hills of Nepal. It has achieved this aim through the supporting objectives to the following extents.

Objective 1 To improve the capacity of household-based agroforestry systems to enhance livelihoods and food security
Households participating in the agroforestry interventions immediately benefitted by the increased incomes from the horticultural cash crop components of these interventions. They learnt nursery skills for further development of their on-farm fodder trees, and business management skills to more efficiently engage in commercial farming. The capacity to promulgate this knowledge and skills has been captured in a suite of extension products.

To reflect the principle that active and equitable forest management is a pathway to food security EnLiFT1 produced a bioeconomic model that integrates the farm-forest interface. It can be used to project likely impacts on food security from agroforestry and community forestry interventions. With this model we also learnt that not all farmers will benefit from the horticultural commodity interventions and those without regular off-farm income (eg through remittances) will have better opportunities in livestock systems with intensive on-farm fodder systems and/or woodlots of high value trees on currently under-utilised land.

EnLiFT1 has clearly articulated the institutional, regulatory and policy barriers to further development of timber production on private land. It has laid the foundations, but not yet achieved the reality, for ensuring comfortable livelihoods and food security based on privately-grown timber.

Objective 2 To improve the functioning of community forestry systems to enhance the livelihoods and food security of CFUG members.
EnLiFT1 successfully improved the functioning of community forest systems through the Silvo-Institutional Framework for scientific forest management.   This framework integrates the biophysical via the participatory silvicultural practices of Active and Equitable Forest Management (AEFM); and the social via the process of Strategic and Inclusive Planning (SIP).

AEFM, by providing striking visual examples of well-managed forests, had a powerful impact on perceptions of all stakeholders. Over the five years of the project we witnessed a shift from resistance and reluctance to actively manage community forests to enthusiastic engagement and encouragement to up-scale the activity.

The SIP activity developed a strategic consultative process in the renewal of community forest operational plans that significantly reduces time and resource demand without compromising critically needed inputs and ownership of CFUG members. Women and disadvantage groups are actively engaged so that it is truly inclusive. It is an activity that includes significant capacity building of CFUG members. It is the foundation for further consultative planning process that need to occur as federalism is instituted where there will be new layers of government involved in forestry planning and management.

EnLiFT1 also produced a comprehensive foundational knowledge base of the current status of community forest markets and the attendant problems. We also learnt that there needs to be a rethink on modes of collective management of community forest

enterprises, and that a community-private partnership has provided early promising results.

Objective 3 To improve the productivity of, and equitable access to, underutilised and abandoned agricultural land
EnLiFT1 was not able to achieve on-ground examples of bringing under-utilised land (UUL) back into production. Unfavourable currency exchange fluctuations and the unexpectedly high costs of labour (compared with the usual in-kind partner commitments in other ACIAR projects) meant that we had very limited resources for this objective. Nevertheless, EnLiFT1 delivered two high-quality and complementary accounts of the drivers and dynamics of UUL that is currently informing policy: e.g. inputs into the 14th Plan of National Planning Committee.

Overarching the three objectives was the highly successful EnLiFT Policy Labs. The EPLs proved to be an integral component of our action research processes. By providing a research-policy interface the science outcomes from the three project objectives has more relevance and impact on enhancing livelihoods and food security from agroforestry and community forestry.

9.2 Recommendations

Key research gaps have been identified as needs for: understanding of the socio-ecological impacts of AEFM; improving local government planning in the context of rapid social, economic and political change; strengthening the CFUG system in the context of new local government powers; reducing gender inequality in community forest decision-making; low-labour input activities that are suitable for time-poor women; tree-based enterprises that could be deployed on UUL; a new institutional framework for regulatory and institutional cooperation between the CFUGs and local governments; pro-poor forest-based enterprises models; alternative regulatory structures for marketing forest products; and responses to the disconnection between research and policies for improving livelihoods.

A phase 2 project, EnLiFT2, has been proposed that focuses on improved forest management in community forests and private land to improve livelihoods, social equity and environmental impact.

It will achieve this through the following objectives:
1. To enhance adoption and benefits from AEFM and improved private forestry practices
2. To develop and institutionalise community forestry planning, governance, and gender equity frameworks within the context of new local government system, and
3. To design and facilitate the establishment of pro-poor small-scale forest enterprises

The proximal causes of improved forest management will be improved social, economic and environmental services from community and private forests; increased income from value-adding; improved forest policy, planning and governance; and enhanced gender equity.

10 References

10.1 References cited in report

Adhikari, B., Falco, S. D. and Lovett, J. C. (2004), "Household characteristics and forest dependency: evidence from common property forest management in Nepal", *Ecological Economics*, vol 48, no.2, pp 245-257.

Amatya SM, Cedamon E and Nuberg I (2018) Agroforestry Systems and Practices in Nepal - Revised Edition, Agriculture and Forestry University, Rampur, Nepal, 108pp + xviii

Amatya SM, Nuberg I, Cedamon E., Pandit BH (2016), Removing barriers to the commercialisation of agroforestry trees in Nepal, IN J Meadows, S Harrison, and J Herbohn (eds) Small-scale and Community Forestry and the Changing Nature of Forest Landscapes, Proceedings o the IUFRO Research Group 3.08 Small-scale Forestry Conference held on the Sunshine Coast, Queensland, Australia 11-15 October 2015, pp1-18

Amatya SM, Nuberg I, Cedamon E, Shrestha KK, Pandit BH, Aulia P, Joshi M, Dhakal B (2018), Participatory market chain appraisal for the full range of agroforestry products including market trends and growing markets, *Banko Janakari*, Volume 27 (2), 2018

Cedamon E, Nuberg I, Lusiana B, Mulia R, Subedi YR, Shrestha K (2016a) EnLiFT Model 1.0: a livelihood and food security model of a forest-farm system, IN J Meadows, S Harrison, and J Herbohn (eds) Small-scale and Community Forestry and the Changing Nature of Forest Landscapes, Proceedings o the IUFRO Research Group 3.08 Small-scale Forestry Conference held on the Sunshine Coast, Queensland, Australia 11-15 October 2015, pp 23-42

Cedamon E, Nuberg I, Mulia R, Lusiana B, Subedi YR, Shrestha K (2018 In process), Contribution of integrated forest-farm system on household food security in Nepal's mid-hills: assessment with EnLiFT Model, *Australian Forestry Special Issue*

Cedamon E, Nuberg I, Paudel G, Basyal M, Shrestha K, Paudel N (2017a), Rapid silviculture appraisal to characterise stand and determine silviculture priorities of community forests in Nepal, *Small-scale Forestry* 16(2):195-218, Published online 28 Aug 2016.

Cedamon E, Paudel G, Basyal M, Nuberg I, Paudel N (2018a), Crown and regeneration responses to silviculture systems in Pine and Sal forests: preliminary results from silviculture trials in mid-hills Nepal, *Banko Janakari Special Issue*

Cedamon E, Paudel G, Basyal M, Nuberg I, Shrestha KK (2018b), Applications of single-tree selection guideline following a DBq approach on Nepal's community forests, *Banko Janakari Special Issue*

Cedamon E, Nuberg I, Paudel N, Basyal M, Shrestha K (2018 in preparation), Active silviculture practice on community forests: forest users' perceptions and observation from mid-hills Nepal, being prepared for *Forest Policy and Economics*

Cedamon E, Nuberg I, Heyojoo B, Shah R, Shrestha K (2018 in process), Modelling pathways for reutilisation of abandoned agricultural land in mid-hills Nepal, being prepared for *Land Use Policy*

Cedamon E, Nuberg I, Shrestha K (2017b), How understanding of rural households' diversity can inform agroforestry and community forestry programs in Nepal, *Australian Forestry,* DOI:10.1080/00049158.2017.1339237.

Gilmour D and Shah R (2012). Synthesis paper of Project planning workshop: Enhancing livelihoods and food security from agroforestry and community forestry systems in Nepal. 11-13 May 2012, Himalaya Hotel, Kathmandu. ACIAR Small Research Activity.

Gilmour, D. (2016), Forty years of community-based forestry: A review of its extent and effectiveness, Food & Agricultural Organization of the United Nations (FAO), FAO Forestry Paper 176, Rome.

Hobley M (2013), Persistence and change: review of 30 years of community forests in Nepal: Multi-Stakeholder Forestry Program (MSFP), Ekantakuna, Lalitpur, Nepal, Ebook 441p

Juita R, Karlan A, Tanika L & Lusiana B (compilers) 2013. Proceedings of Model Design Workshop. Developing functioning models to inform improved interactions between farm and forest systems in Nepal. Held at World Agroforestry Centre, Bogor Indonesia, 25-29 November 2013.

Joshi M, Dhakal B (2015), Report on Agroforestry Business Plan Preparation Training, EnLiFT Project Report

Karanjit S, Malla Y, Khanal R, (2012) Assessment of national regulatory frameworks, policies priorities and strategies relevant to enhancing livelihoods and food security from agroforestry and community forestry in Nepal. IUCN Nepal for the planning workshop reported by Gilmour & Shah 2012.

Karki R, Paudel NS, Ojha H, Shretha KK, Paudel G, Basyal M, Nuberg I (2015), Process report on Inclusive Community Forest Planning, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2015-05:1-24

Karki R, Shrestha K, Ojha H, Paudel N, Khatri D, Nuberg I, Adhikary A (2018), From forests to food security; pathways in Nepal's community forestry, *Small-scale Forestry,* 17(1):89-104, DOI 10.1007/s11842-017-9377-y

Khatri D, Shrestha K., Ojha H, Paudel G, Paudel N and Pain A (2016), Reframing community forest governance for food security in Nepal, *Environmental Conservation*, DOI:10.1017/S0376892916000369,

Shrestha K (2009), Rethinking participatory forestry for equity: views from Nepal, In XIII World Forestry Congress: Forests in Development – a vital balance, Buenos Aries, Argentina, 18-25 October 2009

Malla Y, Neupane HR, Branney PJ (2003), Why aren't poor people not benefiting more more from community forestry? *Journal of Forests and Livelihood,* 3(1), 79-93

Malla Y, Shah R, Chhetri R, K, Subedi YR, Tamang S, Paudel K, Basyal M, Shrestha S, Nuberg I, Shrestha K. (2014), Qualitative Baseline Study on Underutilised Land in Kavre and Lamjung Districts, Nepal, *Research Paper Series on Agroforestry and Community Forestry in Nepal*, 2014-05:1-53

Magrath, W. B., Shrestha A, Subedi, B., Dulal H.B. and Baumback R. 2013. Nepal Forest Sector Survey: Policy priorities and recommendations. Washington, DC: Program on Forests (PROFOR), The World Bank.

McDougall, C. et al., 2009. Facilitating forests of learning: enabling an adaptive collaborative approach in community forest user groups, a guidebook. Bogor: Center for International Forestry Research.

Mulia R, Lusiana B, Cedamon E, Nuberg I, Subedi YR (2017), EnLiFT Model 1.0: a household income and food security model for rural areas of Nepal, A manual

NLSS (2013) Report of Nepal Living Standard Survey, Government of Nepal, Kathmandu

Ojha, HR. (2008). Reframing Governance: Understanding Deliberative Politics in Nepal's Terai Forestry. New Delhi: Adroit.

Ojha, HR., N. Paudel, D. Khatri and D. Bk 2012. Can policy learning be catalyzed? Ban Chautari experiment in Nepal's forest sector. *Journal of Forest and Livelihood* 10(1): 1-27.

Ojha HR, Shrestha KK, Subedi YR, Shah R, Nuberg I, Heyojoo B, Cedamon E, Rigg J, Tamang S, Paudel K, Malla Y, McManus P (2017), Agricultural land underutilization in the hills of Nepal: investigating socio-economic environmental pathways of change, *Journal of Rural Studies*, 53: 156-172, http://dx.doi.org/10.1016/j.jrurstud.2017.05.012

Pandit BH (2014), Why cannot local communities do forestry business? Analysis of barriers in the value chain of private forestry products in Nepal. In R. mandal, S Dhakal, and N Hamal (eds), Proceedings of the 6th National Community Forestry Workshop, Lalitpur, Nepal 16-18 June 2014, pp 306-319.

