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Assessment of timber and fuel wood harvesting practices and distribution pattern in CFUGs of Khotang District, Nepal

Leera Kushmi[1]
Narendra Ojha[2+]
Shiva Khadka[3]

[1,2]*Agriculture and Forestry University, College of Natural Resource Management, Katari, Nepal.*
[1]*Email: kushmileera@gmail.com*
[2]*Email: narendraojha425@gmail.com*
[3]*Institute of Forestry, Hetauda Campus, Tribhuvan University, Nepal.*
[3]*Email: shivakhadka0225@gmail.com*

(+ Corresponding author)

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ABSTRACT

Proper harvesting of forest products is necessary for sustainable forest management, playing a pivotal role in minimizing damage and waste while ensuring the sustainability of forest resources. Sustainable community forest management greatly depends on the harvesting and fair distribution of various forest products (FP). The study's goals were to ascertain the methods, instruments, and strategies utilized in the harvesting process, forest products distribution pattern, and the common issues surrounding the distribution and harvesting of FP in Imo and Ashoje Community Forest (CF) located in Khotang District, Nepal. Operational Plan (OP), focus groups, key informant interviews, household surveys, and minute books were used for data collection. 25% of all households were chosen at random from each of the two CF. The study revealed that traditional methods and tools such as sickles, bill hooks, axes, and saws, were commonly used in the past; however, there has been a shift towards modern tools in recent years. Deviations were observed in forest products harvesting and distribution from that of OP in practice. Fuel wood were equally distributed, timbers were allocated based on priority and circular basis ensuring user satisfaction. The slope was the major constraint for harvesting, as most of the marked trees were not cut because of difficulty in extraction. To improve sustainable forest management, it is recommended that advanced tools and training be provided to users, with regular monitoring by forest officials to ensure adherence to best practices. These measures will help enhance user responsibility and ensure sustainable harvesting operations.

Contribution/Originality: This research investigates the specific harvesting and distribution methodologies of forest resources in the mid-hills of Nepal, with particular emphasis on deviations from the operational plan and assessing challenges in steep terrain. Previous research has not sufficiently tackled these complexities, particularly the integration of contemporary technologies with indigenous practices.

1. INTRODUCTION

Nepal has received international attention as a pioneering nation in devolving forest management responsibilities from the government to local communities for conservation purposes. This approach is adopted on a global scale, with nearly half a billion people relying on community-managed forests as their primary source of livelihood and income [1-3]. Nepal is a prominent example, where over half of the population is engaged in managing more than two million hectares of community forests [4]. Key policies, such as the National Forestry Plan of 1976 and the Forest Sector Master Plan of 1988, laid the foundation for the development of these

community forests. This framework has been further strengthened through legislative acts, including the Forest Act of 1993, the Forest Regulation of 1995, and most recently, the Forest Act of 2019 [5].

The Forest Act of 2019 defines community forests (CFs) as "any part of a national forest that has been handed over to users for the development, protection, utilization, and management of forest resources." Community forests cover approximately 27.5% of Nepal's total forest area [4] with the predominantly located in the mid-hills [6]. They are widely recognized as the most effective forestry program in this region [7]. The primary objectives of the Community Forestry (CF) program are to address the subsistence needs of local communities while promoting forest conservation by granting user rights over forest resources. As an independent entities, Community Forest User Groups (CFUGs) have the power to manage, utilize, and govern their forests, including the authority to set prices for the sale and distribution of forest products [8]. These groups generate income by harvesting and selling both timber and non-timber forest products in local markets [9].

Harvesting of forest products (FPs) involves the felling permitted forest resources and their transportation to depots [10]. This practice is crucial for maintaining forest health, managing biodiversity, meeting the needs of local users, and supporting regional economies. In Nepal, Community Forest User Groups (CFUGs) primarily rely on traditional tools like the axe, sickle, and khurpa, collectively known as "ban godne" for the harvesting of forest products [11]. To achieve effective and sustainable harvesting, it is crucial to adopt technologies that meet two key criteria: sustainability and adaptability to local conditions. Sustainable practices demand that any tool or equipment introduced to enhance efficiency should be locally accessible or developable [12]. The term "sustainability" also refers to minimizing environmental damage or disturbance, such as biodiversity loss [13]. Unsustainable harvesting techniques significantly contribute to forest degradation, underscoring the necessity for sustainable practices [14]. The FAO [15] has established a code of practice for Reduced Impact Logging (RIL), promoting sustainable harvesting techniques that address the growing demand for forest products while maintaining ecological balance. This approach aims to integrate ecological, economic, and social dimensions, ensuring that harvesting practices do not compromise the forest's long-term viability and biodiversity.

Distribution of forest Products (FPs) involves the systematic allocation of forest resources to members of the Community Forest User Group (CFUG), as well as the transfer of surplus items to other neighbour CFUGs. This process is a critical component of equitable benefit-sharing within the CFUG. Moreover, distribution of forest products includes strategies for delivering surplus items to external customers beyond the CFUG, ensuring wider community benefits and expanding market opportunities.

The primary forest products that are essential for local communities include firewood, fodder, timber, cattle bedding materials, and non-timber forest products [16]. As outlined in the operational plan, the Users' Group is solely responsible for the collection, sale, and distribution of these forest items. Following the harvesting of timber, firewood, and other forest products, the Users' Group is required to immediately undertake replanting or restoration activities in the impacted forest areas. Furthermore, CFUGs are obligated to report forest product sales rates to the Division Forest Office [4]. If the Users' Group plans to establish a forest product-based industry in accordance with the operational plan, they may do so outside the Community Forest. However, this requires approval from the appropriate authority, following the recommendation of the District Forest Officer [17].

