Assessment of Tree Species Availability Based on Sawmilling and Timber Markets Survey in Sinnar State, Sudan

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ARTICLE INFO

Keywords:
Timber Species Availability
Sawmill Dynamics in Sudan
Timber Traders and Market Demand
Forest Conservation Strategies
Indigenous Tree Species
Sustainability

ABSTRACT

This study assesses tree species availability in Sinnar state, Sudan, to identify the types of wood used, marketed and explores the selection criteria driven by the continuing demand for timber in construction, furniture, and energy sources. The research included interviews with 87 randomly selected respondents from three timber trading and sawmill companies (Elsuki, Sinnar, and Singa). The surveys utilize descriptive analysis using SPSS and Excel. Findings revealed 28 historically available timber species, of which only eight are currently on the market. Selection criteria for trading species include viability, durability, and market demand. Approximately 47.9 % of timber comes from reserved forests, mainly for sawmill use, while 31.3 % comes from private and community-managed forests. The study highlights a significant decline in the availability of timber species, with 88 % of respondents expressing concerns about this trend due to overexploitation, revealing the urgent need for conservation efforts. This study suggests planting indigenous fast-growing trees to meet the region's timber needs.

TANULMÁNY INFÓ

Kulcsszavak:
Fafajok elérhetősége
Fűrészüzemek dinamikája Szudánban
Fakereskedelem és piaci igények
Erdő megőrzési stratégiák
Őshonos fafajok
Fenntarthatóság

KIVONAT

Fafajok elérhetőségének értékelése a fűrésztelepek és fapiacok felmérése alapján Szinnár Államban, Szudánban. A tanulmány a fafajok elérhetőségének felmérését irányul Szinnár államban, Szudánban, annak érdekében, hogy azonosítsa az építőanyagként, bútorok készítéséhez és energiatermeléshez használt fafajtákat, valamint feltárja a választási szempontokat, melyeket az állandó fa iránti kereslet hajt, az építkezések, bútoripar és energiaforrások területén. A kutatás magában foglalt interjúkat 87 véletlenszerűen kiválasztott válaszadóval három faanyag-kereskedelmi és fűrészüzemi vállalattól (Elsuki, Szinnár és Singa). A felmérések leíró elemzést alkalmaznak SPSS és Excel segítségével. Az eredmények azt mutatják, hogy a korábbi 28 fafajból jelenleg nyolccal kereskednek. Az eladási fafajták kiválasztási szempontjai közé tartozik a megfelelőség, a tartósság és a piaci kereslet. Az összes fakitermelés körülbelül 47,9 %-a tartalékolt erdőkből származik főként fűrészipari felhasználásra, míg a 31,3 %-a magán és közösségi kezelt erdőkből jön. A tanulmány rávilágít a fafajok elérhetőségének jelentős csökkenésére, a válaszadók 88 %-a aggodalmát fejezi ki ezzel a tendenciával kapcsolatban, ami az erőforrás túlkihasználására vezethető vissza. Sürgős megőrzési erőfeszítésekre hív fel. Ez a tanulmány azt javasolja, hogy ültessenek be őshonos, gyorsan növő fákat annak érdekében, hogy kielégítsék a régió faigényét.

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1 INTRODUCTION

According to Newton et al. (2022), a significant proportion of the world's population resides in rural regions. Of the approximately 4.17 billion people in non-urban areas, 95 % lived within a 5-kilometer radius of a forest in 2019. Furthermore, 75 % of the global population, equivalent to approximately 3.27 billion people, resided less than one kilometer from a forest. A strong association between the proximity of forests and the prevalence of extreme poverty is plausible, as evidenced by the approximately 80 % of individuals living in extreme poverty are in rural regions (Castañeda et al., 2018).

The data published by the Population Census Council in 2008 determined that around 29.5 % of Sudan's population concentrates in urban regions, whereas the remaining (70.5 %) reside in rural areas (Hussein, 2014; Idris, 2020). A sizable portion of the rural population depends on the forest to live and uses round timber and poles for construction and wood as a primary energy source. The aggregate extent of forest plantations in Sudan amounts to slightly less than 1,300,000 hectares in the country's northern region.

