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Timber Distribution Dynamics in Scientifically Managed Community Forests: Learning from Nepal

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Abstract: In a bid to address growing timber demand, irregular shelterwood system-based scientific forestry gained momentum in Nepal in 2000. While timber production, in general, is said to have witnessed an increase, the outcomes linked to equitable distribution among users remain unclear, suggesting the need for context-specific studies on the performance of scientific forestry in terms of timber distribution among users. Taking the case of the Western Terai Region of Nepal, this paper provides an in-depth analysis of the patterns and implications of timber distribution under community forestry systems where scientific forest management (SciFM) is practiced. The study deployed focus group discussions (n = 4), key informant interviews, and a review of timber distribution processes for the past six fiscal years (2013–2019), the periods before and after the implementation of SciFM. For data analysis, a deductive approach was used; analytical themes were framed along the lines of timber-harvesting trends, timber distribution structure and processes, and timber distribution patterns based on wellbeing. The study revealed a substantial increase in timber harvesting; considering the base year, harvest increased by 45% in the second year and by 56% in the third year. This was, however, characterized by a 40% decrease in the average volume of timber for users within the community forest user group. Ninety-seven percent of the timber produced in this system was distributed among middle- and high-class groups, with only 3% available for poor households—this puts to question the intended objective of providing sufficient timber, especially to poor users. The paper concludes that technocentric efforts linked to increasing timber sufficiency (e.g., through SciFM) have failed to address the needs of the poorest of the poor, as elite capture prevails. We also call for future studies to explore pathways to deal with the hydra-headed nature of elite capture.

Keywords: silviculture; timber distribution; benefit-sharing; elite; community forestry

1. Introduction

With more than four decades of practice in community forestry (CF), Nepal stands as a notable example of decentralized forest management in the Global South [1–3]. The foundation of CF was laid within the framework of the 1976 National Forestry Plan and the Forest Sector Master Plan of 1988 [4]. Further provisions such as the Forest Act of 1993, the 1995 Forest Regulation, and, recently, the Forest Act of 2019, backed up this process. The 2019 Forest Act defines community forests (CFs) as "any part of national forest that has been handed over to users for the development, protection, utilization, and management of forest resources" [5]. As an autonomous body, community forest users have the right to develop, use, and manage the forest and sell and distribute forest products by fixing the prices

themselves [1]. With its primary objectives to enhance forest conservation, it sought to empower forest users to manage forests for their livelihoods [6,7].

The outcomes of CFs in terms of ecological restoration [8,9], livelihood improvement through income generation [10–13], and community development [14–16] have been investigated. However, its contribution to the national economy was rated as low, considering that timber—a main income generator—was still in insufficient supply [17–19]. It has also been criticized for being protection-focused [20,21]. This drawback led to the introduction of scientific forest management (SciFM), a silviculture system-based forest management approach to enhance forest productivity and contribute to the local and national economy [22]. This system largely focused on timber harvesting [23,24], where the forest management plan allows community forest user groups (CFUGs) to cut mature green trees alongside dead, decay, dying, and deformed trees (4Ds), as opposed to the previous plan that restricted timber harvesting to only 4Ds. Thus, the traditional protection-oriented forest management focused only on removing 4Ds. This has created over-mature forests with different age categories [25]. SciFM gained momentum after the enactment of the revised forest policy in 2000 [26,27], which was initiated with the aim of removing over-mature trees to meet the current timber and fuelwood demand and promote natural regeneration. Equally, it stresses the need to increase production and productivity, considering local demand, while commercializing the forest for prosperity [28]. To date, it has been implemented in 285 community forest user groups (CFUGs) across Nepal [29]. CFs are primarily selected based on their timber production potential [26]. Similarly, the selection is guided by the maturity of the forests, their poor regeneration conditions, and dense canopy cover. In the Terai sal (*Shorea robusta*) forest, SciFM is applied through an irregular shelterwood system [30,31]. In this system, the forest area, considered one compartment, is divided into eight subcompartments, assuming an 80-year rotation age and a 10-year regeneration interval [32]. Different activities are carried out in different subcompartments; for instance, regeneration felling, intermediate felling, and final felling are conducted in one of the subcompartments, whereas in other subcompartments, activities such as thinning and cleaning are conducted.

Studies on SciFM to date, in Nepal, have largely concentrated on silviculture practices [33–35], stakeholders' opinion [27,31,36], users' participation [37–39], and their financial implications [26]. Recent scientific evidence points to the fact that SciFM has commodified CFs towards timber production by emphasizing the economic rationale and controlling access to forest products (e.g., timber) for the poor and marginalized [26]. However, issues linked to the dynamics of timber distribution and its implications at the user level are yet to be explored. Timber has always been one of the key income sources in community forestry in Nepal [14,15], making it a major source of contestation in the Terai region of Nepal, particularly around its distribution. The Terai region is a lowland region of Nepal that lies south of the outer foothills of the Himalayas, the Sivalik Hills, and north of the Indo-Gangetic Plain. It occupies 2,016,998 ha of the total land area of the country. The region is located in a subtropical climate zone characterized by hot and humid summers, intense monsoon rain, and dry winters [22,40]. Recent studies on timber have focused on its income potential and contribution [14].

The studies by Basnyat [23,26] and Yadav [41] have signaled some plausible inferences: (1) Increasing timber production in Nepal's CFs is not unconnected to technocentric interventions (e.g., through SciFM), (2) an increase in timber production is a necessary but insufficient condition to meet household livelihoods and poverty needs in scientifically managed CFs of Nepal, and (3) dealing with the hydra-headed nature of elite capture is, without doubt, a perennial and seemingly unresolved problem in Nepal's CFs. Taking the case of Western Terai, this paper provides an in-depth analysis of the patterns and implications of timber distribution under community forestry systems where scientific forest management (SciFM) is practiced. Particularly, it deals with two key questions: (i) how does the CFUG institution function in the timber harvesting and distribution process?, and (ii) what is the timber distribution pattern at the user level after SciFM implementation in community forests? An understanding of timber harvesting and distribution dynamics at the CFUG level could provide relevant insights on issues of equity with regard to timber distribution and benefit-sharing.

