KENYA FORESTRY RESEARCH INSTITUTE

SOCIO-ECONOMIC IMPACT OF FOREST HARVESTING MORATORIUM IN KENYA




TECHNICAL REPORT

Joram Kagombe, Jonah Kiprop, David Langat, Joshua Cheboiwo, Linus Wekesa, Paul Ongugo, M.T. Mbuvi and Nereoh Leley

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Cover captions

Clockwise: Plywood at a sawmill in Uasin Gishu County
Harvested fuelwood ready for sale in Kericho County
On farm pine plantation in Nyandarua County
Sawn timber at a sawmill in Nyeri County

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Tel: +254-724259781/2, +254-722-157414, +254-20-2010651/2
Email: director@kefri.org Website: www.kefri.org

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FOREWORD

Kenya has long history of public forest plantations development dating back to 1900's when trials of exotic tree species mostly Eucalyptus, Pines and Cypress were established. The country borrowed experiences on tree management from South Africa and Australia. Industrial forest plantations were established for provision of wood raw material on a sustainable basis for sawnwood, plywood, firewood, transmission poles and, pulp and paper production. The plantation coverage in Kenya was its peak in 1980's at 170,000 hectares. The acreage reduced to 165,000 by 1995. The annual planting was 8,600 hectares in 1986 reducing to 300 hectares in 1990's. Forest management and governance in Kenya was one of the best in the continent until mid 1990's when governance challenges emerged which resulted to overharvesting and backlogs in forest plantation establishment.

To remedy the governance challenges in the sector the government banned timber harvesting in 1999 that lasted up to 2012 and a second moratorium was imposed from 2018 to date. These moratoriums led to disruption of plantation establishment and near collapse of the timber industry adversely affecting the sector. KEFRI therefore, undertook a study to assess the socio-economic impact of forest harvesting moratorium to inform future decisions in the sector.

The results of the study showed that the moratorium had significant impact on forestry dependent industries, sector employment opportunities, Kenya Forestry Service operations, and livelihood of forest dependent communities. The study identified economic losses and recommends remedial measures to minimize the need for future moratoriums. The report recommends putting in place robust governance framework and continuous monitoring of public forest plantation management to ensure adherence to the laid down management procedures, plans, timely corrective measures and avoiding lapses after lifting the moratorium.

Private and farm forests have shown resilience to drive future forest sector development and provision of the much-needed forest products. To achieve this, a policy on commercialization of trees should be fast-tracked to provide desired platform for commercial forestry investment in the country

Joshua K. Cheboiwo (PhD)
Director, KEFRI

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ABBREVIATIONS AND ACRONYMS

BF	Board Foot
CFA	Community Forest Associations
FGD	Focus Group Discussions
GDP	Gross Domestic Product
KEFRI	Kenya Forestry Research Institute
KES	Kenya Shillings
KFS	Kenya Forest Service
KNBS	Kenya National Bureau of Statistics
KTDA	Kenya Tea Development Agency
KTGA	Kenya Tea Growers Association
KWPA	Kenya Wood Preservers Association
MEF	Ministry of Environment and Forestry
MENR	Ministry of Environment and Natural Resources
MT	Metric Tonnes
NYS	National Youth Service
SMFE's	Small Medium Forest Enterprises
TMA	Timber Manufacturers Association
USD	United States Dollar

EXECUTIVE SUMMARY

Kenya has had two harvesting moratoriums in public and community forests; the first one was from 1999 to 2012 and the current one from 2018 to date. The current moratorium was imposed to allow for streamlining management and governance in the forestry sector. Kenya Forestry Research Institute undertook a study to assess the socio-economic impact of the forest harvesting moratorium to inform policy decisions. To collect data and information the study applied several approaches namely; literature review; industry and market surveys; case studies; key stakeholders and key informant interviews, focus group discussion and extrapolation of results. The study stratified the country into Western, Central and Coast regions for purposes of data collection and information gathering. Sample representative counties with significant forestry resources that supported vibrant wood consumption and processing were selected and key actors in forest products value chain were selected for data collection. A structured questionnaire was administered to sawmillers, owners of wood treatment plants, industrial wood users, tree growers and SMFE's on forest products. Market surveys for key forest products were undertaken in selected urban towns.