Pandit BH., Nuberg I, Shrestha KK, Cedamon E, Amatya SM, Dhakal B, Nuepane RP (2018 in process), Impacts of market-oriented agroforestry intervention on farm income and food security: a case study from Kavre and Lamjung districts of Nepal, *Agroforestry Systems*

Pandit BH, Neupane RP and SS Bhattari (2012) Contribution of agroforestry and community forestry to food security and livelihhods of rural people in middle hills of Nepal: a stae of knowledge review. Nepal Agroforestry Foundation. Paper presented at Project planning workshop: Enhancing livelihoods and food security from agroforestry and community forestry systems in Nepal. 11-13 May 2012, Himalaya Hotel, Kathmandu. ACIAR Small Research Activity.

Pandit B, Amatya SM, Gautam D, Niraula R, Bhattarai S, Subedi YR, Nuberg I, Shrestha K, Ojha H (2014), Qualitative Baseline Study on Agroforestry in Kavre and Lamjung Districts, Nepal, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2014-04:1-56

Paudel G and Basyal (2015) Report on Participatory Market Appraisals and Business Literacy Workshops held at six priority research sites.To be added to Research Paper Series.

Paudel G, Cedamon E, Nuberg I, Paudel NS, Shrestha KK, Ojha HR (2018) Making community forest management active and equitable: a framework and lessons from Nepal. Submitted to *International Forest Review*

Paudel G, Perdana A, Krishna K, Nuberg I, Ojha O, Paudel N (under preparation), Promised much, delivered a little: story of forest-based enterprise in the hills of Nepal,

Paudel KP (2012) Mapping of Institutions. ForestAction Nepal. Paper presented at Project planning workshop: Enhancing livelihoods and food security from agroforestry and community forestry systems in Nepal. 11-13 May 2012, Himalaya Hotel, Kathmandu. ACIAR Small Research Activity.

Paudel K, Subedi YR, Tamang S, Nuberg I, Shrestha K. (2014), Milestones in Selecting Field Sites for Participatory Action Research, *Research Paper Series on Agroforestry and Community Forestry in Nepal*, 2014-01:1-56

Paudel, K, Tamang, S, & Shrestha, K. K. (2014). Transforming land and livelihoods: Analysis of agricultural land abandonment in the mid-hills of Nepal. *Journal of Forest and Livelihood*. vol. 12, no. 1, pp.11 – 19.

Paudel NS Bastakoti BP, Karki R, Bista R (2012) Drivers and dynamics of agrarian transformations in Nepal: A review of broader socioeconomic issues around Nepalese agricultural development. ForestAction. A paper presented at Project planning workshop: Enhancing livelihoods and food security from agroforestry and community forestry systems in Nepal. 11-13 May 2012, Himalaya Hotel, Kathmandu. ACIAR Small Research Activity.

Paudel N, Karki R, Puadel G, Ojha H, Basyal M, Bhandari A, Tamang D, Bhattarai S, Shrestha K, Nuberg I. (2014), State of art in linking community forestry with food security in the Nepalese hills: Cases of Kavre and Lamjung districts, *Research Paper Series on Agroforestry and Community Forestry in Nepal,* 2014-03:1-105

Paudel NS, Ojha H, Shrestha KK, Cedamon E, Karki R, Paudel G, Basyal M, Nuberg I, Dangal S (2018), Towards active utilisation of community forestry: silvo-institutional model for sustainable forest management in Nepal, *Banko Janakari Special Issue,*

Ribot, J., Lund, J. and True, T. (2010), "Democratic Decentralization in Sub-Saharan Africa: Its contribution to forest management, livelihoods, and enfranchisement." *Environmental Conservation*, vol. 37, no. 1, pp. 35 – 44.

Subedi YR, Shah R, Nuberg I, Shrestha K (2015), Understanding land under-utilisation in midhools of Nepal: six case studies from Kavre and Lamjung Districts, *Research Paper Series on Agroforestry and Community Forestry in Nepal*, 2015-02:1-69

Shah R, Bhattarai S, Shrestha K, Nuberg I (2018), Increasing women's voice in community forestry and agroforestry: lessons from EnLiFT Project in the midhills of Nepal. *Research Paper Series on Agroforestry and Community Forestry in Nepal*, 2018-01:1-29

Tamang DD, Karmacharya P, and Tamang DS (2012) Constraints and gaps in knowledge. Pper presented by SEARCH Nepal at Project planning workshop: Enhancing livelihoods and food security from agroforestry and community forestry systems in Nepal. 11-13 May 2012, Himalaya Hotel, Kathmandu. ACIAR Small Research Activity.

Tamang DD, Shrestha SL, Dangol BDS, Tamnag DS (2014a) Prospects in marketing timber and non-timber forest products from community forestry in Nepal, In R. mandal, S Dhakal and N. Hamal (eds), Proceedings of the 6th national Community Forestry Workshop, lalaitpur, Nepal 16-18 June 2014, pp 130-145.

Tamang D, Cedamon E, Nuberg I, Shrestha K. (2014b), Baseline Household Profile on Agroforestry, Community Forestry and Under-utilised Land in Six Selected Sites in Kavre and Lamjung Districts, Nepal, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2014-02:1-79

Tamang D, Perdana A, Cedamon E, Nuberg I, Shrestha K. (2015), Analysis of Community Forestry Value Chain in Kavre and Lamjung District, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2015-03:1-7

11 Appendixes

11.1 Main project documents

11.1.1 Journal publications with abstracts in time order

K. Paudel, S. Tamang, K.K. Shrestha (2014), **Transforming land and livelihood: analysis of agricultural land abandonment in the mid-hills of Nepal**. *Journal of Forest and Livelihood*, 12(1):11-19,

Abstract: Land grabbing is often seen as a way, among many ways, to intensify agriculture food security around the world today. However, in Nepal, a quite opposite phenomenon is taking place. Fertile lands are being abandoned at an unprecedented degree in recent years. A critical question that then arises is: How and what productive lands are being abandoned by farmers who otherwise had cultivated them for so many generations? The aim of this paper is to investigate the drivers of agricultural land abandonment in the mid hills of Nepal. This study employs a mixed method approach to data collection using household survey and key informant interview, in four mid hill districts of Nepal. The results indicate three drivers: first, socio-political instability, which forced people to move out; second, reduced agricultural production, concomitant with availability of more attractive alternative opportunities; third, farming ceasing to be viable occupation for many farmers to maintain sustainable household economy and being seen as an occupation for those who cannot do much else. Land abandonment has social, economic and ecological implication, particularly for the poorest of the poor. The paper concludes by highlighting some ways to address land abandonment issue.

B.H. Pandit, K.K. Shrestha, S.S. Bhattarai (2014), **Sustainable local livelihoods through enhancing agroforestry systems in Nepa**l, *Journal of Forest and Livelihood*, 12(1):47-63

Abstract: Agroforestry has been recognised as one of the important systems for supporting the livelihoods of large number of rural farmers in the Nepalese hills. However, its conservation and socio-economic values have received little attention. There is no solid information that tells us precisely how the agroforestry system has changed over time and what its drivers are in terms of biodiversity conservation and livelihood improvement. This paper aims to investigate the changing impacts and drivers of the agroforestry system to improve people's livelihoods and deliver the outcomes of biodiversity conservation. This research analyses case study of two Village Development Committees, viz Mahadevsthan and Mithinkot, in Kavrepalanchok district in Nepal. The mixed method approach was employed to collect data. The results indicate that the agroforestry system has changed considerably over time. As a result, the number of agroforestry species has increased in private lands. A total of 145 different species were recorded, of which 56 species were medicinal plants, followed by fodder, tree grasses and fruits. The study further found that species richness has increased, mostly in upland terraces. This resulted in increased livelihood benefits to local people. Production of goat and meat and buffalo milk has increased considerably. The high economic benefits are mainly associated with the introduction of various fodder trees and grasses in the private farmlands. It is concluded that the various drivers of the agroforestry system need to be carefully attended so as to improve both positive conservation and livelihood outcomes. Enabling policy and practices are needed to initiate and support farming cooperative in the commercialization of agroforestry products and market the conservation values in a changing climate.

S. Tamang, K.P. Paudel, K.K Shrestha (2014), **Feminization of agriculture and its implications for food security in rural Nepal.** *Journal of Forest and Livelihood*, 12(1):20-32

Abstract: The rural Nepal is going through unprecedented demographic, socioeconomic and environmental changes. There is a growing pattern of outmigration of the male population from villages to urban areas and overseas in search of better opportunities. This is mainly due to the poor economic development process that could generate adequate income and employment opportunities

at home, political and economic changes and globalisation, concomitant with the attractive employment opportunities offered outside the country. Simultaneously, the rural communities are facing the disincentives of worsening security in villages, employment opportunities, and subsistence farming becoming less and less rewarding and unable in meeting their basic needs. This has led to situation where women, in addition to looking after children and the elderly, have to take additional responsibilities in farming within the traditionally male-dominated farming practices. This is not only inappropriate and unfriendly to women, but also has lowered the use and productivity of land; hence perpetuating, if not exacerbating food insecurity. As a result, there is a reduction in food production. Therefore, there is a need for revisiting the agro-ecological practices to explore the possibility of reintroducing low input and less labour-intensive agroforest-forestry practices which can substantively reduce the workload of women, as well as ensure food security at local level.

Khatri D, Shrestha K., Ojha H, Paudel G, Paudel N and Pain A (2016), **Reframing community forest governance for food security in Nepal,** *Environmental Conservation*, DOI:10.1017/S0376892916000369, *Published Online 26 August 2016*
Abstract: The growing challenge of food insecurity in the Global South has called for new research on the contribution of forests to food security. However, even progressive forest management institutions such as Nepal's community forestry programme have failed to address this issue. We analyse Nepal's community forestry programme and find that forest policies and local institutional practices have historically evolved to regulate forests either as sources of timber or as a means of biodiversity conservation, disregarding food security outcomes for local people. Disciplinary divisions between forestry and the agriculture sector have limited the prospect of strengthening forest–food security linkages. We conclude that the policy and legislative framework and formal bureaucratic practices are influenced by 'modern forestry science', which led to community forestry rules and practices not considering the contribution of forests to food security. Furthermore, forestry science has a particularly narrow focus on timber production and conservation. We argue for the need to recognise the importance of local knowledge and community practices of using forests for food. We propose adaptive and transformational approaches to knowledge generation and the application of such knowledge in order to support institutional change and policy reform and to enable landscape-specific innovations in forest–food linkages.

Cedamon E, Nuberg I, Paudel G, Basyal M, Shrestha K, Paudel N (2017), **Rapid silviculture appraisal to characterise stand and determine silviculture priorities of community forests in Nepa**l, Small-scale Forestry 16(2):195-218, DOI: 10.1007/s11842-016-9351-0, *Published Online: 7 September 2016*
Abstract: Community forestry in Nepal is an example of a successful participatory forest management program. Developments in community forestry in four decades have focused on the social and governance aspects with little focus on the technical management of forests. This paper presents a silviculture description of community forests and provides silviculture recommendations using a rapid silviculture appraisal (RSA) approach. The RSA, which is a participatory technique involving local communities in assessing forests and silviculture options, is a simple and cost-effective process to gather information and engage forest users in the preparation of operational plans that are relevant to their needs. The RSA conducted on selected community forests in Nepal's Mid-hills region shows that forests are largely comprised of dominant crowns of one or two species. The majority of studied community forests have tree densities below 500 stems per hectare as a consequence of traditional forest management practices but the quality and quantity of the trees for producing forest products are low. Silviculture options preferred by forest users generally are those which are legally acceptable, doable with existing capacities of forest users and generate multiple forest products. For sustainable production of multiple forest products, the traditional forest management practices have to be integrated with silviculture-based forest management system.