As many Nepalese households depend on Community Forests (CFs) for their livelihood specially in rural areas, properly managed CFs have the potential to alleviate poverty and enhance the living standards of those communities [18]. Therefore, it is crucial to know about harvesting methods, tools, distribution patterns of forest products of community forest for its sustainable management. However, there is a notable gap in research on these topics in Nepal, particularly in the mid-hills. Existing studies do not sufficiently address the methods and tools used for forest product harvesting, the distribution patterns, or the challenges associated with these practices. Therefore, this study aims to fill that gap by thoroughly investigating the current harvesting methods, tools, and distribution strategies employed in mid-hill community forests. It will also assess deviations from the operational plan (OP) and

the challenges encountered during harvesting and distribution. By addressing these issues, the study seeks to provide valuable insights into the sustainable management of community forests.

2. METHODS

2.1. Study Area

The research was carried out in two community forests of Khotang District, Nepal (Figure 1). Khotang is geographically situated between 26° 50' N and 27° 28' N latitude, and 86° 26' E to 86° 58' E longitude. It ranges from 152 m to 3620 m elevation above mean sea level and covers an area of 1591 km². According to the record of Division Forest Office, Khotang, the district has a variety of forest types, including tropical, sub-tropical, upper temperate mixed deciduous and coniferous forests. The region is home to a wide range of ethnic groups, including Rai, Kshetri, Brahmin, Newar, Kami, Magar, Tamang, Sarki, Damai, Gurung, Sunuwar, and Sherpa.

According to the record of 2022 of Division Forest Office of Khotang, it contains 419 community forests (CFs), encompassing a forest area of 50,047.6 hectares, managed collectively by 51,363 households. For this study, Imo and Ashoje community forests under the Haleshi subdivision forest office were selected to evaluate forest product harvesting and distribution patterns. Imo CF, with an elevation range of 500-800 meters, comprises 55 households and spans an area of 108.90 hectares. Ashoje CF, situated at an elevation of 1,100-1,810 meters, includes 147 households and covers an area of 393.69 hectares. These forests are characterized by the presence of important species such as *Shorea robusta, Acacia catechu, Terminalia tomentosa, Pinus roxburghii, and Schima wallichii.*

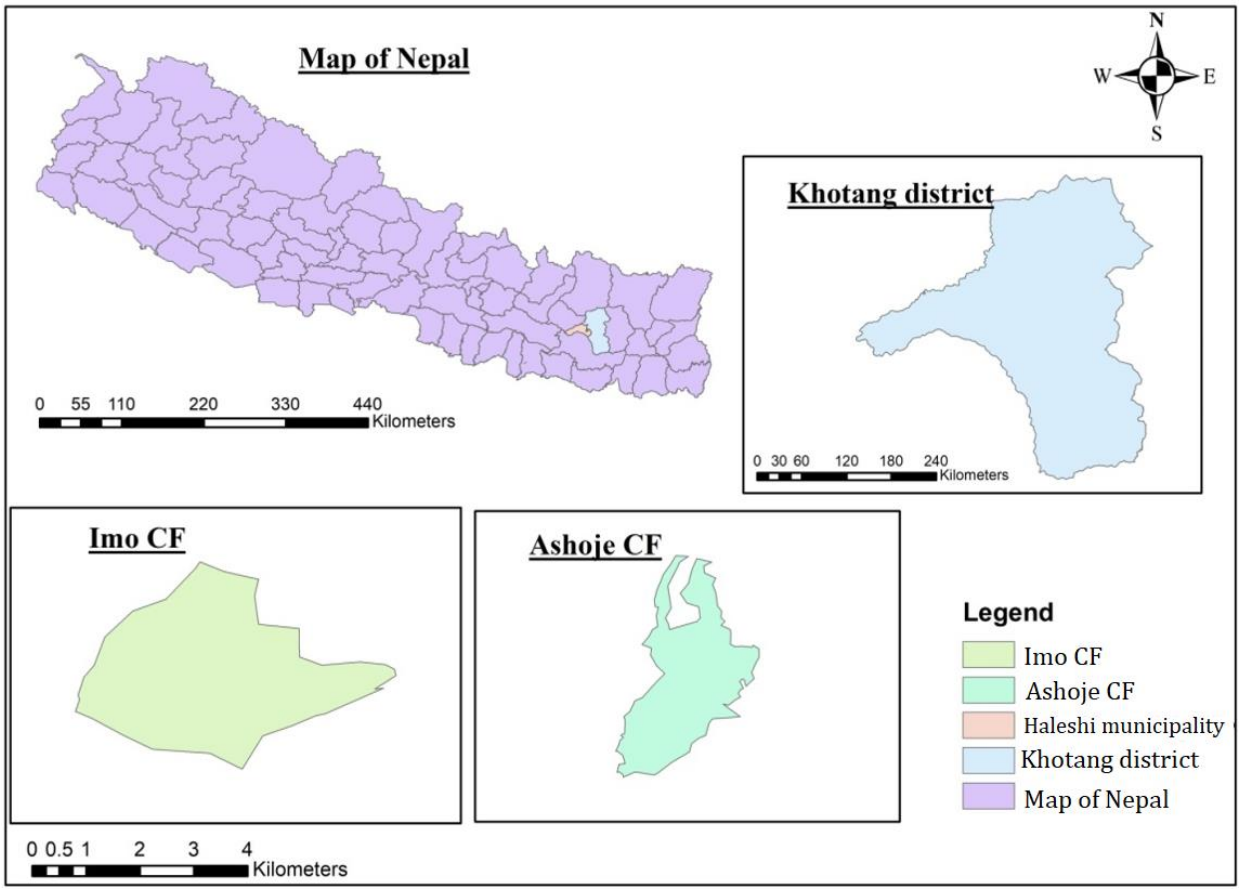

Figure 1. Study area map of Imo and Ashoje community forest.

2.2. Data Collection

This research employs a qualitative and descriptive approach, utilizing both primary and secondary data sources for comprehensive analysis.

2.2.1. Primary Data Collection

Primary data were gathered using various methods including reconnaissance survey, key informant survey, household surveys, and focus group discussions.