Equity in practice in community forests is always an issue of contestation. The Forest Act 2019 and the revised Community Forest Development Guideline of 2014 devolved forest management rights to the community, including reinvestment rights to CFUGs, and clearly stipulates how CFUGs should reinvest their income in community development, forest development, women, and pro-poor activities [14]. Equally, there is the heterogeneity of committee members, where representation in terms of caste, class, culture, and gender is assured [42]. However, several studies have argued that the poor and marginalized benefit less [43–45]. The structural and procedural arrangements in community forest user groups allow elite domination [46]. Usually, the local elite who hold power and wealthier households are selected more frequently than poor and marginalized users for the executive committees [46–49], which are the key decision-making bodies in CFUGs.

Thus, the evidence from this study could further substantiate the need to revisit the governance architecture of Nepal in order to deal with systemic hold-ups that breed inequity. This represents a scientific and policy exigency if SciFM is to meet its intended objectives. The findings will equally be a significant learning avenue for other CBFM regimes in this region that are revisiting community forest governance.

2. Materials and Methods

2.1. Case Study in Community Forest User Groups

The case study was conducted in the Bijaya CFUG, located in the Madhyabindu municipality of Nawalpur district in the western Terai region of Nepal (Figure 1). The CFUG is located at the midpoint of the east–west highway. The CFUG covers a total forest area of 161.72 ha, including 153.72 ha of productive forest. The forest is dominated by productive hardwood Sal (*Shorea robusta* Roth) forest managed under the irregular shelterwood system, with eighty years of cutting cycle. The operational plan under SciFM covers 153.72 out of the 161.72 ha of total forest (Table 1). Its implementation began in 2016.

Table 1. Description of the study site.

CFUG Name	Handover Date as CF	Total Forest Area (ha)	Total HHs Involved	SciFM Started Date	Forest Type	Major Forest Species
Bijaya Community Forest, Nawalpur Nepal	2011	161.72	358	2016	Terai mixed hardwood natural forest	*Shorea robusta* (≤80%) Roth, *Syzigium cumini* (L.) Skeels., *Terminalia chebula* Retz., *Terminalia belerica* (Gaertn.) Roxb.

CFUG: Community Forest Users' Group; CF: Community Forest; HHs: Households; SciFM: Scientific Forest Management.

The forest is managed by 358 households, represented by mixed groups of community and wellbeing ranking. The CFUG has categories of users based on their wellbeing ranking, which is characterized by the presence or absence of concrete houses, business, jobs, and landed property. The rich users are those who have 4- to 5-story concrete houses, stable businesses and jobs, and private vehicles. The middle category of users has 1- to 2- or 3-story concrete houses, some businesses or jobs, and is engaged in agriculture. Poor users have houses made of timber-plank walls, tin roofs, labor jobs, and no registered landed property.

Terai forest is a mixed hardwood forest dominated by Sal (*Shorea robusta*) species. The majority of the forest is natural, with mature stands. In our case study site, more than 80% of the forest is dominated by the Sal species, which is one of the key hardwood species of the Terai forest, with a high market value. Similarly, Sal timber is one of the major income sources of the Bijaya CFUG, which contributes approximately 80% of the total annual income of the CFUG. In the case of the Bijaya CF, an 80-year rotation, with a 10-year regeneration period, is in practice under an irregular silviculture system. The SciFM forest area, i.e., 153.72 ha of forest that is considered as one compartment, is divided into eight subcompartments, i.e., from C1S1 to C1S8 (Figure 1). Based on the availability of mature

trees and accessibility of harvesting, C1S5 was selected as a regeneration felling subcompartment that has comparatively more mature trees.

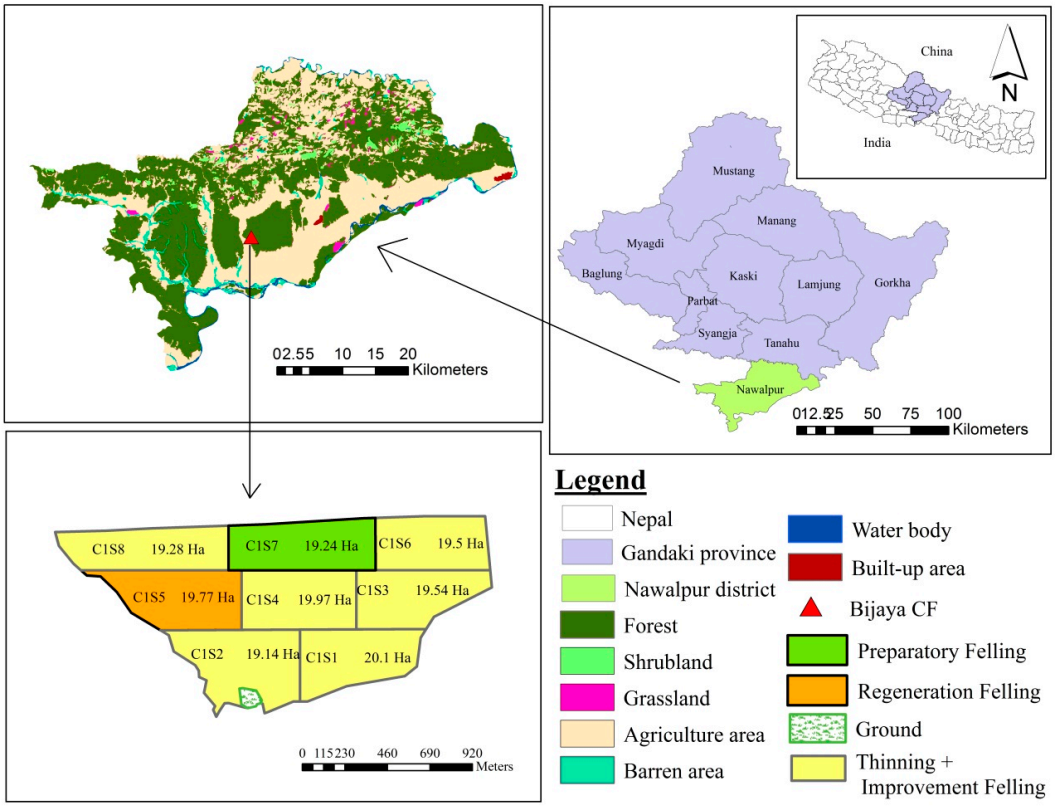

Figure 1. Location map of the study area (Source: Operational plan of the community forest user group (CFUG), 2016).

