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Promoting inclusive and equitable timber business in Nepalese hills: A case of Sindhupalchok and Kavrepalanchowk



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Our Cover: Timber piled up in one of the EnLiFT2 research plots in Chautara, photo by Kapil Dahal.

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Promoting inclusive and equitable timber business in Nepalese hills: A case of Sindhupalchok and Kavrepalanchowk

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List of Acronyms

4D	Dead, Decaying, Diseased, and Dying Trees
AAH	Annual Allowable Harvest
AFFON	Association of Family Forest Owners Nepal
AFO	Assistant Forest Officer
ASEAN	Association of Southeast Asian Nations
CF	Community Forest
CFMG	Community Forest Management Group
Cft	Cubic Feet
CFUG	Community Forest User Group
COVID	Corona Virus Disease
DFO	Divisional Forest Office
FECOFUN	Federation of Community Forest Users Nepal
FENFIT	Federation of Forest-based Industry and Trade, Nepal
FMP	Forest Management Plan
GDP	Gross Domestic Product
IRD	Inland Revenue Department
Kg	Kilogram
Km	Kilometer
M3	Meter Cube
NCI	Non-cultivated Inclusion
NPR	Nepalese Rupees
NTFP	Non-timber Forest Product
PAN	Permanent Account Number
UPVC	Unplasticized Polyvinyl Chloride
USD	US Dollars
VAT	Value Added Tax

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Executive Summary

Timber harvesting contributes to more than half of the forest income that supports rural livelihood in Nepal. The timber is supplied mainly from three different sources in Nepal viz. government-managed forest, community forest, and private forest. Private forest accounts to the maximum supply of timber constituting 86.6% of the total supply. More than 32.54 million cubic feet (cft) of roundwood was supplied to the market in 2019/20, however, the average supply of wood products and revenue generated from them shows a substantial decline. With the decline in the supply of wood from national forests, the import of wood products is accelerating, with an import value of USD 52 million, signifying high dependency of Nepal on foreign timber. There is a need to understand the key constraints and available opportunities to community forestry user groups and private foresters and their perspectives regarding the timber business in order to introduce interventions that would increase the domestic timber supply and reduce imports. This study draws on key informant survey and review of national policies to scrutinize the issues in the timber business in Sindhupalchowk and Kavrepalanchowk. Community forests, private forests, and government-managed forests are the major producers in the study area whereas sawmills and contractors were among the prime timber harvesters. Different manufacturers like furniture, builder's joinery, veneer, and plywood producers are actively associated with the timber value chain. Federation of Forest-based Industry and Trade (FENFIT), Federation of Community Forest Users Nepal (FECOFUN), and Association of Family Forest Owners Nepal (AFFON) are the organizations that facilitate the value chain process. The producers sell timber to a local and urban sawmill that processes the roundwood and sells it in different forms like furniture, and builder's joinery to retailers which sell the products to consumers. There exists a price gap between producers and consumers due to taxes, field costs, transportation costs, transaction costs, timber conversion costs, and some hidden and additional costs. The customers' price is tenfold higher than at the production site. There exists major constraints in the timber business that affect the price and supply of timber. Lengthy auction process, complex regulatory requirement, three layers of taxation, timber measurement, bribes, illegal logging, lack of government resources, limited technical and managerial capacity, short knowledge and labor, inadequate road networks and transportation, inadequate supply chain, limited investment, and cash flow issues have affected the overall competitiveness of timber industry. However, several policies have been formulated to smoothen the timber business and associated governance, but their poor execution has restricted the proliferation of the timber business. There is a huge opportunity to produce timber domestically and contribute to local livelihoods alongside reducing timber import, provided the regulatory and other practical constraints are adequately addressed and eased. Several adjustments like capacity enhancement of producers, short and enhanced auction process, revision of regulatory requirements, effective monitoring to ensure transparency in community and private forests, provision of incentives and financial security to encourage private investments, and proper allocation of human resources in the timber business are recommended to improve the value chain of timber.

National timber economy

Scale and Nature of the timber business in Nepal

Forest in Nepal constitutes to around 44.4% of the total land of the country (DFRS, 2015); thus, reflecting the significance of sector on the national economy. Agriculture and forest sector combined employed more than 60.4% of the population and contributed more than 27% to the national gross domestic product (GDP) in 2018/2019 (MoF, 2020). Whereas FAO's estimation shows the non-linear contribution of the forest sector to the national GDP ranging from 3.5% for 1990 and 3.9%, 2%, 1.1%, and 0.6% for 1995, 2000, 2005 and 2010 (FAO, 2014) respectively. However, study conducted by Nepal Foresters' Association underlined that the forest sector may contribute up to 28% of total GDP (NFA, 2008).

In Nepal, timber harvesting is one of the main income sources of rural communities, contributing to more than half of the total forest income (Meilby et al., 2014). It is estimated that a total volume of 1.66 million m³ (58.64 million cft.) of timber per year can be sustainably harvested and sold, generating Nepalese Rupees (NPR)¹ 55 billion and correspondingly over 200,000 sustainable, full-time equivalent jobs under the conservation scenario (Subedi et al., 2014). Unfortunately, it has been providing only 0.5 m³ and nearly 45,000 full-time jobs annually with current harvesting practices (Aryal et al., 2022). Many forms of forest products such as timber, pole, fodder, fuelwood, and non-timber products are derived for both subsistence and commercial use; wherein, timber has the maximum contribution to the national economy (Bhatt et al., 2021).

In Nepal, timber is produced from three main sources, which include (a) government-managed forests, including collaborative forests, (b) community forests, and (c) private land, including trees on farmland and private forests (MoF, 2020). About 86.6% of timber produced in the country is supplied by private land, followed by government-managed forests (7.7%) and community forests (5.5%) (Basnyat et al., 2020). Mainly timber and firewood are supplied to the market from different forest regimes as the raw material for the forest-based industries and local consumption (FRTC, 2020). For instance, the production of the round wood and fuelwood from different forest regimes and employment generation in the fiscal year 2019/20 is depicted in Table 1. More than 32.54 million cft. of roundwood and 46,000 Chatta² of fuelwood are supplied to the market in 2019/20. Similarly, the trend of timber and fuelwood supply and revenue generated over the five years (Figure 1) depicts that there is variation in both supply and revenue collection. Despite fluctuation over the years, the supply of wood products and revenue experienced a huge decline of 54% in 2015/16 and 48% in 2017/18, respectively. In 2018/19, the supply of timber and fuelwood was 2,235,695 cft, and the government collected USD 7.4 million of revenue with an increment in supply and revenue by 45% and 63%, respectively, compared to the fiscal year 2017/18.

¹ Nepalese Rupee- NPR 121.14 is equal to 1 USD as of 2022/04/10

² Chatta is piling of fuelwood with length 20 ft, breadth 5 ft, and height 5 ft equivalent to 333.33 cft

Table 1: Production of wood from different forest types and employment generation in the year 2019/20

Forest Regime	Round Wood ('000 cft)	Fuelwood (Chatta)	Employment generation ('000days)
Government Managed Forest	1132	13571	10,827
Community Based Forest Management	10166	21261	
Private Forest/Private tree grower	21246	11840	

Source: FRTC (2020)

The study on the demand and supply of wood products projected the timber demand of about 3.7 million m³, 4.5 million m³ and 4.8 million m³ in 2020, 2025, and 2030 respectively, with the highest rise in Terai following the population trend (Kanel et al., 2012). This study mentioned national forests (community forest, collaborative forest, leasehold forest, and government managed forests) and trees on farms and non-Cultivated Inclusion (NCI) as the major sources of wood supply in Nepal. The projected timber supply potential of different forest regimes and other land uses in the year 2025, and 2030 (Table 2) shows that the largest share of total supply is from hill while the lowest is from mountains. There will be timber deficit in Terai which will be backed by timber from hill and mountain in year 2025 and 2030 (Kanel et al., 2012)³.

Out of the total wood supplied, the best or the highly valued wood is usually utilized as timber or poles for construction and furniture. In Nepal, timber wood is used for the production of industrial forest products such as furniture, plywood, veneer sheet, wood chips, frame for doors and windows for building construction, and poles for wooden houses (FRTC, 2020; Subedi et al., 2014) (Figure 2). Mostly, local communities in rural areas are using unprocessed forest products

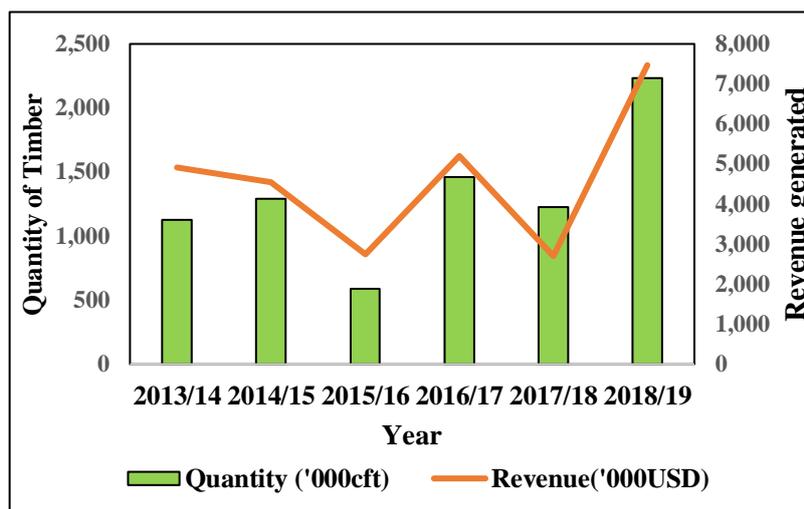


Figure 1: Supply trends of Timber and Fuelwood along with revenue generated in different fiscal years

Source: DOF, 2015; DOF, 2016; DOF, 2017; DoFSC, 2018; DoFSC, 2019.

(round wood, branches of the trees) at the household level from their private land or community-based forest management. However, these households are also using readymade furniture and other processed forest products purchased from the market (FRTC, 2020). The necessity and the use of timber differ according to the geographical regions. In hilly regions, durable high-quality timber is mainly used for construction and preparing agriculture implements such as plowshares (Springate-Baginski et al., 2003). In Terai, timber is usually extracted from the government-managed forest and is used for the construction of dwellings (Bampton and Cammaert, 2007). Also, the timber from the forest in Terai is transported and sold in urban areas like Kathmandu and Pokhara (Kanel et al., 2012).

³ The projections made by the study are based on projected population growth, type of houses to be constructed in future, Nepalese living standard and pricing policies.

Table 2: Projected Effective Supply (Yield) of Timber in Various Years (in '000 cft).

	Land Uses	Year 2025				Year 2030			
		Mountain	Hill	Terai	Total	Mountain	Hill	Terai	Total
Other Land use	Agriculture	2173.7	24696.5	9782.6	36653	2532.4	28772	11526	42831
	NCI	5326	6167.2	595.864	12089	6205	7185.3	705.2	14095
Forests	CF and CFM	3222.8	47453.7	42039.8	92716	3515.8	57807	52790	114113
	Leasehold Forests	174.73	621.28	-	796	190.6	818.96	-	1009.5
	Government Managed forests	54.362	17926	11882.3	29862	61.06	18079	10060	28200

Source: Kanel et al., 2012.

Timber species used in Nepal

The forest species used for timber in Nepal varies along different ecological regions. In the mountain region, the species such as *Quercus spp.* (Oak), *Pinus wallichiana* (Blue pine), *Abies spp.* (Fir), *Cedrus deodara* (Deodar), *Juglans regia* (Walnut), and *Aesculus indica* (Chestnut) are common, whereas the hilly region is dominated by *Pinus roxburghii* (Chir Pine), *Alnus nepalensis* (Utis), *Schima wallichii* (Chilaune), and *Castanopsis indica* (Katus). *Shorea robusta* (Sal), *Dalbergia sissoo* (Sissoo), *Adina cardifolia* (Karma), *Syzygium cumini* (Jamun), *Terminalia tomentosa* (Saj), *Dalbergia latifolia* (Satisal), *Pterocarpus marsupium* (Bijaysal), *Toona ciliata* (Tooni) and *Largestromea parviflora* (Botdhagero) are however predominant in Terai region (Subedi et al., 2014).

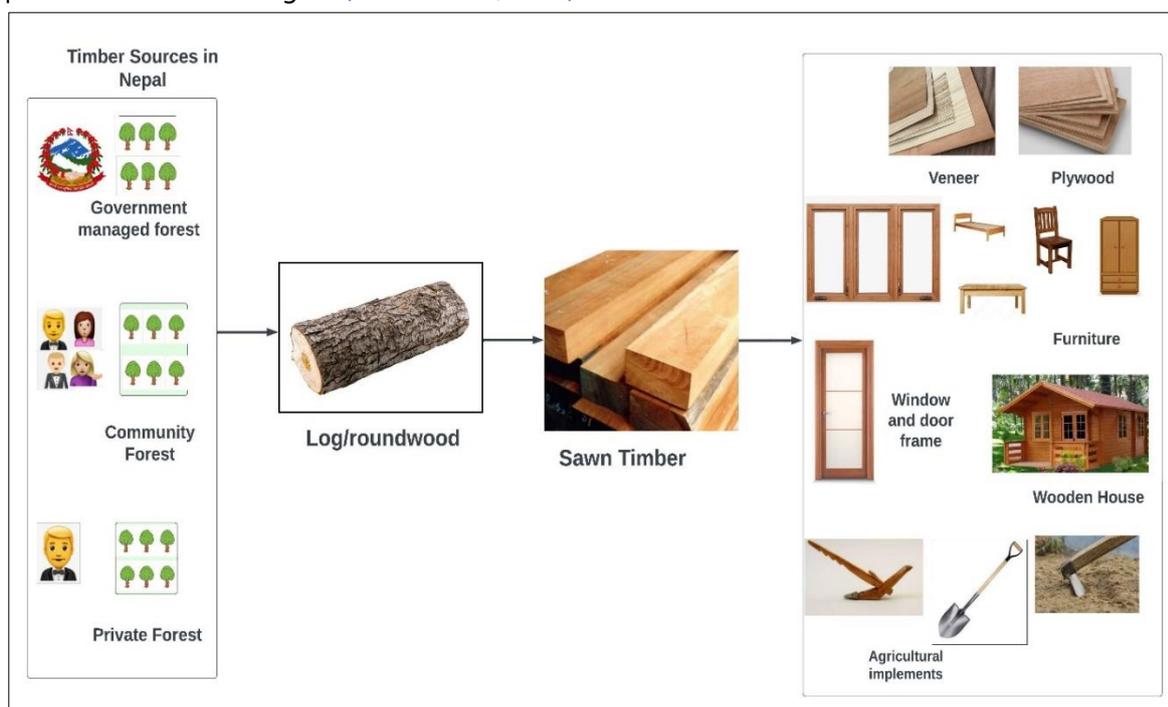


Figure 2: Pictorial view of the timber source and its use in Nepal

Based on various purposes, different timber species are exported from Nepal. The species exported for plywood/veneer include *Tectona grandis* (teak), *Bombax ceiba* (simal), *Alnus nepalensis* (Uttis), *Eucalyptus spp.*, *Mangifera indica* (mango), *Toona ciliata* (toon), *Syzygium cumini* (Jamun), *Dalbergia latifolia* (satisal) whereas the species exported for woodcarving consists of *Juglans regia* (Okhar), *Dalbergia latifolia* (satisal), *Dalbergia sissoo* (sissoo), *Adina cardifolia* (haldu), *Gmelina arborea* (khamari), *Michaelia champaca* (champ), *Cedrus deodara* (deodar) and *Terminalia tomentosa* (saj) (Subedi et al., 2014).