2.2.2. Reconnaissance Survey

A preliminary survey was carried out to examine the present condition of the study area, focusing on its geographic features, the ethnic diversity within the Community Forest User Groups (CFUGs), and the key species found in the community forests. During this phase, permission was obtained from the Division Forest Office and both Community Forest User Committee (CFUC) to conduct the study. Efforts were also made to build relationships with CFUG members, users committee members and staff from the Division Forest Office. These initiatives aimed to promote collaboration and enhance the reliability of future data collection efforts.

2.2.3. Household Survey

A household survey was executed to evaluate the dependence of community forest residents on forest products. Employing a simple random sampling technique, 25% of households were selected for questionnaire administration. The questionnaire, designed in accordance with the community forest's operational plan, aimed to determine the availability of forest products, the seasonal and methodological aspects of harvesting, annual harvest quantities, distribution patterns, and major challenges associated with product distribution and harvesting. The survey incorporated a blend of structured, semi-structured, and open-ended questions to capture a comprehensive understanding of the respondents' experiences and perceptions.

2.2.4. Key Informant Survey

To gather first-hand data on the distribution patterns of forest products within the community, a key informant survey was conducted. Nine key informants (n=9) were strategically selected, comprising village leaders, social workers, Division Forest Office (DFO) staff, and committee members. The survey utilized a combination of structured and unstructured interview formats, including both individual and group discussions.

2.2.5. Focus Group Discussion (FGD)

Focus group discussion were conducted with the community forest Users committee to validate and enrich the findings from the household survey. Separate FGDs were held in each community forest.

2.3. Secondary Data Collection

Secondary data was systematically collected from a range of sources, including CFUG minute books, operational plans, constitutions, and other official records. These sources provided detailed information on harvesting methods, distribution patterns of various forest products, and the seasonal collection periods. Additionally, Different published literature, reports, journals and Internet Surfing were also used for data collection to ensure a comprehensive analysis.

2.4. Data Analysis

Standard procedures were followed to analyze both quantitative and qualitative data, employing appropriate statistical tools and techniques. Qualitative data was analyzed using descriptive text analysis to extract key themes and insights. Quantitative data was subjected to rigorous statistical analysis, with results presented using Microsoft Excel through tables, bar charts, pie charts, and summary statistics. Additionally, the Friedman test was conducted using SPSS for priority ranking. This non-parametric statistical method evaluates group differences when the

dependent variable is ordinal, by comparing mean ranks across related groups and identifying variations in these ranks.

3. RESULTS

3.1. Fuel Wood Consumption Pattern

Fuel wood emerged as the predominant energy source in both community forests (CFs). It was observed that most households relied on fuel wood for cooking their meals as well as preparing animal feed, specifically kudo. While a significant number of households reported a decline in fuel wood demand due to the adoption of alternative energy sources such as improved cooking stoves and Liquefied petroleum gas (LPG) gas, 35% of households indicated an increasing demand for fuel wood attributed to the rise in livestock numbers. Figure 2 illustrates the Fuel wood consumption pattern within Imo CF and Ashoje CF.

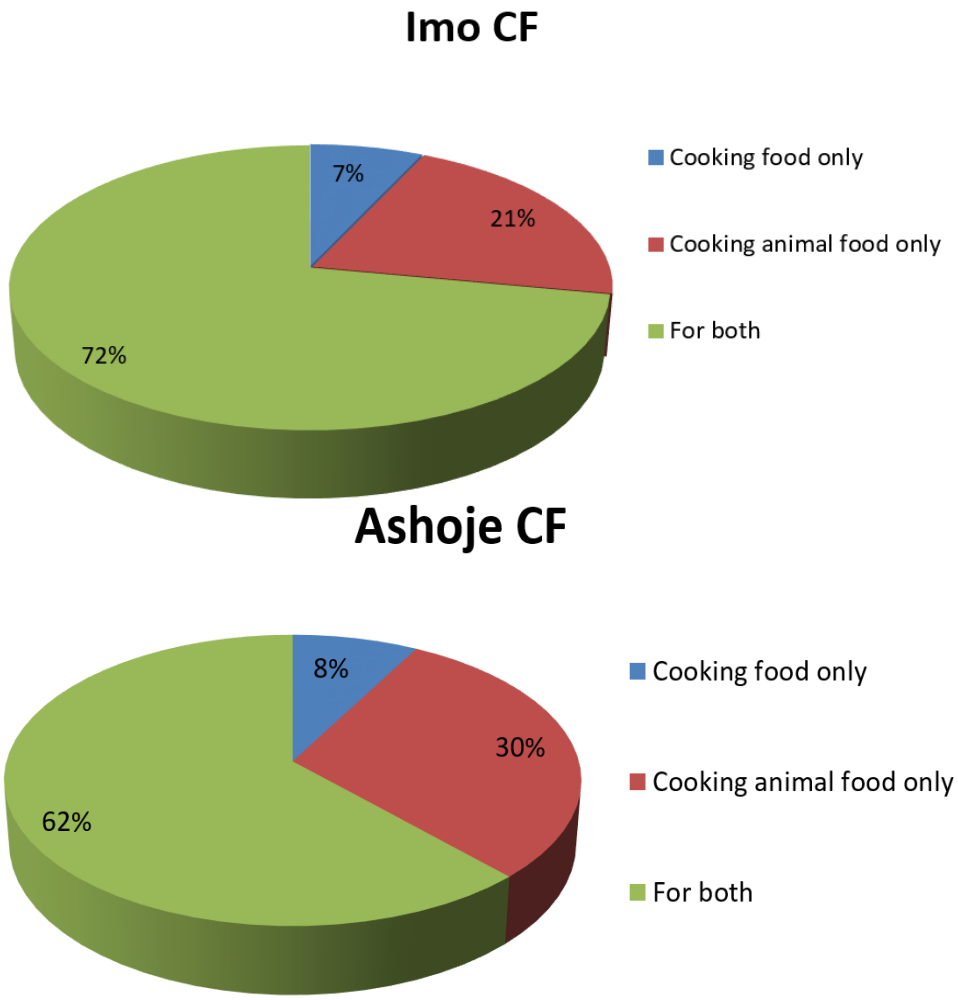

Figure 2. Fuel wood consumption pattern of CFs.