Cedamon E, Nuberg I, Pandit B, Shrestha K (2017), **Adaptation factors and futures of agroforestry systems in mid-hills of Nepal,** *Agroforestry Systems,* DOI 10.1007/s10457-017-0090-9, *Published Online: 24 March 2017*
Abstract: Farmers in Nepal mid-hills have practiced agroforestry for generations as main source or supplement of timber, firewood and fodder from government forests. The nature and extent of

agroforestry practice is being challenged by rapid social and economic change particularly in the recent rise of labour out-migration and remittance income. Understanding is required of the critical factors that influence farmers in the way they adapt agroforestry to their circumstances. This paper analyses the relationship of households' livelihood resources and agroforestry practice to identify trajectories of agroforestry adaptation to improve livelihood outcomes. Using data from a survey of 668 households, it was found that landholding, livestock holding and geographic location of farmers are key drivers for agroforestry adaptation. A multinomial logistic regression model showed that in addition to these variables, household income, household-remittance situation (whether the household is receiving remittance or not) and caste influence adaptation of agroforestry practice. The analysis indicates that resource-poor households are more likely to adapt to terraced-based agroforestry while resource-rich households adapt to woodlot agroforestry. Appropriate agroforestry interventions are: (1) develop simple silvicultural regimes to improve the quality and productivity of naturally regenerating timber on under-utilised land; (2) develop a suite of tree and groundcover species that can be readily integrated within existing terrace-riser agroforestry practices; (3) acknowledge the different livelihood capitals of resource-poor and resource-rich groups and promote terrace-riser and woodlot agroforestry systems respectively to these groups; and (4) develop high-value fodder production systems on terrace-riser agroforestry, and also for non-arable land. The analysis generates important insights for improving agroforestry policies and practices in Nepal and in many developing countries.

Ojha H, Shrestha K, Subedi Y, Shah R, Nuberg I, Heyojoo B, Cedamon E, Rigg J, Tamang S, Paudel K, Malla Y, McManus P (2017), **Agricultural land underutilisation in the hills of Nepal: investigating socio-environmental pathways of change,** *Journal of Rural Studies*, 53:156-172, DOI: 10.1016/j.jrurstud.2017.05.012, Published online: June 2017
Abstract: Why should a parcel of agricultural land be abandoned when there is a scarcity of food? In this paper, we address this question in relation to the hills of Nepal, where agricultural land is being abandoned at an unprecedented rate, despite looming food scarcity. Responding to studies that have highlighted land abandonment trends, we conducted in-depth case studies in two of Nepal's hill districts to understand how land abandonment is taking place, and under what circumstances. Using an interdisciplinary lens and transcending linear models of agrarian change which attribute land abandonment to one or more prominent factors, our study unravels complex, cross-scalar processes, involving the interaction among social forces and environmental factors which lead to land underutilisation. The paper shows that land underutilisation happens through what we term 'socio-environmental pathways', which operate across scales, yet are deeply rooted in local dynamics of agrarian change. These pathways are triggered by, and embroiled within, three wider socio-economic and political dynamics in contemporary Nepal, namely: socio-cultural changes that favour out-migration; evolving economic opportunities that make farming less profitable; and a policy context in which the gravity of the land abandonment challenge goes unrecognised. The framework of 'socio-environmental pathways' applied here also advances a theoretical lens to explain agrarian change in a way that integrates multiple scales and multiple sectors, emphasising a thoroughly empirical approach. Finally, we identify key policy implications of this research on livelihoods and sustainable development.

E. Cedamon, I. Nuberg & K. K. Shrestha (2017): **How understanding of rural households' diversity can inform agroforestry and community forestry programs in Nepal,** *Australian Forestry*, DOI: 10.1080/00049158.2017.1339237, *Published Online* 2 July 2017
Abstract: Socio-economic diversity can help to bring about innovative development in agroforestry practices. The diversity of households in the mid-Nepal hills was analysed using survey data from 521 randomly selected households in six villages. A cluster analysis derived the following household typology based on socio-economic variables—Type 1: resource-poor Brahmin/Chhetri; Type 2: resource-poor Janajati; Type 3: resource-rich mixed-caste households; Type 4: resource-rich Brahmin/Chhetri; Type 5: resource-rich Janajati; Type 6: resource-poor Dalit households. The analysis revealed that social status (caste/ethnicity), household status on foreign employment and landholding are strong predictors of household segmentation in rural Nepal. This paper suggests

revision of existing wellbeing ranking approaches using these socio-economic variables for more inclusive and equitable agroforestry and community forestry outcomes.

R. Karki, K.K. Shrestha, H. Ojha, N. Paudel, D.B. Khatri, I. Nuberg & A. Adhikary (2017), **From forests to food security in Nepal's community forestry**, *Small Scale Forestry*, DOI: 10.1007/s11842-017-9377-y, *Published Online 28 July 2017*

Abstract: There is an increasing recognition of the contribution of forests to food security of poor and marginalised people. However, empirical findings remain limited on how forests contribute to food security. Drawing on four case studies of the community forestr in Nepal, this paper discusses pathways through which forests are contributing to food security needs of local communities. The evidence presented here was gathered through 4 years of action research and draws insights from the 40 years of Nepal's community forest practice, which often regarded as a successful case of conservation and development. It is shown that there are four source distinct pathways through which community forests contribute to food security as a source of: (1) income and employment; (2) inputs to increase food security; (3) directly for food; and (4) renewable energy for cooking. Despite emerging pathways linking forest management to food systems at the local level, forestry policies and institutions have neither explicitly recognized nor strengthened the linkage between forest and food security. The paper highlights that there is a need for a fundamental shift in thinking from conventional notion of 'forests for soil conservation' to 'sustainable forest management for food security'.

N.S. Paudel, H.R. Ojha, K.K. Shrestha, E. Cedamon, R. karki, G, Paudel, M. Basyal, I. Nuberg, S. Dangal (2018), **Towards active utilisation of community forestry: silvo-institutional model for sustainable forest management in Nepal**, *Banko Janakari Special Issue,* Published Online May 2018

Abstract: This paper explains what we term the 'silvo-institutional model' for a more productive, sustainable and equitable management of community forests in Nepal. The paper draws on four years of action research in six research sites of Kavre and Lamjung districts, complemented by the review of silviculture-based forest management by Government of Nepal in various parts of the country. The findings indicate that first, early silviculture-based forest management initiatives have failed because they did not adequately consider the policy and institutional dimensions. Second, current initiatives, while looked promising for the active utilisation of community forests, have faced with complex regulatory and institutional barriers. We argue that a new 'silvo-institutional model', which combines technological and institutional dimensions has a potential to increase the prospect of successful implementation of silviculture-based forest management.

E. Cedamon, G Paudel, M Basyal, I Nuberg, N, Paudel (2018), **Crown and regeneration responses to silviculture systems in Pine and Sal Forests: preliminary results from silviculture trial in mid-hills Nepal**. *Banko Janakari Special Issue,* Published Online May 2018

Abstract: Silviculture trial plots were established in Kavre and Lamjung Districts by the EnLiFT Project (Enhancing livelihoods and food security through improved agroforestry and community in Nepal) to examine stand response to selected silviculture systems- uniform shelterwood, selection system, and negative thinning as a showcase to forest users for these silviculture systems. This paper analyses the extent of canopy gaps on these trial plots after one year of application of silviculture treatments and regeneration development. Using crown photographs, crown cover was estimated and compared between silviculture systems. The analysis showed that rigid silviculture systems like shelterwood and selection system created canopy gaps larger that negative thinning in Pine plantations and the rate of natural regeneration was directly related to the canopy gap. However, in Shorea robusta-Castanopsis-Schima (Sal-Katus-Chilaune) forest, negative thinning created canopy gaps larger than selection system due to removal of 4-D trees, majority of trees were Schima wallichii (Chilaune), which typically have large spreading crown. Although, it may be too early to conclude the relationship between regeneration development and canopy gap from the trial plots, it became clear that silviculture operations have significan role in promoting higher regeneration. Selection and shelterwood systems are better than current silviculture regime represented by negative thinning in this study.

E. Cedamon, G Paudel, M. Basyal, I Nuberg, K.K. Shrestha (2018), **Applications of single-tree selection guideline following a DBq approach on Nepal's community forests**, *Banko Janakari Special Issue,* Published Online May 2018

Abstract: There is a growing interest by forest users, government forest officers and policy makers on maximising forest goods and livelihood provisions from community forestry in a sustainable manner. However, the way several mature community forests are currently manage based on selection, e.g. negative thinning and crown thinning, is questionable as it results to decline in forest stock, timber quality and regeneration. To assist forest users in managing their community forests, an action research was implemented in Kavre and Lamjung to manage Pine (Pinus spp) and naturally-regenerated Sal (Shorea robusta) through selection system. This paper describes the q-factor and its relevance for sustainable community forest management in Nepal. The simple guideline for selection system introduced to 30 community forest user groups in six sites are presented for wider adoption and policy recommendation.

B.P. Pandit, I. Nuberg, K.K. Shrestha, E. Cedamon, S.M. Amatya, B. Dhakal, R.P. Nuepane (in process 2018), **Impacts of market-oriented agroforestry intervention on farm income and food security: a case study from Kavre and Lamjung districts of Nepal**, *Agroforestry System*

Abstract: Recently it has been realized that improving market access for smallholders will lead to improvement in income and food security. However, market failures often limit smallholders' ability to be linked to markets. To address these challenges, market oriented agroforestry action research program was implemented in six sites of Kavre and Lamjung districts of Nepal in 2013. The main objective of this paper is to investigate the changing impacts of the market oriented agroforestry system on improving people's livelihood and meeting food security issues. The net-margin analysis of five priority products of agroforestry (AF) systems including (1) banana based fodder and livestock (2) ginger based fodder (3) tomato based fodder and buffalo (4) alnus- cardamom and fodder (5) round chili and fodder on private lands was conducted. Remaining other components (Tree and animal) constant, farmers benefitted most by banana based high yielding fodder (56%) followed by Alnus-cardamom system (48%), tomato fodder and buffalo (36%), chili fodder (26%) and ginger based (25%) systems due to facilitation of market oriented AF action research services. The impact of market oriented AF intervention revealed that household income was increased by 37 to 48%, which can provide up to additional six months of food to the poorest households. This innovation could be potential to make the majority of households (63%) out of poverty trap with no danger of food shortage during the year. Implications of the study are that farmers must be united for collective marketing of their production and develop marketing strategies to eliminate middle men for better return. Some key lessons learned for the success of this action research include farmers' own motivation, favourable environment and the inclusion of social activities and incentives for cultivating priority products species.

S.M. Amatya, I. Nuberg, E. Cedamon, K. K. Shrestha, B.H. Pandit, P. Aulia, M. Joshi, and B. Dhakal (2018), **Participatory market chain appraisal for the full range of agroforestry products including market trends and growing markets**, Banko Janakari, Volume 27 (2), 2018

Abstract: This paper focuses on the participatory market chain analysis of agroforestry products in six sites of two districts (Kavre and Lamjung) of Nepal. In total, 93 market actors were involved in the study, in which 80 persons were purposively selected from Local Resource Person (LRP) and Local Resource Group (LRG) members and 13 persons were randomly selected from the local, district and national level traders. Primary data on agroforestry products was collected through Participatory Rural Appraisal (PRA) tools following several field visits. Fourteen agroforestry products in Lamjung and 20 agroforestry products in Kavrepalanchok district were selected for analysis. The findings showed that small-scale production and insufficient service to farmers from the village level agriculture collection centers and cooperatives are the major constraints to effective and efficient market chain development and management. The main factors responsible for increasing the production of agroforestry products are the rise in awareness among LRPs/ LRGs about agroforestry practices along with institutional and policy development to facilitate the marketing of

agroforestry products. The paper concludes by highlighting the controlling factors in agroforestry business

Subedi YR, Mulia R, Cedamom E, Lusiana, B, Shrestha K, Nuberg I (2018) **Local Knowledge on Factors Leading to Agroforestry Diversification in Mid-hills of Nepal** Journal of Forest and Livelihood 15(2) May 2018

Abstract: This paper aims to understand the factors that affect decisions made by smallholder farmers in Mid-hills region of Nepal in diversifying tree and crop species on their agroforestry farmlands. Using an analytical hierarchical process implemented through focus group discussions in five sites in Kavre and Lamjung districts, the study documented 18 tree and crop species preferred by farmers and grown on their agroforestry farmlands. It was found that farmers select tree species based on 'output-based' strategy, primarily considering the products or the functions of the tree species. In contrast, they select crop species based on 'input-based' strategy, primarily considering enabling or constraining conditions for crop cultivation. The tree species having favourable characteristics such as fast growing, multipurpose, and low resource competitiveness in intercropping were the most preferred tree species. For crop species, availability of enabling and constraining factors to crop growth such as climate condition and land suitability, and avail- ability of irrigation system were the predominant factors for species selection. Furthermore, preferences for tree species were considerably influenced by socio-economic conditions—house- hold economy and ethnicity— whereas crop selection was not influenced by such conditions. We recommend that local context and knowledge, especially farmers' preferences in tree and crop selection and factors affecting their preferences, should be taken into account while formulating effective agroforestry programs and policy for Mid-hills of Nepal.