The findings indicate that the harvesting moratorium had both positive and negative socio-economic impact on various actors and players in the forestry industry. Many stakeholders in the sector realized significant losses due to the moratorium. The sawmilling industry which relied on 80% of raw materials from public forest plantations had a reduced turnover of over 65% from an estimated annual peak of KES 27 billion in 2017 to KES 9.5 billion in 2018. Following the imposition of the moratorium many sawmills were operating at about 35% of their installed capacity resulting in losses associated with idle machinery estimated at KES 10 billion.

The moratorium led to employees redundancies in the sector with an estimated 85% of the employees laid off translating to income losses of about KES 3.9 billion per annum. The moratorium also affected the supply of wood materials resulting in scarcity and higher prices. Firewood prices increased by 25.5% from an average of KES 1,857 in 2017 to KES 2,330 per m^3 in 2018. As a result, the firewood dependent industries, institutions and farmers incurred additional expenditure of KES 1.28 billion, KES 3 billion and KES 46 million for tea factories, schools and tobacco farmers respectively. The price of charcoal rose by 40% from KES 1,020 per 50 Kg bag in 2017 to KES 1,430 per bag in 2018. The moratorium had a negative impact on production and trade in charcoal as consumers incurred an additional cost of KES 19.7 billion. The moratorium increased the market prices of timber and wood products. Prices of sawn timber increased by a mean of 22.65% with prices increasing by 36.1%, 28.7%, 14.7% and 11.1% for Cypress, Pine, Eucalyptus and Grevillea timber respectively.

For treated fencing poles price increase varied depending on the sizes of the poles; small diameter treated poles increased by 24.4%, medium poles by 14.7%, large by 16.6% and standard transmission poles by 5.5%. The moratorium also affected the reconstituted wood industry, furniture making and wood carving business.

In addition, the economies and livelihoods of forest dependant towns and communities were negatively affected leading to unemployment and poverty. A case study in Rift Valley and Western Kenya showed that on average, about 27.5% of employees working in SMFE's were laid off, most of them being youth. The moratorium also affected key forestry public institutions with Kenya Forest Service losing an estimated KES 2.75 billion per annum in revenue from plantations. The moratorium resulted in increase of importation of timber from 3,231.38 m^3 in 2017 to 29,355.39 m^3 in 2018 leading to a loss of foreign exchange of KES 1.04 billion in 2018.

The unexpected imposition of the moratorium also impacted negatively on sustainable management of public forests as no meaningful planting and silvicultural operations were undertaken. In general, the private tree growers and importers of timber were the key beneficiaries of the moratorium. The moratorium provided opportunities for purchase of trees grown on farms leading to enhanced incomes to farmers and commercial tree growers. The study recommends; review of current licensing of forest logging, fast tracking forestry sector reforms to create good governance structures, development of an effective monitoring system to ensure sustainable management of forest resources and promoting investment in secondary forest products processing for wealth creation and employment.

1.0 INTRODUCTION

1.1 Background Information

Kenya's forestry sector is one of the key areas identified by Kenya Vision 2030 as critical to sustainable development of the country (UNEP, 2012). According to Kenya National Bureau of Statistics (KNBS) economic survey of 2019, forestry and logging contributes 1.3% to the Gross Domestic Product (GDP) of the country. The value of the economic output of the forest sector is currently estimated at KES 78.5 billion (USD 785,440,000), (Cheboiwo *et al.,* 2018). This contribution excludes provision of environmental services and support to other sectors of the economy.

Forestry activities include primary and secondary processes that involve; establishment, maintenance and harvesting of plantations; and processing, manufacturing and transportation of forestry products. The business opportunities of forestry include seed and seedling production, tree growing, processing and distribution of key products such as; saw-logs, transmission poles, reconstituted wood products, furniture, charcoal, construction and fencing poles and non-timber forest products. However, the local business opportunities are threatened by dwindling forest resources due to overexploitation and a low forest cover currently estimated at about 7.4% of the total land area (KFS, http://www.kenyaforestservice.org/). This forest cover is below the recommended global minimum of 10%. Kenya's forests loss is estimated at 5,000 hectares per annum (MEF, 2018). Depletion of forest resources and attendant consequences have the potential to rollback efforts towards the attainment of Kenya Vision 2030 and the Government's Big Four Agenda on food security, affordable housing, manufacturing and universal health care, if immediate remedial action is not addressed

1.2 Challenges in the Forestry Sector

Kenya's forestry sector has faced various governance challenges. The challenges have evolved along different dimensions including; unsustainable utilization of forest resources, weak institutional governance, weak enforcement of rules and regulations and competition from other land uses.