As the plywood and veneer sheets make the major portion of import in wood sector, the major species imported for veneering and plywood and *Shorea siamensis* (Dark Red Meranti), *Shorea argenifolia* (Light Red Meranti), and *Shorea uliginosa* (Meranti bakau). Similarly, plywood with an outer layer of *Alnus spp.* (Alder) and sawn wood or chip lengthwise, sliced, or peeled Pinus species are also imported to Nepal from different countries (NTIP, 2020; DOC, 2020).

The forests in Nepal are mostly natural and characterized by low-quality timber species. People have limited knowledge of tree products and the technologies for raising improved trees, and therefore, they opt for naturally occurring low-quality trees (Amatya, 2017). Further, high-quality timber species like *Shorea robusta* in Terai decay and/or have injury during felling and extraction due to lack in proper harvesting skills, and heavy processing time (Aryal et al., 2022). The silvicultural knowledge for the choice of species and management practices is therefore important depending on the geography of an area.

The forests in mid-hills are usually characterized by the dominant crowns of one or two low-quality timber species. To improve the quality of timber, various silvicultural operations like negative thinning, regeneration felling, harvesting of trees within particular diameter classes, and timber maintenance through weeding, singling, sanitation cutting, and pruning are recommended taking into account the geographical location, ease of applicability, and policy suitability (Cedamon et al., 2017). High mountain forests are less accessible for forest management purposes and local populations are often sparse. Productive potential for timber is often limited by poor road access, although these forests are rich in biodiversity and non-timber forest products (NTFPs) (MoFSC, 2016). Due to the complex geography of mountains and their vulnerability to erosion risks, silvicultural operations should be selected wisely, considering climatic, social, and economic factors. To improve timber productivity, a selection system is recommended. Single tree selection results in the optimum timber harvest, but it is too costly since timber trees are distributed over a large area. The group selection method is prominent in mountain forests which on one hand provide protection from erosion, whereas on the other open canopy allows new regeneration to grow effectively (Schönenberger and Brang, 2004). In comparison to the hilly and mountain region, the forests in Terai consists of high-quality timber. Major silviculture operations in the Terai region include regeneration felling, preparatory felling, thinning and improvement felling, climber cutting ingrown upstands, and regeneration promotion (Subedi et al., 2018).

The limitation in the availability of required dimensions of timber products in Nepal compels the enterprises to import products from other countries. The low-quality species and further reduction in timber yield have caused a problem in producing the outputs as per the demand. In order to increase the strength of timber, eliminate wood rot, prevent the change in the dimension and shape of articles made of timber, and improve the quality of finishing of timber, seasoning is important.

Import and supply gaps of wood and wood products

Veneer sheets, plywood, and builders' joinery have remained the major import and export products. Veneer sheets and plywood are the topmost imported products, having about 50% of the total import value (USD18 million) in 2020 (NTIP, 2020). From 2016 to 2020, the import value of the wood products surpassed their export with the total import on average being a hundred folds higher than the export (Figure 3 and Figure 4). For instance, the import value of wood products is about USD 52 million in 2020 while the export value is only USD 0.4 million. About 131,298 m³ of wood, 5,364,562 kg of fuelwood, 106,897,264 m² of veneer sheets, plywood, and fiberboard, and 268,042 pieces of furniture has been imported. Whereas, Nepal exported only 31680 kg of fuelwood, 57,257 m² of veneer sheets and plywood, and 12678 pieces of furniture with zero quantity of wood (DOC, 2020). The average annual growth rate for imports is about 25% but it experienced a negative trend of 31% during 2019 due to COVID-19 restrictions. Regarding export, Nepal experienced a declining trend by 80% from 2016 to 2019, nevertheless, it has been increasing slowly after COVID and experienced a positive trend of 58% in 2020 (Figure 5). The detailed data on the value of import and export of different commodities is presented in Annex A.

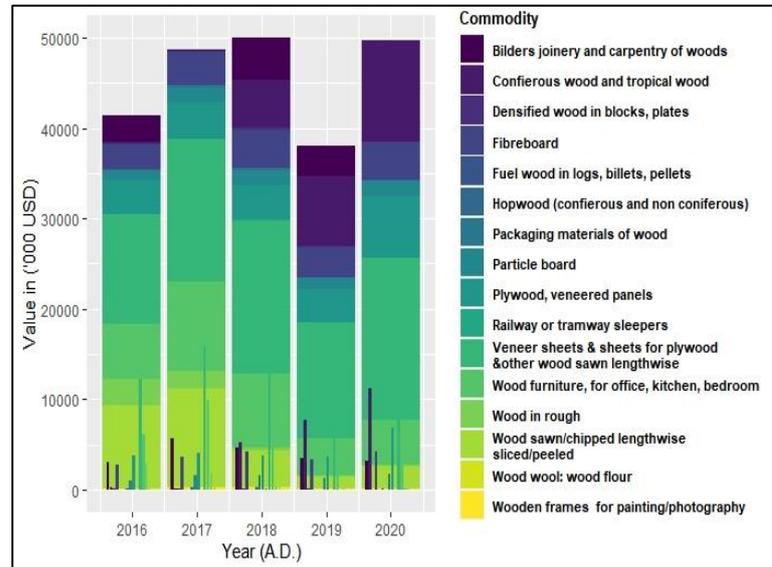


Figure 3: Nepal's import value of wood and wood products from 2016 to 2020.

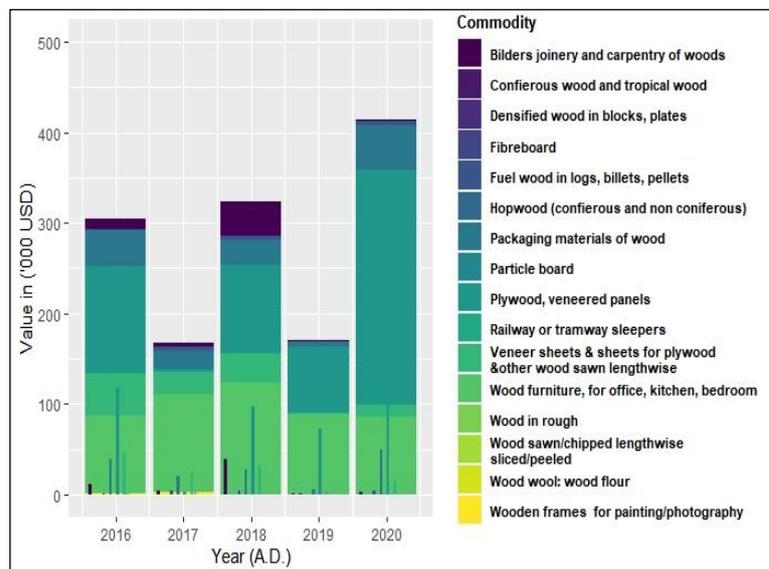


Figure 4: Nepal's export value of wood and wood products from 2016 to 2020.

Currently, India and China are major suppliers of wood for Nepal (GoN, 2017; RSS 2019; UN Comtrade, 2021). Specifically, plywood, veneer, furniture, and fiberboard are imported from India and China to Nepal. About 54% of wood and wood products are imported from India while 12% of the total import is from China (Figure 6). For instance, Nepal imported wood products for US\$ 33 million from India in 2020.

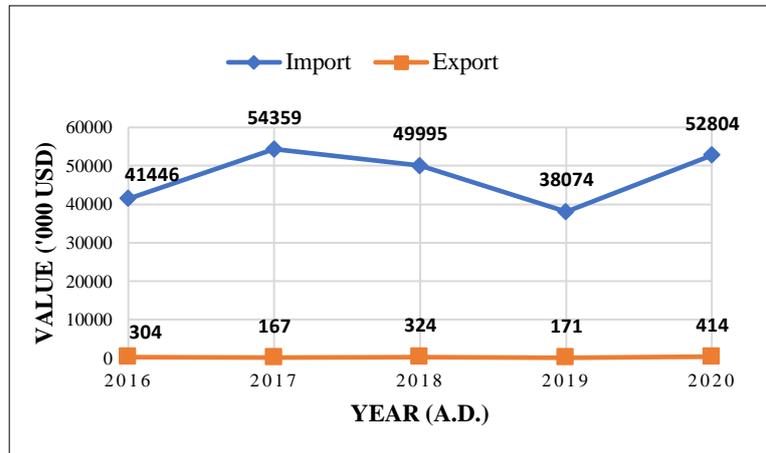


Figure 5: Import and export statistics of Nepal in terms of wood products

Despite being two major importers, the ASEAN countries like Indonesia, Thailand, Singapore, and Myanmar covers about 32% of the total import market of wood and wood products. Almost all of Nepal’s trade (99%) of veneer sheets is with India and the fiberboard, particleboard, and finished products are mainly imported from India and China (DOC, 2020; Subedi et al., 2014). About 63% of the total exports of wood products from Nepal are to India whereas 19% to the USA (Figure 7). Nepal exports mainly veneer sheets, plywood, and wood pellets to India whereas wooden frames for paintings, photographs, wood crates, wooden cases, and wooden furniture to the USA. About 60% of veneer produced in Nepal is locally consumed and the rest is exported to India (Subedi et al., 2014). The annual domestic demand is projected to be 4.8 million m³ in 2030 and the demand for the Nepalese veneer sheets and plywood is increasing in India which could be a good sign to promote Nepalese wood industry. The increment in demand is due to increase in furniture works, particle board and fiber board production in India. (Subedi et al., 2014).

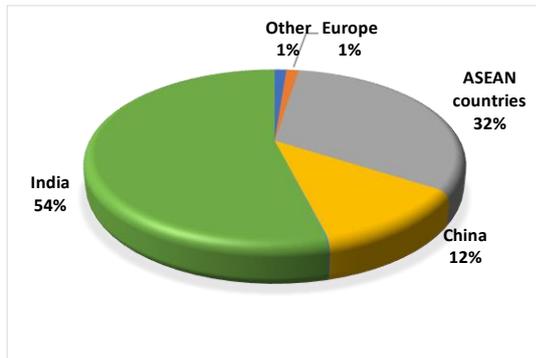


Figure 6: Countries exporting wood to Nepal

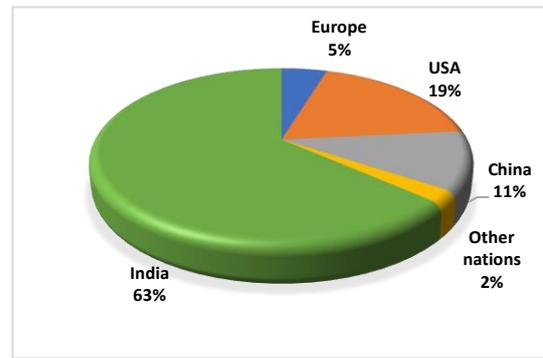


Figure 7: Countries importing wood from Nepal

The data depicted clearly shows high dependency of Nepal on foreign markets for wood products. The government of Nepal has developed Forest Investment Program in 2017 to minimize its increasing dependency on imports of wood products (Saxena et al., 2022). The Forest Investment Program mainly focuses on the theme of forest, climate, and people, incentivizes forest land rehabilitation, improved community forest management, and private forestry to increase outcomes across forest products and ecosystem services such as climate change mitigation and increase socio-economic benefits to local communities by 2025 (MoFE, 2017). Similarly, the Forest Sector Strategy 2016-2025 has envisioned the supply of 1 million m³ of timber annually to the domestic market, reducing imports to zero by promoting

community forests, private forests, forest-based enterprise, and competitiveness in the supply and value addition of forest products and services (MoFSC, 2016). Moreover, the Government of Nepal and the World Bank signed for a US\$ 24 million Forest for Prosperity project through the Forest Investment program. This project aims to transform Nepal's forest sector and reduce wood and forest product imports (World Bank, 2021). The outcome of such programs and plans will take time, and so Nepal will continue to spend on importing timber and wood products from the international market. The local suppliers or wood-based industries prefer importing desired wood to Nepal compared to locally sourced timber due to government regulations and costs (Saxena et al., 2022). Despite this huge scale import, there is still a 51% gap between wood demand and supply (Nuberg et al., 2019). This rate of wood import when the forest cover of Nepal is more than 40% doesn't fix systemic conditions and creates barriers to wood-based industries in terms of enhancing and sustaining local livelihoods (Saxena et al., 2022).

Timber production potential in two mid-hill districts

The study was carried out in two districts: Sindhupalchok and Kavrepalanchowk (Figure 8). Both districts are located in the Bagmati province of Nepal. Sindhupalchok lies east of Nuwakot and Kathmandu, north of Kavre at a geographical location of 25°35' N to 27°05' N and 85°05' E to 86°20' E (DFOS, 2021). It

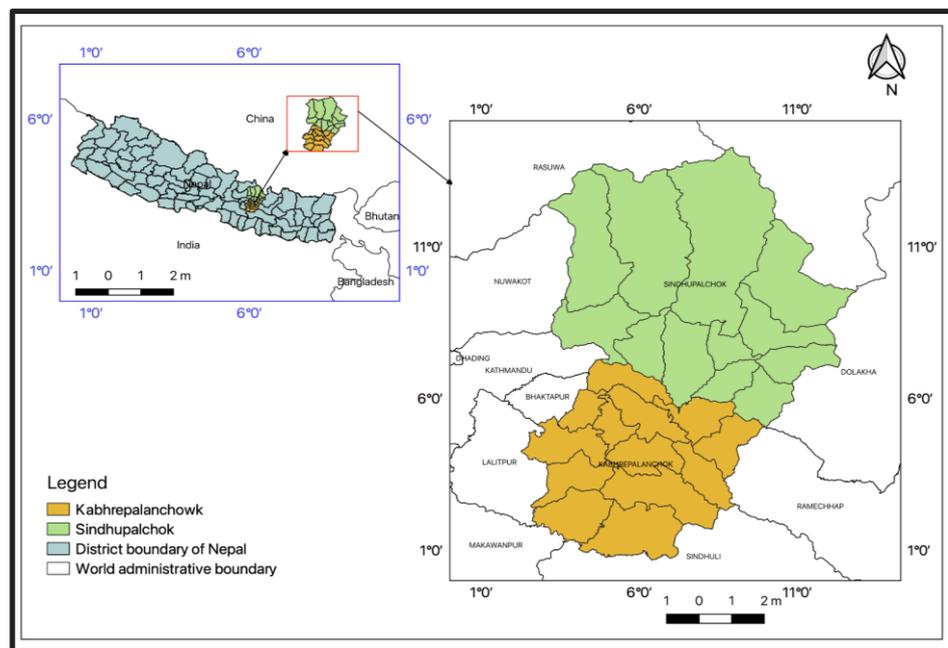


Figure 8: Map showing Sindhupalchok and Kavrepalanchowk districts

covers an area of 2542 km² and is home to a 262,852 population (DCC Sindhupalchok, 2022; CBS, 2021). The district headquarters lies in Chautara. Sindhupalchok lies at an elevation of 850 m to 7050 m and therefore consists of a subtropical to a temperate climate with the highest temperature of 32°C and lowest temperature of 7.5°C (DFOS, 2021). The average annual rainfall in this district accounts for 2500 mm. Sindhupalchok consists of 115109 hectares of forest area with around 527 community forests and 62 registered private forests in 2075/76 (DFRS, 2018; DFOS, 2021). Because the land in this district is infertile, the tolerant species *Pinus roxburghii* (Khote Salla) and *Pinus patula* (Pate Salla) are planted and used for marketing (Pandit et al., 2019). The growing stock of the total productive forest (56,500 ha) of Sindhupalchok is about 141.1 m³ per hectare. It is estimated that 1.12 million cft of timber and fuelwood can be extracted from this district (DFOS, 2021).