3.2. Harvesting Status

The harvesting process in both Community Forests (CFs) were remarkably similar (Figure 3). Upon the Executive Committee (EC) determining the harvest date, a marking committee was constituted to identify the trees for felling. This committee included EC members and general members, chosen based on their availability and interest. Notices regarding the scheduled tree harvesting were then disseminated across various locations to inform the users. The chairperson subsequently informed forest officials about the harvesting, primarily through phone calls and by visiting the sub-division office in person. Forest officials would visit the CF if their technical support was deemed necessary, providing the required assistance.

The trees selected for marking were typically 4D trees—those that were old, crooked, rotted, or of inferior quality—considering factors such as tree competition and crown density. Both CFs had a provision for distributing fuelwood based on participation; individuals who participated in the harvesting collected the fuelwood themselves. Traditional tools such as axes, sickles, and billhooks were predominantly used for harvesting, though some also used modern tools like cross-cut saws or even hired power chainsaws. It was noted that most users preferred to fell trees themselves to avoid the higher costs associated with hiring skilled labor. However, some users, particularly those from women-headed households, did hire personnel for harvesting.

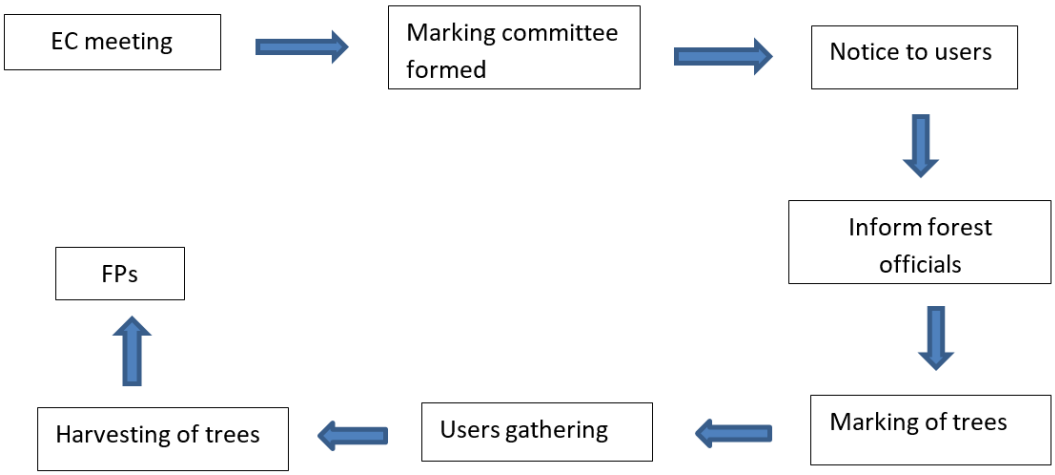

Figure 3. Harvesting process.

In both Community Forests (CFs), users demonstrated a sound understanding of directional felling when using an axe, making the first cut in the intended felling direction and the back cut on the opposite side, slightly above the first cut. However, when using saws, many users lacked the precise knowledge of making the initial cut opposite to the felling direction, often felling trees haphazardly without proper consideration of the intended direction. Post felling, users engaged in various conversion activities such as trimming, branch cutting, sawing, and bucking within the forest, typically transporting the processed wood back home on the same day. While some users relied on vehicles for tree extraction due to the difficulty of carrying over long distances, others managed manually. Despite the operational plan (OP) specifying block-wise tending operations, the selected CFs did not strictly stick to this practice. Fodder trees were extracted annually, with tending operations including thinning, pruning, cleaning, and weeding performed regularly.

3.3. Marking of the Tree

According to the survey, the trees marked for harvesting were typically dead, dried, fallen, diseased, or deformed, with consideration also given to tree competition factors. However, the harvesting committee faced significant challenges in marking trees located in difficult terrain, particularly in areas characterized by steep slopes and rugged landscapes.

3.4. Harvesting Practice of Various FP

Small dry fuel wood: According to the operational plans in both CFs, small dry fuel wood could be collected five days per month from December to Jun without the use of tools. However, the household and key informant surveys revealed that this practice was not followed in reality. Instead, users were permitted to collect small dry fuel wood only once a year, typically a month after the main felling. In urgent situations, users were allowed to collect small dry fuel wood from any part of the forest without using tools.

Green fuel wood: In both CFs, green fuel wood could only be obtained during tending operations within designated blocks, from December to February. Trees selected for harvesting during this period were typically those that were old, diseased, dead, dying, deformed, or leaning. The quantity of green fuel wood to be harvested was determined according to the operational plan (OP).

Timber: In both CFs, the timber harvesting period was uniformly designated from December to April. To harvest timber, individuals were required to submit an application detailing the quantity needed and the intended purpose to the Executive Committee (EC). The EC assessed the applications based on need and priority to allocate the timber accordingly. Applications had to be submitted by December 1, accompanied by the payment of the price set by the EC. Approved applicants were then allowed to collect the timber between December 1 up to April 30.

Other FPs: For the harvesting of other forest products (FPs) users were required to submit an application specifying the purpose by December 1. These forest products could be harvested from designated blocks where tending operations had been completed, during the period from December 1 to January 31. This procedure was consistently applied across all CFs, ensuring a standardized approach to the management and utilization of these resources.