Over time, the government has undertaken national and sector reforms through development of various legislative and legal frameworks to address some of these challenges. The Constitution of Kenya 2010 recommends a minimum national tree cover target of 10%. The Forests Act, 2005 was repealed to Forest Conservation and Management Act, 2016 while The Draft National Forest Policy of 2016 is under review. Forest Conservation and Management Act, 2016 provides for private forest plantation development to contribute to the country's forested area. The Act has also proposed development of 18 subsidiary

legislations to guide specific issues regarding management of the county's forestry sector. Despite the reforms, the forest sector still faces various challenges including forest degradation and governance issues. The main drivers of forest degradation include; changing land use, poor governance mainly weak enforcement of regulations and unprofessional conduct. The governance challenges resulted in untenable forest management practices in the country leading to government decision in February 2018 to impose moratorium on logging activities in public and community forests for three months. The government appointed a Task Force to review the governance and management challenges affecting the forestry sector. The Task Force Report on Forest Resources Management and Logging Activities in Kenya (MEF, 2018) reported that there were major governance issues within the sector that needed to be addressed before lifting the moratorium. The governance challenges identified by the Task Force include; institutionalized corruption, illegal harvesting of indigenous trees, weak enforcement and compliance, mismanagement of plantations and unfair allocation of forest resources. The Task Force recommended far reaching reforms including; institutional reforms within Kenya Forest Service, review of relevant laws and procedures governing disposal of forest produce and review of plantation establishment methods. The Task Force also recommended the extension of the moratorium. Consequently, in May, 2018 the Cabinet Secretary extended the moratorium by six months and which excluded trees on private farms. The moratorium was further extended by one year up to November 2019 and further to November 2020. The reasons for subsequent extensions were to allow for the Task Force recommendations to be implemented.

Based on the extension of the moratorium on logging activities in public and community forests, KEFRI undertook a study to assess socio-economic impact of the moratorium on the forest sector.

1.3 Objectives of the Study

The specific objectives of the study were to:

1. Assess effect of the moratorium on supply of wood materials
2. Assess the effect of the moratorium on timber and wood products prices
3. Examine impact of moratorium on Small Medium Forestry Enterprises (SMFEs)
4. Assess effect of the moratorium on forest dependent urban centres and families
5. Evaluate effect of the morotarium on regional trade in forest products
6. Evaluate effect of the moratorium on national conservation efforts in forestry and tree growing
7. Assess the effect of the moratorium on key forestry public institutions

2.0 METHODOLOGY

2.1 Study Approach

The study applied different approaches for data collection namely: literature review; industry and market surveys; case studies; stakeholder engagement through Focus Group Discussions (FGD), key informant interviews and workshops; and extrapolations.

2.1.1 Literature review

Secondary data was collected from publications on forest moratoria. The information was obtained from; peer-reviewed journals, technical reports, conference papers, unpublished reports, inventory reports, data from Kenya National Bureau of Statistics (KNBS), Kenya Forest Service (KFS) and the Ministry of Environment and Forestry.

2.1.2 Forest industry and market survey

Forest industry and market surveys were conducted in major forest growing and consuming areas in Central, Coast and Western regions of Kenya. The survey and data collection was conducted using a structured questionnaire targeting key actors in the timber market value chain including: tree growers; large, medium and small-scale sawmills; pole treatment plants; timber merchants; furniture making firms; charcoal and firewood producers and consumers; companies utilizing wood in their production processes and smallholder dealers in poles/posts. The main information captured included; prices of forest products, supply of wood products, employment and income losses before and after the ban.