According to FAO/FNC (1995) findings and Keenan et al. (2015), the national forest inventory conducted in Sudan, specifically in the region north of latitude 10° N, revealed that the annual average increment of forest resources was around 11 million m^3. FAO/FNC (1995) and Hansen et al. (2013) estimate a yearly national wood consumption rate of around 16 million m^3, significantly lower than the recorded wood consumption in this case. Notably, energy consumption plays a significant role in driving deforestation. At the same time, other factors, such as horizontal expansion of agriculture, fires, drought, and overgrazing, contribute to the overall loss of forest resources.

The primary purpose of establishing forest plantations has been to acquire fuel wood and building materials, namely eucalyptus and acacias, within irrigated plantations (Riveiro et al., 2023). Furthermore, plantations were established for sawn timber production in many regions of Sudan. These include the cultivation of *Acacia nilotica* in riverine forests, the growth of softwood plantations in Jebel Marra, and the establishment of teak and mahogany plantations in central Sudan. In addition, forest plantations have been employed as a means of environmental conservation, such as establishing shelterbelts and windbreaks inside agricultural initiatives and introducing acacia plantations to mitigate desertification in semi-arid regions.

Preserving watersheds has also been a primary goal, as seen by the plantations established along seasonal rivers and watercourses, canal site plants in northern Sudan, and plantations in Jebel Marra. Non-timber forest products, including gum, forest fruits, tannin, and fodder, have been cultivated by utilizing out-growers and plantations within reserved forest areas (Gafaar, 2011).

FAO (2022) states that wood products have lower levels of greenhouse gas emissions throughout their life cycles than products sourced from non-renewable resources or materials with high emissions. Adequately responding to the increasing demand sustainably entails enhancing the supply by implementing restoration, reforestation, and afforestation programs on lands that have undergone degradation. According to Nhantumbo et al. (2013), forestry initiatives such as allocating resources towards alternative options to large-scale private sector concessions, such as community-owned forests and community-based concessions for various resources, including timber, fuelwood, charcoal, and high-value resources, as well as community licenses for wood and biomass energy, holds promise in enhancing forest management and restoration efforts.

The stated research challenge pertains to the need for a more comprehensive investigation of the availability and distribution of tree species within the designated study sites. This demand is present notwithstanding ample research that has yielded substantial insights into forest-based

small-scale businesses (F-BSSIs) and the timber market. The main objective of this study was to assess tree species availability in Sinnar state, Sudan, to identify the types of wood used and marketed, and to explore the selection criteria driven by the continuing demand for timber in construction, furniture, and energy sources.

2 MATERIALS AND METHODS

2.1 Description of study area

The study area is about 400 Km south-to-south-east of Khartoum along the Blue Nile River. Sinnar State occupies a total area of 40,680 km^2 with a population of 1,508,552 million (Sinnar State, Central Statistics Office 2016). It is located between latitude 12° 5′.and 14° 7′ North and longitude 32° 58′ and 35° 42′ East (Nassrelddin, 2012) (*Figure 1*).

The region's topography is predominantly flat, punctuated only by a few isolated hills. The soil composition consists of dark-colored alkaline clay. Annual precipitation typically falls within 550 to 620 millimeters, mainly between June and October. The primary economic activity in this region revolves around agriculture, with the farming system as the predominant livelihood strategy. Livestock, including goats, cows, sheep, and camels, contributes approximately 23 % to the overall national economy within the study area.

The local vegetation falls within the low rainfall woodland savanna category, characterized by clay-rich soils. Notable tree species dominating the landscape include *Acacia seyal*, *Acacia mellifera*, and *Balanites aegyptiaca*. Additionally, the depressions and periodically inundated plains along the Blue Nile serve as the natural habitat for the renowned Sunut (*Acacia nilotica*) forests, which hold significant cultural and ecological importance in Sudan. Sinnar state was selected as the study area due to its environmental significance, the presence of many stakeholders, and the opportunity to study a range of forest types, particularly the riverine Sunut forests, making it a valuable location for in-depth research and analysis.

