

Building Timber Value Chains for REDD+ in Nepal

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Foreword

I am happy in introducing this report, which explains timber value chain and its implications for REDD+ program implementation in Nepal. The report seeks to outlay the mapping of value chain and analyses value chain actors and governance. More importantly, it explains the mechanisms of profit share of the consumer price of timber along the value chain actors, and associated issues. It might provide a preliminary insight on designing REDD+ implementation activities from a timber value chain perspective.

ICIMOD is proud to be involved in value chain research, which is closely associated with the livelihood of forest dependent people in the Himalayas. Since, ICIMOD is one of the pioneer institutions engaged in REDD+ readiness activities in Nepal, this report is expected to set a baseline for upgrading timber value chain, which is compatible with the objectives of national REDD+ program of Nepal.

I would like to express my gratitude to Kishor Aryal, Bhaskar Singh Karky and the team of Regional REDD+ Initiatives in ICIMOD for conducting this research. I appeal for early actions to all, whom the report has recommended for upgrading the timber value chain more efficient, equity based and effective. Here in ICIMOD, we are ready to play our part of research and consultancy for upgrading the timber value chain for REDD+ compatibility, as it touches the livelihoods of the Himalayas.

David J Molden, PhD
Director General
ICIMOD

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Note: *Considering the anonymity of the interviewees as advised, the names of the interviewees have not been mentioned in this report.*

Executive Summary

This report is intended to explain timber value chain focusing on material flow, governance mechanism, the flow of revenues and value chain issues to be considered for REDD+ implementation in Nepal. The results of the value chain analysis captured the value chain dynamics of Sal (*Shorea robusta*) timber taking two major supply channels into consideration; subsidized local market and open market channel, which are found to be functioning in timber market.

The value chain analysis reveals a mixed governance structure of state, market and forest user groups at different stages of the value chain. Consumer price of timber is found consistent irrespective of how and where it comes from; however, collusive oligopoly during timber auction becomes the major determinant for percentage share of profit from the value chain, among the value chain actors. Increased supply deficit, poor substituting mechanism of Sal timber, huge price difference between subsidized and free market price, high price driven illegal logging, and deprived governance have been seen as major issues for a REDD+ compatible value chain. The results indicate future research and action to simplify the value chain to ensure fair and open auctioning and marketing of Sal timber, which will be a key for the success of a REDD+ programme.

The report has five sections. Section one provides the background on the timber value chain and Nepal's REDD+ programme. This section also states the key problems in timber value chain analysis and highlights objectives of this study. Section two describes the methodology with the explanation of study sites. Section three is the main part of the study that provides analytical information on flow of the materials from forests to the market, different marketing channels, various actors and their functions in the value chain, governance and pricing mechanism and value chain issues. Section four discusses value chains for REDD+ compatibility. Section five summarizes the report in the form of a conclusion.

Market orientation



a) Sawing timber using band saw, b) Stacking of sawn timber for sale, c) Furniture industry- producing finished product as per the customers' demand



Timber loading for transportation to urban market after auctioning



Graded timber stock for auctioning



Timber felling and sectioning



Sal production forest area

Income distribution

Introduction

Broad context and issues

Forest occupies a major portion of land in Nepal and is extracted for livelihood and commercial purposes. The unwise extraction of its resources also significantly contributes to deforestation and forest degradation, which hampers climate change as deforestation accounts for a substantial global greenhouse gas emission. Land use change for agriculture, economic activities through commercial logging, and firewood collection for energy sources are the major forms of deforestation and forest degradation (Sierra, 2001). Logging and timber extraction are responsible for more than two third of the total forest degradation in (sub) tropical Asia and Latin America (Kissinger and Herold, 2012). Timber extraction is driven by market structure, timber value, and timber scarcity. Economic indicators, such as market price of timber, are influential to determine the demand of timber (Pirard and Irland, 2007).

Timber extraction is associated with various underlying social and economic causes of deforestation. Timber is a heavily regulated commodity worldwide, and therefore, the regulation of timber has a significant bearing on how its market operates and value chain develops. Policy practice, regulatory services, and bureaucratic hurdles for forest product utilisation are associated with formal, and most often, informal way of excessive timber extraction (Schaafsma et al., 2014). Effective mechanism to control deforestation and forest degradation, including excessive timber extraction is the major concern for today's global community.

'Reducing emissions from deforestation and forest degradation, and enhancing forest carbon stocks in developing countries' (REDD+) – a proposed forest-carbon offsetting mechanism emerging through ongoing United Nations Framework Convention on Climate Change (UNFCCC) negotiations - aims to mitigate climate change by curbing carbon dioxide emissions stemming from the destruction of forests. This is a proposed performance based mechanism that aims to reduce carbon emissions from forests, by incentivizing forest conservation and management, and by minimizing leakage in tropical countries (Olander et al., 2012). Basically, REDD+ encompasses the following five activities: "reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks" (Olander et al., 2012). So far, only few REDD+ projects are concerned with optimum timber extraction while reducing emissions (Sasaki et al., 2012). There is a need to understand the entire process of wood supply chain, so that, it can be analyzed in the REDD+ context.

Value chain of timber

Value chain has become a popular concept in understanding resource extraction and market dynamics in the recent years. Value chain describes a range of activities from production of primary goods to its final consumption (Figure 1). It encompasses any activity required to develop a product or services through various processes, from resource extraction, production, processing and manufacturing to final consumption and disposal (Geibler et al., 2010).

The value chain of timber generally starts with the places where tree grows, followed by harvesting, collection, transportation, processing and finally consumption by individuals and/or commercial enterprises. The value chain of timber encompasses various inputs from forestry sector (land allocation and timber production), machinery sector (harvesting and sawing) and other social sectors. Besides the material flow, the value chain of timber comprises actors, activities, processes, and governing services at various stages of the chain.

Figure 1: A typical value chain



Source: Schure et al., 2014

In Nepal, government institutions, private farmers and forest user groups are involved in timber production. Land capital, ecological viability, time, cost and labor investment in establishment and management of trees are determining factors for timber production in the value chain. In addition to timber producers, local intermediaries and brokers are involved in harvesting, logging and collection of timber at the local level. Small or large wholesalers and retailers are involved in timber value chain. Small scale at local level or large forest based enterprises, such as sawmills and furniture industries are engaged in conversion, processing and manufacturing of timber. After specific modification and design, timber products are distributed and consumed.

Timber value chain and Nepal's REDD+ programme

Establishing an efficient, effective and transparent marketing channel in timber helps to address mitigating the drivers of deforestation and forest degradation by identifying areas that can ensure sustainability of the value chain (Schure et al., 2014). On a broader scale, equity explains the distribution of costs and benefits at each step in value chain. Fair and transparent distribution of cost and benefits is important construct for upgrading timber value chain. Both cost and product efficiency are important in product transformation and upgrading in various stages of the value chain. Effective governance structure, sound market mechanism and regulatory services are also key interventions to REDD+ for addressing the drivers of deforestation and forest degradation.