2.1.3 Case studies

Case studies on consumption of fuelwood data was undertaken in selected tea factories, schools and government institutions. The consumptive data was obtained using a checklist. Data obtained from case studies was used in computation of per capita consumption of fuelwood. The estimated average per capita consumption value was then used to estimate the national consumption. Values generated were then used to make inferences on economic impact on fuelwood consumption and trade.

2.1.4 Stakeholder engagement and validation

Focus group discussions, key informant interviews and workshops were undertaken with major stakeholders involved in forest products value chain. The stakeholders meeting had representatives of; sawmillers, forest based small scale traders, pole preservation dealers, pole dealers, charcoal dealers and the tea industry. The meeting provided a platform for stakeholders to share experiences and challenges on how the moratorium had affected operations of their businesses. During the forum the stakeholders were also presented with preliminary findings on the "Socio-economic Impact of Forest Harvesting Moratorium in Kenya" for validation and provision of additional data and information.

2.2 Study Areas and Data Sources

Data was collected using a cross-sectional design. Random sampling procedure was applied to select a total of 400 respondents from three regions namely; Central, Coast and Western (Table 1). In the Coast region survey were conducted in Kilifi, Kwale and Mombasa counties while in Central region, the target was Nairobi, Nyeri, Laikipia, Kitui, Embu, Nyandarua, Kiambu, Machakos and Muranga counties. The Western region covered Nakuru, Kericho, Uasin-Gishu, Elgeyo Marakwet, Bungoma, Kisii and Kisumu counties.

Table 1: Categories of respondents interviewed per region

Data source	Western region	Central region	Coast region	Total
Sawmills	27	22	12	61
Wood preservation plant	4	6	3	13
Tea factories	5	4	0	9
Timber merchants	49	36	27	112
Firewood merchants	12	17	14	43
Construction poles merchants	7	9	12	28
Charcoal merchants	15	9	11	35
Post merchants	5	6	7	18
Tree growers	15	14	17	46
KFS	4	3	3	10
TMA	2	3	1	6
Kenya Wood Preservation Association	1	1	0	2
KTGA	0	1	0	1
Ministry of Education/Schools	1	2	2	5
Kenya Prison Service, National Youth Service and Kenya Defence Forces	1	1	1	3
Other industrial wood users	1	4	3	8
Total	**149**	**138**	**113**	**400**

Data on timber import and export was collected from Holili, Loitokitok, Lunga Lunga, Malaba, Busia and Namanga border points and the port of Mombasa. The data were accessed from Kenya Forest Service (KFS) records in these border points. Data gathered included; quantity of wood products from various tree species imported into Kenya for the year 2017 (before the moratorium) and in 2018 (after the moratorium).

2.3 Data Analysis

The collected data was entered and analyzed using MS-Excel and summary frequency tables generated. From the frequency tables, graphs were generated for ease of comparison.

3.0 STUDY FINDINGS

3.1 Effect of the Moratorium on Supply of Wood Materials

3.1.1 Sawmilling

The sawmilling sector is the largest primary wood processing undertaking in the country. The sector deploys a wide range of equipment that include; power saws, bench saws, gang or band saws and wood mizers. The sawmilling industry in Kenya has been growing steadily over the years. There were 444 registered sawmills operating in the country by 1999. The number increased to 633 in 2012 consisting of 30 large, 65 medium, and 538 small sawmills (Cheboiwo, 2016). By 2017, there were about 1,000 sawmills operating in the country with 712 (40 large, 168 medium and 504 small) pre-qualified by KFS. According to Timber Manufacturers Association (TMA) with a membership of 862, the investment in the sector is large with assets valued at KES 550 billion.

The sawmilling industry in Kenya largely depends on wood sourced from public plantations and private farms. The public forests supplied about 80% of the raw materials while 20% was sourced from private tree growers before the harvesting moratorium was imposed. According to KFS, 2017 felling plans, 36,000 ha of plantations were available with a potential to generate round wood of between 2.4 and 2.8 million m^3 valued at between KES 7.2 and KES 8.4 billion. Before the moratorium in 2017, the various categories of sawmills; Large, Medium and Small processed an average of 4,669 m^3, 1,675 m^3 and 940 m^3 timber respectively per annum (Table 2). The annual gross turnover from sawmilling operations before the moratorium was estimated at KES 27 billion. After the moratorium the gross turnover reduced to KES 9.5 billion, which translates to a reduction of 65%.