Kavre lies in the south of Sindhupalchowk at a geographical location of 27°34'60" N and 85°40'0" E. It covers an area of 1,396 km² area and accommodates a total of 366,879 population. The district is situated at an elevation range of 280 m to 3018 m. Being a mid-hill district, Kavre is characterized by a sub-tropical climate (DCC Kavre, 2022). The district headquarters lies in Dhulikhel. Kavre experiences a maximum temperature of 28⁰C and a minimum temperature of 3⁰C. The mean annual precipitation in Kavre is around 1120 mm. Kavre consists of around 73,075 hectares of forest with 642 community forests covering 27,264 hectares and 38 registered private forests (DOFK, 2021). The dominant tree species in this district include Chilaune (*Schima wallichii*), Utis (*Alnus nepalensis*), Pate salla (*Pinus patula*), and KhSallaalla (*Pinus roxburghii*), Sal (*Shorea robusta*), and Gobre salla (*Pinus wallichiana*) (DOFK, 2021).

In both districts, 90% of timber is harvested from the private forest. Reduction in timber production was observed during the COVID-19 period due to lockdown and the circular by the Ministry of Forest and Environment on 28 May 2020, restricting timber harvesting in Nepal during the pandemic (MoFE, 2020). The total timber harvested from different forest regimes in both Sindhupalchowk and Kavrepalanchowk districts in recent years is depicted in Table 3.

Table 3: The quantity of timber harvested in the study area in different fiscal years

District	Forest regime	Timber harvest (cft.) in different fiscal years			
		2017/18	2018/19	2019/20	2020/21
Sindhupalchowk	Community Forest	30,282	28,363	14,984	15,988
	Private Forest	158,491	250,356	137,422	111,422
Kavrepalanchowk	Community Forest	36,342	31,015	27,890	34,742
	Private Forest	269,337	232,342	217,388	109,519

Governance of timber business in Nepal

Generic value chain in the study area

Value chain study helps to understand the resource extraction and market dynamics of any product. It describes the activity required to develop a product through several processes ranging from resource production to final market consumption (Geibler et al., 2010). Government institutions, private farmers, and community forestry user groups are generally involved in the timber production processes in Nepal. Timber production is influenced by capital, time, cost, labor investment, and ecological sustainability during the management of forests. Mediators/middlemen or local traders are involved in the harvesting, logging, and collecting of timber. The major traders (wholesalers, retailers) both at small and large scales are engaged in the timber value chain. Forest-based enterprises like sawmills and furniture industries are involved in the conversion, processing, and manufacturing of different forms of timber. After making necessary modifications and designs, different final products from timber are consumed by customers (Aryal et al., 2016). Since different stakeholders are engaged in several stages of the value chain, identifying concerned stakeholders, their functions, and perspectives would be crucial in understanding the value chain.

Major Stakeholders and their role in the value chain

The major stakeholders involved in timber business include forest producers and managers, timber harvesters, manufacturers and investors, and the forest-related association and network (Figure 9). Community forests, private forests, and government-managed forests are major producers even though government-managed forests are only allowed to extract 4D (dead, decaying, diseased, and dying) trees, and trees felled during the establishment of transmission lines in the study area. Furthermore, the prime timber harvesters consist of sawmills and contractors. Different manufacturers like furniture, builder’s joinery, veneer, and plywood producers are actively associated with the timber value chain. Sawmills and retailers are among the major investors in the timber business, whereas some importers have invested

in the import of timber products from different countries and their sales in Nepal. The whole process of producing, harvesting, selling, and consumption requires an institution to advocate the issues and facilitate the process. FENFIT, FECOFUN, and AFFON are the associations and networks supporting in the timber value chain. The major contributors to the value chain are the Divisional Forest Office (DFO), community forestry user groups, private forests as producers and managers, sawmill and contractors as major harvesters,

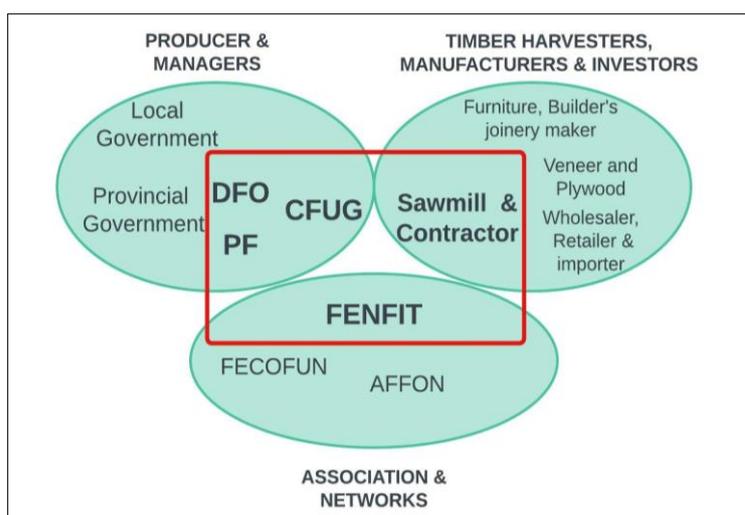


Figure 9: Major stakeholders involved in timber value chain

and manufacturers, and FENFIT as the network of the timber traders in Nepal. Each stakeholder has a unique function in the value chain process which is depicted in Table 4.

Table 4: Stakeholders of timber value chain and their functions

Stakeholders	Functions						
	Production	Harvesting/Log hauling	Processing and Manufacturing	Trade	Research and Policy	Regulation	Facilitation
Community Forest User Group							
Private Forest/Private tree growers							
District Forest Office							
Local Government							
Provincial Government							
FENFIT							
FECOFUN							
AFFON							
Saw mill and contractors							
Veneer and plywood producers							
Furniture and builders joinery							
Wholesaler, retailers and importers							

The community user groups are involved in both timber harvesting from community forests and their sale to sawmills and local contractors, whereas private forest growers sell their timber to the contractors who themselves harvest the timber and haul it to the processing and manufacturing unit. The DFO is responsible for the facilitation and regulation of the timber selling process from the government-managed, community, and private forests. DFO supports the producers in documentation processes, monitors during the harvesting process regarding the amount harvested according to the permit, harvesting of restricted species, and facilitates numbering, marking, and sealing before the transportation of timber. Local government and provincial government formulate forest-related policies and regulate the local and provincial tax, but their functioning is disappointing. Other stakeholders are dissatisfied with the working mechanisms, arbitrary taxes, and indolence in administrative and regulatory tasks by both local and provincial governments. Associations and networks like FENFIT, FECOFUN, and AFFON usually conduct policy lobbying and studies regarding timber trade and support the producers in legal and administrative complications. Moreover, FECOFUN monitors all the timber selling processes and associated transparency and accountability of CFUGs. The processing, manufacture, and trade of finished products are carried out by sawmills, contractors, furniture, builder's joinery makers, wholesalers, and retailers. Similarly, veneer and plywood producers process the wood and act as a trader of respective products.

The whole process from timber production to consumption involves both synergy and conflict between the stakeholders during different stages. The synergy and conflicts observed during the field study at each step of the value chain are as follows:

Timber harvesting: The synergy exists between producer and harvesters during the documentation process, marking, harvesting, piling, yarding, and hauling. At the same time, there exists certain conflict between community user groups and local contractors regarding the measurement of timber. According to the local traders/investors, there is a difference of around 10% timber between the auction amount by community user groups and the actual measurement. While community user groups state that the long auction period causes timber to dry and shrink, which affects the total amount of timber. Similarly, the unclear demarcation of the boundary between private and community forest causes conflict for resource use.

Timber transportation: Producers and managers, harvesters, investors, and retailers work in close coordination for timber transportation. However, there is a conflict between investors (local traders) and government agencies (forest staff, security staff, provincial government) due to bribes and arbitrary taxes, sometimes collected at various instances while transporting the logs.

Timber processing/manufacturing: The major conflict exists between sawmill, furniture manufacturers, and the government agency, mainly Inland Revenue Department (IRD), on the issue of VAT amount. As per saw millers, they have to issue under bills for price and quantity to consumers to avoid tax and due to high amount of wastage during processing. The actual billing of the timber amount purchased by sawmill or furniture which is asked by IRD creates problems for traders in managing timber stock.

Value chain of Pine and Alnus species

The value chain analysis of three species viz. *Pinus roxburghii*, *Pinus patula*, and *Alnus nepalensis* were carried out (Figure 10). Comparatively, the demand for Pinus species was higher for furniture, housing, and building construction in both the districts. Similarly, Alnus species is mainly used for building construction purposes due to its less durability and strain capacity. These species are mainly traded in major cities like Kathmandu, Bhaktapur, and Banepa (see annex B for detailed value chain).

Timber is harvested from both community forests and private land. The government-managed forest is not included in the value chain analysis due to its minimal production, which only comprises of 4D trees. The harvested timber from CFUG is used first internally within community forests at a minimal rate, and for the remaining timber, CFUG calls for the auction. The local trader buys timber from CFUG and private forests and sells it to local sawmills as well as a major trader in big cities (urban sawmill, building, and furniture manufacture, veneer, and plywood industry). Some quantities of timber from private tree growers are illegally sold to local sawmills and consumers directly after sawing. The local and urban sawmills sell the sawn timber to furniture manufacturers and builders' joinery, who further sell the product to general retailers, furniture retailers, and local contractors. Sawmills sell the wastage (bark and sawdust) as fuelwood directly to the consumer. The veneer and plywood factories provide respective products to the wholesaler who sells those to consumers either directly or through retailers.

The values of round wood and sawn timber are calculated based on the information provided by people engaged in harvesting, logging, transportation, and final sale. The values of the round wood are calculated for the local level as well as major cities as round wood is sold in both markets while the value of sawn timber and is calculated only for the major cities as the major portion is sold in major cities like Kathmandu and Banepa.

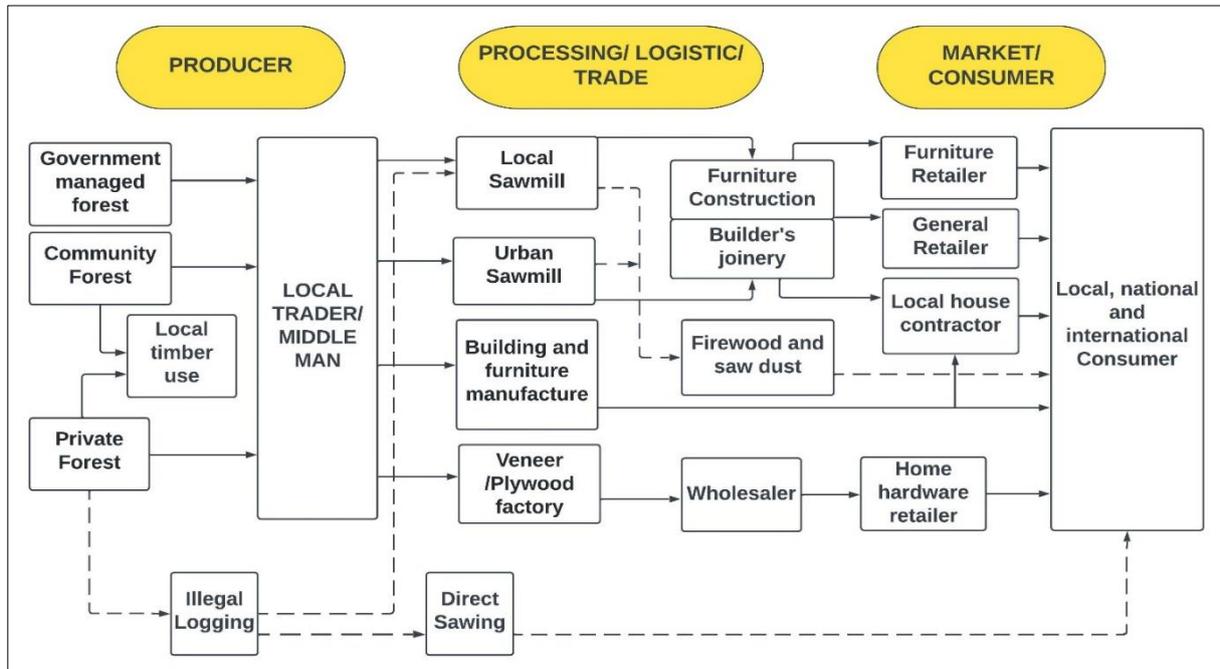


Figure 10: Generic value chain of *Pinus* and *Alnus* spp. in the study area

Perspective of different stakeholders on the timber business

The perspectives of different stakeholders were collated through separate interviews (listed in Annex C). A brief description of the stakeholder's perspectives is presented below:

A. Producers and managers

- a. **Community forest user groups:** The community-based forest management is perceived as a successful model for fulfilling the local demand for forest products. There could be a good opportunity for the timber business if sawmill and treatment plant are available at the local level. They can help produce high-quality timber and generate associated local employment. Further

proper marketing may help in expanding the timber business. Despite these opportunities, there are several constraints regarding the timber business from CFUG, which are listed below:

- i. The major constraint is the ***lengthy auction process for selling timber from community forests***, which leads to the decay of softwood species in the hilly region. Further, the auction process is politically influenced and involves a security threat to community user groups. Community user groups are threatened by traders to favor them during auction process through local gangs.
 - ii. Community user groups ***lack technical and managerial capacity*** regarding forest management and timber business.
 - iii. The ***legal procedures are cumbersome, and the provision of three-layered taxation*** from DFO, local government, and provincial government further complicate the process. The hidden costs, especially the bribes to different authorities, add to the transaction costs, whereas a delayed response from administrative agencies discourages the producers.
 - iv. ***Registration of community forests in PAN as profitmaking institutions*** is very incompatible with community user groups, and without regular income, it would add financial burden to the user groups.
- b. Private forest/Private tree growers:** Private forest may be one of the best models to meet the local demand as well as to contribute to the national economy if provided with better technology for harvesting, transportation facilities, and ample support from different agencies. The availability of barren land in hilly areas due to the out-migration could be an opportunity for establishing commercial plantations of timber species. However, several constraints are hindering private forestry practice in the hilly region. The major constraints include:
- i. ***Lack of technology and skilled manpower*** at the local level affects the efficient harvesting and extraction of timber from the private forest.
 - ii. ***Delay in cash flow from middleman/local trader*** to private tree grower discourages private owners from investing in the timber business.
 - iii. Hilly regions are characterized by ***poor road networks and transportation facilities***, which in turn affects the cost of timber transportation. If the source is closer to the road facilities, the price of timber is comparatively cheaper and vice versa.
 - iv. Private tree growers lack knowledge regarding timber rate, institutional process, and harvesting procedure which makes them fully dependent on middlemen.
 - v. ***Complicated legal procedures and tax burden*** from all three layers: DFO, local government, and provincial government, further entangle the process.
- c. Divisional forest office (DFO):** The government-managed forests, private forests, and CFUGs have the potential to supply adequate wood if the skilled manpower and technology for harvesting and processing are available. The productivity of hill forests can be upgraded through relevant silvicultural treatments. There is a huge prospect for the timber business if the seasoning or treatment plant would be available to convert softwood to hardwood. Similarly, there could be a huge market for byproducts if product diversification can be administered. Amid these opportunities, the following constraints were noted at the DFO level:

- i. A **long tender process** results in the decay of softwood species in the hilly region. The tender process for softwood, hardwood, and naturally fallen trees should be different. The e-bidding should be practiced in the timber business to make this process transparent.
- ii. DFO lack **adequate human and economic resources** and are therefore unable to conduct effective monitoring of the timber business.
- iii. **Technological constraints and lack of road networks** in hilly regions have further affected the timber business resulting in higher price of timber.
- iv. For CFUG in particular, the major problem exists in the **outdated operational plan, transparency, and accountability**, which hinders equitable and inclusive participation of the poor, marginalized, and women. Many CFUGs don't ensure the participation of women and the poor in the executive committee as well. Well-being ranking which categorize the users into pro-poor, poor, middle class, rich and wealthy on the basis of economic condition, social status, education level, land holdings and family size is not efficiently used for distributing timber internally. The high level of politics and resulting conflicts in some CFUGs hinder the effective implementation of forest management activities.
- v. There are **no incentives from the government** for the participation of forest officials in timber harvesting, marking, auction process, and timber sealing before transportation which results in informal costs. The government should provide incentives or make a policy such that no informal costs are welcomed in the timber business.
- vi. There is a problem with **illegal logging and transportation** to the local sawmill in the hilly region. Due to this, sawmill usually shows a higher recovery percentage to accommodate illegal logs but carry out under billing of the price, which affects tax to the government.
- vii. There is a **conflict between CFUG and traders due to timber measurement** after the auction process. The buyer always measures at the thin end, whereas it should be measured in the middle of the log. DFO requests the producer and trader to do ring cutting/marketing for accurate measurement, but buyers do not show interest in it. They get more timber than the measured as our volume calculation is based on the quarter-girth formula, which only estimates about 78-79% of the timber.
- viii. The **higher transportation cost, manual extraction**, and high margin by saw millers make wood expensive in Nepal. The government should fix the price margin percentage on timber which can make it cheaper.
- ix. For **private forests**, the **restriction on certain species** by the government hinders commercial production. Moreover, it requires the involvement of several agencies like DFO, survey department, and CFUG for boundary demarcation and harvesting permits which makes the process long. The proper arrangement of human and financial capital should be ensured to encourage private tree growers to practice agroforestry/ farm forestry.
- x. In the case of the government-managed forest, the permission to harvest only 4D trees and restriction on extracting green trees limits productivity. All species should be harvested based on their rotation age which can increase productivity and restrict import into our country.
- xi. **Non-effective power-sharing** among the government agencies, for example, the involvement of the provincial government to issue a harvest permit which delays the overall process.

B. Timber harvesters, manufacturers, and investors

- a. **Sawmill and contractor:** Sawmills have the potential to export timber if they are provided with the necessary technological support, such as treatment and seasoning plants. Till now, the production area lacks road networks, and both the harvesting and transportation are completely manual, which cannot produce the timber with accurate dimensions according to the market demand. Technological interventions may be a prospect to produce timber of the required size. If the administrative procedures for harvesting and processing private forests are made easier, the bare land in the hilly region would be utilized for commercial timber production. Nevertheless, there exists some constraints from the point of view of sawmill and contractors, which are mentioned below:
- i. Sawmillers are **hesitant to buy wood from CFUGs considering the long process, huge commission to a local gang and government agencies despite the tax** and the involvement of multiple stakeholders that complicates the process. Further, the issue due to measurement difference between auction amount and the real amount resulting in timber deficit has caused a loss to sawmill. Also, effective monitoring by DFO during the timber auction process in CFUGs is lacking, which creates conflict between traders and producers.
 - ii. In addition, the **wood and raw material supply are inadequate** and inconsistent.
 - iii. Inadequate space for depot and limited storage facility hampers the wood quality and results in the decay of softwood that obstructs the business. Further, due to the **lack of skilled manpower**, outsiders should be hired for timber processing which increases the cost. The expensive instruments and lack of treatment plants hinder the production of timber as per market size.
 - iv. Moreover, the **inclination of customers toward alternatives like Aluminum, and UPVC** (unplasticized polyvinyl chloride) than wood due to lower prices has issued high competition in the timber business.
 - v. **Hidden costs/bribes to government agencies in addition to three-layered taxes** to DFO, local and provincial government has made the process incommensurate and expensive. Government should make provision for e-bidding through procurement office directly for the timber business in Nepal which can lower the transaction cost as well as the hidden costs/bribe
 - vi. Sawmills have **limited or no access to financial services to support the timber business**. The insurance premium is also very high as insurance has grouped it as highly inflammable.
- b. **Furniture/Veneer and plywood industry:** The market demand for furniture is very high due to the urban growth and change in the lifestyle of people. If the furniture manufacturers are provided with new efficient technology like finger joint technology, the high-quality final products can be manufactured which would support the market expansion of furniture. The market for veneer and plywood is exemplary. All the products are used domestically, thus creating a prospect for the veneer and plywood industry. Alongside the prospects, several constraints have restricted the expansion of furniture, veneer, and plywood industries that are presented below:
- i. An **insufficient and inconsistent supply of raw materials** hinders production. Further, the registration process for forest-based industries is complicated and impractical for the entrepreneur (0.5 km to 1.5 km in hilly and Chure region respectively in Bagmati Province).
 - ii. The **inaccessibility to new and appropriate technology** hinders the furniture industry to increase the efficiency and quality of finished products.
 - iii. The **lack of skilled manpower for furniture and builder's joinery** has obligated the manufacturer to hire expensive foreign laborers.

- iv. The **huge amount of export tax (NPR 6 per kg) on veneer sheets** hinders foreign trade.
- v. The alternatives, mainly customized products using assembled technology, are available in the market at a lower price which has created a pricing risk for the furniture market.
- vi. Also, the **manufacturers who use illegal wood for furniture have distorted the market** price of furniture and builders' joinery.

C. Association and Networks

- a. **FECOFUN, FENFIT:** There is a huge opportunity for the timber industry in Nepal. The intervention of new technologies, production of skilled manpower, and proper financial access to producers/traders can create a huge difference in the timber business. It can create employment and support income generation at the local and national levels. The establishment of the byproducts industry and the provision of product diversification in Nepal can restrict the import of furniture and builder's joinery, thereby creating a prospect for local timber. From the perspectives of FECOFUN and FENFIT, the major constraints the timber industry has been facing include:
 - i. The **regulatory requirement from government agencies** and lengthy, time-consuming documentation process at different institutions demotivates the entrepreneur from engaging in the timber business. The e-bidding of timber from CFUG should be practiced to maintain transparency and accountability.
 - ii. The **current auction process and related policies hamper the effective and timely supply** from the hilly regions. It takes more than one month to complete the auction process, which deteriorates the wood quality or adds to the cost of preserving the wood.
 - iii. The provisions of **three-layered taxations** to DFO, local and provincial government, despite their nominal managerial role, make the whole process of timber business inconvenient. Moreover, the obligation to pay tax on total transaction costs, which includes manpower as well is very irrelevant, affecting the timber price.
 - iv. The **transparency and accountability in CFUGs are highly questionable**. The measurement of timber is biased to favor some traders. Further, the products from CF are misused by elite people who collect wood in the name of poor people and sell it. The lack of proper auditing creates a problem.
 - v. The **monitoring during the measurement and other processes is not conducted properly** by DFO, resulting in the conflict between producer and trader. Several hidden costs the bribes to different agencies add to the price of the timber making wood expensive. The price exaggeration ranges from NPR 40-50 per craft.
 - vi. The **difficult topography of the hilly region and inaccessibility of roads create problems** in timber extraction and transportation, which inflate the timber price.
 - vii. The forest management practices **lack proper coordination** between government agencies and associations.

Explaining Price Gap in the value chain

The royalty rate of the government is the baseline for fixing the price of timber in Nepal. The royalty rate of timber log fixed by the Government of Nepal (2011 June 6 in Nepal gazette) for *Pinus roxburghii* is NPR 200 per cft. and NPR 150 per cft. for "A" and "B" categories respectively which is one of the most traded species in the hilly region. Similarly, the royalty rate for other softwood species traded in the hilly regions: *Pinus patula* and *Alnus nepalensis* is NPR 100 per cft. The winning bidders have to pay 13% VAT for the timber bought from the producer. Despite this, many factors determine the timber price in Nepal that comprises field cost, transportation cost, transaction cost, and timber conversion cost.

Particularly in the study area, the main reasons behind the high price difference between the producers and consumers are the high percentage of losses during conversion from log to sawn timber, handling, and transportation costs, and the high level of risk at different levels, as well as hidden costs. The field cost of timber collection in the hilly region was found to be NPR 100-120 per cft. due to difficult topography and manual extraction. The transportation from the harvesting site to sawmill where woods are processed to sawn timber costs NPR 90-100 per cft., due mainly to inadequate road linkage and expensive fuel prices. At the moment, the arbitrary tax from local government and provincial government costs up to NPR 15-20 per cft. which is further adding up to the cost of timber in the study area. Further, the expensive labor cost for sawing i.e., NPR 30-50 per cft. due to the shortage of skilled manpower at the local level and dependency on Indian labor inflates the price of sawn timber.

According to the saw miller and contractors, they usually receive 10% less timber than the auction amount due to errors in measurement, which obligates traders to increase the price, but the case is not applicable in the case of private forests. In addition, the softwood harvested from the hilly region has short durability. However, the complex regulatory requirement and lengthy auction process delay the timber collection (even 6 months), which results in the decay of species like *Alnus* and *Pinus*. This compels traders to increase the price of timber to recover from the loss in the timber business. The hidden costs/bribe to local government agencies and local gangs ranges from NPR 25-40 per cft., depending on species and quantity, that further makes the timber more expensive. Moreover, the high level of wastage of softwood during processing, which ranges from 25-30% depending upon the final product, also makes some part of the additional cost in the timber business.

Table 5 presents the cost and distribution of gross margin (in NPR) along with the different actors of the timber value chain. This is a sample depiction of the calculation based on the harvesting of *Pinus* in Sindhupalchowk and selling in Kathmandu and Banepa. The calculation shows that there is a huge price difference between production and final consumption. The price of timber is more than fourfold higher in Kathmandu in comparison to the production site with a high level of gross margin at saw millers. This further increases at the furniture or build joinery level due to higher additional costs (labor cost, storage cost, processing cost), and therefore customers' price is tenfold higher than at the production site.

Table 5: Cost and gross margin distribution across the timber value chain (in NPR)

	Producer	Local trader	Saw miller at local level	Urban Sawmill or Major Trader	Retailers of furniture/ build joinery
Buying price		200	350	350	800
Additional costs		80 (20)	250	250(50)	1000
Selling Price	200	350	750	800	2300
Gross Margin		50	150	150	500

Equity and inclusion challenges of timber business in Nepal

The fair and transparent distribution of cost and benefits is a very important aspect of ameliorating the timber value chain (Aryal et al., 2016). The timber value chain experiences asymmetric power distribution and is dominated by a few big players. The urban timber buyers based in Kathmandu and big cities control the trade in Nepal by mobilizing local agents to obtain timber. This type of domination discourages smallholders to participate in the timber business because private producers hugely depend on big players to secure permits for the sale of timber (Field data, 2022; Subedi et al., 2014). The smallholders who work on a small scale with a low quantity of trees/timber cannot afford high transaction costs and are deprived of anticipated returns (Field data, 2022). In addition, cumbersome regulatory procedures, tax burdens additional to VAT, hidden charges or donations to various clubs and local bodies, and high transaction costs for harvesting and trade are considered additional challenges for smallholders (Field data, 2022).

In the study sites, inequity, unaccountability, and lack of transparency were observed regarding the timber business in CFUG. CFUG directive 2014 for selling timber (GoN, 2014) focuses more on the internal use of timber than selling outside. As per the directive, CFUG provides timber internally to local, poor, and marginalized people even at half price, but they cannot afford it due to higher transaction and extraction costs. Besides, the timber business of CFUG is influenced by elite capture. The timber allocated for the poor people is detained by the elites using power and sold for profit. Moreover, elites dominate in CFUG formation, decision making, and use of CFUG funds and benefit sharing in the hilly region of Nepal (Thomas, 2007; Upreti et al., 2012). Usually, CFUGs sell all the harvested timber at once through the auction process which requires a lot of investment, but local sawmiller/traders cannot afford the high transaction cost and therefore the auction process is mainly dominated by the major traders of Kathmandu valley and Banepa. The auction process further undergoes political influence and is interfered by local gangs for extortion. During the auction process, some CFUG members act as an agent and favor some traders and restrict other firms from participation, whereas some CFUGs misuse the revenue collected from the timber business and DFOs are obliged to close their bank accounts. This has raised a question regarding the transparency of CFUG as mentioned by DFO and FECOFUN. Many CFUG sawmills have become un-functional because they have to participate in the auction process to acquire timber from their own community forests. Similarly, the lack of transparency, accountability, politics, conflict among communities, and lack of business capacities are other reasons behind the failure of community-run sawmills which are also highlighted by the study on Chaubas sawmill in Kavre (Shrestha et al., 2022). The failure of the CFUG sawmill led to the obstruction in the use of resources in the local context, income generation, and equitable benefit sharing among forest users.