Figure 1. Map of the study area

2.2 Data collection

This study applied a purposive sampling technique. The sampling frame comprised 112 sawmilling and timber markets. The sample size was determined by applying the formula (Yamane, 1967) in Equation (1), an approach that has been widely used in various studies (Pello et al., 2021; Amare et al., 2019; Hemida et al., 2023).

$$n = N(1 + N(e)^2) \quad (1)$$

Where:

n:	sample size
N:	the total number of participants from sawmilling and timber markets
e:	marginal error at a 5 % precision level.

Accordingly, 87 respondents were selected randomly from two groups: 37 sold firewood and small wood for construction, and 50 were engaged in timber trading for sawmills. These individuals were chosen from three localities: Elsuki (37 respondents), Singa (30), and Sinnar (33). Participants were included based on their availability and willingness to participate.

Data was collected through primary and secondary means. Primary data was gathered through face-to-face interviews using a semi-structured questionnaire complemented and validated by key informant interviews. Before the formal interview, the questionnaire was rigorously pre-tested with a cohort of 10 farmers to assess its reliability and validity.

Secondary data comprised various documents, including archival records, FNC and FAO reports, literature (articles, books, policy briefs), and internet sources. This secondary data played a crucial role during the primary data collection phase and was instrumental in determining the indicators and factors utilized in the study and designing the questionnaire for data collection.

2.3 Statistical methods

The collected data were processed and analyzed using statistical software, specifically SPSS (version 25) and Excel 2016. Descriptive statistics, such as percentages and frequencies, were employed to present and summarize the data.

3 RESULTS

3.1 Demographic and educational profile of timber traders and sawmill owners

The study results reveal that all respondents were male (100 %), revealing a male-dominated industry (*Table 1*). The table indicates that most sample participants' ages range between 50–59 years (43.5 %) and 40–49 years (40 %) for timber traders and sawmill owners, respectively. The educational levels of timber traders and sawmilling owners show that many respondents have secondary education (30.4 % and 28 %), respectively.

The educational backgrounds in the timber trading and sawmilling industries display distinctive trends. Timber traders have higher enrollment in Khalwa (13 %) than sawmill workers (4 %), indicating a more substantial influence of traditional education in trading. Basic education is more common among timber traders (26.3 %) compared to those in sawmilling (21 %). Primary education is more prevalent in sawmilling (16 %) than in timber trading (4.3 %). Both sectors have similar secondary education rates, with 30.4 % timber traders and 28 % sawmill workers. University education is slightly higher among timber traders (13 %)

than sawmill workers (9 %). Given the sector's need to comprehend technical documentation and safety regulations, 21 % of sawmill workers are literate, compared to 13 % in the timber trading industry.

The presence of a significant portion of respondents with 20–30 years of experience (30.4 % in timber traders and 48.0 % in sawmilling) suggests stable involvement in the industry. Conversely, those with less than 20 years of experience highlight ongoing entry into the market (30.4 % in timber traders and 16 % in sawmilling). Additionally, 30.4 % of the timber traders reported having been in the business for 31 to 40 years. The figures for those with over 40 years of experience are lower, representing only 8.8 % of timber traders and 16 % of sawmilling.

Table 1. Age, sex, years in business, and education level profiles of timber traders (% of respondents in each class)

Characteristics		% of respondents	
		Timber traders (37)	Sawmilling (50)
Age (years)	18-29	0	4.0
	30-39	8.7	8.0
	40-49	17.4	40.0
	50-59	43.5	28.0
	above 60	30.4	20.0
Sex	Male	100	100
Educational Level	Khalwa*	13.0	4.0
	Basic	4.3	16.0
	Secondary	30.4	28.0
	Primary	26.3	21.0
	University	13.0	9.0
	Literacy	13.0	21.0
Years in Business	Less than 20	30.4	16.0
	20-30	30.4	48.0
	31-40	30.4	20.0
	above 40	8.8	16.0