Nepal is a REDD+ participating country, and is actively involved in REDD readiness activities after the 13th Conference of Parties in 2007. Nepal's REDD+ Readiness Preparation Proposal (R-PP) and Emission Reduction Program Idea Note for 12 southern districts have been approved by the Forest Carbon Partnership Facility of The World Bank. Nepal R-PP envisions a detailed study on value chain of forest products whereas its REDD+ strategy (draft) envisions developing and implementing modules to regulate value chain involving local communities and private organizations to enhance sustainable forest based enterprises. The REDD+ readiness documents advocate for value chain study of timber to provide analytical basis for designing Nepal's REDD+ interventions.

Problem statement

REDD strategy draft (2015) identified unsustainable harvesting and utilization of forest products, unregulated and illegal logging, and poor technology in forestry sector as some of the prominent drivers of deforestation and forest degradation. The scale and severity of timber extraction depend on practices of forest management, harvesting and logging techniques, timber processing and valuation, market structure of timber, and governance mechanism of timber management and utilization. Timber market is linked to the prices of timber at various stages in the value chain (Ning and Sun, 2014). Timber value affects the patterns of market demand of timber and, accordingly, domestic demand of timber is crucial in shaping timber extraction (Sierra, 2001). Since the market structure of timber is highly influential in determining timber extraction, market efficiency of timber products is an important issue to consider for implementing national REDD+ program of Nepal.

So far, only a few studies (Subedi et al., 2014; Dangi et al., 2012; and Kanel et al., 2012) have been conducted on the value chain of timber in Nepal. There exists a clear knowledge gap about the equity in sharing of consumer price of timber along the value chain actors, power coalition between value chain actors, and sustainable timber based enterprises development. Therefore, in the forefront of the soon-implementing REDD+ program, this study is expected to explain and explore the value chain dynamics of timber, and discuss intervening activities for national REDD+ program implementation, so that, the timber value chain becomes sustainable, fair and equitable

Objectives of the study

The research aimed to analyze the timber value chain focusing on material and financial flow, and explore the value chain issues to be addressed for successful REDD+ program implementation and upgrading the value chain in Nepal. To achieve the aims of the research, this study answers the following research questions.

- How the value chain of timber operates, what processes and mechanisms are involved in value chain activities from primary production to final market?

- Who are the primary actors and what are their roles and interrelationships in timber value chain?
- What legislative and institutional structures are governing the timber value chain?
- How the consumer price of timber is distributed at different stages of value chain and shared among the actors?
- What are the major issues for upgrading REDD+ compatible timber value chain?



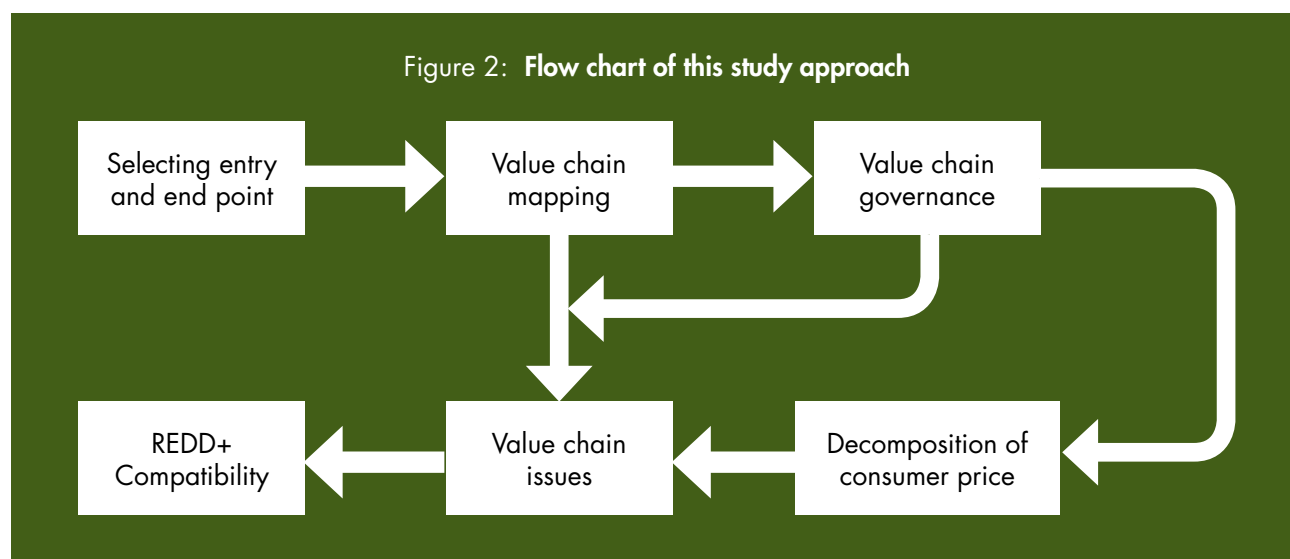
Use of axe and two-man saw for felling trees, Rupandehi, Nepal

Methodology

Research approach

The study is a non-experimental explanatory sociological research. This research follows a case study approach, in combination with dive-in approach for VCA (Lusby and Panlibuton, 2007). The study approach follows interviewing the key informants and reviewing available statistics. The dive-in approach, on the other hand, guides selection of target groups based on key information, and proceeds accordingly to avoid drawn out analysis (Lusby and Panlibuton, 2007). For undertaking the value chain research, the study follows key underlying steps developed by Kaplinsky and Morris (2001).

Figure 2 outlines the methodological approach to answer the research questions. The study first selected an entry point (such as forest management and timber production) for timber value chain then assessed the actors and processes of the value chain activities as well as the material flow. Transformation of timber from one form to another along the chain was assessed. Enabling institutions for operating value chain, relevant legislative measures and regulating services were analyzed to understand the value chain governance. Decomposition of consumer price among the actors in value chain was carried out to understand the percentage share of timber value at each stage (Aoudji, et al., 2012). Various value chain issues were assessed qualitatively which enables the study to finally discuss the required interventions for REDD+ compatible value chain in Nepal.



Study area selection

The study primarily focused on southern part of the country, which is considered as productive for timber production and domestic supply. Two districts, namely Rupandehi and Kailali, were selected purposively to represent major timber production area of the country (Map 1). Among the two districts, Kailali represents first class and Rupandehi represents second class district, based on the government's classification, regarding timber production and supply. Brief introduction of the districts is presented in Table 1. In addition, the study also focused on the capital city of the country, Kathmandu valley, which happens to be the main domestic market for timber trade.