In the case of private forests, the tree growers don't have sufficient knowledge regarding the timber business and rely on traders. However, they have not received enough support and incentives from governing agencies despite paying regular taxes, which has demotivated them to invest in timber business. There is no significant coordination between timber producers and buyers, however, there is strong coordination between producers and local traders/middlemen. The relationship between local traders/middlemen and major traders (sawmill, furniture based in big cities) is cordial but not reliable due to financial issues.

There exists no mechanism for risk-sharing between value chain actors, so all the risks associated with the timber business have to be borne by buyers only, which demotivates the traders to invest in the timber business. For e.g., in Khasrepakha CFUG of Kavre, the buyer received 33% less amount of timber than the auction amount. The buyer further mentioned that the diameter of the log in the official document was 48 inches but only 41 inches on real ground (Field data, 2022). The buyer mainly questioned the verification process of DFO and the intention of CFUG. The two case studies on the timber business from CFUG and private forests highlighting the regulatory requirements, transparency, complex auction process, hidden costs, and other associated problems are presented at the end of this section.

Owing to the lack of transparency, motivation among traders, and some complicated government regulations, timber business is risky. An increase in the price of timber alongside a decline in timber supply in the market has instigated customers to opt for other cheaper alternatives like aluminium, UPVC doors, windows, and assembled furniture. For example, a customer can get an aluminium window for NPR 20,000, whereas they have to pay NPR 30,000 for a wooden window frame. Earlier, the market price of sawn timber of Pinus species was NPR 1000-1100 per cft. in Kathmandu valley and Banepa, however it is difficult to even get NRs 800 per cft. as mentioned by the saw millers. Further, they mentioned that the ratio of timber and timber alternative business changed from the ratio 80:20 to 40:60 at present. For instance, Nepal imported doors and windows of aluminum and UPVC materials worth about USD 7.9 million in the fiscal year 2019/20 (DOC, 2020).

Box 1: Timber business from CFUG

My name is Padam Bahadur Shrestha, and I am the owner of Jugal Furniture and Sawmill, Chautara, Sindhupalchowk. I used to buy wood from both CFUG and private forest but now, I don't prefer to buy wood from CFUG. A few years ago, I and my friend won the auction at ChhapDeurali CFUG of amount NPR 8 million. From the day I won the auction, the local gangs threatened me and asked for at least ten percent of the auction amount (NPR 0.8 million) even before the timber was transported. They didn't allow me to transport unless I agreed to pay them. Moreover, the commission at every step of timber purchase from CFUG has demotivated and upset me. After that, I never looked to the CFUG for buying timber. I feel very easy to buy timber from PF because only two parties exist there (Tree grower and buyer), and the rate is fixed on mutual agreement. However, the attitude of the government remains the same for PF as well. Now one can imagine how we can be motivated and sustain our timber business.

Box 2: Timber business from PF

My name is Krishna Bahadur Shrestha, and I am private tree grower. I had some trees to sell so I went to DFO to understand the necessary process. I live 30 km far from DFO and I have visited them more than seven times, but they keep asking me to visit next time. They asked me for different documents and made me visit different government office unnecessarily. I was irritated; therefore, I had no option than to contact the middleman. The middleman finished all the process within a week and started harvesting trees from my field. The middleman felled all the trees and counted and measured 97 logs. I was unaware about the measuring process so believed the middleman that the timber was only 97 cft. Later, my friend alerted me about the measurement process and I realized that I lost big amount while selling wood. If I was supported properly by DFO regarding the timber price and measurement system, I would have earned more money.

Effectiveness of Policy and measures in improving timber governance and suggested change

Different policies related to timber business and associated governance

Several acts, regulations, and policies have been formulated to ease governance over timber and encourage private sector investment. Forest Act (GoN, 1993) and Forest Regulation (GoN, 1995) which is recently replaced by Forest Regulation 2022 (GoN, 2022) are the major policies that govern all the forest management practices or regimes in Nepal. The Forest Act 1993 (GoN, 1993) provided local communities the authority to manage forests as per the forest management plan (FMP) prepared by CFUGs (Baral and Vacik, 2018). An annual allowable harvest (AAH) is apportioned in FMP. CFUGs can harvest timber within their forests as long as the harvestable volume does not exceed AAH, but it is rarely achieved (Baral and Vacik, 2018). The Forest Products Collection, Sale, and Distribution Directives (2014) encourage CFUGs to achieve their AAH prescribing timber harvest. The newly developed Forest Act 2019 (GoN, 2019) clarifies the overall management provision of government-owned forests. It regards leasehold forests as a common way in which national forests can be utilized for timber harvesting allowing private entities to conduct forest operations. The Forest Sector Strategy 2016-2025 recognizes community forests and private forests as the opportunity to maximize domestic timber supply and strengthen the timber value chain. The National Forest Policy 2019 (GoN, 2019a) ensures the access of all stakeholders to timber products and promotes investment in forest-based industries (Subedi, 2019). The brief provision and implications of several forest policies, fiscal policies as well as industrial policies related to timber business and governance, are listed in Table 6, Table 7, and Table 8 respectively.

Table 6: Forest policies related to timber business their provision and implications

S. N.	Policies	Provisions related to timber	Implications
1	Forest Act 1993 (Replaced by Forest Act 2019) (GoN, 1993)	A license is required for the utilization, removal, sale, and distribution of timber from Government-Managed forests. The price of the product is prescribed by the Government. Government-managed forests allow the felling of the dead, dying, and diseased trees but not the green trees. Any part of national forest can be handed over to user groups to conserve, use and manage the forest and sell and distribute the forest products independently by fixing their price according to the work plan (Chapter 5, article 25).	The Act favors community to manage the forest and engage in the timber business independently.
2.	Forest Act 2019 (GoN, 2019)	This Act has introduced a provision of partnership forests in partnership between DFO, local levels and forest users (Chapter 6, Article 23). The forest products from partnership forest should be used internally and only the remaining products should be sold outside of the group (Chapter 6, Article 25). The collection and transportation of forest products from private forests or private cultivation for commercial purpose will require an approval of local government. The transportation of forest products	It focuses on the internal use of forest products rather than their trade. The regulatory requirements regarding the transportation and use of forest products from private forest for

		<p>from one local level to another for commercial purpose would require an approval from DFO. For household purpose, the transportation of forest products from one local level to another within same district requires an approval of local government while transportation from one district to another requires an approval from DFO (Chapter 10, article 36).</p>	<p>commercial as well as household purpose is complex which demotivates private tree growers in timber business.</p>
3.	<p>Forest Regulation 1995 and its first amendment 1999, second amendment 2003, and third amendment 2005 (replaced by Forest Regulation 2022)</p> <p>GoN (1995)</p>	<p>Forest products shall not be collected, sold, and distributed exceeding the quantity specified in work plan for whole year. When forest products are likely to damage and get destroyed due to natural calamities, the limitation of quantity will not be considered for collection, sale, and distribution (Chapter 2, article 6).</p> <p>Government will constitute a district forest product supply committee in order to sell and distribute forest products. The committee sells the timber for rural household purpose, development and construction works to be undertaken from public participation and for relief from natural calamities and for agricultural tools (Chapter 2, article 9).</p> <p>Government may issue a ban on collection use, sale, distribution, and transportation for any specified category of Forest products (Chapter 2, article 12)</p> <p>To export forest products to foreign countries, authorized officer may recommend to customs office for granting permission (Chapter 2, article 13).</p> <p>Timber may be collected out of forest during the period between October 17 to June 14 (8 months) (chapter 2, article 16).</p> <p>For the transportation of timber, the authorized timber trader shall issue a release order from the ferry-post of round logs. After sawing round logs, the concerned sawmill of furniture industry shall transport them as their products. DFO should be informed in advance (Chapter 2, article 21).</p> <p>The royalty for the timber species is listed in Annex 3 of the regulation.</p> <p>CFUGs can collect, sell, and distribute only those forest products mentioned in work plan and after collection, CFUGs have to make an arrangement for</p>	<p>It creates a prospect to engage in forest-based business along with managing overuse of forest products for commercial purpose.</p> <p>If a good cooperation is established between the committee and public, the sale and distribution of products from committee would be smooth and easier.</p> <p>A permission system before export is effective in checking the type of forest products (banned or not), but it may create havoc regarding the administrative processes in user groups who want to export trees.</p> <p>Transparency in CFUGs can be maintained with account records but it should be regularly monitored.</p>

		<p>reforestation or rehabilitation as soon as possible. The sale rate of forest products should be informed to DFO. CFUG can run a forest-based industry outside forest by obtaining approval from concerned agency (Chapter 4, article 32).</p> <p>User groups have to maintain accurate records of sale, income and expenditure. A receipt in triplicate format (Annex-17) should be handed over to buyer, forest office and kept by themselves during sale (Chapter 4, article 33).</p> <p>While transporting timber outside user group, marking should be done and concerned forest office should be informed in advance (Chapter 4, article 35).</p> <p>If a private forest wants to use timber for own purposes, notifying DFO in writing at least before 24 hours along with recommendation from VDC or municipality is necessary. The same process is for registered private forest while transporting forest products. An unregistered forest owner should submit application to DFO before cutting trees from private land (Chapter 7, article 62).</p>	
4.	Forest Regulation 2022 (GoN, 2022)	<p>Article 25 highlights the provision of auction process for timber sale from government managed forests and the royalty rate of different species (listed in Annex 6). Only the registered forest-based industry which is also listed at DFO can compete in auction but in case of hilly district, local sawmill can also compete. The buyer can sell log only after sawing or one level of processing (Article 27).</p> <p>CFUG should harvest timber based on AAH mentioned in operational plan (Article 48, Sub article 3). CFUG need approval from DFO even for the internal use (Article 48, Sub article 4). CFUG are allowed to cut more than AAH if they have to distribute to the user that suffered from natural hazards or other hazards (Article 48, sub article 5). If the timber amount crosses the limit of AAH during collection of naturally fallen trees, the AAH should be compromised with next year AAH (Article 48, sub article 6). CFUG can hire firm/company to extract timber from the forest, but those firms will not be valid for auction process (Article 48, sub article 11).</p> <p>Article 49 prioritizes the internal use of timber and the sell/trade of remaining wood only. During internal use, the poor, marginalized, women should</p>	<p>The Regulation has increased the royalty rate of timber species which can affect timber business and promote alternatives. The forest-based industries require recommendations from associations which can create syndicate of certain traders in timber business. However, the provision of allowing local sawmill of hilly region in auction process can motivate small holders in timber business.</p> <p>The Regulation encourages internal use of timber and supply of timber to locally managed enterprise at the royalty rate which can</p>

		<p>be given priority. Similarly, it also includes the provision of the supply of wood to enterprise managed by CFUG at the royalty rate fixed by government.</p> <p>CFUG can establish forest-based enterprise alone or with cooperation of other CFUGs outside community forest (Article 51).</p> <p>The local government should list all private forests and help DFO in the identification and registration process (Article 81). To transport timber within the same local level, a permission from local government is needed whereas to transport timber from one local level to another local level, permission from DFO is required (Article 81).</p> <p>Private forest owners are encouraged to practice agroforestry and cultivate medicinal plants in their private land. Private forests can sell timber, medicinal plants, and non-timber species (species listed in Annex 48) like other agricultural crops. The species that private forest or private tree grower can sell are mostly softwood species (Article 82).</p> <p>To list the forest-based industry at DFO, forest-based industry needs a recommendation from the subdivision forest office and FENFIT along with industry registration document (Article 128).</p>	<p>flourish the establishment of forest-based enterprises and domestic consumption of forest products.</p> <p>The involvement of local government in exercising private forestry would need a strong coordination between local government and DFO.</p> <p>The regulatory requirements regarding the transportation of timber from private forest is complicated which discourages private tree growers in timber business.</p> <p>The Regulation supports private tree growers to diversify their production through agroforestry, however, it restricts the cultivation of hardwood species in private land.</p>
5.	<p>Forest Product Auction Procedure Directives 2003 (GoN, 2003)</p>	<p>Article 7 describes the auction process of different forest products.</p> <p>The auction should be announced for 15 days if forest product is of NPR 1 lakh and for 21 days if forest product is worth more than NPR 1 lakh (Article 9).</p> <p>The firm or company should have valid registration, PAN, and tax clearance for competing in auction (Article 10).</p> <p>At least two applications for bidding should be received to open the auction, otherwise it should be renounced for next 15 days (Article 16).</p>	<p>The auction process is lengthy. Also, it can be lengthier if at least two bids are not received during auction. During this the softwood species from hilly region may be damaged and decayed causing a loss to the buyer.</p>

		<p>The auction should be based on the minimum selling royalty rate maintained by the government (Article 20).</p> <p>The winning bidder should transport timber within 3 days of receiving the permit for transportation (Article 26).</p>	
6.	<p>Directives for collection and sale of timber/ fuelwood from community forests, 2014 (GoN, 2014)</p>	<p>Forest User Groups should complete timber harvesting and hauling, between the period of October 17 to 28 May of each fiscal year. But transporting them to the depot can go till the end of 14 June (Chapter 2, article 4).</p> <p>Timber should not be harvested near water source, riverbank, erosion prone areas, Chure areas, slopy areas, and biodiversity hotspot (Chapter 2, article 7).</p> <p>4D trees should be given priority while harvesting timber and fuelwood from CFUG (Chapter 2, article 8).</p> <p>While harvesting, at least 25 mother trees for single species forest and 5-10 mother trees for mixed species forest should be left (Chapter 2, article 8).</p> <p>The permission from forest authorities should be taken for internal use as well as timber sale (Chapter 2, article 11 & 12).</p> <p>While harvesting, the log size should be prepared as per market requirement (Chapter 2, article 16).</p> <p>The directive has highlighted the use of timber for internal use (for CFUG members) on a priority basis and based on the well-being ranking of the members. The rate should be fixed on the basis of Forest Regulation 2051, Annex 2 (Chapter 4, Article 23). The timber requested by CFUG members shall not be used for commercial purposes (Chapter 4, Article 26).</p> <p>Chapter 5 of this directive deals with the sale of timber and fuelwood outside forest user groups. It has laid five points procedures for such sale. Forest user groups has to follow the bidding process if they have to sell for commercial purpose. Article 33 provides an auction procedure that the CFUG has to follow. The procedure consists of 10 important rules</p>	<p>The directive addresses the environmental and ecological risks as well as the maintenance of forest health associated with timber harvesting.</p> <p>The provision of mother trees further supports the sustainability of forest resources.</p> <p>Forest user groups are discouraged to sell their forest products outside their groups.</p> <p>The CFUG timber selling process is very lengthy and requires a high level of regulatory tasks. During this time the quality of timber may deteriorate which can result in the economic loss to timber trader.</p>