**Islamic school for The Holy Quran and its studies.*

3.2 Types of wood used/sold in depots (Mawrda) and sawmilling for the past three decades

The study results show 27 timber tree species in the marketplace over the past three decades. Most species are unavailable due to conservation protection, overharvesting, prohibitive costs, habitat destruction, geographic inaccessibility, and regulatory restrictions (*Table 2*). The same table shows that the main timber species in the market (Mawrda) were *Acacia nilotica* (52.2 %), *Cordia sinensis* (43.5 %), and *Khaya senegalensis* (34.8 %). Respondent rankings of wood types available for sawmilling revealed 48 % for *Acacia polyacantha* and *Diospyros mespiliformis*, 44 % for *Khaya senegalensis* and *Balanites aegyptiaca*, and 36 % for *Acacia nilotica*.

Table 3 illustrates the incidence of timber and sawing wood the respondents traded in the study area according to their importance. The same table indicates that the main timber species were *Acacia nilotica*, representing (100 %) and (95.7 %) for marketing and sawmilling timber, respectively. Besides that, *Azadirachta indica* and *Mangifera indica* were the second most crucial wood species after *Acacia nilotica* in sawmilling 88 % and timber traders 69.6 %. This may be due to their availability, market demand, market price, and the available income for the buyers (Blair et al., 1982; Nautiyal, 1988).

Table 2. Species of Market Traded Timber over the last 30 Years

No	Binomial Nomenclature	Local Name (Arabic)	% of respondents	
			Timber traders	Sawmilling
1	*Acacia nilotica* subsp. *tomentosa*	Sunut	52.2	36.0
2	*Acacia polyacantha* Willd	Kakamut	17.4	48.0
3	*Acacia seyal* var *seyal* Del.	Talh	13.0	0
4	Adina microcephala (Del.) Hiern	Mishka	0	8.0
5	*Albizia aylmeri* Hutch. ex. Broun	Sereira	0	8.0
6	*Anogeis. leiocarpus* (DC.) Guill. & Perr.	Sahab	17.4	0
7	*Balanites aegyptiaca* (L.), Del.	Higlig	26.1	44.0
8	*Borassus aethiopum* Mart.	Delieb	8.7	0
9	*Cono. lancifolius* Engl. ex Engl. & Diels	Damas	8.7	4.0
10	*Cordia africana* Lam	Gimbil	0	4.0
11	*Cordia sinensis* Lam.	Andrab	43.5	32.0
12	*Crateva adansonii* DC	Dabkar	0	4.0
13	*Dalbergia melanoxylon* Guill. & Perr.	Babanus	13.0	0
14	*Diospyros mespiliformis* Hochst. ex DC.	Goghan	30.43	48.0
15	*Eucalyptus camaldulensis* Dehn.	Ban	26.1	0
16	*Fagus sylovatica*	Zan	4.3	0
17	*Faidherbia albida* (Delile) A.Chev.	haraz	13.0	0
18	*Ficus sycomorus* Linn	Gameiz	0	12.0
19	*Hyphaene thebaica* (Linn.) Mart	Dom	8.7	0
20	*Khaya senegalensis* (Desr.) A. Juss	Mahogany	34.8	44.0
21	*Oxytenanth. abyssinica* (A. Rich.) Munro	Gana	17.4	0
22	*Piliostigma reticulatum (DC.) Hochst.*	Abukhmira	0	12.0
23	*Pseudocedr. kotschyi* (Schweinf.) Harms	Duruba	8.7	4.0
24	*Pterocarpus lucens* GuilL. & Perr.	Taraya	26.1	0
25	*Sterculia setigera* Del.	Tartar	8.7	0
26	*Tamarix nilotica* (Ehrenb.) Bunge	Tarfah	0	4.0
27	*Tectona grandis* L	Teak	8.7	12.0
28	*Ziziphus spina-christi* (Linn.) Desf	Sidr	0	28.0