3.5. Tending Operation Practiced in CF

Thinning: In both CFs, thinning operations were conducted annually, primarily during the 'ban godne' process, to enhance the growth of select trees and ensure adequate space for regeneration. This process involved removing adjacent old and 4D trees to reduce competition. The trees designated for thinning were marked by a group selected by the Executive Committee members. Pruning: Pruning was carried out every 4-5 years as per requirement, with the primary objective of improving tree health and increasing the availability of fuelwood. During years when pruning was performed, thinning operations were suspended. This activity involved the participation of all users and was predominantly done using traditional tools such as sickles.

Weeding and Cleaning: Weeding and cleaning were conducted as necessary, although the operational plan specified that weeding should be performed annually. This was particularly important when the forest was overgrown with bushes and shrubs that hindered the growth of desired species. Users engaged in cutting, uprooting, and removing invasive species, undesired shrub growth, climbers, and thorny species using locally available harvesting tools, thereby maintaining the ecological balance and promoting the health of the forest.

3.6. Compliance with CF Operational Plan in Terms of Harvesting

Imo CF is subdivided into two management blocks, while Ashoje CF is divided into four management blocks and harvesting activities scheduled for specific blocks as outlined in the operational plan (OP). However, both CFs exhibited deviations from the prescribed practices in the OP. Table 1 presents the deviations between the observed forest management practices and the provisions outlined in the Operational Plan (OP).

Table 1. Deviations in the tending operation with regard to OP.

Year	Imo CF		Ashoje CF	
	Block to do tending operation as per OP	Block in which tending operation was done	Block to do tending operation as per OP	Block in which tending operation was done
2018	1	1	1	1
2019	2	1	2	3
2020	1	2	3	2
2021	2	2	4	3
2022	1	1	1	2

Similarly, harvesting needs to be carried out based on the annual increment of the growing stock-volume. The OPs had a provision for harvesting FPs, especially timber and fuel wood which is shown in following table:

In both CFs, silvicultural operations were not conducted in strict accordance with the operational plan (OP). The forests received inadequate attention from the concerned authorities due to the lower value of timber and insufficient quantities of key species such as *S. robusta* (Sal) and Non Timber Forest Products (NTFPs) species. Additionally, there was a lack of awareness among users and committee members about the necessity of block-wise harvesting. Committee members and forest guards (Ban Heralu) made decisions on which blocks required silvicultural treatments based on their assessments during forest inspections. Consequently, the selection of blocks for harvesting was based on subjective judgment rather than adherence to the OP's systematic approach.

Furthermore, harvesting was expected to align with the annual increment of growing stock volume as specified in the OP. However, the actual practices often deviated from this guideline, impacting the sustainable management of forest products, including timber and fuelwood. Table 2 shows the Annual Allowable Cut (AAC) for timber and fuelwood in both community forests.

Table 2. AAC of timber and fuelwood of both CFs.

Block	Imo CF		Ashoje CF	
	AAC of timber (Cft)	AAC of fuel wood(Bhari)	AAC of timber (Cft)	AAC of fuel wood (Bhari)
1	649	422	331.56	276
2	436	351	265.27	194
3	----	----	401.64	299
4	----	----	474.48	326
Total	1085	773	1472.95	1095

Timber harvesting volumes were lower than stipulated in the operational plan (OP), particularly for species such as S. wallichii (Chilaune) and C. indica (Katus), which, despite their abundance, were less favored by users. whereas, S. robusta (Sal) trees were found in insufficient quantities to meet demand, prompting users to purchase ready-made, high-quality timber from the market for their new construction needs. The OP provided specific guidelines for the extraction of fuelwood from designated blocks. However, adherence to these guidelines was compromised due to a shortage of skilled personnel capable of performing the necessary calculations and assessments. This lack of expertise resulted in deviations from the prescribed extraction volumes. Table 3 illustrates the overall deviations from the Operational Plan (OP) observed in both community forests.

Table 3. Overall deviations observed in tabulated form.

S.N	Practice stated in OP	Actual practice
1.	Harvesting should be conducted block wise.	Harvesting was not strictly confined to designated blocks in both CFs.
2.	Scientific marking should be performed using Tancha with the assistance of a forest technician.	Marking in most cases was done by users and the executive committee (EC) without the involvement of forest officials
3.	A harvesting monitoring committee from the EC should be formed to record details such as time of harvest, tree number, species, and size, and to oversee the harvesting process.	A numbering committee was formed from the EC and users to mark trees for cutting, noting only the species but not the size. Monitoring was not conducted.
4.	After preparing the depot register, it must be submitted to the sub-division forest office before sales and distribution.	Depot registers were not prepared or submitted as required.
5.	"Chhappan" register, "Kataan" register and "Depot" register" have to be made.	Only the marked trees are noted in a copy, with the name of the trees species lacking comprehensive register documentation.
6.	Marking should be done on two sides, one just above 6 inch from ground and other,	Marking was done only on one side, at comfortable height.

S.N	Practice stated in OP	Actual practice
	above 4.5 feet from ground.	
7.	Tending operations should include bush clearance, fodder tree management, amlisho plantation, fire line construction, and erosion control activities.	The primary focus was on cutting and collecting fuelwood for personal use, with minimal attention to other tending activities.
8.	Timber and fuelwood harvesting should be based on the annual allowable cut (AAC) for each block as specified in the OP.	AAC calculations were not considered, and no assessments were made during the harvesting of forest products.

3.7. Tools and Techniques for Harvesting

3.7.1. Tools and their Usage

In both CFs, Users use traditional tools like axe, sickle, bill hook, and cross-cut saw for harvesting the forest product (Table 4). They are easy to use and do not require special skills. But nowadays most of the CFUGs uses power chain saw for harvesting timber as a modern tool.

Table 4. Tools used by CFUG's.