		<p>with several annexes to follow and appears to be complicated for the forest user groups to follow. 15 days' notice shall be published in a national daily newspaper if the valuation of forest products is less than NPR 1 lakh and if it is more than NPR 1 lakh notice of 21 days should be announced. At least 3 quotations must be received to carry out the auction process otherwise the notice will be re-announced for a second time.</p>	
7.	National Forest Policy 2019 (GoN, 2019a)	<p>Forest policy aims to be self-reliant on forest products and promote their export with value addition.</p> <p>For sustainable and effective forest product harvesting, the development and use of innovation and technology are encouraged by the forest policy.</p> <p>The investment of private, community and government sectors in forest-based industries will be encouraged.</p> <p>Timber productivity will be increased through zoning and species selection based on climatic distribution, and productivity analysis.</p> <p>The expansion and development of private forest, agroforestry, and family forestry will be stimulated by providing loan with low interest.</p>	<p>The policy facilitates the investment of different sectors in the timber economy.</p> <p>The policy includes the strategies to increase timber production by encouraging several forestry practices by supporting practitioners.</p>
8.	Forest sector strategy 2016-2025 (MoFSC, 2016)	<p>Milestone by 2025: 1 million m³ of timber will be commercially supplied to the domestic market annually and imports will be reduced to zero through additional supply.</p> <p>Action: The present royalty system on timber will be reviewed and revised based on market prices for timber and international best practice.</p> <p>Further the strategy envisions to identify investment opportunities for private sector partnerships with CFUGs to enhance sustainable and productive forest management, and marketing and processing of forest products, especially timber.</p> <p>The strategy also plans to conduct awareness campaigns amongst the public and timber enterprises to create a better understanding and demand for legitimately sourced forest products.</p>	<p>It promotes the domestic timber use by reviewing timber price, encouraging private investment, and forest-based enterprises thereby creating an opportunity for local enterprises to flourish in timber business.</p>

9.	Community Forest Development Program Guideline 2014 (GoN, 2014a)	<p>To ensure good governance, important indicators are selected. These indicators are discussed in the general assembly.</p> <p>All the expenditures and profits from forest products are audited at least once a year.</p>	An on-time discussion with members and continuous auditing provides a prospect to improve the governance system related to timber from community forest.
10.	Circular - MFSC (Ministry of Forest and Soil Conservation), December 2011	The fallen trees should be harvested only within AAH. It encourages the harvesting of 4D trees to improve forest quality.	It intends to improve forest quality but is seen as an act to centralize forest management.
11.	Circular- MFSC, March 2012	The growing stock volume of the forest should not exceed 178 m ³ per ha while assessing AAH. The harvesting is limited to nearly 1% of growing stock volume (assuming 178 m ³ per ha)	It restricts the full phase harvesting of timber and other products and centralizes the forest management in Nepal.
12.	Community Forestry Economic Directive, 2017 (GoN, 2017a)	<p>Chapter 2, Article 5 directs all CFUGs to get Permanent Account Number (PAN) from Internal Revenue Department.</p> <p>Chapter 11 highlights the process for timber sale from CFUG and associated transparency and accountability.</p> <p>Chapter 13 provisions the yearly audit for every CFUG however Chapter 15 Article 60 obligates audit only for the CFUG which have yearly income more than NPR 50000.</p>	It helps to maintain transparency and accountability within CFUGs but an obligation of PAN for every CFUG doesn't seem relevant.

Table 7: Fiscal policies related to timber business, their provision, and implications

S.N.	Policies	Provisions related to Timber	Implications
1	Value Added Tax Act 1996 (GoN, 1996)	<p>Tax shall be levied and recovered on the royalty amount or auction amount of the timber, whichever is higher, at the time of the auction, release letter, or obtaining the saw order, for the timber of national forest, whichever is earlier.</p> <p>If the timber of a privately cultivated land, private forest, or community forest is sold for business purpose, despite that royalty is not chargeable, tax shall be levied as provisioned in sub-section (1) as if it was the timber of a national forest.</p>	The tax levied by government in the timber from all sources accounts the contribution of timber business in national economy.
2	Income Tax Act 2002 (GoN, 2002)	No tax shall be levied on the income of forest-based industries	The tax exemption for forest-based industries can help in expansion and increment of investment in timber related business.
3	Custom Tariff 2020/2021 (GoN, 2020)	<p>The export tariff for fuelwood, logs, rough wood, Hopwood, sawn wood accounts for 200% whereas the tariff for veneer sheets is NPR 6 per kg and paper board is NPR 5 per kg.</p> <p>The import tariff for fuelwood in logs, rough wood, Hopwood, and sawn wood amounts NPR 5 per m³. The import tariff for veneer sheets and particle board when imported from SAARC countries is NPR 6 per kg and NPR 7.25 per kg respectively whereas if imported from other countries is NPR 10 per kg and NPR 15 per kg respectively.</p>	The export tariff is very high which restricts Nepali traders to export their products while the low import tariff encourages traders to import wood from foreign countries.

Table 8: Industrial policies related to timber business, their provision, and implications

S.N.	Policies	Provisions related to Timber	Implications
1	Industrial Enterprises Act 2020 (GoN, 2020a)	<p>Forest-based industries are entitled to hundred percent exemption on dividend tax.</p> <p>Possessory right of a forest within any specific area may be provided on bond or lease under the prevailing law to a forest product-based industry by specifying necessary terms.</p> <p>The Government of Nepal may provide incentives, exemptions, facilities, or concessions, as prescribed, to the forest product-based industries.</p>	Through different incentives such as tax exemption, facilities, and land possessory rights, the Government of Nepal supports forest-based enterprises that can motivate entrepreneurs to invest in forest-based industries
2	Industrial Policy 2011 (GoN, 2011)	<p>Industries based on forest products are listed as prioritized industries.</p> <p>The policy aims to promote micro-enterprises, cottage, and small industries based on forest products.</p> <p>The industries based on forest products will be made on available forest on lease.</p>	Prioritization of forest-based industries and envisioned support to promote forest-based enterprises can generate local employment and support local and national economy.

Suggested changes or strategies

Timber business accounts for a sizeable share of national income, which ranges from 3.0% to 11.3% of total household income (Meilby et al., 2014). Several policies have been formulated with a wide vision of improving the timber governance and developing forest-based enterprises. The policies gravitate towards incorporating catalogues of regulatory requirements regarding timber harvesting, which have often posed a restrictive and demoralizing view towards timber business. The harvesting of timber in Nepal becomes difficult when discouraging policies are executed without reformation (Baral and Vacik, 2018). Based on the experiences and review, policies have been amended, updated, or replaced, but still they fall short in addressing the actual issues on the ground. For example, the Forest Act 2019 was created in order to address the drawback of policies that govern timber harvesting, however, it seems to favor larger development groups as these groups can easily get access to forested land, but it is unclear if the same treatment will be applicable to smaller development groups and business enterprises (Saxena et al., 2022). Similarly, newly formed Forest Regulation 2022 (GoN, 2022) has put forward some changes in existing regulation on timber use and sale. For instance, only registered and listed forest-based industries can participate in the auction process, but they need a recommendation from FENFIT, which can create conflict among traders as well as syndicate on timber business. The increased royalty rate can benefit producers, but it seems to be a huge loss for buyers/traders. It can hinder the timber business of softwood species in the hilly region. It also has the potential to increase wood imports as well as promote timber alternatives in the Nepalese market. In a nutshell, various kinds of adjustments are required for smoothening the value chain of timber and improving timber governance which are listed below:

Capacity enhancement of timber producers: The technical and managerial capacity of CFUG should be enhanced regarding the timber auction process, forest management, forest enterprise and associated business, and regulatory requirement because many forest-based enterprises have failed due to a lack of business as well as managerial capacity. Further private forest owners should be alerted about price and necessary regulatory requirements and motivated for plantation.

Shorten the length of auction process and promote practice of e-bidding: Based on the interviews, primary issues have been highlighted in the auction process. The tender process is extremely long, which leads to the damage of softwoods; therefore, limiting the auction period to 7 days for softwood in hilly regions could be considered. Also, the provision to sell timber through auction by creating smaller lot should be initiated by CFUG so that smallholders with lower investment capacity can participate. The e-bidding of timber should be carried out to maintain the transparency in timber business. In e-bidding, all interested firm/traders will submit EOI (Expression of Interest) online to procurement office for buying timber. The online process will restrict the middleman from the value chain and lower the chance of particular trader being favored by CFUG. This will reduce transaction cost and the hidden cost in as well as increase transparency in timber business.

Restructure financial provisions: The three-layer taxation system is creating burden over the traders that should be unified into one with the cooperation between all levels. The taxation system by local and provincial governments seems arbitrary despite a 13 % VAT which needs to be executed with formal regulations. Traders moreover, need to pay double tax, once after buying timber and then after processing which should be abolished to encourage traders to hold on to timber business. In the document, an income tax is levied for forest-based enterprises however, in practice, 1.5% of income tax is being paid by the traders in our study area, which is further supported by a value chain study in Terai (Aryal et al., 2016). In addition to several level of taxation, the value chain of timber consists of hidden costs, especially bribes at different stages, which requires effective monitoring from concerned authorities.

Complex regulatory requirements in CFUGs need a revision: Even though CFUGs are prompted towards managing, selling, and distributing forest products by themselves in policies, complex regulatory requirements put on several restrictions on real ground. The obligation of CFUG to register with PAN should be revised and only profit making CFUG should be obliged for PAN registration. CFUG based sawmill should be provided with wood for sawing which can help in generating income in local level as provisioned by forest regulation (GON, 2022). This would also need effective monitoring to limit the misuse of products. In order to combat the issue of extraction and transportation, especially in hilly regions, the trail or smaller stone paved road should be allowed to be constructed inside CFUG after conducting environment impact assessment. This can help in extracting the wood which would otherwise add upon cost by more than NPR 50-60.

Monitoring the transparency of timber sale/distribution in CFUG: There is a conflict between traders and CFUG because of the difference in measurement between auction amount and the actual amount, which demotivates both parties. Government should participate in the measurement of timber or monitor the measuring systems to avoid conflict. Other than the financial and regulatory issues, the timber governance in CFUG is characterized by an elite capture. An effective monitoring of the forest products that are provided by CFUG for internal use is necessary as the likelihood of elite people apprehending the timber and selling those for profit is prevalent. The participation of poor, marginalized,

and women have been prioritized in policies, but in actual practice, the participation of those in the executive committee and decision-making process is almost nil. The powerful monitoring to ensure a proper implementation of policies is therefore important. However, the newly formed policies have incorporated several issues of transparency, but effective implementation of policies is always challenging.

Simplification of the administrative processes in private forest: Despite potentiality, only around 0.05% of private forest has contributed to 20% of domestic timber each year (Aryal et al., 2020). If the harvesting, extraction, transportation, and sale of timber from private forest is eased, the contribution could be further elevated. One door policy for all the regulatory requirements of timber sale should be enacted i.e., DFO can be empowered to process permit, taxations, land survey and other administrative operations instead of involving multiple institutions. The provisions of timber transportation from private forests even within the district and local level is complicated and needs to be untangled.

Financial support to private tree growers: The provision of loan to private forest or forest-based enterprises to augment the product diversification and processing would support entrepreneurs willing to invest in wood business which is also highlighted by Industrial Enterprise Act (GoN, 2020a) and National Forest Policy (GON, 2019a). Government should be flexible to allow the cultivation and sale of hardwood species in private forests. The delay in cash flow is observed as a major problem in private forestry which needs to be revised so that the cash payment is made before the transportation of timber.

Strengthening the capacity of forest authorities: Lack of human and financial resources in forest department hinders effective implementation of regulations and monitoring of timber business. Subdivision or DFO should be given the power to decide on harvesting permits rather than leaving it up to the province, which delays the process. The forest official must be provided with incentives during their participation in the timber sale process which can deter informal costs.

Innovation and technology: The manual extraction and transportation have caused wastage of a lot of timber and restricted the production of required dimensions as per market demand. The development and expansion of innovation and technology as underlined in the National Forest Policy and Forest Sector Strategy, such as portable sawmill, can be a prospect for timber market. Further, government should invest or encourage private sectors to invest in seasoning and treatment plant to convert softwood to hardwood that would protect the damage of wood during storage for longer time.

Managerial role from local level: Local government instead of acting merely as a tax collector, should pursue their managerial role as well. The new regulation has made the role of local government quite clear, thus hiring staffs and capacitating them for administrative tasks.

Provisions to reduce imports and increase exports: The import of wood can be an opportunity for forest-based industries, but it actually doesn't provide livelihood benefits as done by locally harvested wood (Aryal et al., 2020). Further, the production of logs in the size based on market demand as stated in policies is not implemented on the ground. Despite the mention of 10 ft logs to be made available only 6-8 ft domestic timber are available in the market due to lack of road facility inside CFUGs and manual extraction which promotes the import of foreign timber. The proper monitoring of the dimension of logs is necessary so that domestic timber can meet the requirement of local people. Further, the export tariff on veneer and other forest products should be lowered to encourage foreign export.

Promote the use and supply of timber: Government should direct all its related institutions to use timber in their offices viz. window, door and provide awareness regarding the health benefits of wood in compared to available cheaper alternatives like aluminum and UPVC. In addition, the supply of timber should be guaranteed before registering the forest-based industries.

Financial security: Security should be provided to huge investments on timber business that would motivate several traders to participate in trade and export of forest products. Further, insurance premiums should be lowered to enhance risk-taking capacity of traders and a provision of bank loan to forest-based industries as stated in national Forest Policy 2019 (GoN, 2019a) should be implemented and the process for bank loan should be made simple to increase the investments in timber business.

Practices at the international level and lessons to learn

In India, timber from government forests should be harvested according to National Working Plan Code, and it should not exceed the growing stock or mean annual increment (MAI). Government forests are managed according to an approved work plan of 10 years (GOI, 2014). For private forests, the timber company/farmer must have permission for harvesting timber raised on private land. This differs among states of India e.g. In Andhra Pradesh, there is no restriction for timber felling from the private forests where tree growers can fell trees at their will. In Bihar, the matured tree can be cut and transported with permission of the zonal forest office. In Uttar Pradesh, there is no restriction for felling trees grown in individual holdings measured up to two hectares (WWF, 2012). About 82% of sawn timber comes from small forest-based enterprises, and half of the industrial wood supply comes from non-forest resources mainly private farms which only covers 15% of total forest area. It is estimated that 90% of wood-based products in India are manufactured in private sector (Saigal and Bose, 2003).