Table 2: Volume and value of timber processed by different categories of sawmills by 2017 before the moratorium

Sawmill category	Number of prequalified sawmills	Average volume of timber processed per annum (m^3)	Total volume of timber processed (m^3)	Average price (per m^3) (KES)	Total value of timber (KES)
Large	40	4,669	186,760	30,000	5,602,800,000
Medium	168	1,675	281,400	30,000	8,442,000,000
Small	504	940	473,760	30,000	13,132,800,000
Total	**712**		**941,920**		**27,177,600,000**

Source: KFS 2018

After the moratorium, some sawmillers had difficulties in accessing raw materials which led to low timber production with some mills operating at about 35% capacity, while others were closed down due to lack of raw materials. The mills which were partially operating relied on highly priced, poor quality and immature trees from private forests. Due to the poor form of the logs, the wood mizers could not process such materials and were sawn using circular and power saws leading to low recovery. The low recovery coupled with high prices led to low profit margins. Additionally, most of the sawmillers had paid for logs which they had been allocated in public forests and paid for by the time of the moratorium. The logs remained in the forest and continue to degrade leading to loss of value and revenue to sawmillers.

Plate 1: Harvested materials left uncollected in Mau Forest Conservancy, Kericho County after the imposition of the moratorium

3.1.2 Firewood production and consumption

About 80% of rural and peri-urban population use firewood for domestic energy needs. Institutions such as; schools, tea, textile, food and chemical processing industries among others use firewood as a source of energy. The major suppliers of firewood are the smallholder tree growers and public forests spread across the country. The moratorium has led to scarcity of firewood resulting in higher prices.

i. Tea Processing

Tea industry in Kenya is a major foreign exchange earner. For instance, in 2018 the industry contributed 4% of the GDP and 26% of export earnings. The 66 Kenya Tea Development Agency (KTDA) factories are the major firewood consumers accounting for 80% of annual wood consumption by the tea sector. The common tree species used as firewood by the tea factories are *Eucalyptus grandis*, *Eucalyptus saligna* and *Acacia mearnsii*. Use of firewood is preferred as it reduces processing costs, saves on foreign exchange leading to increased incomes to tea growers. On average, each of the 66 KTDA managed factories use between 1,000 m^3 and 2,500 m^3 of firewood per month. Processing of 1 kg of tea uses about 3.3 kg of firewood. In 2018 during the moratorium period the firewood demand for KTDA was 2,707,815.26 Metric Tonnes (MT) valued at KES 6.3 billion. On average, the prices of firewood increased by 25.5% from an average of KES 1,857 in 2017 to KES 2,330 per m^3 in 2018. The increase in price resulted to factories spending an additional cost of KES.1.28 billion on firewood (Table 3).

Table 3: Firewood costs by KTDA tea factories before and after moratorium

Month	Quantity of tea processed in 2018 (kg)	Quantity of firewood utilized (M^3)	Value of fuel wood before moratorium (KES)	Value of fuel firewood after moratorium (KES)	Additional cost as a result of moratorium (KES)
March	30,986,830	197,788	367,292,829	460,846,684	93,553,854
April	44,579,880	284,552	528,413,854	663,007,151	134,593,297
May	43,355,790	276,739	513,904,481	644,802,068	130,897,587
June	43,299,060	276,376	513,232,049	643,958,360	130,726,310
July	35,278,160	225,179	418,158,785	524,668,805	106,510,019
August	37,432,600	238,931	443,695,775	556,710,370	113,014,594
September	42,530,860	271,473	504,126,427	632,533,428	128,407,000
October	49,283,640	314,576	584,168,422	732,963,071	148,794,649
November	45,648,570	291,373	541,081,241	678,901,072	137,819,831
December	51,829,000	330,823	614,339,061	770,818,531	156,479,470
Total	**424,224,390**	**2,707,815**	**5,028,412,929**	**6,309,209,544**	**1,280,796,615**