2.2. Data Collection

To obtain the relevant data for the study, we categorized the data collection process based on our objectives and the intended results. We collected data to analyze (i) timber harvesting and distribution structure and process, (ii) timber-harvesting trends, (iii) timber distribution patterns, and (iv) timber distribution based on the users' wellbeing category. For this, we used a descriptive and narrative approach comprised of the analysis of timber harvesting and distribution structure and institutional setup and the established process adopted for timber distribution at the CFUG level. Similarly, we analyzed timber harvesting and distribution patterns for the last six fiscal years (2013/2014 to 2018/2019), comparing it before and after SciFM implementation. Equally, we categorized the CFUG based on the wellbeing (rich, middle, and poor class) of the users and analyzed the timber distribution pattern amongst these groups in the community forest after the implementation of SciFM. The analysis provides an average result for the three fiscal years (2016/2017, 2017/2018, and 2018/2019). The detailed process and instruments used are discussed below. We began by undertaking a review of timber distribution processes for the last six fiscal years (2013 to 2019) in the targeted community forest user group. This led to the generation of data on the timber supply pattern. Similarly, relevant governance documents (the CFUG's operational plan, minutes, and timber sales records) were reviewed to understand relevant information at the user level of the institutional setup and forest management activities of Bijaya Community Forest.

For data collection, two key instruments were employed: a focus group discussion guide (8 items) and a key informant interview guide (12 items). These instruments were developed to capture issues linked to timber harvesting, decision-making and timber distribution, institutions and processes linked to timber supply, the role of users and divisional forest officers (DFOs), and the executive committee.

In total, we conducted four focus group discussions (FGDs): one with CFUG EC members (11 members; 6 males and 5 females), one with general users (15 users in the mixed group), one FGD with Dalits and Janjatis (Dalits are usually lower caste people, representing marginalized and disadvantaged groups with poor social status; Janjatis refer to Adivasi, a general term in Nepal meaning primitive ethnic groups; 10 user households), and one with Brahmin and Chhetri (Brahmin and Chhetri generally represent the higher caste groups, with strong social status; they usually lead in decision-making positions; 10 user households). Each FGD lasted between two hours and two hours and thirty minutes. The discussions were carried out with open-structure questions, and the information obtained was recorded on field notes used for further analysis. Discussions focused on the status of forest consumption and timber distribution patterns at the household level before and after the implementation of SciFM. Equally, we discussed user roles in timber harvesting and distribution and the relationship between the user's wellbeing class and timber distribution.

From each focus group, we identified key informants and conducted in-depth interviews with them to profoundly unearth some issues that might not have been openly discussed. We primarily focused on how timber is distributed and how timber distribution decisions are made, who leads the decision making, and why. In the case of timber harvesting and distribution structure and processes, we focused on how the EC and members associated with EC were extensively involved in the timber distribution process at the CFUG level, and there was no role for other users in this process. Importantly, we analyzed the criteria for selecting the timber received by user households. In all, there were eight key informant interviews (KIIs): three from executive committee members, three from general users, including women members, and two from ethnic group members. This process helped us to gain insight into each of the key stakeholders' impression of the SciFM implementation, particularly on timber distribution and the associated benefits (Figure 2). It was easy to organize the respondents since the first author has worked with these groups over the years. We explained the motives behind the research to the participants, and they were assured of confidentiality. Field notes were used to record the data. The data obtained were transcribed and coded. Based on the coded data, we summarized this information in the narratives presented in the results section. All of the informants selected were between the ages of 35–60 years, and they were considered to be experienced enough to share their views on the situation as it unfolded over the years.

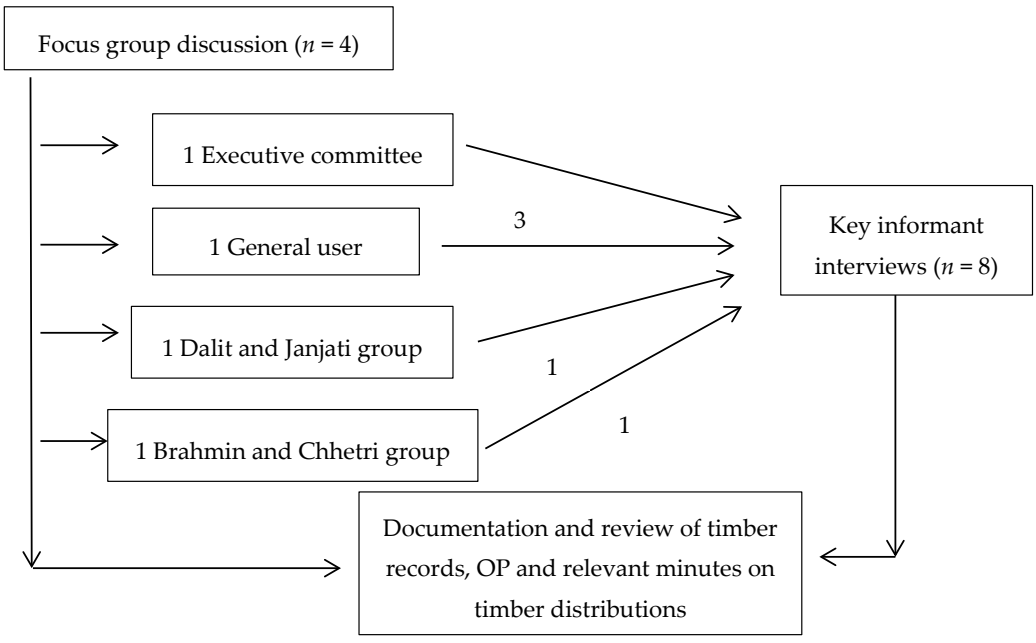

Figure 2. Data collection flow chart.