In Bhutan, community forest management group (CFMG) need the permission of president of CFMG for harvesting any forest products. They can only fell after marking by the concerned Chief Forest officer and transport with a valid permit. CFMG is allowed to sell surplus wood only. No tax is levied for the internal use, while the department levy royalty for commercial purposes. The department do not impose any royalty on trade of tree, plant, and non-wood forest products from private land however tree marking, and permit are required for harvesting (RGB, 2017). About 97% of timber comes from the national forest which the government institution manages, as timber is harvested from only natural forest, which covers 14% of the country. The government capacitates its own authority and established government institutions like Natural Resources Development Corporation Limited (NRDCL) for harvesting and Bhutan Board Products Limited as plywood industry (EFI, 2016). Similarly, in China, a harvesting permit that complies with the annual allowable logging quota approved by government, is required for harvesting timber. There is no tax and fees to be paid to the national or local government to manage and harvest forests except in the case of forest land conversion, for which forest recovering fee applies (ATIBT, 2022). The Forest Act developed in 1927 in Bangladesh allows private communities to harvest timber in social forestry, private land, and home gardens with prior permission from Bangladesh Forest Department (EFI, 2016). The forest policy endorsed in 1994 in Bangladesh encourages afforestation on private and fallow land, agro/farm forestry, which resulted in 80% supply of country's industrial round wood from home gardens and private lands (MOEF-FAO, 2011).

The practices and associated consequences in international settings could be taken as learning to promote timber business in Nepal. Encouraging communities to practice private forestry, farm/agroforestry can help to generate local employment and income at the local level. The lower level

of regulatory requirement for timber production and transport from community managed forests and private forests can motivate the forest producers to engage themselves in timber business. The suggested intervention in different areas like CFUG, PF and DFO with the projected benefit is depicted in Figure 11.

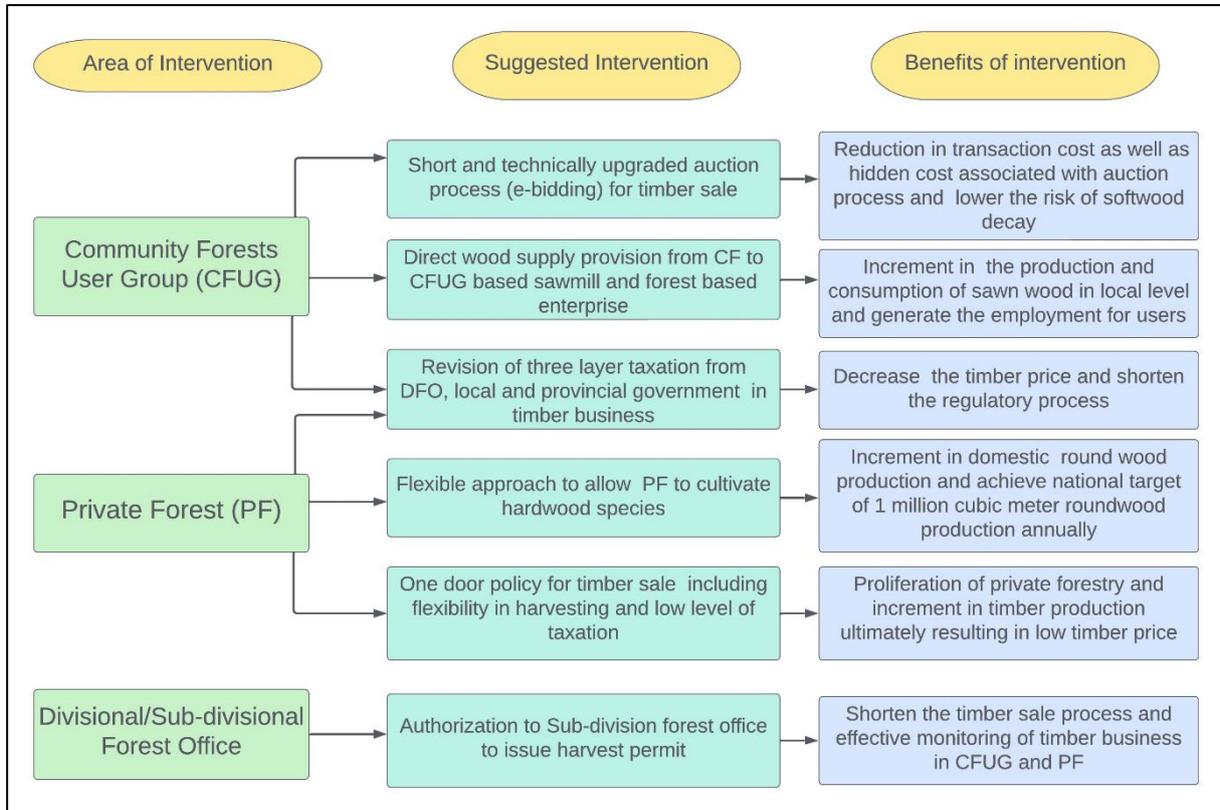


Figure 11: Suggested intervention in timber business in Nepal

Conclusion

Timber business in the Kavre and Sindhupalchok districts have good scope in contributing to the national economy and local livelihoods. However, the regulatory requirements, recalcitrant stakeholders, unavailing monitoring, and a gap between policy design and implementation have restricted the inclusive and equitable timber governance. DFO, CFUG, and private forest constitute the major producers of timber, sawmill and contractors are among the major investors, whereas FENFIT, FECOFUN are established as an association and networks. A level of synergy exists between these stakeholders; however, some kinds of conflict intervene during the regulatory tasks for the sale of timber.

The major challenge in regards to inclusiveness in timber business is lack of transparency and accountability within the user groups. Elite capture is dominant and nominal participation of smallholders in the use and sale of timber because of associated high price is prevalent. The extraction and transportation in the study area is completely manual resulting in loss of wood and increase in the price of timber. Further, the lengthy auction process that takes place at once for a larger lot of timbers has put on restriction to smallholders and sawmillers with lower investment to participate in the auction and undertake timber business. The complex regulatory requirements and involvement of multiple sectors in the administrative tasks have demotivated both CFUGs and private tree growers from investing in the timber business. On one hand, the complicated documentation process and on the other hand, extensive

price distortion from producer to consumer due to the involvement of various kinds of taxation, hidden costs, transportation and extraction costs and other additional cost has triggered illegal timber harvesting and their use. The high price of timber at all stages has restricted the smallholders from participating in the production as well as in the use of timber and has influenced expansion of timber alternatives like aluminum and UPVC.

Low import tax has elevated the import whereas higher export tariff has affected the traders willing to export their products to foreign countries. The timber business in Nepal lacks technological interventions at all levels and is short of human resources and capital, which has hindered the proper implementation of policies. Even though the policies related to timber governance are well documented and have incorporated several issues, their execution is still in a dilemma due to an ineffective monitoring system and inadequate resources. However, the timber governance has space for improvement in order to make it equitable and inclusive. This would require review and revision of policies, proper monitoring, financial support, proper coordination between stakeholders, simplified regulatory requirements, tax improvisation, and capacity development.

References

- Amatya, S. M., & Lamsal, P. (2017). Private forests in Nepal: status and policy analysis. *Journal of Forest and Livelihood*, 15(1), 120-130. <https://doi.org/10.3126/jfl.v15i1.23094>
- Aryal, K., Karky, B.S., Joshi, S.R., & Shrestha, A.J. (2016) Building timber value chains for REDD+ in Nepal. ICIMOD Working Paper 2016/9. Kathmandu: ICIMOD. Available online: <https://lib.icimod.org/record/32385>
- Aryal, K., Rijal, A., Maraseni, T., & Parajuli, M. (2020). Why is the private forest program stunted in Nepal? *Environ. Manag.* 66 (4), 535–548. <https://doi.org/10.1007/s00267-020-01343-z> .
- Aryal, U., Neupane, P. R., Rijal, B., & Manthey, M. (2022). Timber Losses during Harvesting in Managed *Shorea robusta* Forests of Nepal. *Land*, 11(1), 67. <https://doi.org/10.3390/land11010067>
- ATIBT, 2022. Legal framework for forest management and timber trade of China. International Tropical Timber Technical Association. Available online: <https://www.timbertradeportal.com/en/china/30/legal-framework#section-2> (accessed 29 June 2022)
- Bampton, J., & Cammaert, B. (2007). How can timber rents better contribute to poverty reduction through community forestry in the Terai region of Nepal. *Journal of Forest and Livelihood*, 6(1), 28-47.
- Baral, S., & Vacik, H. (2018). What Governs Tree Harvesting in Community Forestry—Regulatory Instruments or Forest Bureaucrats’ Discretion?. *Forests*, 9(10), 649. <https://doi.org/10.3390/f9100649>
- Basnyat, B., Baral, S., Tiwari, K. R., Shrestha, G. K., Adhikari, B., & Dahal, Y. N. (2020). Covid-19 outbreak, timber production, and livelihoods in Nepal. *Tribhuvan University Journal*, 15-32. <https://doi.org/10.3126/tuj.v34i0.31536>
- Bhatt, B. P., Chhetri, S. G., Silwal, T., & Poudel, M. (2021). Economic contribution of forestry sector to national economy in Nepal. *Journal of Resources and Ecology*, 12(5), 620-627. <https://doi.org/10.5814/j.issn.1674-764x.2021.05.005>
- CBS (2021). Preliminary report of Census 2021. Central Bureau of Statistics, Kathmandu, Nepal.

- 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 Nepal. *Small-scale Forestry*, 16(2), 195-218. <https://doi.org/10.1007/s11842-016-9351-0>
- DCC Kavre (2022). Brief Introduction of the Kavrepalanchok District. District Coordination Committee Kavrepalanchok, Nepal.
- DCC Sindhupalchok (2022). Brief Introduction of the Sindhupalchok District. District Coordination Committee Sindhupalchok, Nepal.
- DFOK (2021). Progress report of Fiscal Year 2020/21. Divisional Forest Office, Kavrepalanchok.
- DFOS (2021). Progress report of Fiscal Year 2020/21. Divisional Forest Office, Sindhupalchok.
- DFRS (2015). State of Nepal's Forests. Forest Resource Assessment (FRA) Nepal, Department of Forest Research and Survey (DFRS). Kathmandu, Nepal. Available online: https://frtc.gov.np/downloadfile/state%20forest%20of%20Nepal_1579793749_1579844506.pdf
- DFRS (2018). Forest Cover Maps of Local Levels (753) of Nepal. Department of Forest Research and Survey, Babarmahal Kathmandu, Nepal. Available online: [http://frtc.gov.np/downloadfile/Forests%20Cover%20Maps%20of%20Local%20Levels%20in%20Nepal%20Summary%20\(1\)_1568111767\(2\)_1572858696.pdf](http://frtc.gov.np/downloadfile/Forests%20Cover%20Maps%20of%20Local%20Levels%20in%20Nepal%20Summary%20(1)_1568111767(2)_1572858696.pdf)
- DOC (2020). Nepal Foreign Trade Statistics, Fiscal Year 2019/20. Department of Custom, Ministry of Finance, Singhadurbar, Kathmandu. Available online: https://customs.gov.np/storage/files/1/FTS/Annual_FTS_pdf.pdf (accessed on 10 May 2022)
- DoF (2015). Hamro Ban 2070/71. Department of Forests, Babarmahal, Kathmandu, Nepal.
- DoF (2016). Hamro Ban 2071/72. Department of Forests, Babarmahal, Kathmandu, Nepal.
- DoF (2017). Hamro Ban 2072/73. Department of Forests, Babarmahal, Kathmandu, Nepal.
- DoFSC (2018). Hamro Ban 2073/74. Ministry of Forest and Environment. Department of Forests and Soil Conservation, Babarmahal, Kathmandu, Nepal.
- DoFSC (2019). Hamro Ban 2074/75. Ministry of Forest and Environment. Department of Forests and Soil Conservation, Babarmahal, Kathmandu, Nepal.
- EFI (2016). South Asian Association for Regional Cooperation (SAARC) area cross border timber trade including regional institutional mechanism and Tradelink with Myanmar. European Forest Institute, Indufor.
- FAO (2014). Contribution of the Forestry Sector to National Economies, 1990-2011. By A. Lebedys and Y. Li. Forest Finance Working Paper. Forest Economics, Policy and Products Division, Food and Agriculture Organization of the United Nations Rome, 2014, Rome.
- FRTC (2020). Assessment of Forestry Sector Contribution to other Economic Subsectors, Government of Nepal, Ministry of Forests and Environment, Forest Research and Training Centre, Babarmahal, Kathmandu, Nepal.
- Geibler, J. V., Kristof, K., & Bienge, K. (2010). Sustainability assessment of entire forest value chains: Integrating stakeholder perspectives and indicators in decision support tools. *Ecological Modelling*, 221(18), 2206-2214. <http://dx.doi.org/10.1016/j.ecolmodel.2010.03.022>
- GOI (2014). National Working Plan Code, Forest Research Institute, Government of India. Available online: <https://www.forests.tn.gov.in/tnforest/app/webroot/img/document/gov-india-publication/11.pdf> (accessed 20 June 2022)
- GoN (1993). Forest Act. Government of Nepal (GoN), Kathmandu, Nepal, p. 27.
- GoN (1995). Forest Regulation, 2051. Government of Nepal (GoN), Kathmandu, Nepal.