Table 3. Traded timber Species in 2023

No	Timber species	% of respondents	
		Timber traders	Sawmilling
1	*Acacia nilotica* subsp. *tomentosa*	100.0	95.7
12	*Acacia seyal* var *seyal* Del.	0	8.7
7	*Anogeissus leiocarpus* (DC.) Guill. & Perr.	0	26
5	Azadirachta indica A. Juss	88.0	69.6
9	*Balanites aegyptiaca* (L.), Del.	12.0	17.4
3	*Eucalyptus camaldulensis* Dehn	0	13.0
10	*Ficus sycomorus* Linn	0	8.7
4	*Mangifera indica* Linn.	88.0	47.8
6	*Oxytenanthera abyssinica* (A. Rich.) Munro	0	21.7
11	*Psidium guajava* (L.)	0	26.1
8	*Ziziphus spina-christi* (Linn.) Desf	0	21.7
	Total		100.0

3.3 Reasons for choosing Sunut timber

The data analysis found that *Acacia nilotica* is the primary species used by the respondents for sawmilling (100 %) and timber (95.7 %) in the market. Respondents (*Figure 2*) rank *Acacia nilotica* timber products according to market choice. The responding timber traders (67 %) and sawmill timber (76 %) chose timber according to species availability. In contrast, some respondents (28.4 %) chose *Acacia nilotica* timber based on demand.

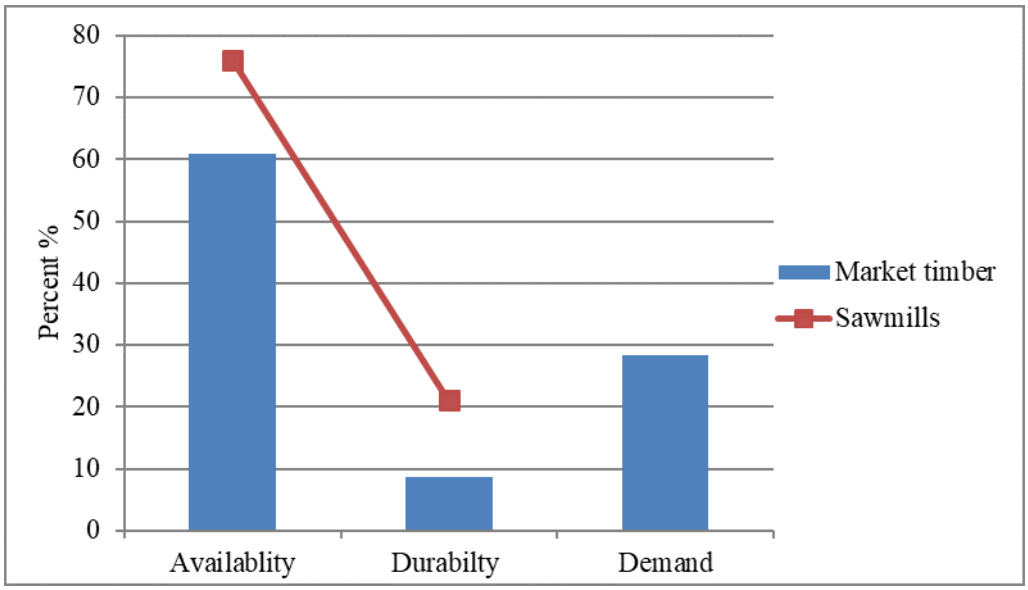

Figure 2. Reasons for choosing Sunut Timber

The study identifies forest reserves, unique forests, and community forests as the primary timber suppliers, as shown in *Table 4*. The comparison of timber sourcing between the timber traders and sawmilling sectors highlights distinct preferences, underscored by a chi-square test statistic of 73.55 and (P = 0.000), indicating significant differences in the sources of timber for trade and sawmilling. With timber traders, 30.42 % of respondents source from forest reserves, 4.38 % from notable and community forests, and 65.20 % utilize a combination of sources, reflecting a broad sourcing strategy aimed at risk mitigation. In contrast, sawmilling shows a more substantial reliance on local sources, with 76.90 % sourcing from forest reserves and 11.50 % from community forests, suggesting a dependency on localized timber supplies. Only 7.40 % of sawmill respondents use multiple sources, indicating less diversity in their sourcing strategy than timber traders. The notable disparity in sourcing practices reveals operational differences and carries implications for regulatory and sustainability considerations, emphasizing the need for targeted policies ensuring sustainable resource utilization.