Similarly, the timber supply records before SciFM (fiscal year 2013/2014, 2014/2015, and 2015/2016) and after the implementation of SciFM (2016/2017, 2017/2018, and 2018/2019) were collected and minutely reviewed. Equally, the wellbeing ranking of household members was categorized as poor, medium, and rich based on the operation plan in order to investigate timber supply patterns at each level. The documents on timber records, like CFUG minutes, bills of timber sales, audit reports, and timber distribution, were reviewed. First, we recorded the total timber harvested on an annual basis for all the six years, followed by the record of the timber distribution to users and other stakeholders in each fiscal year from 2013 to 2019. The information from these records, coupled with the interviews and FGDs, guided the derivation of issues linked to inequitable distribution of timber among different groups of users in order to understand the hydra-headed nature of elite capture in the entire process.

2.3. Data Analysis

Timber Supply Analysis

We adopted a deductive approach [50,51], as the research questions were developed following analytical themes prior to data collection. The themes were framed along the lines of timber-harvesting trends, timber distribution structure and processes, and timber distribution patterns based on wellbeing. Based on these themes, thematic analysis and narratives were employed in the analysis. This was characterized by the transcription of the participants' diverse opinions, including the use of direct quotes and extracts from field notes, to shed light on the discussion. The data obtained from focus group discussions, KII and CFUG minutes, timber distribution records, the CFUG operational plan, and the constitution were reviewed, coded, and entered into MS Excel and the Statistical Package for Social Science (SPSS). First, the timber harvesting and distribution structure and processes at the CFUG level were minutely analyzed. Then, the total amount of timber harvested in each fiscal year was calculated, and it was analyzed and presented in terms of average annual timber harvested before and after SciFM implementation. Then, the timber distribution pattern to user households and other stakeholders was calculated and presented. It was calculated by the total share of timber between users and other stakeholders as per the annual timber distribution records maintained at the CFUG. Equally, the share of timber between the different stakeholders was calculated in percentage by comparing it with the total harvested timber. Finally, within the user's category, we calculated timber distribution between wellbeing rankings. In this procedure, the data were processed and reviewed to verify accuracy before being analyzed using basic descriptive statistics. The results are presented in the form of graphs, tables, and figures, with narrative discussion and individual quotes. All the analysis is further categorized based on the timber demand and supply pattern before and after the implementation of SciFM. While developing the results and discussion along with analyzing the quantitative data, the quantitative information and data obtained from FGD and KII were equally articulated and presented, essentially in the form of quotes and statements. Equally, this information assisted in the quantification of data obtained from the CFUG records.

3. Results

3.1. Timber Harvesting and Distribution Dynamics at the CFUG Level

Our result depicts a substantial increase in timber harvesting after SciFM implementation in the CFUG, with an increasing trend in the first three years of SciFM implementation. This was, however, characterized by a 40% decrease in the average volume of timber for users within the community forest user group. Ninety-seven percent of the timber produced in this system was distributed amongst middle- and high-class groups, with only 3% available for the poor households. Similarly, the results show that the timber harvesting and distribution structure is dominated by the elite and well-off groups. This has created an avenue for the elite and decision-makers around timber governance to reap benefits after the implementation of SciFM.

3.1.1. Timber Harvesting and Distribution Structure and Processes

The results here describe the institutional structure and process adopted by the Bijaya CFUG for timber harvesting and distribution at the user level. Additionally, it compares and contrasts the bureaucratic processes and complexities around timber harvesting and distribution.

Timber harvesting is one of the key activities of CFUGs that is carried out annually. It is the key source of income for the CFUGs. Though the amount of timber to be harvested is mentioned in the CFUG operational plan (OP), CFUGs need formal permission from the District Forest Office to harvest timber. They have to pass through a series of steps that need to be consciously followed by the CFUG to procure a harvesting permit [52]. According to Puri et al. [53], each year, CFUGs follow at least nine steps before they get final approval from the DFO for distribution and sale of the timber from their CFUGs. To achieve this, CFUGs visit this service at least 20 times to get through this process. During this process, the involvement of the executive committee (EC) with the forest authority is significant, where the forest authority is directly or indirectly involved throughout the harvesting process. This shows that the decision of forest product harvesting in CFUGs, particularly timber, still hinges on the forest authority [54] and the nexus between the EC and the forest authority. Additionally, the process is further complicated if the timber has to be sold to people other than community forest users.

Case of Bijaya Community Forest User Group on Timber Distribution Structure and Processes

In the case of timber distribution in the Bijaya CFUG, the EC is the main institutional structure that makes the decisions on timber distribution. However, the CFUG also has a monitoring committee that monitors the needs of the users based on timber demand applications, analyses them, and presents them to the EC for the final decision (Figure 3).

In the Bijaya CFUG, we found the monitoring committee to be a subset of the EC, which comprised the members from the EC. It usually monitors cases of timber demand by the users and ensures that it will not be misused. Generally, the EC opens the timber call and collects the timber demand from the users. This is minutely analyzed, verified, and assessed through user household visits by the monitoring committee formed for this purpose. After finalizing the user households that are eligible to get timber, the committee forwards the list to the executive committee for a final decision. Finally, the EC, through its meeting, finalizes the list and the amount of timber to be distributed to users. The timber distribution criteria are as follows: (i) first come first serve to the schedule, i.e., the user who applies first can claim timber first, (ii) users have to initiate building their house before they claim timber, and they have to show proof of it, (iii) the users who want to build multistory houses will be supplied more timber, and (iv) the timber is graded into A, B and C grades and it is priced as follows: Grade A = NRs1000/cft Grade B = NRs900/cft, and Grade C = NRs800/cft.