11.1.2 Research student papers (published and in process)

De Ieso C, Nuberg I, , Kravchuk O (2018**) Informing Community Forest Management: A Retrospective Analysis of an Old Silvicultural Trial in Nepal** *Small-scale Forestry*, *17*(2), 211-224.
This study demonstrates a simple method to gather information from old demonstration trials. It was undertaken in the context of a 32-year-old thinning trial in a naturally regenerating stand of *Shorea robusta Gaertn. f.* in a community forest in the Sindhupalchok district of Nepal. The trial was established by the Nepal-Australia Forestry Project in 1983 and the only documentation of the trial is a report of measurements undertaken in 2005. The site has been relatively untouched, apart from the collection of non-timber forestry products (NTFPs) by the Community Forest User Group (CFUG) that manages the site. The 1983 project had 6 treatments including: pruning, selective thinning, and mechanical harvesting. The impacts of the six treatments were measured by pairing the treatment plots with comparison plots at the same position on the slope in the surrounding forest. Measurements taken were: height, diameter at breast height, canopy cover, and species distribution and count to compare with the area of forest outside the treatment plots using the slope position as strata. Evidence of a remaining treatment effect from 1983 was found for only two of the original thinning treatments. These treatments were the most intensely thinned, and had either positive or negative impacts on *S. robusta* growth, depending on their position on the slope, indicating the overriding influence of slope position. Using information from measurements taken in 2005 and 2015, it is recommended: that a 4 m x 4 m target spacing should be used as the basis for silvicultural treatments for regenerating *S. robusta* forests; this density be maintained with planned removal of regenerating saplings; this target be modified with sensitivity to the position on slope; and it should be a staged harvest done in coordination with the community's annual needs.

Puri, L, Nuberg I, and Ostendorf (2017) **The adequacy of community forest operational plans for estimating fuelwood supply and consumption in Nepal** Australian Forestry, 2017, Vol 80, No 5, pp 317-327
Abstract: Fuelwood derived from community forests of Nepal is critical for rural livelihoods. Supply of fuelwood is regulated through 5-year operational plans. The aim of this study was to evaluate the adequacy of operational plans in addressing the demand and supply of fuelwood in community forests of Nepal. Data was gathered from operational plans, household interviews and fuelwood

supply assessment in 13 community forests of Nalma (inaccessible by road) and Taksar (accessible by road) villages of Lamjung district. Our study revealed that per capita annual fuelwood consumption in Nalma (486 kg) was significantly higher than in Taksar (398 kg), and also significantly different combinations of fuelwood, biogas and electricity were utilised between the villages. These differences were associated with their respective distances from the main road. Community forests contributed 57% and 63% of the total fuelwood consumption in Nalma and Taksar, respectively. Of 13 community forests, nine have planned annual demand and supply of fuelwood well below our estimates of actual supply and consumption, indicating that most of the operational plans inadequately represented the prevailing demand and supply of fuelwood. In addition, the planned quantities of fuelwood demand and supply in current operational plans were markedly different and poorly linked to the previous projections, which suggests inconsistent and inadequate application of standard planning guidelines. We recommend a revision of the methods used in the preparation of these plans to determine fuelwood demand and supply in community forestry implementation.

Puri, L, Nuberg I, and Ostendorf (2018) **Locally perceived social and biophysical factors shaping the effective implementation of community forest management operations in Nepal.** (in review)

Abstract: Despite an ostensibly conducive policy environment in Nepal, community forest management has stagnated at a suboptimal level to deliver the benefits stipulated in operational plans. This study assessed the current state of forest management against the backdrop of locally relevant factors that circumscribe management strategies in 13 community forests in the mid hill region of Nepal. It adopted a mixed-method approach utilizing data collected from forest inventory and operational plans of these community forests, household survey and focus group discussions to assess the state of management strategies and local factors influencing them. The results reveal that the current state of forest management is only rudimentary and confined largely to basic operations like bush cutting and removal of low quality trees to obtain fuelwood and other products. We identified three primary factors determining the quality of forest management, namely: reduced dependency on forests; low income benefits from forest; and inadequate capacity for technical forest management. Accordingly there is low incentive to adopt more sophisticated forest management. Even though timber is perceived as the main source of income from community forests, its production is limited by terrain condition, regulatory procedures, accessibility to road and market and inadequate capacity to undertake silviculture-based forest management. We conclude that current state of forest benefits is insufficient to stimulate forest user groups to enhance management operations. We suggest policy imperatives that: 1] promote enterprise-based forest management to increase forest-based incomes; and 2] adopt collaborative action research to experiment and demonstrate beneficial

Puri, L, Nuberg I, Ostendorf B and Cedamon E (2018) **Evaluating spatial patterns of wood extraction in community managed forest of Nepal** *(under review)*

Abstract The intensity of wood extraction in relation to the forest stock is an important indicator of sustainable forest management. We examined whether the spatially regulated management and utilization policies enforced in community forestry result in spatial congruence between the forest stock and wood extraction. Using stump as the indicator, we assessed the state and spatial distribution of wood extraction in 13 community forests in two rural villages of mid-hills Nepal. The community forests are classified as natural mixed Schima wallichii-Castanopsis indica-Shorea robusta (SCS) and Schima wallichii-Castanopsis indica (SC). The forest data were collected from randomly distributed sample plots in community forests. The spatial data like road, slope and community forest were acquired from government maps and updated in the reference of available data on web-based imageries. Moran's global and local indexes were calculated to assess the spatial clustering of stump and tree parameter values at the sample points and identify the locations with significantly high-high and low-low clustering. The probability of wood extraction was estimated using binary regression with distances, forest types and slope as predictors. Overall, wood extraction from SCS forest was higher in both villages but the proportion of stump in SC and SCS forest was different between the villages. Moran's global indexes indicated that the trees and

stump values are spatially clustered and that wood extraction intensity poorly corresponds with the wood stock in the forest. The probability of wood extraction is influenced by biophysical and accessibility factors. We conclude that locally spatial system of wood extraction is poorly reflected in practice and call for a system to assess and monitor the spatial variability and patterns of wood extraction in order to avoid the likely degradation of community forests in the changing context of policy, accessibility and market potentials.

Badu M, Nuberg I, Cedamon E, Sharma S (2018) **Management of the forested catchments of Nepal's mid-hills amid mismatched perceptions on forest-water relationships: Challenges and opportunities.** Submitted Mountain Research & Development.
Abstract The expanding community forestry practices since the late 1970s and, recently, outmigration have caused increased forest cover in Nepal's mid-hills catchments (> 52 % of the 4.3 million ha area) that are increasingly recognised for ecological functions, including water. While the hydrological effects of this increase are unclear, there are mismatched perceptions about forest-water relationships that further challenge the sustainable management of these catchments. This paper shows the prevalence of the culturally formed notion of "more forest-more water" within the broader Nepalese society that is often acknowledged by the forest policy-making community despite considerable scientific evidence refuting it. On the other hand, the results of the semi-structured interviews (n=150) conducted among the members of the Community Forest User Groups (CFUGs) in Roshi Khola catchment of the mid-hills district, Kavre show that 44 and 37 % of the respondents consider forests as contributing to increased and decreased water quantity, respectively. There was a positive correlation (p=0.041) between the duration of membership in the CFUG and the perceptions on water quantity. The respondents with the negative perceptions about forests' impacts on water quantity also strongly disapproved the pine forests. These results offer opportunities for increased scientific research to generate consistent knowledge for sustainable management of the forested landscapes as envisaged by the recent forestry documents including the Forest Policy 2015 and Forestry Sector Strategy 2016-2025.

Badu M, Nuberg I, Ghimire CP, Bajracharya, RM, Meyer, W (2018) **Negative trade-offs between community forest use and hydrological benefits in the forested catchments of Nepal's mid-hills.** (to be submitted Mountain Research & Development)
Abstract: Inherent soil properties and vegetation characteristics of forested landscapes are important determinants of entry and movement of water through the soil. In the forested catchments of Nepal's mid-hills, this is further affected by the persistent community forestry practices comprising systematic withdrawal of forest products including firewood, litter, fodder and medicinal herbs by the local communities. In order to assess the impact of those practices, we measured selected soil properties including bulk density (BD), soil organic carbon (SOC) and saturated hydraulic conductivities (Ks) across four depths (0-10, 10-20, 20-50 and 50-100cm) of three types of dissimilarly used community forests viz. natural broadleaf, predominantly planted pine and a mixed forest that were subsequently compared with a minimally used religious forest in Roshi Khola catchment of Kavre district. An analysis of a total of 92 minimally disturbed soils samples showed, overall, significantly (p< 0.05) lower BD and higher SOC across corresponding depths of the religious forest revealing low compaction and higher accumulation of carbon, respectively, while also signifying the reduced degree of community use of the forest. The K_s values, determined using the constant head method, ranged approximately from 9 to 170 mmhr^{-1} that were generally lower for the mixed and broadleaf forests compared to the less intensively used predominantly planted pine and the religious forest. The lower K_s and higher BD values for the mixed and broadleaf forests suggest reduced water penetration with implications for the dry season flows despite greater use values offered by those forests to the local communities.

Badu M, Nuberg I, Cedamon E, (2018) **Effects of community forestry practices on overland flow production in a small forested catchment of Nepal's mid-hills.** (to be submitted to Ecological Processes).
Abstract. High deforestation rates in Nepal's mid-hills catchments reportedly threatened landscape stability and caused hydrological disorders that involved high overland flows during monsoon and reduced sub-surface flows during dry periods. As part of the remedial measures, large sections of

the mid-hills were reforested giving rise to an increased area of broadleaf and conifer forests, particularly since the commencement of the community forestry program in the late 1970s. While community forests are inherent part of the mid-hills lifestyle, there is growing uncertainty about the role of increased forest cover, particularly the planted pine, on the region's dwindling water availability. The article presents results of field experiments on overland flow production in a naturally regenerated broadleaf, predominantly planted pine and mixed forest that undergo varying degree of community use in a forested catchment of Kavre district, Nepal. The overland flow production ranged approximately from 1-15 % of the 24-hour rainfall with the intensively used broadleaf and mixed forests being more responsive to the incident rainfall, hence more conducive to overland flow production. The results highlight the important role of the community forestry practices in affecting the overland flow production suggesting that vegetation characteristics alone are inadequate determinants of forest-water relationships in forested catchments as perceived by the local communities.

Tamang S and Shrestha KK (2018) **Feminization of agriculture in Nepal: a burden or an opportunity for women?** Asian Development Perspective Journal (to be submitted)

Rural Nepal is going through unprecedented socio-economic and political changes including high youth out-migration from villages to cities and overseas in search of better employment opportunities. Remittance economy is one of the strong factors contributing on these changes leading towards feminization of local communities including agriculture. Feminization is forcing women to take additional responsibilities of household and agriculture performance. This paper is based on field research carried out in two rural villages in Nepal employing mixed methods generating both qualitative and quantitative data to explore how is feminization occurring and what are the impacts on women and their traditional gender roles. The study suggests that in one hand, this had lead women to take additional responsibilities in household and farming within the traditionally male-dominant farming practices which is not only inappropriate and unfriendly to women. This is leading towards increased workload to women as labor supplier, less production causing food insecurity. In other hand, there are increased windows of opportunities for women for increased participation in social domain, decision-making at household levels, and access to and control over productive resources including land. Who is benefiting and who is bearing the burden depends on the diverse wealth and caste/ethnic category as well as family and community structure. However, there is no choice to revisit both at policy and practice to make the male dominant farming technologies more female friendly and less labor intensive to empower women and develop their entrepreneurship who engage in farming for food security.

Tamang S, Shrestha KK & Zwi A (2018) **Local consequences of remittance economy in Nepal**
Abstract: Remittance economy has been touted as one of the major drivers of growth in Nepal's GPD and is often considered as 'good' for reducing poverty and enhancing human development. Yet, what is less known is the process by which the male-driven remittance economy has changed gender roles within the households and community. This paper explores local consequences of remittance economy in Nalma of rural Nepal and demonstrates that women are now mobilising remittances for minor household matters such as buying goods, but any significant mobilisation of remittances still depend on their male counterpart. Moreover, increased numbers of women have now members of political parties, NGOs and local and state governments. Yet, they often occupy sub-ordinate positions, and many of them leave these positions once their husbands return home from overseas. This research implies that the remittance economy has brought some changes, but it has not done much for women empowerment.