Timber species selection

Sal (*Shorea robusta*) was selected for this value chain study. Lowland of Nepal, constituting sub-tropical Sal forests, is considered as an important timber production area. Among the important timber species, Sal dominates more than half of the lowland forests of Nepal (Webb and Sah, 2003). According to a study by Kanel et al. (2012), Sal occupies 56% of the total timber entering in Kathmandu valley. Sal is highly valuable and the most popular timber

Map 1: Study areas

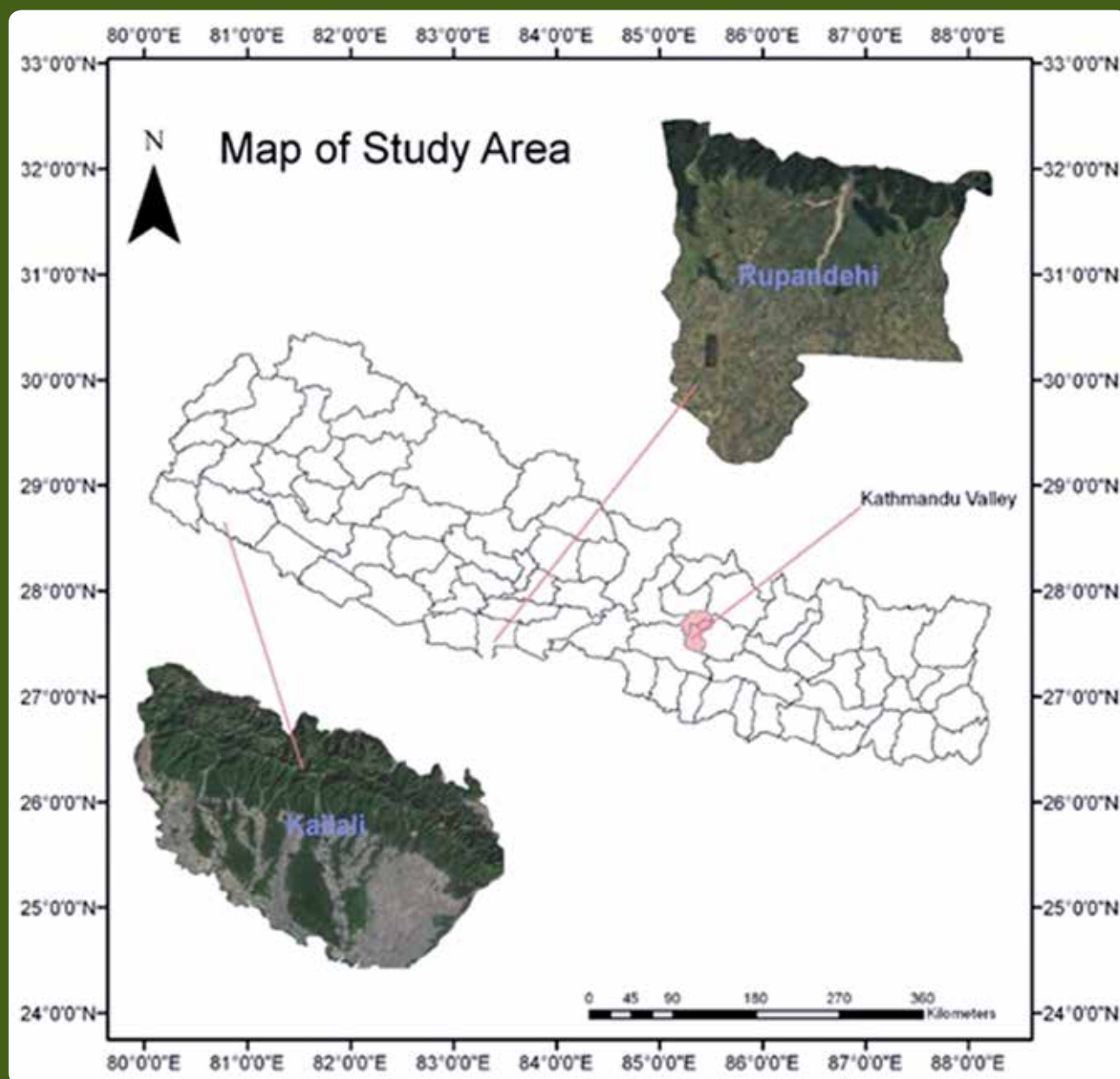


Table 1: Information of study sites

Description	Rupandehi	Kailali
Development Region	Western Terai	Far-Western Terai
Total Area	1,367 sq.km	3,286 sq.km
Forest area	26,524 ha (20%)	205,939 ha (60%)
Major timber species	Sal, Asna, Sissoo	Sal
No. of community forests	89 (14,180 ha)	394 (40,068 ha)
No. of collaborative forests	1 (1,118 ha)	1 (2,321 ha)
No. of Sawmills	188	63
No. of Furniture industries	495	179
Main timber market	Bhairahawa, Butwal	Dhangadhi, Tikapur

Source: DFO Rupandehi and DFO Kailali, 2015

species for building construction (such as, door and window frames) and other commercial purposes. Because of its high social and economic value, Sal forest is one of the most disturbed forest types in South Asia (Sapkota et al., 2009). Sal is mostly found in national forests such as government managed forests (GMFs), community forests (CFs) and collaborative forests (CBFs). Therefore, the timber species is selected to understand the value chain of timber from national forests.

Data collection and analysis

Interviews, literature reviews and desk research were the main sources of data collection for this study. The interview was based on purposeful sampling (Maxwell, 1998), allowing a deliberate choice of participants to achieve representatives of individuals/organizations and heterogeneity of understanding. Participants were selected from different backgrounds, such as government officials, local timber traders, community user groups, saw millers and owner of furniture industries. A total of 48 interviews were carried out from Rupandehi, Kailali and Kathmandu. The interviews were carried out from April to June 2015. Secondary data were extracted from policy documents and other sources which were concerned with demand and supply of timber, value chain operating policies, guidelines and government circulars.

Timber supply and decomposition of consumer price along the value chain actors, as well as difference in timber price were analyzed quantitatively. The mapping and governance of value chain and its issues were analyzed qualitatively. Both inductive and deductive coding was employed to cater both data driven themes and pre-determined concept driven themes (Fereday and Muir-Cochrane, 2008). The resulting thematic codes were summarized for interpretation of results and discussion.

Few assumptions were made during the analysis. The information about decomposition of consumer price of timber, money distorted through traders' collusion, and trend of timber price collected from interviews were considered valid, as they are case sensitive and hard to get through authorised documents. Other assumptions were made for standardisation of grading of timber and estimation of conversion loss during the decomposition of consumer price.