Table 4. Timber sources used by respondents

Timber soures	% of Respondent		X^2	df	p
	Timber traders	Sawmilling			
Missing	0.0	4.20			
Forest reserves	30.42	76.90			
Special and community forest	4.38	11.50	73.55[a]	3	0.000
All of the above	65.20	7.40			
Total	100	100			

[a] = Chi-squared test indicates significant differences

3.4 Wood product preference

The study results on timber species selection criteria in marketing indicate that timber availability is the predominant element influencing the decision-making process for 40 % of participants. By comparison, a notable proportion of individuals, precisely 28 %, choose based on species durability and market demand. Furthermore, a mere 4 % of participants justify their selection based on the economic aspect of the species. Concerning sawmilling, most sellers (47.8 %) choose according to a mixture of the reasons above, as depicted in *Figure 3*. The study findings are consistent with the discoveries made by Nautiyal (1988), wherein a combination of factors, including consumer demand, market dynamics, availability of raw materials, and consumer purchasing power, influences the importance of these items.

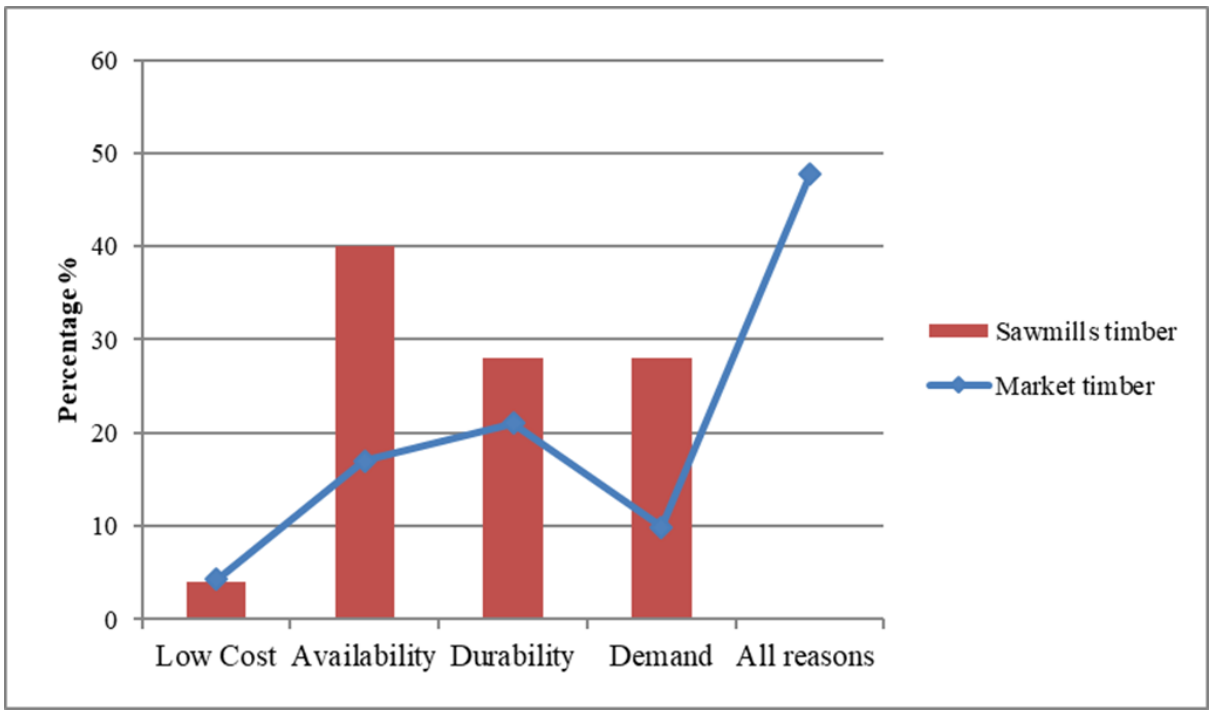

Figure3. Reasons for choosing trading timber species

According to the data presented in *Table 5*, most participants (88 %) have observed variations and declines in the availability of trade timber species over the past three decades. As *Table 6* shows, timber traders have confirmed that various factors contribute to these fluctuations, including seasonality, general overexploitation, and seasonal overexploitation.