Krishna K Shrestha, Govinda Paudel, Hemant R Ojha, Naya S Paudel, Ian Nuberg and Ayusha Bajracharya
Can community forestry groups run enterprises? A case of *Chaubas* timber processing company in Nepal. Submitted to Forest Policy & Economics
Community forestry enterprises (CFEs) are considered as means to enhance community livelihoods in many developing countries. It is usually assumed that CFEs contribute to social, economic and

environmental development and address poverty. However, a growing body of literature suggests that it is often difficult to establish, grow and sustain economically profitable and socially beneficial CFEs. Many CFEs have emerged, operated and then failed. Questions are thus raised about the viability and sustainability of CFEs. The aim of this paper is to investigate why do CFEs fail and what makes them likely to succeed. By analyzing the establishment, support mechanisms and cycle of success and failure of *Chaubas-Bhumlu* Community Saw Mill (*Chaubas* CFE) located in *Kavre* district of Nepal, this paper demonstrates that CFEs fail because of unsupportive government policies, political instability, complexities of heterogeneous communities and poor infrastructure and technology. We argue that CFEs do not necessarily led to sustainable enterprise, even with substantial start up support from external agencies such as the government and aid projects. Despite good natural resource base, viable business plan, and significant start-up capital and marketing support, community enterprises run and operated in heterogeneous society face number of socio-cultural and political complexities. Efforts to initiate and maintain such CFEs require deeper understanding of entrepreneurial basics, viz. innovation, risk, knowledge, and opportunities, which are embedded within the policy environment, societal differences, and political conflicts so that CFEs can evolve as an enterprise and sustain socio-economic and environmental benefits.

Govinda Paudel, Edwin Cedamon, Ian Nuberg, Naya S Paudel, Krishna K Shrestha, Hemant R Ojha (2018) **Making community forest management active and equitable: a framework and lessons from Nepal.** Submitted to International Forest Review

Nepal's community forestry (CF), despite celebrated success in achieving environmental outcomes, has not been performing well for optimizing economic benefit and addressing issue of inequality. Firstly, community forests remained seriously underutilized because of protection-oriented management. Secondly, CF's achievement on equity and livelihood has been questioned because of persistent inequitable benefit sharing and elite control. Forest management becomes active and equitable when it enhances forest productivity, optimum use of forest products and equitable benefit distribution. This paper has explored underlying drivers of inactive and inequitable management of CFs and examined local politics that shapes forest management decisions. The study has drawn on ongoing research project being implemented in six community forest user groups (CFUGs) in Kavre and Lamjung districts of Nepal. We reviewed operational plans of CFUGs for information on total resource potential and benefit sharing provisions. Informed observation of CFUG activities allowed us to understand local politics of resource governance. We also reviewed previous decisions of communities related to forest product utilization and benefit sharing mechanisms. Additionally, our analysis was also informed from interviews with relevant stakeholders. We found that community forests in Nepal are not actively managed and communities are harvesting forest products far less than full potential. The reasons for inactive and inequitable management include inadequate silvicultural knowledge in communities, inequitable distribution of benefits favouring well-off households, and local elites shaping management decisions that restrict access of poor and marginalized people. We argue that institutional transformation is required for active and equitable forest management that is responsive to needs of poor and marginalized people and suggest pathways for such transformation. The study contributes to literature on politics of access on common forest resources.

11.1.3 Books and conference proceedings

Amatya, S., Shrestha, R., & Cedamon, E. (2016). **NEPAL FORESTRY HANDBOOK (3rd ed.).** Nepal Foresters Association.

Amatya S.M., Cedamon E., Nuberg I. (2018), **AGROFORESTRY SYSTEMS AND PRACTICES IN NEPAL**-Revised Edition, Agriculture and Forestry University, Rampur, Nepal, 108pp + xviii

Department of Forests (2017), **First National Silviculture Workshop, Workshop Proceedings, Kathmandu Nepal 19-21 February 2017 S Adhikari, R Karki, A Gurung (Editors),** Department of Forests, 540 pp.

11.1.4 Conference papers

Tamang DD, Shrestha SL, Dangol BDS, Tamang DS (2014) **Prospects in marketing timber and non-timber forest products from community forestry in Nepal**, In R. Mandal, S. Dhakal and N. Hamal (eds), Proceedings of the 6th national Community Forestry Workshop, Lalitpur, Nepal 16-18 June 2014, pp 130-145.

Abstract: Nepal's national forest in general and community forests in particular have made impressive progress in the past three decades. These progresses are tangible in several areas such as forward looking liberal policies; framing of regulatory rules of forest management; the development of forests professionals; development of human resources at the village level and community level; building capacity of community user groups such as Federation of Forest User Groups-Nepal (FECOFUN). After thirty years of consolidation and growth in the forest sector, it is now the time to move from primary stage of growth to a more complex secondary stage, where community members can benefit from income, jobs and community development through the commercialisation of national, community and private forests in Nepal. The paper below argues for this case based on the step by step approach in improved policy, regulatory framework, institutional development, improve forest management or operational plans and developed infrastructure. These synergistic and coordinated developments, from the local to the national level, can usher commercialization of the forestry sector in the country through improved market access and outlet, thereby facilitating mutual benefits for the community as well as the nation.

Paudel NS, Karki R, Paudel G, Ojha H Shrestha K (2014), **Reframing the farm-forest interface: how can community forestry better address food security and livelihoods in Nepal**. In R. Mandal, S. Dhakal and N. Hamal (eds), Proceedings of the 6th national Community Forestry Workshop, Lalitpur, Nepal 16-18 June 2014, pp 320-335

Abstract: Despite three decades of community forestry development in Nepal, studies report that CF's actual contribution to livelihoods remain far less than the potential. Moreover, as Nepal is facing increasing food security challenges, a question has emerged whether, how and to what extent CF can contribute to food security of the rural poor. Given the presence of over 18,000 community forest user groups (CFUGs) and over 1.4 million hectares of forest under CF across the country, its potential contribution to food security has become a national policy question. Yet little evidences and analysis exists. In this context, this paper defines and characterizes the dimensions of the forest-food conundrum, and explores potential directions of policy decisions for transforming forest-farm interface to enhance CF contribution to food security.Drawing on the evidence from textual analysis of key policy documents complemented by seven CFUGs in Kavre and Lamjung districts, this paper evaluates how regulatory regime (defined as policy and legal frameworks including how they are implemented in practice) shape the link between CF management and food security in practice. The evidence demonstrates that current regulatory regime: 1) has promoted a narrow view of forest conservation that often prohibits community groups to use forest land even for food crops that can be grown with minimal ecological disturbance; b) is less-responsive to local practical innovations and the potential to recognise, upscale and promote those innovations widely; c) is profoundly contradictory between intention and practice on the question of linking markets to forest management. Clearly, the current regime requires fundamental revision to better align CF

with food security. Several opportunities for change in the regulatory regime are identified: c) revisiting the market related regulations and enforcement mechanism to create paid employment at the village level, a) promoting field experimentation and innovation in the ecologically sustainable and food maximising forest-agriculture production system, and b) instituting mechanisms to identify and respond issues and innovations in the changing contexts.

Pandit BH (2014), Why cannot local communities do forestry business? **Analysis of barriers in the value chain of private forestry products in Nepal**. In R. Mandal, S Dhakal, and N Hamal (eds), Proceedings of the 6th National Community Forestry Workshop, Lalitpur, Nepal 16-18 June 2014, pp 306-319.

Abstract: Agroforestry (AF) has now gained renewed interest in the context of increasing need for enhancing farm-based livelihood opportunities. As the markets for a variety of timber and non-timber forest products grown, rural communities in Nepal have the opportunity to gain cash income through private forest products value chain. Yet, there is still an absence of clear and well-defined regulatory framework to promote private forestry products. This study is based on reviews of Forest Act 1993 Forest Regulation 1995 and Private Forest Development Directives 2011 as well as recent case studies form Kavre and Lamjung districts of Nepal related to the trade of forestry products. Findings demonstrate that various regulatory as well as non regulatory barriers restrict the promotion of forestry products in the market value chain, starting from the nursery establishment, through cultivation, harvesting, transportation to marketing. Forestry and agroforestry products from private lands require a permit for transportation to markets within the village. However, if forestry products have to be transported outside the village it is mandatory that private individual has to obtain the permission from the District Forest Officer. Farmers have to pay royalties to the forest department for cultivated products if the are transported without having registration of private forests. Although the Private Forest Development Directives 2011 has tried to make the process more simple, the study revealed that AF products' producers of the case study sites are constrained by the number of issues, of which obtaining private tree registration certificate and associated transportation permits from DFO is very complex and involves a lot of risks and uncertainties for marketing of their products from private lands. This analysis demonstrates that regulatory and institutional factors are crucial in determining the extent of benefits local communities can receive from the markets, than simply by the physical characteristics or the market value of the product itself. This study recommends several ways in which policy and regulatory practices can be improved to support farming communities in the commercialisation of agroforestry products for better livelihoods and sustainability of agroforestry landscapes in Nepal.

Paudel G, Paudel N, Khatri DB (2014), **Revenue and employment opportunities from timber management in Nepal**, In R. Mandal, S Dhakal, and N Hamal (eds), Proceedings of the 6th National Community Forestry Workshop, Lalitpur, Nepal 16-18 June 2014, pp 108-120.

Abstract: Community forestry in Nepal has contributed to generating forest resources, environmental health and community livelihoods. Though scholars, practitioners and advocates of CF have shown that CF is successful in the restoration of greenery and enhancing growing stock, it is equally recognized that the full economic potential of CF has not yet been realized. However, there is little study on the precise economic potential of timber management in Nepal's community forests. This paper assesses the total timber stock, its annual increment and total amount of allowable harvest in Nepal's community forests. We reviewed operational plans of 2955 community forest user groups form 14 districts across the country selected through stratified random sampling. The findings were then extrapolated to estimated market prices of timber and amount of employment generation from the processing of this volume of timber. The worth of timber extracted would be approximately NRs 27 billion at the market price. Timber management in CFs would generate about 21,000 full time jobs every year. Finally, the paper highlights the implications to policy, regulatory provisions and institutional practices to realize the economics potentials of CF in addressing poverty of forest managing communities.

Amatya SM, Nuberg I, Cedamon E, Pandit B (2016), **Removing barriers to the commercialisation of agroforestry trees in Nepal**, In J. Meadows, S. Harrison, and J.

Herbohn, (eds), Small-scale and Community Forestry and the Changing Nature of Forest Landscapes, Proceedings from the IUFRO Research Group 3.08 Small-scale Forestry Conference held on the Sunshine Coast, Queensland, Australia, 11 – 15 October, 2015, pp 1-18

Abstract: Agroforestry has evolved as a part of the traditional subsistence farming systems in the mid-hills of Nepal. These farming systems are undergoing major changes brought about by the outmigration of male labour and resulting feminisation of the rural labour force. There has been inadequate agronomic development and serious food insecurity is a problem in Nepal. Of 75 districts, 42 have a food deficit. Most of these districts are in the mid-hills and mountain region of Nepal. Fortunately, the productive functions of trees in these agroforestry systems perform important subsistence functions of supplying firewood and fodder, and also present a resource that can be utilised to redress the trade imbalance of Nepal's timber products. However, there are many barriers to getting these trees into the market. This paper presents two agroforestry case studies of differing situations with respect to market integration of agroforestry products. It then analyses the barriers for advancing agroforestry, and draws practical policy implications for promoting commercial agroforestry, in Nepal. The first case study describes subsistence-level agroforestry systems including: fuel and fodder trees on terrace risers sustaining a few livestock; agropastoral systems on fallow land; and silvo-fishery, apiculture and sericulture. In most areas of Nepal agroforestry has not made major advances and all these practices by and large provide productive services at subsistence level only. There are however instances where agroforestry trees are well linked into industrial wood flows. The Government of Nepal is promoting small-scale woodlots or private forests as part of an agroforestry system. Adoption of private forestry in Nepal remains very low with only about 2458 registered private forests covering an area of 2333 ha. Despite this low registration, volume of timber extracted from private land is twice that from other sources (community forest and government forest). The second case study describes a situation where trees from private land are well linked into commercial wood flows and highlights the specific institutional arrangements that have facilitated this development.