An interview with a saw-miller, Rupandehi, Nepal



Value Chain Mapping and Analysis

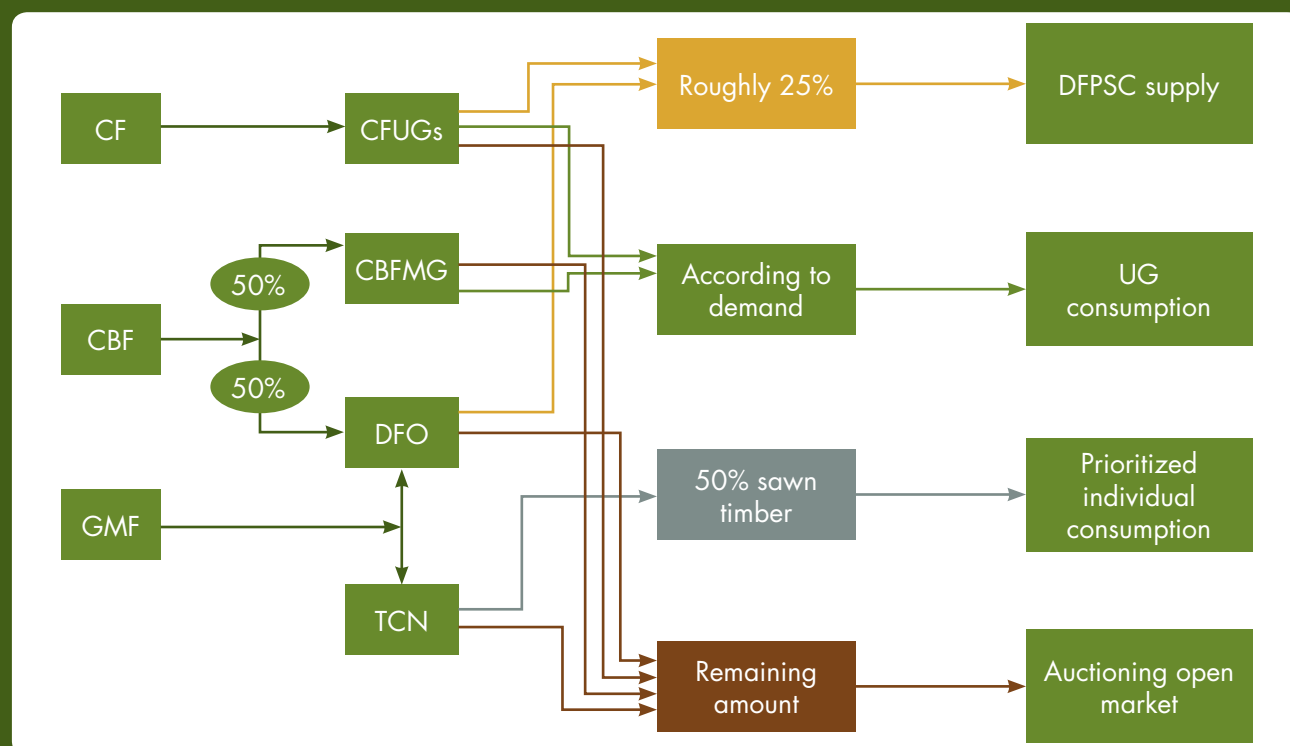
Collection and material flow of Sal timber

Production and collection of Sal timber is through the removal of dead, dying and diseased (3D) trees. CBFs and some CFs in Rupandehi have been practising scientific forest management (irregular shelterwood system, regeneration felling, fireline construction and removal of aged trees), however, the common measure of timber production is through removal of 3D tree, being within the allowable harvest of respective forest regimes.

The harvested and collected Sal timber from different forest regimes is distributed in different ways (Figure 3). Timber collected from CFs is mainly distributed within the respective community forest user group (CFUG) members according to their demand. The timber collected through collaborative forest management group (CBFMG) is distributed between the CBFMG and District Forest Office (DFO); one half to DFO and other half to CBFMG. DFO gets timber from both GMFs and CBFs. Among the timber collected to DFO, certain amount (roughly 25%) is allocated to District Forest Product Supply Committee (DFPSC) for supply within the district and rest of the amount is sold through auction. Regarding GMFs, there is a different case if Timber Corporation of Nepal (TCN) is functioning in a district. In such district, DFO asks TCN for the collection of 3D trees from GMFs, and the collected timber is distributed 50-50 between TCN and DFO. The DFO part of timber is sold through the same process, and TCN part of timber is further divided into two halves. One half is sold by sawing through the TCN's depots nationwide and other half is sold through auction. TCN and DFPSC follow the same procedures for collecting applications and sales, but DFPSC sells logs where as TCN sells sawn timber. Furthermore, DFPSC sells only within the concerned district, but TCN sells nationwide (roughly 25% within the concerned district and 75% through their depots nationwide). Local distribution and district consumption (such as, DFPSC supply, UG consumption and prioritized individual consumption) satisfy the prioritized local market channel

Besides the prioritized local market, the remaining timber goes to open market through timber auction. The timber distributing and selling institutions such as CFUG, CBFMG, DFO and TCN follow the same process for timber

Figure 3: Collection and supply channels of Sal timber



auction. These institutions publish a tender notice to invite timber based industries and individuals to involve in bidding process. Saw-millers, furniture industries, timber traders, and suppliers take part in the bidding processes. The individual or institution with higher bidding price would get the timber through auctioning. Generally, after auctioning, the timber is taken to sawmill for transforming timber log into sawn timber, and further sawing according to the size demanded. Then, timber is sold to the furniture industries and finally distributed to the final consumers.

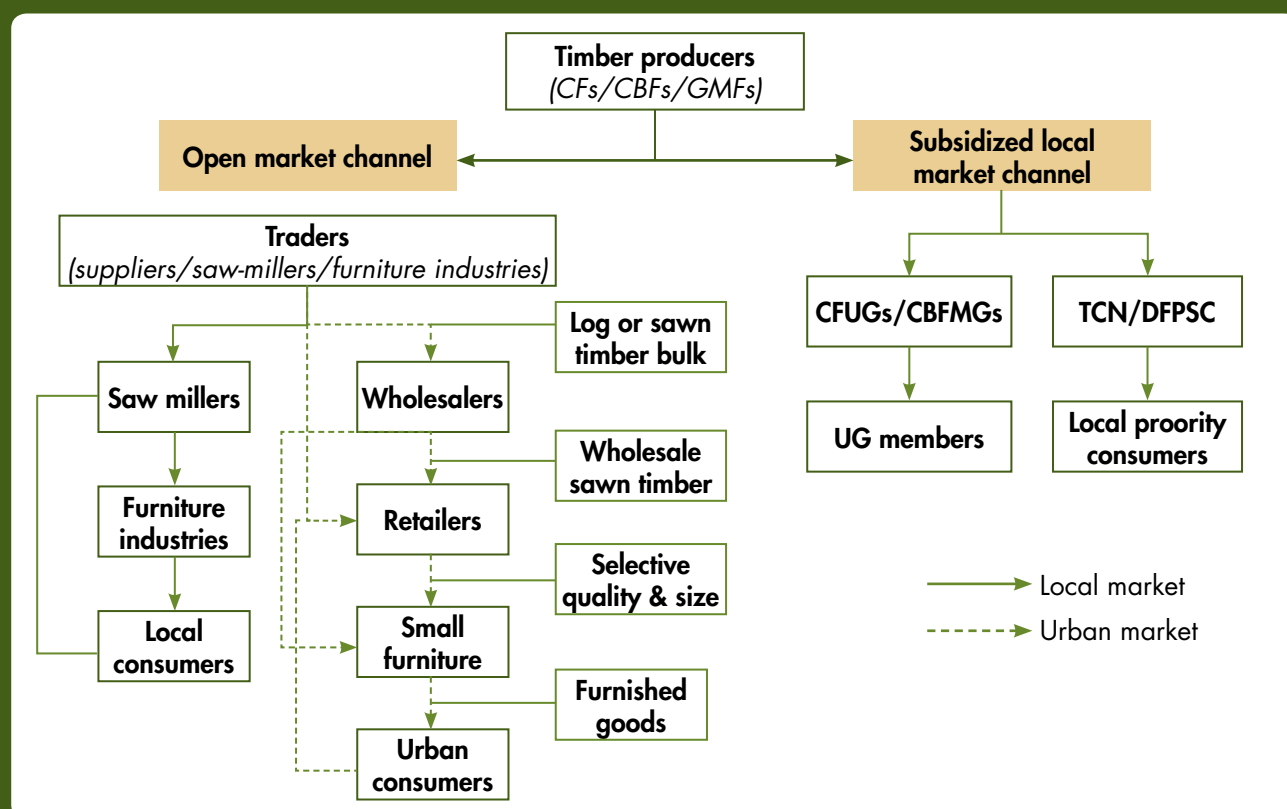
The product transformation and the proportion of each product from a log depend on the grades of timber. Generally, 'A' grade timber is expected to produce 70% sawn timber, 10% strips, 15% fuelwood and 5% wood dusts. The percentage of sawn timber is low and the percentage of fuelwood and strips is higher, for 'B' and 'C' grade timber.