The price of the timber is finalized from the meeting of the CFUG, where all the users agree on the price. However, such a meeting is usually dominated by rich and middle-class users who dominate the decision-making. Similarly, the amount of timber to be distributed to the users depends on the annual demand obtained from them. However, after the implementation of SciFM, the CFUGs need to provide 25% of the remaining timber, after fulfilling user demand, to *Apurti*, and the remaining 75% is sold to contractors through an open tender. *Apurti* is a formal committee in the Divisional Forest Office, named "District Ban Paidawar Apurti Samiti", which distributes timber to the general population in the district, collecting the surplus timber from CFs and government-managed forests. One of the executive committee members briefly presented the situation:

> *"The timber demand from users is increasing annually, and we have tried our best to fulfill it. We give priority to those users who have already started constructing their houses. Equally, after SciFM implementation, we are also selling timber to contractors. When we sell to contractors, we receive substantial income and this is an opportunity for us to increase our income".*

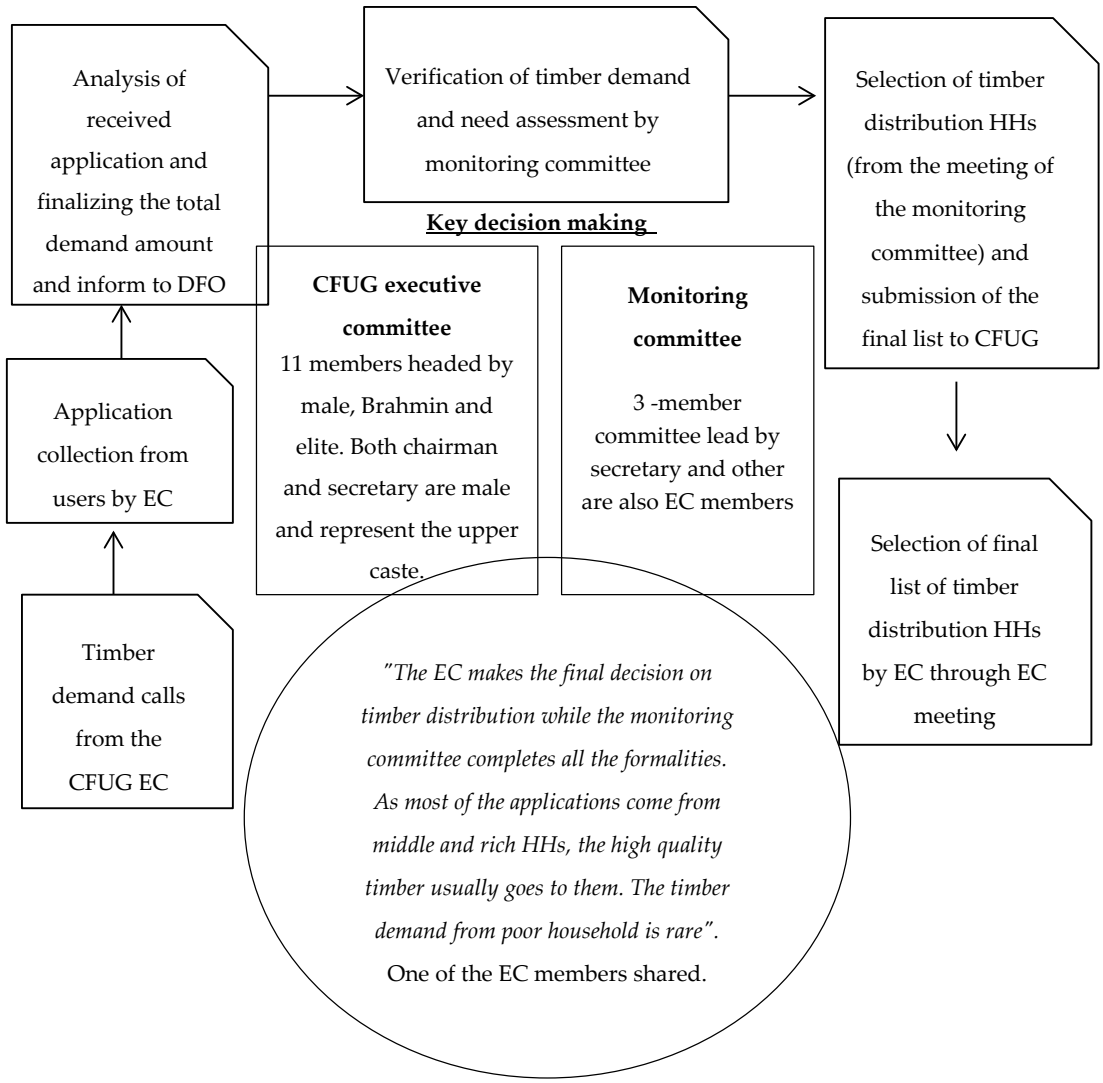

Figure 3. Timber distribution decision-making process at the CFUG level.

3.1.2. Timber-Harvesting Trend

We found a substantial increment in timber harvesting after the implementation of SciFM. Before SciFM implementation, the three-year (fiscal year 2013/2014, 2014/2015, and 2015/2016) average timber harvest was 1567.7 cft/year. This increased by 3.5-fold after SciFM implementation, i.e., 5912.16 cft/year within three fiscal years (2016/2017, 2017/2018, and 2018/2019; Figure 4). Similarly, after SciFM, the annual timber harvest showed an increasing trend. In the fiscal year 2016/2017, it stood at 3481.9 cft. This increased to 6282.83 cft in the fiscal year 2017/2018 and 7971.77 cft in the fiscal year 2018/2019. With reference to the year 2016/2017, the first year of the SciFM implantation, in the second year (2017/2018), the harvesting increased by 45%, and, in the third year, it increased by 56%. The increase in timber harvesting after SciFM, compared with before SciFM implementation, is due to the irregular shelterwood system employed in scientifically managed community forests. This system allowed harvesting of all mature trees in felling subcompartments except some mother trees (around 20–25 mother trees/ha). Equally, all 4Ds are also removed from all other compartments.