Cedamon E, Nuberg I, Lusiana B, Mulia R, Pandit B, Subedi YR, Shrestha K (2016), **EnLiFT Model 1.0: A Livelihood and Food Security Model of a Forest-Farm System**, In J. Meadows, S. Harrison, and J. Herbohn, (eds), Small-scale and Community Forestry and the Changing Nature of Forest Landscapes, Proceedings from the IUFRO Research Group 3.08 Small-scale Forestry Conference held on the Sunshine Coast, Queensland, Australia, 11 – 15 October, 2015, pp 23-42

Abstract: This paper presents the concept, specification and calibration of a systems model for temporal simulation of a forest-farm livelihood system. The model has been developed to examine the level of food security of the forest-farm livelihood system in Nepal and to identify interventions to increase household income and food security. The model framework consists of five modules: annual crops, tree and understorey, livestock, community forest and Food Security Index. The household activities are categorized into the four aspects of food security: availability, access, use, and stability of supply. The model can be applied over 6 household types based on caste and wealth. This typology was derived from cluster analysis of data from a survey of 668 households in 6 villages in 2 mid-hill districts. An example is presented from simulation runs of one type of household – a capital-rich Janajati household for four selected agroforestry production scenarios. The simulation experiment reveals strong relative significance of the tree-understory module on household food security and the crucial importance of off-farm income and remittances from overseas.

Cedamon E, Paudel G, Basyal M, Nuberg I, Paudel N (2017), **Canopy Gaps and Regeneration Development in Pine and Sal Forests Silviculture Demonstration**

Plots in Midhills Nepal, In S. Adhikari, R. Karki, and A. Gurung, (eds), Proceedings of the First National Silviculture Workshop, Kathmandu, Nepal, 19-21 February, 2017,

Abstract: Silviculture demonstration plots were established in Kavre and Lamjung districts by the EnLiFT Project to examine stand response to selected silviculture system – uniform shelterwood, selection system, and negative thinning and as a showcase to forest users for these silviculture systems. This paper analysis the extent of canopy gaps on these demo plots after silviculture treatments and regeneration development one-year after treatment. Using crown photographs, crown covers are estimated and compared between silviculture systems. The analysis has shown that rigid silviculture systems like shelterwood and selection system can create significant canopy gaps than negative thinning in pine plantations and that the rate of natural regeneration is directly related with the canopy gaps. In Sal-Katus-Chilaune forest however, negative thinning created canopy gaps larger than selection silviculture demo plots due to removal of 4-D trees, majority are Chilaune trees, which typically have large spreading crown. Although conclusion from the demo plots at this stage may be too early to make on regeneration growth and canopy gap relationship, it is clear that silviculture operations have significant role in promoting higher rate regeneration growth and that rigid silviculture operations like selection and shelterwood systems are better than current silviculture regime represented by negative thinning in this study.

Paudel NS, Ojha H, Shrestha KK, Karki R, Paudel G, Nuberg I, Cedamon E (2017), **Towards Active Utilisation of Community Forestry: Silvo-Institutional Model for Sustainable Forest Management in Nepal,** In S. Adhikari, R. Karki, and A. Gurung, (eds), Proceedings of the First National Silviculture Workshop, Kathmandu, Nepal, 19-21 February, 2017, pp……..

Abstract: This paper explains what we term the „silvo-institutional model" for a more productive, sustainable and equitable management of community forests in Nepal. The paper draws on four years of action research in six research sites of Kavre and Lamjung districts, complemented by the review of silviculture-based forest management by Nepal government in various parts of the country. The findings indicate that first, early silviculture-based forest management initiatives have failed because they did not adequately considered the policy and institutional dimensions. Second, current initiatives, while looked promising for the active utilisation of community forests, have faced with complex regulatory and institutional barriers. We argue that a new „silvo-institutional model" which combines technological and institutional dimensions, has a potential to increase the prospect of successful implementation of silvicultural-based forest management.

Paudel G, Karki DB, Basyal M, Paudel NS (2017), **Silviculture for Enhancing Economic Contributions of Community Forestry: Experience from Lamjung District,** In S. Adhikari, R. Karki, and A. Gurung, (eds), Proceedings of the First National Silviculture Workshop, Kathmandu, Nepal, 19-21 February, 2017,

Abstract not provided

Paudel G, Khanal PP, Cedamon E, Basyal M (2017), **Prospects of Application of Shelterwood System in Mature Pine Stands in the Hills of Kavre District,** In S. Adhikari, R. Karki, and A. Gurung, (eds), Proceedings of the First National Silviculture Workshop, Kathmandu, Nepal, 19-21 February, 2017,

Abstract: Nepal's forestry has given little or no attention to initiate productive management of forests. Forestry practices dominated by protection-centric dogma provided incentives to passive management of forests. Communities (also state) suffer from such state of inaction(s) in forestry. Despite many benefits, silviculture system based forestry remains neglected. Amid rare experience of application of shelterwood system (SWS) in Nepal, we have analyzed the prospects of application of SWS in the hills of Nepal. This paper is based on the analysis of data from few demonstration plots in mature pine stands in Kavre district. The plots are established in mature pine plantations at rotation age. We applied SWS as a treatment in the demonstration plots and

measured and compared the regeneration with the control plot. We demonstrate that SWS is applicable in mature pine plantations in the hills with some modification in felling pattern. We also evaluate the social and biophysical response to crown opening under SWS. We analyze and enlist the challenges and prospects of the application of SWS in the sloppy hills. Our findings suggest additional set of precautions, such as the grazing and forest fire control, should be taken while applying SWS in the hilly terrain.

Cedamon E, Paudel G, Basyal M, Nuberg I, Shrestha KK (2017), **Q-Factor is a Useful Guide for Selection Silviculture on Nepal's Community Forests,** In S. Adhikari, R. Karki, and A. Gurung, (eds), Proceedings of the First National Silviculture Workshop, Kathmandu, Nepal, 19-21 February, 2017, pp……..

Abstract: There is growing interest by forest users, government forestry officers and policy makers on maximising forest goods and livelihood provisions from community forestry in a sustainable manner. However the way several mature community forests are currently managed based on selection, e.g. negative thinning and crown thinning is questionable as it results to decline in forest stock, timber quality and regeneration. To assist forest users in managing their community forests, an action research has been implemented in Kavre and Lamjung to manage planted Pine (Pinus spp.) and naturally-regenerated Sal (Shorea robusta) through selection system. This paper describes what is q-factor and its relevance for sustainable community forest management in Nepal. The simple guideline for selection system introduced to 30 community forest users groups in six sites are presented for wider adoption and policy recommendation.

Nuberg IK (2018) **Pathways to agroforestry wealth in Nepal.** Keynote paper. International Agroforestry Conference 27-29 April 2018, Bhrikuti View Hotel, Katmandu
Abstract: The presentation presents a conceptual framework for understanding the links between the farm and community forest in the mid-hills of Nepal and the role agroforestry has in enhancing livelihoods and food security. This framework underpins the EnLiFT project. Some results from EnLiFT are presented concerning drivers of under-utilised land, how simple agroforestry interventions can lift households above the poverty line, but how widespread prosperity requires commercial agroforestry systems, most likely on the currently under-utilised land. To achieve this four propositions are made to establish the pathway for agroforestry wealth: 1] agroforestry should not be institutionally separated from agriculture and community and private forestry; 2] Multi-sectoral commitment is required to educate and support youth to engage in agriculture, encourage investment of remittances into agriculture; provide legal systems to provide confidence for landholders to invest in commercial agroforestry partnerships; 3] Greatest potential in larger, commercially-oriented fodder-livestock and timber-woodlot systems; and 4] Current constitutional changes an excellent opportunity to develop policies and institutions to encourage wealth-generating agroforestry

11.1.5 Conference and seminar presentations

S.Tamang, K. Paudel & K. K. Shrestha (2014), **Agricultural (in) justices: Investigating feminization of agriculture and its implications to food security in Nepal**, Oral Presentation, 3rd World Congress on Agroforestry, 10-14 February 2014, New Delhi

K.Paudel, S.Tamang, K. K. Shrestha, R.Shah (2014), **Transforming land and livelihoods: Analysis of agriculture land abandonment in the mid hills of Nepal**, Oral Presentation, 3rd World Congress on Agroforestry, 10-14 February 2014, New Delhi

B.Pandit, K. K. Shrestha & S.Bhattarai (2014), **Conservation and livelihood impacts of agroforestry system: A case study of Kavrepalanchok district of Nepal,** Oral Presentation, 3rd World Congress on Agroforestry, 10-14 February 2014, New Delhi

R.Shah, A. Adhikari and R. Khanal (2014), **In search of Dynamic Linkages between Agroforestry and Ecosystem based Adaptation: A Case Study of Rural**

Mid Hills of Nepal, Oral Presentation, 3rd World Congress on Agroforestry, 10-14 February 2014, New Delhi

D. Khatri, N.Sharma, K. K. Shrestha, H.Ojha, G.Paudel (2014), **Why has community forestry made limited contribution to agroforestry in Nepal? : institutional constraints for fodder and grazing in community forestry**, Oral Presentation, 3rd World Congress on Agroforestry, 10-14 February 2014, New Delhi

I.Nuberg, K.K. Shrestha, H.Ojha, E. Cedamon (2014), **Enhancing livelihoods and food security from agroforestry and community forestry through action research in Nepal**, Poster Presentation, 3rd World Congress on Agroforestry, 10-14 February 2014, New Delhi

H.Ojha & K. K. Shrestha (2014), **Agroforestry response to water stress: Comparative insights from Australia, India and Nepal**, Poster Presentation, 3rd World Congress on Agroforestry, 10-14 February 2014, New Delhi

B.Pandit, H.Ojha & K. K. Shrestha (2014), **Barriers to integrating forestry into agricultural system: Analysis of forest legislation and policy in Nepal**, Poster Presentation, 3rd World Congress on Agroforestry, 10-14 February 2014, New Delhi

L.Puri & H. Meilby (2014), **Trees on Farmland: composition, abundance and role of trees on farmland in rural communities**, Poster Presentation, 3rd World Congress on Agroforestry, 10-14 February 2014, New Delhi

S.Amatya, I.Nuberg, R.Neupane, B, Pandit (2014), **The business of Nepalese agroforestry: applying science to improve livelihoods**, Compendium, 3rd World Congress on Agroforestry, 10-14 February 2014, New Delhi

R.Neupane (2014), **Agroforestry's contribution in enriching soil fertility to improve livelihoods of the subsistence farm households in the Hills of Nepal**, Compendium, 3rd World Congress on Agroforestry, 10-14 February 2014, New Delhi

Paudel, G, Cedamon, E, Nuberg, I, Paudel, N and Shrestha, K (2015), **Why Community Forest Management in Nepal is not Active and Equitable**, Oral Presentation, IUFRO Research Group 3.08 Small-scale Forestry Conference, 11-15 October 2015, Sunshine Coast Australia

Paudel, G, Shrestha, K, Nuberg, I, and Khatri, DB (2015), **Institutionalizing community-based enterprise in Nepalese community forestry**, Oral Presentation, IUFRO Research Group 3.08 Small-scale Forestry Conference, 11-15 October 2015, Sunshine Coast Australia

Cedamon, E. (2015), **Enhancing livelihoods and food security from agroforestry and community forestry in Nepal**, Oral Presentation, Research Day 2015, School of Agriculture, Food and Wine, University of Adelaide, 2 November 2015, Adelaide Pavilion, Adelaide South Australia

Shrestha KK, Ojha H (2016), **Land Under-utilisation pathways: drivers, and policy solutions, National Workshop on Land Management and Food Security: Addressing Underutilised Agricutural Land Issues in Nepal**, Jointly organised by National Planning Commission and Australia Centre for International Agricultural Research 28 – 29 Aril 2016, Staff College, Lalitpur, Nepal.

Shrestha, KK (2016), **Persistence and change in Nepal: Local consequences of global remittance economy**, Political Ecology Group Seminar, Department of Geography, University of Cambridge, UK, 9th February 2016.