Value chain actors and their functions

The study focused on realizing following actors in timber value chain: primary producers, sales entities, traders (including local intermediaries/brokers), and consumers. Sal timber value chain actors can be visualized according to the two main marketing channels of timber. One is local subsidized market channel and other is open market channel (Figure 4). The local subsidized market channel can further be categorized based on forest user group consumers and prioritized consumers. Likewise, the open market channel can also be characterized by two sub-channels; local market and urban market. Primary producers of Sal timber are CFUGs, CBFMGs, and DFO. When the timber collected from these forests is abundant to satisfy the UG members' demand, the remaining is sold to timber traders through auction. Government institution, DFO, is responsible to manage national forests as GMFs. Besides, DFPSC and TCN are the other two entities having authority to sell the collected timber through subsidized market as well as open market.

Timber traders are the main actors in the open market channels of Sal timber, entering by taking part in a timber auction. Although some local traders are also involved in buying contract for felling, bucking, logging, loading, transportation, unloading, collection and piling of timber at the field depot (*Ghatgaddhi*), their prominent role in the value chain can be seen during and after the timber auction. Timber traders can be characterized by those actors

Figure 4: Value chain actors in different marketing channels





Hole in the sectioned timber bole (*over-matured Sal tree's common defect*)

and institutions, whose business activities are administered by Inland Revenue Department of Nepal through Value Added Tax (VAT), as an indirect tax levied on value creation/addition. When the timber is sold to a private actor or agent with highest bidding price, it either goes to the local market or to the urban market channel.

Regarding the local market channel, the timber is disbursed to local sawmills. Saw-millers get the timber either by paying the highest bidding price during auction or by buying from the traders who win the bid. Saw-millers convert timber log into sawn timber and other timber products according to the size demanded and market trend. Trolley is used to convert big timber logs into sawn timber and planks, whereas band-saw is used to produce small-sized timber structures.

Urban market channels are initiated by the wholesalers who buy timber from tender winning local or district level traders. They collect large volumes of timber (log or sawn) from various districts. The wholesalers have relatively high control over the supply of timber in the urban market. Small sized furniture industries buy timber from retailers based on their need, through selective quality and size. Finally, the furniture industries sell the furnished timber goods to the urban consumers.

Among them, district union of forest based entrepreneurs is one of the powerful units for determining price of timber in the value chain. Moreover, in many cases, local political leaders and local gangs are informally involved in influencing timber auctions. District office of cottage and small industries, district office of Inland Revenue department, police check posts and transportation service providers are also relevant actors concerning timber trade. Financial institutions are also important entities for granting loans to value chain agents, especially the timber traders.

Value chain governance

Timber value chain in Nepal is guided by a mix governance structure of the state government, market and forest user groups. It can primarily be categorized in three main phases: (1) from production to collection; (2) timber auctioning process; and (3) marketing and consumption. The first one is government centric, in which the production and collection of Sal timber is highly influenced by the government in the value chain and is followed by the forest user groups. The auctioning process is influenced by both the government institution and market actors. The market structure and consumption pattern is, usually, driven by big market actors, such as the timber wholesalers and retailers. In addition to the big market actors, pricing and distribution of timber is also guided by the local timber traders and their district unions.

From the broader perspective, DFO, as a government institution, has the highest power in the existing timber value chain, with the legal authority to govern and control the system from timber production to sell primary product through auction. Although, CFUGs and CBFMGs can decide how much timber to collect annually from their forests, they need approval from DFO before felling the trees. CFUGs and CBFMGs have authority to sell the collected timber within their user groups but when they want to sell surplus timber to the open market, they still need approval from DFO for timber auctioning. Sealed-bid auctioning process is the only way to sell Sal timber to the open market where timber selling entities (such as DFO, TCN, CFUGs and CBFMGs) sell the timber to market actors (local traders, representing suppliers of wholesalers-retailers, saw-millers and furniture industries).

Forest Regulation 1995, Forest Product Collection and Sales Directives 2000, and Forest Product Auction Procedure Directives 2003 include provisions for timber traders to involve in trade activities of forest products having an authorized license. Timber auction is the process where all the bidders submit their sealed bids to the auctioneer simultaneously, and the highest bidders win the bidding process. Timber producers set reserve price (minimum price value) for the bidding during auction, and lobby to get the highest bidding price for timber. Reserve price is primarily based on the royalty rate of timber published by the Ministry of Forests and Soil Conservation through Department of Printing (*Nepal Rajpatra*). The local traders try to get the product at minimum price (but no less than the reserve price) as possible. Moreover, local traders' collusion is prominent in determining the timber price during auctioning from CFUGs and CBFMGs. After the auctioning, the auctioneers get the highest bidding price, however, 15% of the bidding price by CFUGs and price based on the royalty rate of Sal timber by TCN have to be paid to the government fund. Likewise, according to the VAT Act 1995 and Income Tax Act 2001, winning bidders have to pay 13% VAT and 1.5% tax of the bidding price (including field costs) of Sal timber to the government.

When the timber is sold to the market through auction, timber traders are highly influential in determining market supply and pricing of the final products. Although, timber traders are free to supply the timber throughout the country, they have to ask DFO for sawing permit (except Kathmandu valley) and transportation permit. Further supply of the product after auction depends on the business interest of the bidders and local resource availability. For instance, in Rupandehi (relatively resource deficient district), the timber is processed in local sawmills and only few surplus amount is further sold to urban wholesaler and retailers. In contrast, in Kailali (resource abundant district), most of the timber brought through auction is further sold to the urban wholesalers and retailers either by sawing timber or timber logs directly.