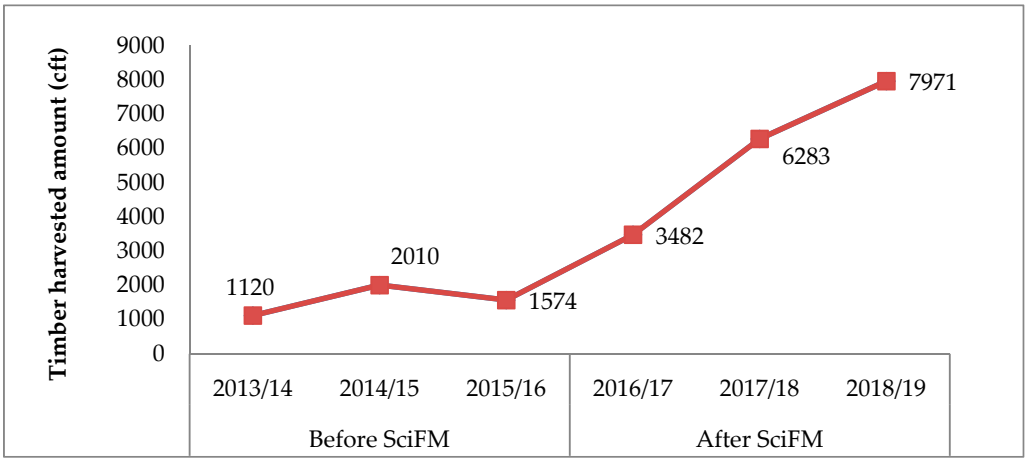

Figure 4. Timber harvesting trend before and after scientific forest management (SciFM).

3.1.3. Timber Distribution Pattern

We found a difference in the volume of timber distribution before and after SciFM implementation. Before SciFM implementation, the total harvested timber distributed to the user households was 1567.7 cft/year on average. However, after SciFM implementation, the harvested timber was shared with timber for the contractors and *Apurti*. The average share of timber for contractors was 1613.15 cft/year and 703.91 cft/year for the *Apurti*. Furthermore, an increasing trend in the distribution of timber to the users in each fiscal year (3595.1 cft/year) was observed. However, it is lower than the average amount of the annual harvesting of the timber in the CFUG after SciFM (5912.16 cft/year on average).

On average, we found a 40% decrease in the distribution of timber to the users than that of actual annual harvesting of timber in the CFUG after SciFM implementation (Table 2). Additionally, an increasing trend in the supply of the timber to contractors and *Apurtis* in each of the fiscal years were observed. Thus, in terms of timber supply, the involvement of other stakeholders besides users, such as contractors and *Apurti*, had increased after SciFM implementation in CFUGs. The proportion of timber distributed to contractors increased from 14% in the year 2016/2017 to 31% in 2018/2019, while that for the *Apurtis* increased from 3% to 19% within the same period (Table 2). The result points towards an interesting fact that there is a decreasing amount of timber supply to users and an increasing amount of supply to contractors and *Apurtis* although the timber harvesting amount has increased annually after SciFM implementation. This raises a question as to whether the implementation of SciFM was meant to serve the needs of these bodies or to narrow the supply gap for the peasant forest users. The total volume of timber distributed to users seems to be on the increase; the percentage share of timber to users was found to be on the decline, i.e., the total volume of timber distributed to users in fiscal year 2016/2017, 2017/2018, and 2018/2019 was 83%, 61%, and 50%, respectively. Although, in general, an increase in supply was observed even for users, this did not favor the lower wealth class, as will be discussed below.

Table 2. Timber distribution pattern before and after SciFM implementation at the CFUG level.

Forest Management Intervention	Fiscal Years	Total Amount of Timber Harvested (cft)	Timber Distributed (cft)			% of Timber Distributed		
			Users	Contractor	Apurti	Users	Contractor	Apurti
Before SciFM implementation	2013/14	1120	1120	0	0	100	0	0
	2014/15	2010	2010	0	0	100	0	0
	2015/16	1574	1574	0	0	100	0	0
After SciFM implementation	2016/17	3482	2905	482	95	83	14	3
	2017/18	6283	3809	1857	617	61	30	9
	2018/19	7971	4071	2501	1400	50	31	19

3.2. Timber Distribution Based on Users' Wellbeing Category

We categorized the CFUGs based on the wellbeing (rich, middle, and poor classes) of the users and analyzed the timber distribution pattern amongst these groups in the community forests after the implementation of SciFM. The analysis provides an average result for the three fiscal years (2016/2017, 2017/2018, and 2018/2019) after the implementation of SciFM. According to the CFUGs' wellbeing category, the rich class of people has their own private businesses in city centers like Kathmandu and other cities of Nepal. They are involved in jobs. This group of users rarely attends CFUG meetings and other events. The key positions and decision-making are largely occupied by middle-class users, who are heavily involved in CFUG activities. More than 90% of decision-making positions, including in the EC, are occupied by middle-class users. Poor users are key forest dependents, and they are mainly tasked with daily labor and have weak representation in the ECs.

Timber Distribution Based on the Wellbeing Category

On the basis of distribution across wellbeing groups, the middle-class users consume a higher portion of timber, followed by the rich and poor users (Figure 5). We found 88% of timber was consumed by middle-class users in the last three years of SciFM implementation. This user group dominates CFUGs in terms of user numbers and also dominates the decision-making bodies, like the EC and subcommittees. Only 3% of timber is distributed to poor households.