S.N	Tools used	For what purpose
1.	Sickle	Firewood cutting, bush cutting, pruning, cleaning, vines cutting, thinning
2.	Axe	Felling tree, splitting, bucking, trimming and limbing
3.	Bill hook	For looping, bush cutting
4.	Cross cut saw	Logging, sound timber production, planking and bucking
5.	Power chain saw	Felling large diameter tree mainly for timber

The respondents were showing interest to use modern tools as they make the work easier, less tiring, rapid, and more enjoyable. Figure 4 illustrates the respondents' preferences for different tools.

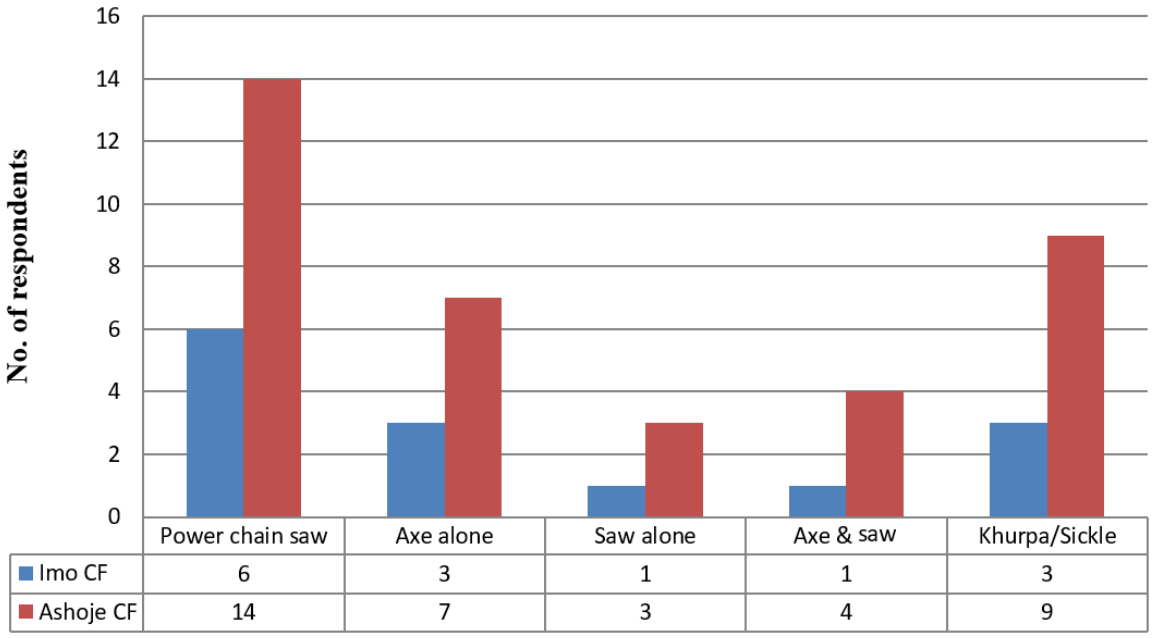

Figure 4. Tools preference as per respondents.

The household survey revealed that a significant number of respondents favored using power chainsaws due to their speed and ease of use. However, a smaller portion of respondents opted for traditional tools like axes and handsaws, citing the need for special training to operate power chainsaws and their high cost, which makes them unaffordable for individual purchase.

3.8. Harvesting of Forest Product

Users were asked about the priorities they would give during harvesting of FP and asked to rank them accordingly, 1 being the first priority and 4 being least. Their responses were as follows:

Table 5. Priorities ranking during harvesting.

Priorities	Imo CF		Ashoje CF	
	Mean rank	Priority	Mean rank	Priority
Own safety	1.36	1st	1.50	1st
Regeneration	1.93	2nd	2.06	2nd
Terrain condition	2.71	3rd	2.67	3rd
Harvested wood quality	4.00	4th	3.78	4th

The Table 5 shows the different priorities of the HHs as analyzed by Friedman test.

3.9. Forest Product Distribution

3.9.1. Distribution Pattern in CF

The household survey indicated that the distribution patterns for timber and fuelwood have remained consistent in both Community Forests (CFs) since their inception. Timber distribution was based on submitted applications, with priority given to those in need after a thorough investigation. Alternatively, a rotational distribution method was sometimes employed. For fuelwood, households that participated in the harvesting process were permitted to collect and keep as much fuelwood as they gathered themselves.

3.9.2. Basis of FP Distribution

In both Community Forests (CFs), the distribution of fuelwood and timber adhered to a participation-based system and an application-based system, respectively. Fuelwood distribution allowed individuals involved in tending operations to collect and take as much fuelwood as they gathered. Timber distribution, on the other hand, was managed through submitted applications and prioritized based on need or a rotational distribution method.

3.9.3. Satisfaction about the Distribution System

The household survey and focus group discussions revealed that the almost all users were satisfied with the distribution system in Ashoje CF. Similarly, in Imo CF, 75% of users expressed satisfaction with the current distribution system. However, 25% of users, particularly women-headed and economically disadvantaged households, preferred an equitable distribution system. This reflects a diverse community viewpoint, with a significant portion supporting the prevailing equal distribution approach and a notable minority advocating for a more equitable system to meet specific needs and challenges.

3.10. Most Demanded FP

According to the survey, fuelwood emerged as the most demanded forest product (FP) in both Community Forests (CFs), with most households relying on it for cooking their food and preparing animal feed, known as Kudo. This was followed closely by fodder, due to the prevalent livestock rearing among households. Timber demand was notably higher in Ashoje CF compared to Imo CF, although it remained lower than the demand for fuelwood. Users generally preferred purchasing ready-made Shorea robusta (Sal) and Dalbergia sissoo (Sissoo) timber from the market over utilizing the Scgima wallichii (Chilaune) and Castanopsis indica (Katus) timber from the CFs, despite the presence of some Sal trees in the forests, which were insufficient to meet the overall demand. This trend is shown in Figure 5.