Cedamon E (2017), **Household typology of rural Nepal**, Oral Presentation, Research Day 2017, School of Agriculture, Food and Wine, University of Adelaide, 1 December 2017, Adelaide Hills Convention Centre, Hahndorf, South Australia

Nuberg I (2018) **Pathways to Agroforestry Wealth.** Keynote presentation in International Agroforestry Conference 27-29 April 2018, Bhrikuti View Hotel, Katmandu

Bastakoti D, Nuberg I, Luedeling E (2018) **Impact pathway validation for an agroforestry intervention in Nepal** Tropen Tag. Ghent University, Beligium 17-19, 2018

11.1.6 Research Paper Series

Paudel K, Subedi YR, Tamang S, Nuberg I, Shrestha K. (2014), **Milestones in Selecting Field Sites for Participatory Action Research**, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2014-01:1-56

Tamang D, Cedamon E, Nuberg I, Shrestha K. (2014), **Baseline Household Profile on Agroforestry, Community Forestry and Under-utilised Land in Six Selected Sites in Kavre and Lamjung Districts, Nepal**, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2014-02:1-79

N Paudel, R Karki, G Puadel, H Ojha, M Basyal, A Bhandari, D Tamang, S Bhattarai, K Shrestha, I Nuberg. (2014), **State of art in linking community forestry with food security in the Nepalese hills: Cases of Kavre and Lamjung districts**, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2014-03:1-105

B Pandit, SM Amatya, D Gautam, R Niraula, S Bhattarai, YR Subedi, Nuberg I, Shrestha K, H Ojha (2014), **Qualitative Baseline Study on Agroforestry in Kavre and Lamjung Districts, Nepal**, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2014-04:1-56

Malla Y, Shah R, Chhetri R, K, Subedi YR, Tamang S, Paudel K, Basyal M, Shrestha S, Nuberg I, Shrestha K. (2014), **Qualitative Baseline Study on Underutilised Land in Kavre and Lamjung Districts, Nepa**l, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2014-05:1-53

Amatya SM, B Pandit, Subedi YR, Nuberg I, Shrestha K. (2014), **Survey of Agroforestry Systems in Kavre and Lamjung Districts of Nepal**, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2014-06:1-21

Mulia R, Lusiana B, Nuberg I, Shrestha K. (2015), **Modelling concept of EnLiFT version 1.0: a model to simulate food security at household level**, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2015-01:1-7

Subedi YR, Shah R, Nuberg I, Shrestha K. (2015), **Understanding Land Underutilisation in Midhills of Nepal: Six Cases from Kavre and Lamjung Districts**, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2015-02:1-70

Tamang D, Perdana A, Cedamon E, Nuberg I, Shrestha K. (2015), **Analysis of Community Forestry Value Chain in Kavre and Lamjung District**, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2015-03:1-7

Paudel KP, Subedi YR, Tamang S, Nuberg I, Shrestha K. (2015), **Drivers and Dynamics of Underutilised Lands in Midhills of Nepal, Research Paper Series on Agroforestry and Community Forestry in Nepal**, 2015-04:1-27

Karki R, Paudel NS, Ojha H, Shrehta KK, Puadel G, Basyal M Nuberg I (2015), **Process report on Inclusive Community Forest Planning, Research Paper Series on Agroforestry and Community Forestry in Nepal**, 2015-05:1-24

Cedamon E, Nuberg I, Paudel G, Basyhal M, Paudel N, Dangol S, Shrestha K, Ojha H (2015), **Achievements of EnLiFT Silviculture Demonstrations**, Research Paper Series on Agroforestry and Community Forestry in Nepal, 2015-05:1-24

11.1.7 Workshop Recommendations / Reports

Recommendations of the National Workshop for 14th Plan

28-29th April 2016 in the Staff College, Jwalakhel, Lalitpur

The following text has been submitted for inclusion in 14th National Plan.

Programme to bring back Under-utilised and Abandoned Agricultural Land into Production and Enhance Productivity

Background
The construction of physical infrastructure such as roads, industrial estates, urban settlements, electricity generation and extension lines, educational institutions, hospitals, etc. is increasing at a fast rate. In addition, conservation needs have aimed to increase forests, watersheds, water-bodies, etc. For these reasons, agricultural land in the Terai and in the periphery of towns and cities is gradually being converted into non-agricultural uses.

On the other hand, people, most often from the hill-region of Nepal, are migrating to cities and abroad in search of jobs, often leaving agricultural land abandoned/fallow and underutilised. As recent research conducted by EnLifT (Enhancing Livelihoods and Food Security from Agroforestry and Community Forestry) Project in 2015 has shown that nearly one-third of agricultural land has been abandoned in the middle hills.

Due to conversion of agricultural land into non agricultural uses in Terai and peri-urban areas and underutilization in hills, food production has been negatively affected. Though land conversion in Terai and peri-urban areas cannot be checked immediately, gricultural underutilised land in the hills can be brought back into production. In view of the huge agricultural import [Approximately Rs 1 Kharba (US$ 1billion)] and one-fourth of landless Nepalese farmers living under food insecurity, this state of agricultural land underutilization in the hills has become a serious problem.

Several proximate causes have been identified for agricultural land underutilisation. Declining land productivity has forced people to move out of agriculture. Lack of security and confidence hampers the use of land. On the one hand, land owners feel insecure of maintaining their ownership in share cropping. On the other hand, share croppers are also not interested in farming due to insecure leasing terms. Absence of clear land contract/regulatory arrangement prevents agricultural entrepreneurs to engage in the farming business. Various drivers have made the situation worse - youth out-migration (triggered by the lack of employment opportunity at home), lack of agricultural subsidies and services, decline of traditional farming institutions, inequitable land ownership, limited technological innovations, and a lack of overall environment for business oriented agricultural innovations.

These factors have shown a clear need to enhance agricultural productivity and prevent agricultural land from being left abandoned/fallow by addressing some of the proximate causes and underlying drivers. This directly contributes to enhance food security, increase employment opportunities and help alleviate poverty – the major goal of the national plan.

Objective
To ensure that agricultural land will be fully utilised and no land will be left abandoned/fallow, and hence contribute to food security in Nepal, particularly to the country's vulnerable and poor people

Strategies
- Increase agricultural production by bringing back the abandoned/fallow agricultural land into production
- Attract youth interest and private sectors investments towards agriculture by promoting agriculture as a dignified and attractive enterprise

Operating Policies
- Clear legal and regulatory provisions will be made to facilitate leasing/contracting of agricultural land that ensures the protection of the interests of both land owners and the share croppers
- Land use planning will be implemented at local, provincial and national level through a full-fledged Land Commission and local governments

- A new agricultural subsidy scheme, including the protection of vital food crops, will be introduced to encourage farmers, entrepreneurs and local governments (including incentive to channel remittance to agriculture)
- A special nation-wide campaign 'youth and agriculture' will be launched in the rural areas and schools by providing educational materials and incentives such as loans, subsidies and school bursaries to students through local governments
- In order to achieve food self-sufficiency and promote commodities with comparative advantage, provisions will be made to allocate a certain percentage of national income received through remittance, for the purpose of bringing back the underutilised agricultural land into production.
- Ministry of Agriculture, Forests and Soil Conservation, Irrigation, and Land Reform and Management will jointly plan activities to bring back underutilised agricultural land into production and implement the integrated plan with common objective.
- The concept of a Land Bank will be piloted in selected VDCs and municipalities with special attention to the livelihoods of the poor, Dalit and disadvantaged groups.
- In order to attract and retain agricultural graduates in agricultural production and engage them in commercial farming, post-graduate scholarships will be provided through the Land Banks. These graduates will be given land by the Land Bank including loans and subsidies for commercial farming.

Expected Outcomes
- 30% of the underutilised agricultural land (2015 benchmark) will be brought back into productive use by 2021
- Agricultural productivity will be increased
- A shift in youth attitudes to view agriculture as a better opportunity for wealth generation than working overseas

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Key messages, Recommendations and Next Steps:
The participants worked in 10 groups to identify key messages, recommendations and next steps to implement the recommendations. The compiled key messages, recommendations and next steps are:

Key messages:

- An enabling environment for silvicultural application need to be created through policy guidelines, institutional commitment, awareness raising and training.

- Silviculture is the fundamental to improve forest health, increase production of goods and services, which can transform Nepal from timber importing to exporting country and help achieve the sector's vision of 'forestry for people's prosperity'.

- Silviculture based sustainable forest management, considering the local practice and knowledge, need to be applied in all accessible forests with active participation of concerned user.

- All the constraints that prevent the effective implementation of silviculture need to be removed by recognizing the context, objectives and on-the-ground reality of forest management.

Recommendations:
Silvicultural technologies:
1. Prescribe appropriate silvicultural systems considering silivicultural characteristics, forest conditions including species composition, forest size, management objectives and physiographic characteristics, while not compromising multiple functions of forests.

2. Develop simple and integrated manual/handbook of silviculture for major forest types and regimes.

3. Increase the productivity of the forests by ensuring quality of seed, mother tree selection, seed orchard, gene pool conservation, and using appropriate harvesting and logging tools and techniques.

4. Identify and document indigenous and traditional silvicultural knowledge, and improve indigenous system considering science and market.

Capacity building and awareness:

5. Develop capacity and capability of foresters and stakeholders (government, forest users, private sector, media and other stakeholders) on silviculture based management through motivational and promotional activities, awareness campaigns and training programs.

6. Develop training manual on silviculture based forest management for different levels.

7. Create and mobilize expert group to develop strategy, intensify silvicultural practices and develop knowledge and capacity of stakeholders

8. Establish *Forest Council* to ensure technical quality for silviculture based forest management.

Governance, institution and organization:

9. Ensure rights of forest managers by defining and clarifying role and responsibilities of participating parties in silviculture based forest management.

10. Reform existing institutions in line with the state re-structuring to provide technical backstopping for the silviculture based sustainable forest management.

11. Develop and institutionalize information system based monitoring mechanisms.

12. Establish set of principles, criteria, indicators and verifiers for evaluating and developing quality of silviculture based forest management governance.

13. Develop and implement contracting of forest management in community, private and public partnership.

14. Create enabling environment for silviculture-based forest management with safeguard measures for the potential misuse of funds and risk of encroachment, fire, and environmental hazards.

Policy / legal framework and guidelines:

15. Define and authenticate silvicultural related terms, terminologies and activities.

16. Review and harmonize existing policies, acts, regulations, strategies and guidelines regarding silvicultural provisions.

17. Carry out permanent zoning of forest area in each district based on forest type and management systems.

18. Expedite operational /management plan preparation and approval process.

Research and innovation:

19. Document existing qualitative and quantitative data on silvicultural practices including local skills and knowledge, and identify the gaps

20. Identify silvicultural options for trees outside forests (private, public)

21. Implement research trials (harvesting) to identify suitable silviculture systems across different management regimes and contexts

22. Undertake research to identify the blockages to the application of silvicultural knowledge and communicate the success stories

23. Conduct research into the market opportunities for forest goods and services, and economic optimal rotation age

Investment, Technology and Safety:

24. Develop self-sustainable forest financing from sources of fund from FUGs, forest entrepreneurs, private sector, corporate responsibility and the government, and by also establishing forest development and industry promotion board/fund.

25. Develop financial and technical incentives (such as grant, low interest loan and insurance provisions) with simple access mechanisms for forest management

26. Address the trade barriers with local stewardship/certification and by simplifying harvesting, logging, grading and transportation procedures.

27. Improve measurement, harvesting and logging tools and technologies; and mechanize and digitize the forest management and marketing operations.
28. Make compulsory to use safety gears and strengthen workers safety, OHS (Occupational Health and Safety), capacity building, insurance and social safety.

Suggested next steps:

1. Prepare a 10-year plan for silviculture based forest management, and allocate budget from the next fiscal year to implement activities identifying specific location and define goal to increase forest productivity by 1 cft per year per ha.

2. Document and maintain existing seed orchards, and develop new seed orchards of major species in each physiographic region.

3. Set up silviculture working groups at Central and Regional/State Level, and expedite the process of forming Forestry Council.

4. Review and harmonize existing directives and guidelines to promote silviculture based forest management.

5. Revise and update community forest inventory and thinning guidelines.

6. Develop research plan in coordination with academic institutes, Ministry of Forest and Soil Conservation, and private sector.