Regarding coordination, no significant relation can be found between timber producers and buyers due to sealed-bid auction, however, a meaningful coordination can be realized among local bidders. The coordination between local traders and urban traders was also found weak. In the urban market, generally, a stable relation can be found between wholesalers and retailers.

Determination and decomposition of consumer price

Price determination of Sal timber through local subsidized channel is highly dependent on locality and resource availability. CFUG rate of Sal timber ('A' grade equivalent) ranges from NRs 800-1000 per cft in Rupandehi district (for instance, NRs 800/cft in Pragati CF; and NRs 1000/cft in Sinhadarja and Saljhandi CF). CFUG rate of Sal timber in Kailali is highly variant, ranging from as low as NRs 250/cft in Ratopani CF, NRs 325/cft in Baskota CF to as high as NRs 1080/cft in Matribhumi CF and NRs 1320/cft in Chetana CF. CFs with high price rate were found to



Timber loading for transportation to urban market after auctioning

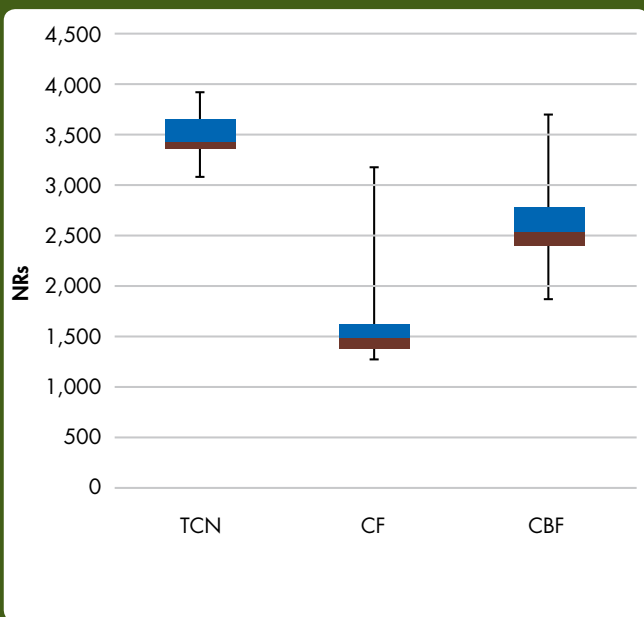
sell the timber based on foot measurement such as NRs 90/foot (Matribhumi CF) and NRs 110/foot (Chetana CF). CBFs in the two districts have the user group rate equals to the DFPSC rate of NRs 1600 and 1226 per cft for 'A' grade equivalent Sal timber in Rupandehi and Kailali respectively.

Royalty rate of the government is the baseline for pricing timber in the open market. Revised royalty rate of timber log fixed by the Government of Nepal (published on 6th June 2011) is NRs 800, 500 and 300 for 'A', 'B' and 'C' grade Sal timber respectively. No timber selling entity can sell below the royalty rate to open market. Price rate of TCN (effective from 5th August 2014) for timber log is NRs 1471, 1106 and 781 for 'A', 'B' and 'C' grade respectively. DFPSC rate differs from district to district, for instance, DFPSC in Kailali has the price rate of NRs 1226, 802, and 492 for 'A', 'B' and 'C' grade Sal timber respectively. On the other hand, DFPSC in Rupandehi has the corresponding price rate of NRs 1600, 1200, and 800. DFPSC also sets the price rate based on royalty rate, collection costs and contingency.

The bidding price during auction is the major determinant for variation in the share of consumer price of timber along the chain. Price value of log timber depends on its grading and accordingly, the quality of timber, and its percentage when it is converted to sawn timber. Since the resultant timber unit for consumer is independent of its grading, for this study, all types of timber were standardized¹ to 'A' grade timber. Auction price of timber from TCN, CFs and CBF in Kailali is presented in box plot in Figure 5. The auction price shows huge difference in price of timber log from CF and TCN. The timber logs were from the same district, and also the same standardization was employed for all timber logs from these institutions. The median price of timber log from CFs was NRs 1539.09/cft and from TCN was NRs 3447.35/cft of timber (TCN's price was 224 % higher than CFs' price). Likewise, auction price of timber log from CBF was NRs 2565.87/cft, remained in between these above two price figures. If the

¹ According to stumpage price value of timber (800 for A grade; 500 for B grade; and 300 for C grade), all the B grade timber converted to A grade by dividing the unit by 1.6 (800/500), and all the C grade timber are converted to A grade by dividing the unit by 2.67 (800/300). It seems logical, because the A grade timber is generally expected to produce 70-80% of log timber to sawn timber, and B and C grade 50 % and 30-40% accordingly.

Figure 5: Auction price from different institution in Kailali



median timber prices are compared for both TCN and CFs, it is evident that the CFs in Kailali were in loss of NRs 29,624,534.30 last year.

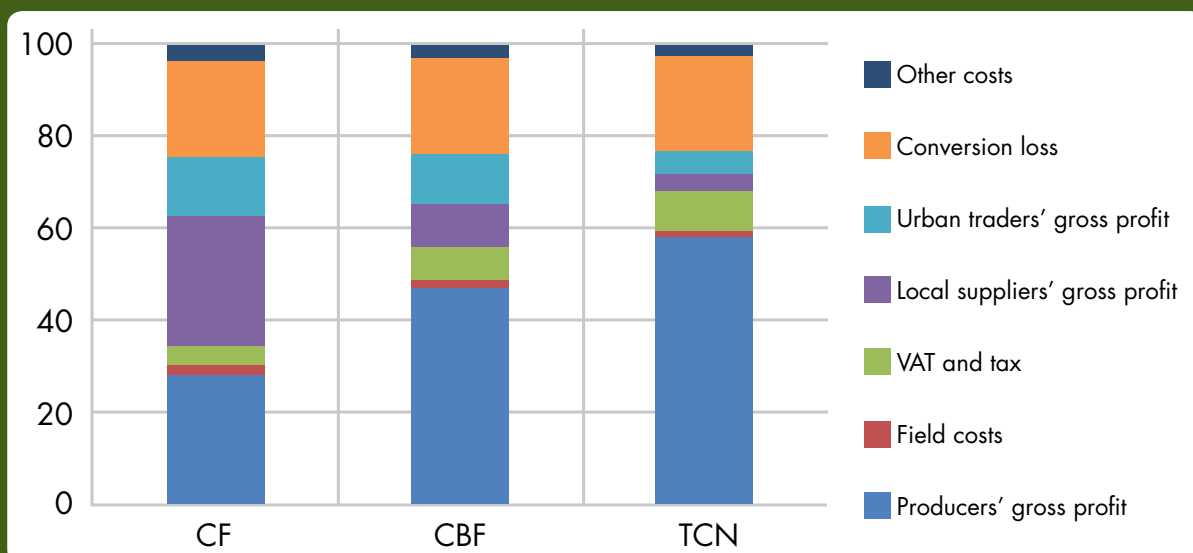
Similarly, the variation on auction price can be realized in Rupandehi district as well. The unit price of timber log auctioned from DFO, Rupandehi ('A' grade equivalent to 10769.86 cft, dated 20th March 2015) was an average of NRs 1657.87/cft. The average unit price of timber log from Lumbini CBF (255.34 cft) and CFs (737.61 cft from 3 CFs Saljhandi CFUG, Pragati CFUG and Kanchan CFUG) was NRs 4307.17 and 1888.82 per cft respectively. These variations in auction price were reported due to different levels of collusion among the local traders. For instance, when the auction processes were not influenced by the traders' collusion, auction price of timber became higher (such as the price rate of CBF auction in Rupandehi and TCN auction in Kailali) whereas, the auction price of timber log went down (such as in DFO and CFs' auction in Rupandehi, and CFs' auction in Kailali), when the auction processes were