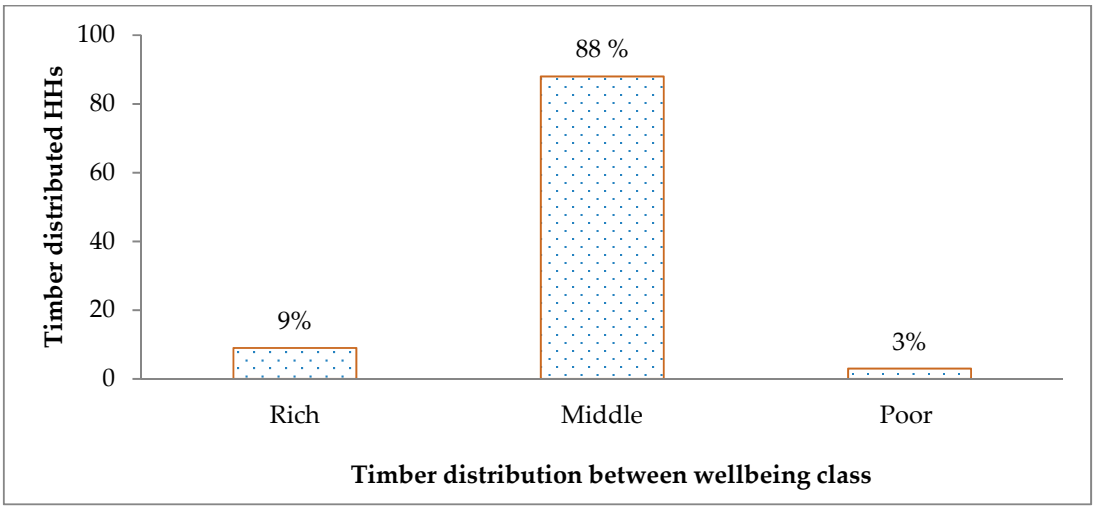

Figure 5. Timber distribution between wellbeing classes after SciFM implementation.

One of the users (representing poor households) shared his plight,

"We cannot afford to buy timber from the CFUG, it is for those users who can construct good houses and can influence the decision to their favor. How can we build a concrete house, which is the prerequisite to getting timber from our CFUG?"

In the same light, the predominantly middle-class executive members justified their actions by indicating that fewer valid requests are received from the low-class users:

"I agree, the majority of the timber goes to middle-class households. This can be clearly seen from this year's timber demand—there were very few timber demands from poor households. The problem is from the fixing of the price as there is always a meager voice of marginalized and poor groups while fixing prices. The middle class dominates the decision-making process. Equally, the timber distribution criteria discourage them and they cannot afford it. We should rethink the timber distribution system and address the concern of poor and marginalized groups. I am planning to put these issues in the

upcoming EC meeting. There is a misuse of timber by this privileged group (middle class), and the elite also benefit from the provisions developed for poor and marginalized groups."

4. Discussion

SciFM implementation in Nepal has been echoed as a solution towards the established misfortune linked to passive forest management and a blanket policy approach, which contributes to the significant loss of forest resources and timber importation of more than 80% of the timber necessary to meet its domestic demands [55]. Traditional protection-oriented forest management was focused on removing dead, dying, and deformed trees, causing the forest area to be dominated by over-mature trees with a lack of proper age class [25]. This, on the one hand, limited the forest product supply to the local people, and, on the other hand, led to poor forest management. Thus, SciFM implementation was viewed as an approach to enable the forestry sector of Nepal to self-sustain its timber demands [27]. In line with this, our result contributes to this discussion and provides a clear picture of the current implementation of SciFM, concerning the pattern of timber distribution in the lowland region of Nepal. Additionally, it argues for CFUG governance, focusing on the CFUGs' institutional structure and functioning, which largely favor the local elite when it comes to decision-making and its implications in SciFM implementation. The elite in this paper refer to a small and dominant group of community members who hold or influence community forest user group decision-making in their favor or as per their interest.

Timber Harvesting and Distribution: How the Elite Dominate While Neglecting Concerns of the Poor

Community forestry has been criticized for being less productive [12,20,21,56]. Thus, the application of the SciFM scheme sought to increase forest product supply, particularly timber supply. Our result depicts a substantial increase in timber harvesting, with an increasing trend in the first three years of SciFM implementation. Along the same lines, Khanal and Adhikari [24] find that SciFM intervention has increased the harvesting of forest products from community forests. Similarly, the arguments by many scholars like Bampton and Cammaert [57] and Joshi et al. [31] also support that SciFM implementation is timber-focused. Equally, Basnyat et al. [23] describe Nepal's SciFM as timber-centric; users obtain a considerable amount of timber, and they invest time to harvest timber from the forest.

However, we found a decrease in the average volume of timber supply to users by about 40% after SciFM implementation, although the total volume of timber distributed to users seems to be on the increase. Likewise, after SciFM, timber was sold more to outside stakeholders than to users, e.g., contractors and the *Apurti*, and, interestingly, as the annual harvesting of the timber increases, the timber sales with these agencies increases. The remaining timber, after fulfilling the demand of users, is auctioned to contractors—this explains the largely skewed supply towards *Apurtis*. However, huge differences in the timber transaction amount between users and contractors and *Apurtis* have created some timber governance irregularities and provided a hidden opportunity to directly involve stakeholders. Equally, CFUGs take this as an opportunity to increase their annual income. This indicates that although the benefits after SciFM exceeds traditional protection-oriented management systems [24], CFUGs prioritize timber sales to contractors and outside stakeholders instead of fulfilling user demands and local needs. One of the CFUG committee members succinctly presents the situation:

"Though the annual allowable timber harvesting has noticeably increased after we initiated SciFM in our forest, timber distribution issues have been encountered. Last year, 2665 cft of timber was put for auction by the CFUG. However, the auction price (NRs 1200–1300/cft) put by the contractor was far less than the market price of the timber (the market amount is around NRs2000–2200/cft). We suspected that there should be some issues as the difference in the market and auction rates could benefit middlemen, while the CFUG loses about NRs 2.6 million. Thus, we dissolved that auction process and reopened it, and, finally, we sold at the market price of NRs 2000–2200/cft".