Table 5. Fluctuations in Species Availability for trade

	% of respondents		X^2	df	p
	Timber traders (37)	Sawmilling (50)			
Missing	4.38	4.58			
yes	65.14	87.40	5.973[a]	2	0.0145
No	30.48	8.02			
Total	100	100			

[a] = Chi-squared test indicates significant differences

Table 6. Reasons for fluctuation in timber species availability for trading

	% of Respondent		X^2	df	p
	Timber traders (37)	Sawmilling (50)			
Missing	12.92	7.69			
Seasonality	34.79	56.15			
General overexploitation	4.38	0.0	9.264[a]	4	0.05
Seasonal overexploitation	39.17	36.15			
All of the above	8.75	0.0			
Total	100	100			

[a] = Chi-squared test indicates significant differences

The study findings indicate that fourteen timber species have become endangered due to a significant decrease in their market availability. *Table 7* shows that most respondents, specifically 73.9 % and 96 %, expressed concern regarding the endangered status of *Balanites aegyptiaca* for marketing and sawmilling, respectively.

Table 7: Respondent perceptions of endangered timber species in the study area

No	Binomial Nomenclature	% of respondents	
		Timber traders (37)	Sawmilling (50)
1	*Acacia senegal* (L.) Willd	21.7	8.0
2	*Acacia seyal* var *seyal* Del	26.14	8.0
3	*Balanites aegyptiaca* (L.), Del.	73.9	96.0
4	*Borassus aethiopum* Mart	13.0	0
5	*Cordia sinensis* Lam	8.7	0
6	*Dalbergia melanoxylon* Guill. & Perr.	4.3	0
7	*Diospyros mespiliformis* Hochst. ex DC.	8.7	0
8	*Ficus sycomorus* Linn	4.3	0
8	*Hyphaene thebaica* (Linn.) Mart	13.0	0
10	*Khaya senegalensis* (Desr.) A. Juss	0	12.0
12	*Tectona grandis* L	4.3	0
13	*Fagus Sylvatica*	4.3	0
14	*Ziziphus spina-christi* (L.) Desf	21.7	24.0

4 DISCUSSION

This study offers significant findings regarding market preference for timber species distinguished by their exceptional quality, strength, and durability. As a result, many species have been subjected to extensive exploitation. This discovery further corroborates Nasroun (1975) and Chen et al. (2019), illustrating that various criteria influence species choice, including accessibility, aesthetic appeal, durability, and capacity to absorb varnish and adhesive substances. As a result, certain species, including *Pterocarpus lucens*, *Khaya senegalensis*, *Diospyros mespiliformis*, and *Sterculia setigera* demonstrate limited availability and are not readily obtainable within the commercial sphere. Furthermore, the forested regions in Sudan have experienced a significant reduction due to inadequate management practices and unregulated land utilization, with current coverage standing at approximately 19 % (Yagoub et al., 2017; Sulieman, 2018, Sompougdou et al., 2024). The endangerment of these species

contributed to a significant decrease in their availability within the commercial market (Fremout et al., 2020). In addition to supporting the findings of Mukhtar (2002), Newbold et al. (2015), and Fremout et al. (2020), which assert that certain crucial tree species face threats and are at risk due to recurring droughts or excessive logging activities, some of these species lack the capacity for natural regeneration.