influenced by the traders' collusion.

Field costs include marking, felling, bucking, transportation, and piling of timber in the depot. The field costs of timber collection in Lumbini CBF, Rupandehi was NRs 96 per cft. Likewise, the field costs of timber collection in most of CFUGs were found to be ranging from NRs 80-100 per cft of timber. The field costs may also go up to NRs 113 per cft in case of timber collection from GMFs in Rupandehi. When the timber traders buy timber logs through auction, they transport the timber from selling depot to sawmill incurring additional costs for loading, transportation and unloading. Market price of timber depends on types of market: value of sawn timber in urban market is about NRs 5500 per cft, but in local market, it varies from NRs 4200 to 4800 per cft.

Consumer price of timber in open market is irrespective of its source and primary producers. But, the share of the consumer price varies according to selling institution and its value chain dynamics. Decomposition of consumer price of Sal timber originating from different selling entities in urban market is presented in Figure 6. Producers' gross profit represents the auction price that the selling entities get through auctioning. Field costs include operational

Figure 6: Percentage share of consumer price along the value chain (A case from Kailali)



costs incurred in the field. Winning bidders have to pay 13% VAT and 1.5% income tax of the sum amount of producers' gross profit and field costs. Local suppliers' gross profit, in this case, indicates the local traders' costs and profit margin when they supply timber to the urban market. The urban traders' gross profit indicates their costs of transportation and sawing of timber in sawmills and furnishing timber product which also includes the profit margin of the traders. Conversion loss indicates the monetary value of loss of timber when it is converted from log to sawn timber form. Conversion loss was estimated assuming that the 'A' grade equivalent timber log gives 70% sawn timber, 10% strips, 15% fuelwood, and 5% dusts. It represents net monetary loss during conversion due to the relatively low valuation of timber by-products compared to the sawn timber. The other costs include miscellaneous and transaction costs involved in the whole supply chain informally. In this connection, Kanel et al. (2012) estimated 4.03% of total consumer price shared by transaction and miscellaneous costs, which was a bit higher than the current estimate.

Value chain issues

The timber value chain imitates many issues related to forest producers, auction processes, market player and other sustainability issues. The following are the key issues, which need to be addressed for upgrading the timber value chain:

- **Lengthy process of timber collection:** There is complex and lengthy process of getting permission for collection of timber. Generally, timber has to bear two rainy seasons that result into quality distortion such as brightness of timber (*palash*) would diminish. In addition to reducing quality, this tedious process also irritates the value chain actors to work on fair timber trade effectively and timely.
- **Un-fair auction process:** Due to the lack of clear guideline, unnecessary intrusion of timber brokers (basically, free riders) is prominent. For instance, more than two third of total bidders buy tender forms just for bargaining with the winning bidder. Collusive activities of local traders are the prominent issues in auction. It is interesting to note that within same district (Kailali) there was huge difference in auction price from different institution such as, TCN, CFs and CBF, which often lead to unfair market competition. In addition to the local traders, several non-forestry actors such as political parties, security personnel and local gangs are also involved in distorting the real price either in auction or during transportation and collection.
- **Rent seeking behavior of value chain actors:** Rent seeking behavior is reported to be realized from some of the government staffs, local dominants, community elites, and political persons. As a governance issue, rent seeking behavior has been reported as one of the socio-political causes for deforestation and forest degradation in Nepal (FAO/UNDP/UNEP& MFSC Nepal, 2014). Moreover, it indirectly helps for unequal benefit sharing and timber price distortion.
- **Improper policy for timber market:** Frequent changes in decision making process, improper policy practice for timber collection, negative perception of public and conservationists towards timber traders, and frequent bans on timber collection have hampered the timber traders' business both in short and long term. Timber business needs huge investment and has to bear a high risk. To be an established timber trader, one has to have a large network of people to get timber, which is not in hand of many traders. The entry for new entrants into bidding process is very difficult, if they are not a part of the existing network. And, the government policy has not been addressing such issues.



Weighing firewood for sale, Rupandehi, Nepal

- **Rapid increase in timber price:** The trend of timber market price is increasing in the last decade very rapidly (Figure 7). Lack of supply from forest, unscientific management of forests, and process complication in timber collection were the main reasons for increase in price. The timber traders believe that the timber price significantly increased after the peace process in the country, since then, people were secured for housing and hidden money was grounded immediately. This resulted in high demand of timber but the supply was not increased which ultimately resulted in the high timber price in the market. The wholesalers in urban areas were the main actors to substantially increase the timber price. The timber price has slightly been decreased in the last couple of years because of importing timber (from Malaysia, Indonesia, and Myanmar) to halt the increasing market demand of Sal timber. Furthermore, some traders believed that the rate of demand of Sal

timber (compared to the rate of construction) has been decreasing due to the timber import, PVC and aluminum for construction, and abundant availability of China made furniture. Uncertain government policies such as timber bans, risk and uncertainty during collection and transportation of timber also urges for higher prices.

Figure 7: Trend of timber pricing
(based on key informants)



Timber loading for transportation to urban market after auctioning



Discussing Value Chain for REDD+ Compatibility

Based on the value chain study of timber, a number of leverage points have been identified for REDD+ compatibility. Among them, following key findings can be traced while implementing national REDD+ programme:

Supply deficit of Sal timber: A major issue in the value chain of timber is related with the restricted supply of timber to the market. A report (FAO/UNDP/UNEP& MFSC Nepal, 2014) stated that the timber productivity in Nepal is estimated only 2.5% of its potential. Current legislations follow the conventional management practice of the collection of only 3D trees. Although, sustainable forest management ensures continuous flow of timber while satisfying the requirements of REDD+ schemes (Sasaki et al., 2012), scientific management to replace aged trees and rotational harvesting is found lacking in many sites. This reduction in supply results an increase in price of the product (Jonsson et al., 2012), and it affects the consumption pattern. Schaafsma et al. (2014) also stressed that increasing supply shortage might shift the harvesting of trees from other areas (marginal forests), either legally or illegally.