7. Allocate a proportion of income from all forest management regimes to research and innovation (like 25% into forest management)

8. Explore the possibility of establishing forest development and industry promotion board/fund

9. Strengthen Forest Workers' rights, safety and safeguards.

International Agroforestry Conference 27-29 April 2018 . Hotel View Bhrikuti, Kathmandu

International Agroforestry Conference (IAC) was organized on 27-29 April 2018 at Hotel View Bhrikuti, Lalitpur, Nepal with the purpose of bringing together national and International researchers and professionals to share knowledge and experience for the "Promotion of Agroforestry for Rural Income, Climate Change Mitigation and Adaptation" with focus on four major themes: Agroforestry and Sustainable Development; Agroforestry Technological Innovations; Climate Change Adaptation and Mitigation; Policy, Institution and Gender; plus one concurrent theme: Agroforestry, Traditional Crops and Livelihoods in the Hindu Kush Himalayas. The conference was led by Nepal Agroforestry Foundation (NAF) in collaboration with Ministry of Agriculture, Land Management and Cooperatives, Nepal; Ministry of Forest and Environment, Nepal; Kathmandu Forestry College (KAFCOL); Enhancing Livelihood and Food Security through Agroforestry and Community Forestry (EnLiFT) project funded by the Australian Centre for International Agricultural Research (ACIAR); World Agroforestry Centre (ICRAF); International Centre for Integrated Mountain Development (ICIMOD); Food and Agriculture Organization of the United Nations (FAO) Nepal; Agriculture and Forestry University (AFU); Institute of Forestry (IOF), Tribhuvan University (TU), and Asia Network for Sustainable Agriculture and Bioresources (ANSAB). The University Grant Commission (UGC) Nepal also joined at the latter part of the conference and agreed to provide funding support of NPR 250000 to the conference in addition to funding support of ACIAR/EnLIFT (NPR 500000), AFU (NPR 50000), ANSAB (NPR 50000). Conference bag and one full participant support from FAO, Nepal, and eight persons' participation cost from ICRAF and five persons' cost from ICIMOD.

Over 100 scientists, professionals, and practitioners of Agroforestry representing 13 countries: Australia, Bangladesh, Bhutan, Canada, China, Costa Rica, India, Netherlands, Nepal, Pakistan, Sri Lanka, UK and USA graced the event which included five keynote speakers/presentations, three panel sessions involving 14 panelists/presenters, 3 special guest presentations, and 40 technical presentations in two parallel sessions. The inaugural session was graced by Honorable Minister for Forests and Environment, Mr. Shakti Bahadur Basnet along with other dignitaries—Dr. Bimala Rai Poudyal, Honorable member of National Assembly, Chairperson of NAF, Dr. Ramji Neupane, representatives of organizing partners, and government organizations. Various aspects of agroforestry such as policy, economy, utilization of abandoned lands, climate change issues and

mitigation, agroforestry for biodiversity conservation, the role of Nepal in agroforestry, gender inclusion and protection of natural resources were addressed by the delegates. On the third day, the conference was formally closed by Chief Guest, Joint Secretary of Ministry of Forest and Environment, Mr. Dhananjaya Paudel along with representatives of partner organizations, organizing committee members, and all the participants.

Overall, the conference was successful to deliver the following key messages:
- Enhancing coordination, cooperation and commitment of relevant agencies to enable policy and legal systems that support and promote agroforestry system in order to also ensure the inter-linkage of the system with agriculture, community and private forestry.
- Blending of indigenous local knowledge and science for improving agroforestry systems and introducing farmers and community with appropriate combination of over-storey and under-storey species.
- Need for stable and sustained funding for research and projects that focus on context specific design and solutions, and fill in knowledge gap resulting due to inadequate understanding of different agroforestry systems and their roles in livelihoods enhancement and sustainable development.
- Need of Suitable technological intervention to improve abandoned agricultural degraded land and to mitigate climate change i.e. biochar a soil amendment.
- Promotion of gender equity and youth involvement in the agroforestry system.
- Promoting agroforestry market system and carbon trade for sustainable agroforestry practices in Nepal.

11.1.8 Summary of 12 EnLiFT Policy Labs and associated events

S.N	Topic of Policy Lab	Policy Question	Participant/venue/date
1	Transforming state-community contract in community forestry	• Backlog in renewal of CFOPs • Conservative resource assessment (inventory, AAC calculation) • Level of support and monitoring from DFO staff in CF activities	Civil society - 2 Government - 3 Donors -2 IUCN/ 15 Jan 2017
2	Scientific Forest Management	• Community forests are suffering from passive management • Regulatory and institutional regime are not supportive to active management • Modifications and adjustments are needed to make recently Introduced scientific forest relevant to CF	Government- 2 Civil society - 4 Private sector - 2 Indreni Food land/ 12 Dec 2014
3	Policy and regulatory framework needed to promote private forestry	• How have the regulatory provisions on registration, harvesting and marketing of private forest products constrained? • How can such regulations and DFO support encourage private forest owners?	Government - 2 Private sector - 2 Civil society - 1 Donors – 1/ IUCN/ 8 March 2015
4	Implications of current land use practice on food security	• What policy and regulatory factors have led to land underutilization in Nepal? • How can local governments facilitate and enforce land use practice favouring food food security?	Government- 2 Civil society - 1 Private sector - 2 Political parties – 2 Hotel Summit/19 Jan 2015
5	Facilitate increased timber supply from CF/PF for post-earthquake reconstruction	• How much is the demand-supply gap of timber for post-earthquake reconstruction? • what exhumations can be made to ease timber harvesting and transport from AF/PF during reconstruction phase?	Government - 2 Civil society - 2 Private sector - 1 Hotel Ugrachandi Banepa/ 19 June 2015
6	Enhancing research –policy link through EPL	• a. What are the different methodological options in linking research with policy?	Researchers -6/ September, 2014/IUCN
7	Understanding and experimenting with EPL	• How is EPL distinct from conventional approach to research-policy liking? • How can we conduct it effectively within EnLiFT?	Researchers -5/ October, 2014/IUCN
8	Understanding and experimenting with EPL	• How is EPL distinct from conventional approach to research-policy liking?	Researchers -5/ March, 2015/IUCN

		• How can we conduct it effectively within EnLiFT?	
9	Understanding and facilitating the coordination between forestry and agriculture	• What are the existing mechanism to enhance agri-forestry interface? How does food security help increase forest and farm interlink?	Govt forest officer -4 Researcher -2/ August, 2015/ Ministry of Agriculture
10	Enhancing utility of EnLiFT research findings to implementers	• To what extent the EnLiFT research finding are useful to you? • How can you better use the research finding?	Govt forest officer -4 Local government officers -2 Researcher -2/ May, 2016/DFO Kavre
11	Enhancing utility of EnLiFT research findings to implementers	• To what extent the EnLiFT research finding are useful to you? • How can you better use the research finding?	Govt forest officer -4 Local government officers -2 Researcher -2; May, 2017/ DFO Lamjung
12	Facilitate timber harvest and transportation from private and CF lands	• How are policy provisions on private forestry being implemented? • What are implementation challenges in relaxing timber harvest and transport?	Govt forest officer -4 Researcher -2 March, 2017/Regional Forest Directorate Hetauda

11.2 Summary of agroforestry field interventions

Two planting cycles were completed within the project period. In first cycle of plantation, 180 farmers have planted 63,300 seedlings of various fast growing multipurpose tree species such as Ipil-Ipil, Bhatamase, Guajuma, Mendula, Balkaino, Mulberry, Lapsi on their respective farmlands. Seedlings of these species were raised in 10 nurseries. Among them, 31 plots were established for demonstration purposes, where 11,474 seedlings of Ipil-Ipil, Bhatamase, Mendola, Guajuma, Bakaino were planted. The 1st cycle of plantation has been already reported in Annual Report 2015-2016.. This summary is the 2nd cycle of plantation in two phases.

Second cycle plantation status- First phase
To start with 11 temporary nurseries were established in six sites. A total of 30,603 numbers of seedlings were raised in two districts (Table 24).

Table 24: Tree species and their number in Kavre and Lamjung districts

S.No	Species	KabhrePalanchok district		
		Chaubas	Dhungkharka	Methinkot
1	Ipil-Ipil	1742	1566	1346
2	Bhattamase	980		2096
3	Koiralo	240		
4	Uttis	1312		
5	Chuletro	66		
6	Mendula	660		2096
7	Kimbu	800	5	
8	HattiPaile		360	
9	Paiyoun		1500	
10	Dudhilo		85	
11	Gogan		1005	
12	Chuletro		510	
13	Bakaino			462
	Total	**5800**	**5031**	**6000**
S.No	Species	Lamjung district		
		Dhamelikuwa	JitaTaksar	Nalma
1	Ipil-Ipil	874	1273	200
2	Bhattamase	713	1465	1200
3	Mendula	1037	660	900
4	Taki	610	610	
5	Koiralo	80	260	
6	Bakaino	766	2162	400
7	Kimbu	100		
8	Marich	152		
9	Lapsi			270
10	RaiKhaniyo			40
	Total	**4332**	**6430**	**3010**

Additional 9,861 seedlings were obtained from various sources (DFO office of Kavre, Lamjung and private nursery) and distributed among LRG's and LRP to plant on their farm land. The main species brought from DFO nurseries were Teak *Tectona grandis* (Teak), *Gmelina arborea* (Gamari), *Morus alba* (Kimbu) and *Cinamonum tamela* (Tejpat) which has been planted on farmers marginal and under-utilized land in all six sites.

Plantation establishment
A total of 226 farmers were involved during 2nd cycle of plantation establishment- first phase They have planted 28,396 number of multipurpose tree species such as Teak, Gamari, Eucalyptus, Khair, Lapsi, Tejpat, Ipil-Ipil, Mendula, Bhatamase, Bakaino, Kimbu, Tanki and 7,

892 forage species such as Broom grass, NB_{21} and Setaria on their farmland during late June-early July. Farmers involved in planting tree and forage crops in provided in Annual Report 2016-17. Table 25 shows the altitude, number of farmers and tree and forage planted by these farmers in all the six project sites.

Table 25: Altitude, number of farmers and number of seedlings planted in project sites.

S.N	Name of test sites	Altitude (MSL)	Farmers involved	Planted tree seedlings	Planted forage/broom grass seedlings
1	Dhamilikuwa	587 - 622	34	4710	3010
2	JeetaTaskar	452 - 668	39	4244	1805
3	Nalma	1089 - 1116	30	1689	565
4	Methinkot	1156 - 1174	42	6651	-
5	Dhungkharka	1715 - 2076	32	5492	2512
6	Chaubas	1690 - 1810	49	5610	-
	Total		*226*	*28, 396*	*7,892*

Second cycle nursery production and plantation establishment- Second phase
In addition to 226 LRGs who participated in the second cycle plantation of first phase, 74 new farmers have participated as LRGs in plantation programme, planting mainly of multipurpose species as hedge rows plantation in 2017. The plantation of first phase was completed in August, 2016 and the second phase just started in the beginning June 2017. Despite enormous efforts, all 300 LRGs have not been successful in establishing high yielding fodder crops on their respective farmland as hedge rows. They planted an average of 148 fodder trees randomly on their private farmlands. Besides, they planted multipurpose tree species and forage crops as understory crops in all six sites. Table 26 provides a glimpse of change in agroforestry components between the base (2013) and year 2016 .

Table 26: Change in Agroforestry components in between 2013 and 2016.

AF components		Research sites (Before (B) = 2013 and After (A) = 2016)											
		Jita		Nalma		Dhamilik uwa		Mithinkot		Dhungkhar ka		Chaubas	
		B	A	B	A	B	A	B	A	B	A	B	A
1. Trees	Fodder	2	218	18	87	4	101	33	183	59	155	85	145
	Timber/ Fuel	8	37	63	154	4	27	21	31	98	161	41	59
	NTFP trees	1	30	1	13	1	25	2	7	32	67	2	4
2. Under storey crops	forage/ grasses	130	368	45	63	34	143	72	126	11	59	47	106
	Banana	8	30	13	17	12	45	2	2	0	0	0	0
	Tomato	8	41	7	18	5	26	13	42	30	90	0	11
	Cardamom	0	0	18	100	0	0	0	0	1	25	58	161
	Round chilli	0	0	1	17	0	0	47	60	6	14	0	0
	Ginger	91	108	27	37	0	0	325	383	0	0	0	0
3. Animal	Cattle/ buffalo	2.1	2.1	2.0	1.5	1.7	1.8	2.1	3.0	2.0	3.2	1.6	0.7
	Goat	1.6	3.9	1.2	3.0	2.3	4.3	3.7	5.2	2.7	4.2	1.9	2.7