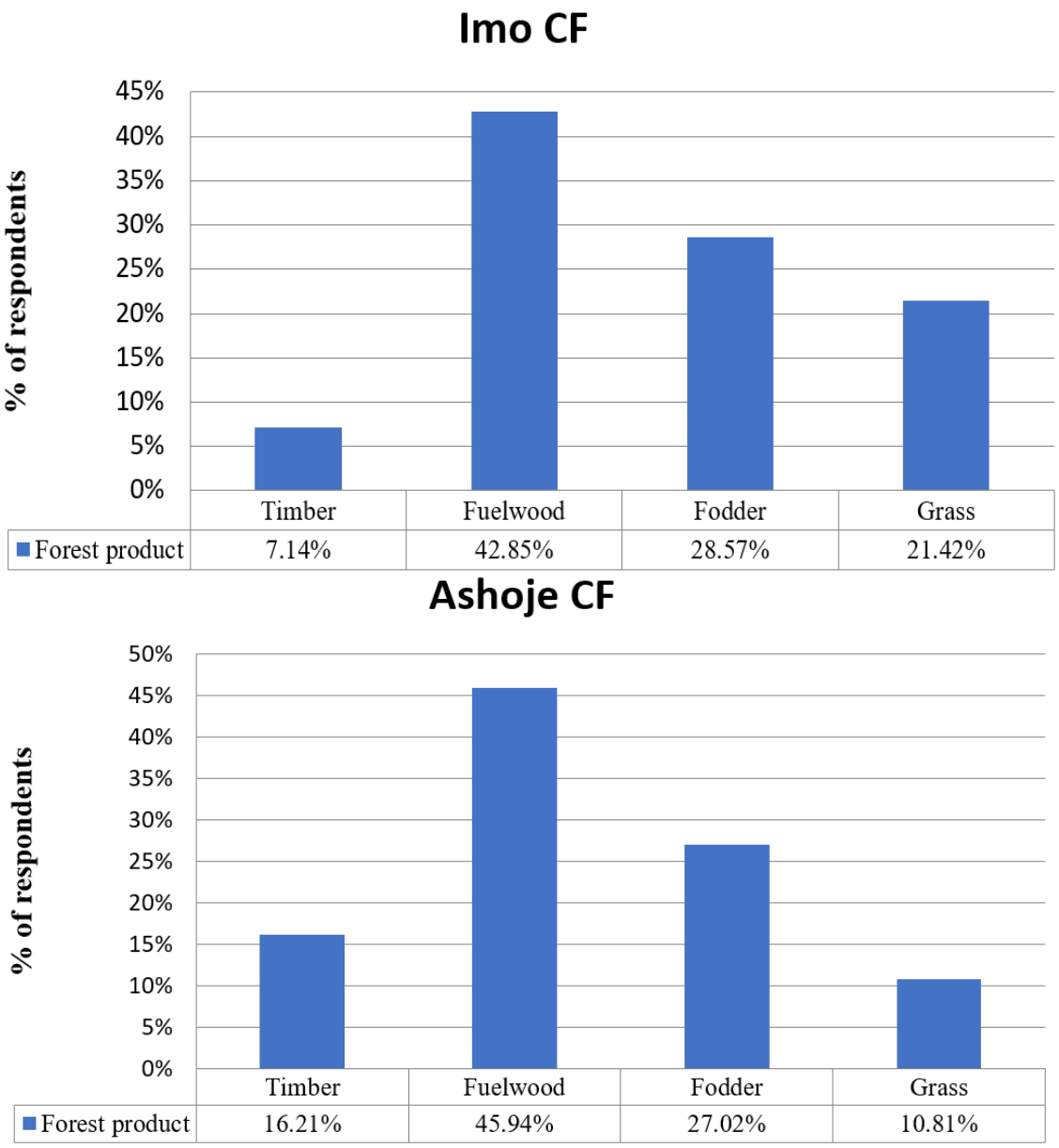

Figure 5. Most demanded FPs of both CFs.

3.11. Livestock Number and Fodder Sufficiency

According to the respondents in both Community Forests (CFs), the availability of fodder was insufficient for the majority of users. Households with larger numbers of livestock experienced greater fodder shortages compared to those with fewer livestock, due to the higher demand for fodder. A similar pattern was observed for fuelwood, where households with higher fuelwood needs reported significant insufficiencies. This indicates a direct correlation between the quantity of livestock and fuelwood demand with the extent of resource scarcity experienced by the users.

3.11.1. Compliance with CF OP in Terms of FPs Distribution

In both Community Forests (CFs), the distribution patterns of forest products (FPs) showed similar deviations from operational plan (OP), as presented in Table 6.

Table 6. Overall deviations observed in distribution of FPs.

S.N	Practice as stated in OP	Actual practice
1.	CF should first issue a notice inviting users to submit applications based on their actual needs, and then investigate the needs and priorities of all applications received before making FP distributions.	The actual needs of users were not considered in the process. Instead, those who paid the amount set by the Executive Committee (EC) would received forest products, irrespective of their individual needs or demands.
2.	FPs should be distributed on equitable basis.	FPs distributed on equal basis.

4. DISCUSSION

The present study aimed to evaluate the methods of timber and fuelwood harvesting, as well as their distribution among community forest users, with a focus on promoting sustainable utilization and management of forest resources. The harvesting process in both Community Forests (CFs followed a systematic approach that emphasized committee decision-making and active user participation. A marking committee, composed of Executive Committee (EC) members and volunteers, facilitated community engagement and accountability. Notices distributed to users ensured transparency and awareness, while direct communication with forest officials demonstrated a collaborative relationship for technical support. This approach differs significantly from the findings of Chaudhary, et al. [14] which pointed to lack of involvement of forest officials in decision-making processes, and lack of regular assessments, along with weak enforcement of regulations and limited technical support, all of which contributed to unsustainable harvesting practices. In contrast, the current study showcases a structured framework that emphasizes active user participation and strong collaboration with forest officials. This indicates a more sustainable and effectively managed system, reflecting notable advancements in forest management practices compared to those reported by Chaudhary, et al. [14].