Substitution of Sal timber: Sal is a so-called brand for consumers in Nepal. Supply deficit urge for timber import. And, when the import of timber is increased, the economic value of domestic forest resources decreases in a long run. Furthermore, profits of such timber market would largely be captured by the intermediaries, whose livelihoods do not depend directly on forest resources (Schaafsma et al., 2014). Moreover, the use of metals instead of timber also hampers the carbon substitution of timber product (such as carbon pooling from matured forest to durable furniture structure, creating open space in forest area for new biomass formation)

Huge difference between subsidized and free market price: CFs and CBFs distribute timber within the user groups at significantly low rate compared to the market price. On one hand, as Bogdanski (2011) suggested, subsidized price increase consumption pattern, leading to resource exploitation. Gunes and Kenan (2010) mentioned that the subsidized timber to local user groups cause unfair competition in the timber market, which may introduce market failure and other social externalities. On the other hand, when looking at the case of Kailali, almost 30,000 households are residing in public and encroached land (*aawadi jagga*), and they have no access to any kind of timber through legal process. In this way, they have no access to subsidized timber, and also they (landless people) cannot afford a high price to buy from open market. This indicates that most of the local people in such areas fulfill their timber demand through illegal sources. The issue of encroachment is an important challenge in lowland of Nepal, however, their timber demand also pose an additional concern for implementing the REDD+ program.

Collusive oligopoly in Sal timber trade: High variation in bidding price of timber during auction also poses many socio-economic issues in the value chain of timber. Traders' collusion in timber auction, especially during the auction from community user groups such as CFs and CBFs, put another important topic for REDD+ compatibility. Looking at the difference between the auction price of timber log from competitive bidding (such as TCN in Kailali) and collusive bidding (CFs in Kailali), real timber producers are getting very low incentives from the timber value chain. Local user groups get only 25-35% share of the final consumer price. From the collusive market, highest gross profit goes to those actors, who are not involved in forests development activities and who do not directly depend on forest resources for their livelihoods. Also, as long as the prices are very high, illegal trade will always flourish which will be counterproductive for REDD+ implementation as well.

Price-driven illegal logging: Although, mass logging of timber from illegal source is decreasing, frequent illegal logging of timber for individual or small group of people is more prominent in Terai areas. A possible explanation of this can be the result of high market price of timber even though resource is abundant in their locality. It is well reported that illegal logging is indirectly pushed by the high price value of timber in the market (Kanel et al., 2012; Paudel and Karky, 2013). Therefore, control of price rate and its determination at the local (or district) level, according to the proximity of resources, should be a concern for implementing REDD+ to reduce illegal logging.



Timber being wasted due to conflict between stakeholders

Poor governance: Good governance of timber value chain should be a major concern for simplifying value chain, regulating services and enabling fair and equitable value chain activities. DFO, as a government institution, is the main entity for regulating fair timber value chain. DFO acts as both the value chain operators (sales institution) as well as value chain regulator (controlling and enabling the value chain). The dual role could probably bias the price and product monitoring of the sales done by itself. In addition, even though, some criteria exist for grading of timber log, most often, it is a subjective decision of technicians. Although, the government has set the royalty rate of the timber, prevailing market price is found very high from the royalty rate due to the extended value chain. Some traders also commented that regulatory dominance from government institutions can be realized in most of the value chain activities from collection of timber from forest land to allow sawing permit of timber log in sawmill. All these hurdles and others risks of value chain activities are reflected in consumer price of timber in the final market.

Underprivileged sustainable forest based enterprises development: Sustainable forest based enterprises development would be ensured only through sustainable timber value chain, for which coordination and cooperation of value chain actors are vital. The partnership between government and timber traders should also be strengthened to ensure sustainability of the value chain. Current legislations allow traders from many disciplines to involve in the value chain during auction, and the intrusion of these traders (as brokers) is also influential for resulting high market price of timber. Scoping of the traders should be a major concern, which can be done by prioritizing them based on their business plan and sustainability. After that, they can be engaged in value chain by following their business ethics. To do so, a *voluntary social accountability standard* can be developed, as in South Africa, to ensure ethical trading (Morris and Dunne, 2004). Deliberate involvement of prioritized traders may induce monopoly in timber market, so, the market should be competitive, but the long actors' chain might be shortened.

Weak implementation of policies: Despite some provisions in policy documents for timber traders and forest based enterprises since 2000 (Dhungana and Bhattarai, 2008), due to the lack of specific program and institutional requirement to translate these policies in implementation, the market actors of timber have not realized market friendly policies. Furthermore, excessive power of forest administration to regulate timber collection and supply also indirectly promotes illegal logging (Jong et al., 2014). There seems to be a clear need to have a policy with implementation mechanism in place for promotion of Sal timber value chain. The public private partnership, taking local forest user groups at the center of a partnership model, might enhance sustainable timber value chain ensuring fair, equitable and effective share of the timber market to the value chain actors.

Conclusion and Recommendation

This study was designed to explain the value chain of timber by analyzing the processes of material flow, value chain actors and activities, governance mechanism, and share of consumer price along the actors. Furthermore, this study has aimed to explore value chain issues and prospects that have to be addressed to make REDD+ compatible timber value chain.

Major sources of Sal timber are CFs, CBFs, and GMFs. Except a few examples of scientific forest management in CBFs and some CFs, extensive practice of timber supply is through the collection of 3D trees. After the collection of timber, it is distributed through many selling entities. The distribution channels of Sal timber can be explained through two main channels; subsidized local channel and open market channel. The timber flow through subsidized local channel is from forest user groups and local timber selling entities. The amount and rate of timber flow depends on local resource availability. Timber flow from open market channel is mainly through timber auction. The bidder with highest bidding price wins the auction and buys the timber. Then the timber flows either to local market through sawmills and furniture industries, or to the urban market through wholesalers and retailers.

Supply and governance of timber market has a mix structure of government and timber traders. As an authorized institution, DFO has authority to determine amount of collection and supply of timber to the open market. Both government and market actors define the auction process and pricing but the market actors solely define the amount and price of timber to the final consumer. A huge difference in the auction price is realized when auctioning from different selling entities. Most often, the bidding price of timber from CFUGs is found relatively lower than other entities. Some prominent issues exist in the timber value chain which may have important concerns for the future REDD+ implementation in Nepal. Furthermore, traders' collusion in timber market, lack of baseline to determine local or district level market price of timber, and weak value chain governance from government institutions put additional challenges in the value chain.


In order to proceed for REDD+ compatible timber value chain, scientific forest management in all forest regimes, minimising differences between subsidized local and open market price, and determining as well as controlling local timber price according to the resource proximity should be ensured. Moreover, disintegration of traders' collusion and scoping of timber market actors through establishing certain voluntary standards should be a major concern in the market. Fair market regulation, good governance, and fair as well as equitable profit share of timber market among the value chain actors are the basic instruments for ensuring REDD+ compatible timber value chain.

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