- GoN (1996). Value Added Tax Act (2052). Government of Nepal (GoN), Kathmandu, Nepal.
- GoN (2002). Income Tax Act (2058). Government of Nepal (GoN), Kathmandu, Nepal.
- GoN (2003). Forest Product Auction Directive (2060). Government of Nepal (GoN), Kathmandu, Nepal.
- GoN (2011). Industrial Policy (2067). Government of Nepal (GoN), Kathmandu, Nepal.
- GoN (2014). Community Forest Product Collection and Sale Directive. Government of Nepal (GoN), Kathmandu, Nepal.
- GoN (2014a). Community Forest Development Guideline (2071). Government of Nepal (GoN), Kathmandu, Nepal.
- GoN (2017). Disaster Risk Reduction and Management Act 2017. Ministry of Law, Justice and Parliamentary Affairs, Kathmandu.
- GoN (2017a). Community Forest Economic Directive (2073). Government of Nepal (GoN), Kathmandu, Nepal.
- GoN (2019). The Forest Act 2019 (2076). Government of Nepal (GoN), Kathmandu, Nepal.
- GoN (2019a). National Forest Policy (2075). Government of Nepal (GoN), Kathmandu, Nepal.
- GoN (2020). Custom Tariffs 2020/21. Ministry of Finance, Department of Custom, Government of Nepal (GoN), Kathmandu, Nepal. Available online:
[https://customs.gov.np/storage/files/1/Custom%20Tariff/Customs%20Tariff%20%202077%20\(20-21\)%20Eng.pdf](https://customs.gov.np/storage/files/1/Custom%20Tariff/Customs%20Tariff%20%202077%20(20-21)%20Eng.pdf)
- GoN (2020a). Industrial Enterprise Act (2076). Government of Nepal (GoN), Kathmandu, Nepal.
- GoN (2022). Forest Regulation, 2079. Government of Nepal (GoN), Kathmandu, Nepal.
- Kanel, K.R, Shrestha, K., Tuladhar, A., & Regmi, M. (2012). A study on the demand and supply of wood products in different regions of Nepal. REDD—Forestry Climate Change Cell Babarmahal, Kathmandu, Nepal. Available online:
https://www.academia.edu/3589566/A_Study_on_The_Demand_and_Supply_of_Wood_Products_in_Different_Regions_of_Nepal
- Meilby, H., Smith-Hall, C., Byg, A., Larsen, H. O., Nielsen, Ø. J., Puri, L. & Rayamajhi, S. (2014). Are Forest Incomes Sustainable? Firewood and Timber Extraction and Productivity in Community Managed Forests in Nepal. *World Development*, 64: S113–S124.
<https://doi.org/10.1016/j.worlddev.2014.03.011>
- MOEF-FAO (2011). National forest and tree resources assessment. Ministry of Environment and Forests of Bangladesh and the Food and Agriculture Organization of the United Nations, Bangladesh Forest Department and FAO, Dhaka, 2011.
- MoF (2020). Economic Survey 2076/077 B.S. Ministry of Finance, Singha Durbar, Kathmandu.
- MOFE (2017). Forest Investment Program, Ministry of Forest and Environment, REDD Implementation Centre, Babarmahal, Kathmandu.
- MoFE (2020). Circular on Timber harvesting during Pandemic, 28 May,2020. Ministry of Forest and Environment, Singhadurbar, Kathmandu.
- MoFSC (2016). Forest Sector Strategy 2016-2025. Ministry of Forest and Soil Conservation, Singhadurbar, Kathmandu, Nepal.
- NFA (2008). Contribution of forestry sector to gross domestic product in Nepal. Department of Forest Research and Survey and Nepal Foresters Association, Babarmahal, Kathmandu, Nepal.

- NTIP (2018). Nepal Trade Information Portal. Ministry of Industry, Commerce and Supplies. Trade and Export Promotion Centre, Lalitpur, Nepal. Available online: <https://nepaltradeportal.gov.np/web/guest/home>
- Nuberg, I. K., Shrestha, K. K., & Bartlett, A. G. (2019). Pathways to forest wealth in Nepal. *Australian Forestry*, 82(sup1), 106-120. <https://doi.org/10.1080/00049158.2019.1614805>
- Pandit, P., Baniya, B., Cedamon, E., Nuberg, I., & Pandit, B.H. (2019). Rapid Private Forests Owners Survey in Kavre and Sindhupalchok Districts of Nepal, Research Paper Series on Improved Forest Management in Nepal, 2019-01:1-26.
- RGB (2017). Forest and nature conservation rules and regulations of Bhutan, Royal Government of Bhutan, Ministry of Agriculture and Forests. Available online: <http://extwprlegs1.fao.org/docs/pdf/bhu202103.pdf> (accessed 24 June 2022)
- RSS (2019). Country's dependency on wood increasing, timber import exceeds Rs 6 billion. My Republica. Available online: <http://myrepublica.nagariknetwork.com/news/70395/>
- Saigal, S. & Bose, S. (2003). Small-scale forestry enterprises in India: overview and key issues. Winrock International India, New Delhi and International Institute for Environment and Development, London (unpublished draft). Available online: https://rmpportal.net/library/content/frame/small-scale-forestry-enterprises-in-india-overview-of-key-issues.pdf/at_download/file (accessed 27 June 2022)
- Saxena, A., Buettner, W. C., Kestler, L., & Kim, Y. S. (2022). Opportunities and Barriers for Wood-Based Infrastructure in Urban Himalayas: A review of Selected National Policies of Nepal. *Trees, Forests and People*, 100244. <https://doi.org/10.1016/j.tfp.2022.100244>
- Schönenberger, W. & Brang, P. (2004). *Silviculture in Mountain Forests. Site-Specific Silviculture*, Elsevier, 1084-1094
- Shrestha, K. K., Paudel, G., Ojha, H., Paudel, N. S., Nuberg, I., & Cedamon, E. (2022). Community entrepreneurship: Lessons from Nepal's Chaubas community forestry sawmill. *Forest Policy and Economics*, 141, 102779. <https://doi.org/10.1016/j.forpol.2022.102779>
- Springate-Baginski, O., Dev, O. P., Yadav, N. P., & Soussan, J. (2003). Community forest management in the middle hills of Nepal: the changing context. *Journal of Forest and livelihood*, 3(1), 5-20.
- Subedi, B. (2019). Law amended to ease acquisition of forest land. *The Kathmandu Post*. <https://kathmandupost.com/money/2019/03/12/law-amended-to-ease-acquisition-of-forest-land> (accessed May 30, 2022).
- Subedi, B.P., Ghimire, P.L., Koontz, A., Khanal, S.C., Katwal, P., Sthapit, K.R. & Khadka Mishra, S. (2014). Private Sector Involvement and Investment in Nepal's Forestry: Status, Prospects and Ways Forward. Study Report, Multi Stakeholder Forestry Programme - Services Support Unit, Babarmahal, Kathmandu, Nepal. Available online: <https://ansab.org.np/publications/private-sector-involvement-and-investment-in-nepal%E2%80%99s-forestry--status,-prospects-and-ways-forward>
- Subedi, V. R., Bhatta, K. D., Poudel, I. P., & Bhattarai, P. (2018). Application of silvicultural system, yield regulation and thinning practices in natural forests: case study from western Terai. *Banko Janakari*, 27(3), 92-97. <https://doi.org/10.3126/banko.v27i3.20553>
- Thomas, C. A. (2007). Constituting forest communities in the hills of Nepal. *The International Journal of Biodiversity Science and Management*, 3(2), 115-125. <https://doi.org/10.1080/17451590709618167>
- UN Comtrade (2021). Nepal- Imports and Exports, World, Plywood, veneered panels and similar laminated wood, Value (US\$) and Value Growth, YoY (%), 2003—2017. Available online: <https://trendeconomy.com/data/h2/Nepal/4412>

- Uprety, D. R., Gurung, A., Bista, R., Karki, R., & Bhandari, K. (2012). Community forestry in Nepal: A scenario of exclusiveness and its implications. *Frontiers in science*, 2(3), 41-46. doi: 10.5923/j.fs.20120203.05
- World Bank (2021). A new and more sustainable era of Nepal's forests. World Bank Blogs. Available online: <https://blogs.worldbank.org/endpovertyinsouthasia/new-and-more-sustainable-era-nepals-forests-0>
- WWF (2012). Framework for Assessing legality of forest operations, timber processing and trade Annex in India. WorldWide Fund for Nature International. Available online: http://awsassets.panda.org/downloads/gftn_traffic_india_legal_framework_guidance_final.pdf (accessed 25 June 2022)

Annexes

Annex 1: Detail data on import and export

1) Import Data

S.N.	HSC	Commodity	Imported value in 2020 (USD)	Imported value in 2019 (USD)	Imported value in 2018 (USD)	Imported value in 2017 (USD)	Imported value in 2016 (USD)	Quantity imported in 2020	Unit
1	4401	Fuel wood, in logs, in billets, in twigs, in faggots; coniferous wood chips; wood pellets	4156.264463	77.89256198	1887.960248	2472.256198	0	5266422	KG
2	4403	Wood in rough; tropical wood or sawn	73991.3719	36340.91736	340007.3967	1917215.099	2851558.314	694	MTQ
3	4404	Coniferous and non-coniferous hoopwood:split poles: piles, pickets and stakes of wood	50145.75207	27255.06612	38124.94215	17365.04959	17910.73554	39806	MTQ
4	4405	Wood wool: wood flour	19902.01653	12855.99174	9661.809917	12943.64463	11964.17355	98140	KG
5	4406	Railway or tramway sleepers (cross-ties) of wood	0	516.2479339	95503.39669	349.0165289	1574.173554	0	MTQ
6	4407	Wood sawn/chipped lengthwise, sliced/peeled	2496662.264	1361245.917	4050046.702	10986041.5	9221204.711	64217	MTQ
7	4408	Veneer sheets & sheets for plywood & other wood sawn lengthwise	18012370.81	12849547.78	16935100.7	15756303	12175135.52	79658583	SQM
8	4409	Coniferous wood and tropical wood (including strips and friezes for parquet flooring, not assembled)	11185803.17	7680236.694	5284666.289	167531.8595	212604.5455	20713538	SQM
9	4410	Particle board	1665426.537	1268155.554	1610857.455	1582035.496	1012010.909	806149	SQM
10	4411	Fibreboard of wood and other ligneous material	4220911.537	3386875.603	4254253.471	3692332.62	2788038.893	1660866	SQM

11	4412	Plywood, veneered panels and similar laminated wood, block board	6794965.05	3643173.215	3810222.463	4046290.521	3778178.917	4058128	SQM
12	4413	Densified wood in blocks, plates	10068.81818	93478.12397	160422.314	115708.157	106590.7438	62323	KG
13	4414	Wooden frames for paintings, photographs, mirrors or similar objects	129174.2397	100544.4711	290518.5372	241033.8926	115518.8843	86021	KG
14	4415	Packaging materials of wood: cases, boxes, crates, pallets	40479.33058	31128.52893	244276.8347	304439.6281	68013	183768	PCS
15	4418	Bilders joinery and carpentry of woods	3137516.281	3422591.289	4701219.281	5632672.264	2963861.678	6494976/27481	KG/MTQ
16	9403	Wood furniture, for office, kitchen, bedroom	4962835.438	4159609.008	8167820.719	9883776.537	6121825.835	268042	PCS

2) Export Data

S.N.	HSC	Commodity	Exported value in 2020 (USD)	Exported value in 2019 (USD)	Exported value in 2018 (USD)	Exported value in 2017 (USD)	Exported value in 2016 (USD)	Quantity exported in 2020	Unit
1	4401	Fuel wood, in logs, in billets, in twigs, in faggots; coniferous wood chips; wood pellets	3678.280992	0	4189.090909	4142.413223	1443.966942	31680	KG
2	4403	Wood in rough; tropical wood or sawn	0	0	0	0	0		
3	4404	Coniferous and non-coniferous hoopwood:split poles: piles, pickets and stakes of wood	0	0	0	0	0		
4	4405	Wood wool: wood flour	0	0	0	0	0		

5	4406	Railway or tramway sleepers (cross-ties) of wood	0	0	0	0	0		
6	4407	Wood sawn/chipped lengthwise, sliced/peeled	0	0	0	0	0		
7	4408	Veneer sheets & sheets for plywood & other wood sawn lengthwise	13784.27273	2362.809917	31946.09603	24651.01628	45694.60331	2867	SQM
8	4409	Coniferous wood and tropical wood (including strips and friezes for parquet flooring, not assembled)	0	0	0	0	0		
9	4410	Particle board	0	0	0	0	0		
10	4411	Fibreboard of wood and other ligneous material	0	0	0	0	0		
11	4412	Plywood, veneered panels and similar laminated wood, block board	259946.0496	72410.72727	97726.49446	2637.41157	118380.5207	54390	SQM
12	4413	Densified wood in blocks, plates	0	598.8512397	0	0	0		
13	4414	Wooden frames for paintings, photographs, mirrors or similar objects	410.2396694	0	141.0371901	3098.412893	1537.123967	15	KG
14	4415	Packaging materials of wood: cases, boxes, crates, pallets	49390.73554	5877.495868	28137.38298	20841.35983	38950.09917	1215	PCS
15	4418	Bilders joinery and carpentry of woods	2204.553719	1048.264463	38562.0843	3836.91	12103.60331	834	KG
16	9403	Wood furniture, for office, kitchen, bedroom	84841.47107	88369.18182	123078.2387	107559.8678	86293.63636	12678	PCS

Annex B: Value Chain Analysis

S.N.	Activities	Cost Per Cft.		
		Pinus roxburghii	Pinus Patula	Uttis
	I. Field Costs			
1	Wood price from CFUG	200	100	100
2	Marking Chapan	10	10	10
3	Felling and Logging	30	20	20
4	Piling/Yarding	50	50	50
5	Loading	30	30	30
6	Transportation to Big cities	100	100	100
7	VAT	26	13	13
	Total	446	323	323
	Sub total II: Additional costs within district			
1	Municipality/RM	10	10	10
2	Province	5	5	5
3	Indirect cost(briber, local gangs)	40	25	25
4	Log Marketing	3	3	3
5	Transaction costs	10	5	5
6	Miscellaneous	10	5	5
	Total	78	53	53
	III. Additional cost in urban			
1	Unloading in KTM/Banepa	10	10	10
2	Yarding /Pilling	10	10	10
2	Miscellaneous	5	5	5
	Total	25	25	25
	Total A= I+II+III	549	401	401
1	Sawlog price upto Kathmandu	549	401	401
2	VAT	46	34	34
3	Sawn Milling Cost	40	40	40
4	Sawn Timber price adjusting recovery %	635	475	475
6	Yarding/Piling/Storage	10	10	10
7	Return on Investment and Profit	155	65	65
	Sawn timber price in big cities	800	550	550
	Recovery %= 60-65%			

Annex C: List of interviewed key informant

S.N.	Category	District	Name	Institution Name and Address
1	DFO/AFO	Sindhupalchok	Krishna Bdr Thapa	AFO, Divisional Forest Office, Sindhupalchok
2	DFO/AFO		Shankar Thapa	AFO, Subdivision Barahbise
3	CFUG		Sukabir Shrestha	SansariDanda CF
4	Private Forest/tree grower		Krishna Bdr Shrestha	Chautara Sangachwok Municipality-7
5	Private Forest/tree grower		Lok Bdr BK	Chautara Sangachwok Municipality-7
6	FECOFUN		Janak Giri	FECOFUN Sindhupalchok
7	Middleman		Lok Bahadur Giri	Raj Furniture Bhaktapur (Agent)
8	Sawmill		Padam Bdr Shrestha	Jugal Sawmill
9	DFO/AFO	Kavrepalanchok	Nucche Shrestha	AFO, Divisional Forest Office
10	CFUG		Chandra S Lama	Dharapani CF
11	Private Forest/tree grower		Jhamka Pd Chaulagain	Chaubas
12	Private Forest/tree grower		Netra Prasad Chaulagain	Bhumlu 4 Chaubas
13	Middleman		Sunil Lama	Anil Sunil Sawmill (Agent)
14	Major trader	Banepa/ Bhaktapur/ Kathmandu	Madhav Mani Humagain	Banepa Sawmill/FENFIT
15	Furniture/Plywood		Rajan Baidar	Anil Sunil Sawmill Banepa
16	Major trader		Keshav GC	Anupa Sawmill Pepsicola
17	Furniture/Plywood		Raj Machasi	Raj Furniture Bhaktapur