Examples of such species include *Adansonia digitata*, *Borassus aethiopum*, *Hyphaene thebaica*, *Cordia africana*, *Dalbergia melanoxylon*, *Anogeissus leiocarpus*, *Ziziphus spina-christi*, and *Khaya senegalensis*. Famuyide et al. (2012) have also documented that excessive exploitation in Nigerian forests and forest reserves, driven by rising requests for these species, has restricted the market availability of species such as *Khaya spp., Afzelia africana, and Terminalia spp.* (Sambe et al., 2022; Ali et al., 2023). *Table 7* documents and presents the endangered species found in Sinnar State. *Table 3* displays several presently traded wood species, including *Khaya senegalensis*, Azadirachta indica, *Acacia nilotica*, and *Balanites aegyptiaca*. The present study's findings indicate that 88% of participants experienced changes in the availability of timber species traded over the past three decades (Chabi et al., 2013; Lusweti et al., 2021).

According to FAO (2010), there is evidence to substantiate the many explanations provided by participants about the fluctuating availability of timber species within the investigated region. FAO estimates indicate that forest areas in Sudan have been depleted by approximately 19%. The standing volume of the stock witnessed a decrease, with estimates suggesting a reduction from roughly 2.4 billion cubic meters during the mid-1970s to around 1.5 billion cubic meters by the mid-1980s. The result is consistent with the findings of Hansen et al. (2013) and Keenan et al. (2015), wherein deforestation and degradation were discovered. According to those two research studies, an estimated 11.4 million hectares of natural forests across the globe undergo deforestation annually.

Nevertheless, it is essential to acknowledge that many natural forests have shifted from a production focus to preservation-oriented utilization. Presently, around 290 million hectares are designated as legally protected and reserved. In addition, wood species choice for commercial purposes is consistent with Idumah and Awe (2011), who noted that furniture producers in the Ibadan Metropolis consider characteristics such as hardness (strength) and longevity when selecting wood species.

Moreover, choosing between unprocessed Sunut logs and processed Sunut timber depends on the wood product, such as furniture of local or high-quality nature. The transportation of raw logs is a costly undertaking. Most logs are crooked and uneven, which disqualifies them from regional sawmilling. As a result, the timber obtained from such logs are of lower quality than logs allocated for state sawmilling. These designated logs are used for railway sleepers and other *Acacia nilotica* timber products based on special orders (Gubartalla, 2003).

Most participants claim to possess sufficient expertise and information regarding diverse timber species within the designated duration of the research, as evidenced by their disclosure of the number of years they had been engaged in the industry (Poudyal et al., 2020).

5 CONCLUSIONS

The area researched has witnessed a substantial decrease in the accessibility and variety of timber species throughout the preceding three decades. Incorporating social values into the concept of sustainability does not inherently guarantee an expanded set of harvesting alternatives for forest managers. The research findings show that only eight of 28 timber species commonly available over the past 30 years are on the market. The observed change is ascribable to the adverse consequences of extensive logging and overexploitation of these specific species.

Furthermore, the present study found that the supply of traded timber species fluctuates due to seasonal variations and excessive exploitation. Several species currently at risk of extinction include *Balanites aegyptiaca* (commonly known as Higlig), *Borassus aethiopum, Tectona grandis, Hyphaene thebaica*, and *Khaya senegalensis*.

A comprehensive assessment of forest policy is necessary to identify the stakeholders responsible for protecting forests from excessive exploitation and degradation. Additionally, comprehending the difficulties associated with conserving and preserving economically valuable species across various forested regions within the state is essential. Promoting the cultivation of *Tectona grandis*, *Khaya senegalensis*, and fast-growing tree species alongside commercially desirable species is a possible approach to mitigating the declining supply of popular timber species. This method minimizes the potential depletion of precious and high-quality timber species. Furthermore, assessing the legality of used timber to ensure that only legitimate timber with minimal risk is in responsible supply chains and marketplaces is essential. Further investigation is necessary to examine the diverse factors that affect the successful management of species of high value, with the aim of satisfying market demand.

Acknowledgements: The author extends heartfelt gratitude to the Faculty of Natural Resources and Environmental Studies, University of Sinnar, Sudan, for their invaluable support of this research. Additionally, appreciation is due to the rural communities, particularly those working in sawmilling and timber traders within Sinnar state, for their generous contribution of essential information.

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