The selection of trees for marking primarily focused 4D trees—those that were old, crooked, decaying, or of inferior quality—taking into account factors such as tree competition and crown density. Notably, no marking instruments (tacchas) were used, and the marking process was conducted without the supervision of a forest technician, which is even supported by Pahari and Bhattarai [19]. According to the operational plan (OP), the harvesting, tending operations, and silviculture practices of forest products were supposed to be carried out systematically on a block-by-block basis. However, this structured approach was not implemented in either of the Community Forest (CF). Studies by Baral and Vacik [20] and Pahari and Bhattarai [19] also highlight similar inconsistencies, revealing that block-wise forest management was not followed as outlined in the OP. Tending operations were not consistently implemented in the designated blocks outlined in the operational plan (OP), and these inconsistencies continued to occur over several years. Furthermore, silvicultural operations were not conducted according to the plan; instead, blocks were selected for harvesting based on subjective decisions rather than the prescribed block-wise approach. In terms of timber harvesting, the quantities planned for species like *Schima wallichii* and *Castanopsis indica* were not met. Additionally, the extraction of timber and fuelwood failed to align with the Annual Allowable Cut (AAC) specified in the OP, largely due to the lack of skilled personnel capable of conducting the necessary assessments. These deviations indicates a gap between the intended sustainable management practices outlined in the OP and the actual practices implemented on the ground. This highlights the urgent need for improved technical support, stricter enforcement of regulations, and enhanced training for community members to ensure adherence to sustainable forestry practices.

A Study by Yadav [21] indicates that most Community Forests (CFs) still rely on traditional tools for harvesting. However, this research reveals a combination of traditional and modern practices in the harvesting processes within CFs. Traditional tools such as axes, sickles, and bill hooks are still commonly used, highlighting the continued relevance of these age-old techniques in forest management. However, there is a noticeable shift towards modern tools like cross-cut saws and power chainsaws, indicating an increasing willingness to embrace technological advancements to enhance efficiency and productivity. In both Imo and Ashoje CFs, safety was

identified as the top priority, with mean ranks of 1.36 and 1.50, respectively. This highlights the critical importance placed on safety during harvesting operations. Following safety, concerns regarding regeneration and terrain conditions were also prominent, indicating a strong awareness of sustainability and the practical challenges presented by the landscape. Conversely, the quality of harvested wood received the lowest priority, with mean ranks of 4.00 and 3.78, indicating that immediate product quality is considered less critical compared to other factors. The Friedman test confirms consistent priority patterns across the surveyed households, highlighting shared values and considerations among community members.

The results revealed that among all forest products, fuelwood had the highest demand among users. This is primarily because Community Forests (CFs) in the region are dominated by species such as Chilaune, Khotesalla, and Khayar, with only a few Sal trees. Users generally do not prefer these species over Sal and Sissoo, opting instead to purchase timber from the market, which contributes to the relatively lower demand for timber. The primary reliance on fuelwood for cooking purposes underscores its significant demand, aligning with findings by Martin [22] that forests in hilly regions are not typically exploited for monetary gain. While the introduction of alternative energy sources such as improved cooking stoves and LPG gas has reduced fuelwood demand in some households, the increased number of livestock has led to higher fuelwood demands for others. This is supported by the findings of Baland, et al. [23]; Mahapatra and Mitchell [24] and Marchant [25] who noted that fuelwood is essential for preparing the boiled mixture of straw, oilseed cake, flour, and grain husk known as kundo or khole, which is fed to cattle [26].

Gentle [27] identified that community forests (CFs) in the Pyuthan district were less equitable towards disadvantaged and poor groups compared to wealthier users, thereby exacerbating socioeconomic disparities. Conversely, the current study indicates a more inclusive distribution system within the CFs, where user satisfaction is high and an equal participatory distribution approach is favored. This finding suggests that the distribution system has not contributed to widening the wealth gap, possibly due to the relatively lower demand for timber. Yadav [21] noted that harvesting practices typically reflect the actual demand for forest products. In the CFs under review, the executive committee's decisions on tree selection for harvesting align with this approach. Users express contentment with the distribution system, which is based on equal participation and application, even though this may not fully account for the Annual Allowable Cut (AAC) for specific blocks, as noted by Baral and Vacik [20] and Pahari and Bhattarai [19]. Further, variation in harvesting procedures have led to adverse impacts on forest regeneration. Improper treatment of logs during transport has resulted in the destruction of undergrowth, with the majority of regrowth lost due to tree felling practices. Additionally, the expected activities of bush clearance, fodder tree and Amrisho plantation, and erosion control, integral to tending operations, were not adequately executed. This absence reflects a focus on immediate utilization of forest products at the expense of long-term forest health, indicating a need for enhanced adherence to comprehensive management practices.

5. CONCLUSION

Most users initially relied on traditional equipment due to financial constraints, but after receiving training in modern tool usage, they have increasingly adopted contemporary methods. While users were proficient in directional felling with conventional tools, many were less confident with this technique when using saws alone. Forest product harvesting deviated from the block-by-block method outlined in the operational plan (OP), being conducted according to decisions made by the Executive Committee. Distribution practices were primarily based on equal participation for fuelwood, while timber distribution was application-based, prioritizing the needy after thorough investigation or following a circular distribution method. The majority of users expressed satisfaction with this system, although some women-headed and low-income households advocated for a more equitable distribution, particularly regarding fuelwood. The steep terrain presented significant challenges to harvesting, as many designated trees were left uncut due to extraction difficulties. Both community forests (CFs) contained low-

value timber species, resulting in limited user interest in inferior quality trees. Despite this, user dedication and interest have driven forest conservation efforts without profit motives. The community's dedication highlights their joint effort to protect forest resources, demonstrating a stewardship mindset as opposed to a profit-driven strategy.

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