This shows that the timber distribution process has created an avenue for the elite and decision-makers around timber governance to reap benefits after the implementation of SciFM. The complicated bureaucratic process during timber harvesting and the chain of involvement of forest technicians while allowing timber-harvesting decisions, the extensive involvement of the EC, no role for users in the timber distribution process at the CFUG level, and, importantly, the criteria for selecting how much timber to be received by user households, largely ignores poor community forest users in favor of forest technicians and the local elite. This has consciously or unconsciously created a narrative around timber—"timber is not for poor and marginalized households; it is a business for the elite". Basnyat [26] supports this view by stating that CFUGs give first priority to selling timber on the market or to the local elite while neglecting local user demand, particularly the poor and marginalized groups. Both elite capture and bureaucratic control govern this process. Thus, this system could ultimately decrease user participation in decision-making and forest management activities [31,39,58].

Among the wellbeing classes, timber benefits substantially remain within the elite and dominating class. For example, 97% of timber each year is distributed to the dominating middle class and rich class user households. However, very little timber is provided to poor households. On the other hand, the decision-making bodies, like the EC, are dominated by the elite users, where out of 10 members of the EC, 8 are from middle class user households, who are the key elite in CFUGs. Elite capture issues in CFs have been extensively reported, revealing how well-off users manipulate and capture timber transactions to the detriment of poor and marginalized groups [57,59,60]. Although there is no clear policy and guideline for the equitable distribution of timber, CFUGs usually collect timber demand applications and authenticate them by visiting user households to check whether they actually need the timber or not. Based on that and reviewing the history of the users, including how many times and what quantity of timber the users have received before, the committee finally decides on timber distribution. There is no specific and established timber distribution criterion based on the user's category. It all depends on the CFUG's committee decision.

In this situation, SciFM implementation in community forestry, with its key focus on timber and income, ends up benefitting the elite and well-off groups, while ignoring the poor and their livelihood concerns. This leads to the reinvention of elite domination around timber governance and justifies the hydra-headed nature of elite capture. Several studies have illustrated that the well-off groups and powerful local elite dominate the executive committees of CFUGs more frequently than the poor and disadvantaged [47–49,61]. This is equally relevant in the Nepalese context as the institutional structure of community forest user groups places the whole authority of decision-making power in the hands of the few members of the executive committee [47,62]. Evidence suggests that community forestry benefits have flowed less to marginalized and disadvantaged households than to the middle class and wealthy households [41]. On the other hand, the reluctance of forest bureaucracy and the local elite to transfer power to the poor locals [63], as they have captured the decision-making process, is evident in Nepal [39,64]. As local groups begin to have mature, well-defined policies, institutions, and practices [3,7], they could potentially contribute to redefining community forestry positions by contributing substantially to local livelihood and poverty reduction.

Overall, we found that SciFM intervention in community forest has some positive implications, although several limitations have been demonstrated by recent studies; it is accused of having decreased user power and user participation and posing threats of recentralization [31,39,65]. SciFM has focused on timber harvesting and employed technical aspects that could be a burden to forest users [27,38]. Additionally and most importantly, it could create opportunities for the local elite while neglecting the concerns of the poor [26]. We see SciFM intervention as an opportunity for timber-based enterprises, as envisioned by the Forest Policy 2015 and Forest Act 2019. It could be the vehicle for decreasing timber import and fulfilling national timber demand [32]. Most importantly, it could be the vehicle for poverty reduction through reinvestment in livelihood improvement and community development. There is a strong nexus between community forests, community livelihoods, and poverty reduction [6]. However, several studies have argued that there are no expected results produced by CFs in terms

of poverty reduction [43,44]. The poorer households are found to have received fewer benefits from CFs [43,45], and it is argued that the rules of equality in sharing costs and access to benefits have unexpectedly resulted in unfair outcomes, as poor and vulnerable groups need more and specific forest products than the wealthier households do. Similarly, the protection-oriented forest management practices, which only allowed limited harvesting of forest products and did not reach their full potential, have resulted in poor socioeconomic benefits for rural livelihood improvement and poverty reduction. Thus, SciFM intervention provides a great opportunity to establish the narrative that CFs can substantially contribute to poverty reduction. However, with signs of unequal distribution of timber under SciFM, it remains questionable whether increases in timber production would essentially contribute to improving the wellbeing of all CFUG members. This leads us to share the position that governance issues linked to equitable resource distribution and benefit-sharing should be prioritized. Furthermore, the current arrangement has prioritized timber production and supplies to the market over the demands of users—this contradicts the very essence of instituting SciFM. Finally, along with timber governance that includes equitable distribution among users, the capital for reinvestment in a new forest (regeneration felling, regeneration growths, and its management) is required and is important for the sustainable management of SciFM in community forestry. Together, the CFUGs' commitment and collective action matter a lot.

5. Conclusions

While SciFM is applauded for having contributed to increasing timber production, several questions relating to the volume of timber harvested and its pattern of distribution among user groups still beg for clarity. In this paper, we explored the dynamics of timber distribution under community forestry systems where scientific forest management is practiced in Nepal's Terai region. We conclude that despite the increase in timber after SciFM initiation, questions linked to equity in the distribution amongst different wealth groups remain unanswered. As a step towards seeking solutions here, SciFM as a process should be firmly institutionalized. With a substantial increase in timber harvesting (56% increase by the third year), one would have expected the household supply gap to be narrowed substantially. However, this gap was narrowed for middle and rich households, who enjoyed up to 97% of the timber, as opposed to just 3% for the poor households. The present lethargy could be traced from the significant representation of the former groups in the decision-making body, giving them the opportunity to make decisions that suit their interest. By way of conclusion, we argue that the technocentric efforts linked to increasing timber sufficiency (e.g., through SciFM) is a necessary but insufficient condition to meet the needs of the poorest of the poor, as elite capture persists. Though timber harvesting increased after SciFM for the CFUGs, its distribution and effective management need collective planning and an equity approach. Similarly, governance issues linked to equitable resource distribution and benefit-sharing should be prioritized. Further research should explore pathways to deal with the hydra-headed nature of elite capture. Policywise, the current institutional setup should be revised to accommodate a significant representation of poor and indigenous users. This will reflect their needs and aspirations during the decision-making processes linked to timber allocation and change the current narrative, which attributes timber to middle and rich households.

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