Source: Tea Directorate, 2018 and own computations

Despite the increase in production cost attributed to increased firewood prices, the market prices of tea have remained constant, consequently, most factories have reported a decline in profits due to the moratorium. The decline in profits has resulted in net payment to farmers declining by about KES 5 per kg of tea (Tea Directorate, 2018). Some tea factories have opted to use sawdust briquettes to supplement firewood, however, the supply of sawdust has reduced as most sawmills closed down immediately after the moratorium. Some other factories opted to use sugar cane bagasse. However, the bagasse residue has been reported to block boilers leading to high maintenance costs. If the current moratorium continues, the tea industry is likely to revert to use of furnace oil and this will escalate the production costs and make Kenyan tea less competitive in the international market. Furthermore, the use of furnace oil would have a negative impact on the environment.

ii. Schools

Firewood remains the most common type of fuel in Kenyan schools with about 93% of schools using it for cooking and heating water (Wanjiru, 2016). Consumption of firewood by schools ranges from 0.25 m^3 to 0.74 m^3 per student per year depending on the type of cooking Jikos (RETAP, 2007; Ngeywo, 2009; Wanjiru, 2016; Ministry of Energy, 2019). Primary and secondary schools consume about 4,993,776 m^3 and 1,358,784 m^3 of firewood respectively per annum translating to an annual total value of KES. 11 billion. As a result of the moratorium, the prices of firewood rose from an average of KES 1,857 in 2017 to KES 2,330 in 2018 per m^3, consequently, schools spent an additional KES 3 billion to purchase firewood (Table 4).

Table 4: Firewood consumption in schools and respective costs before and after the moratorium to degrade leading to loss of value and revenue.

School	School population 2017	Quantity of firewood used ($M^{3)}$	Value of firewood before the moratorium (KES)	Value of firewood after the moratorium (KES)	Additional cost of firewood as a result of moratorium (KES)
Primary	10,403,700	4,993,776	9,273,442,032	11,635,498,080	2,362,056,048
Secondary	2,830,800	1,358,784	2,523,261,888	3,165,966,720	642,704,832
Total	**13,234,500**	**6,352,560**	**11,796,703,920**	**14,801,464,800**	**3,004,760,880**

Source: Ministry of Education, 2018 and own computations

Key informant interview from Makueni County reported that the price of a truckload (3 tonnes) of firewood rose from KES 7,000 to KES 18,000 and some schools were contemplating shifting to using liquefied petroleum gas. Some parents that used to pay school fees in form of firewood had their children locked out of schools for lack of fees.

Source: KEFRI field survey

iii. Public Institutions

Public institutions which include; Kenya Prison Service, National Youth Service, hospitals and Kenya Defence Forces prepare and serve food to large populations daily consuming large quantities of firewood. The harvesting moratorium impacted negatively on their operations as they incurred high firewood costs.

iv. Tobacco Curing

Tobacco manufacturing in the country is dominated by two players, British American Tobacco (BAT) and Mastermind Tobacco Company (MTC). Key tobacco growing areas in the country are Eastern region (Meru, Tharaka-Nithi and Embu), Western region (Bungoma and Busia) and Nyanza region (Migori and Homa Bay). At peak production farmers contracted by British American Tobacco (BAT) and Mastermind Tobacco Company (MTC) had approximately 3,500 hectares under tobacco. Tobacco farming requires substantial amount of wood for curing, constructing curing barns, poles and sticks for the preparation of tobacco prior to curing. A hectare of tobacco requires about 28 MT of wood to cure tobacco. Many studies on curing tobacco using wood provide varying wood requirements (Manyanhaire and Kurangwa, 2014; Musoni *et al.,* 2013; Geist, 1999; Kagombe, 2017). On average 1 kg of tobacco requires 6.3 kg of firewood for curing.

The annual production of tobacco in Kenya is about 9 million kg which is cured using 98,839 m^3 of firewood valued at about KES 183 million. The increase in the price of firewood by KES 473 per M^3 after the moratorium resulted to an additional cost of about KES 46 million. The harvesting moratorium has impacted on the income of farmers negatively as prices of tobacco have remained the same.

3.1.3 Charcoal production

Production of charcoal in Kenya is estimated to use l16.5 million MT of round wood annually or 240,000 hectares of woodlands (MENR, 2013). Charcoal is an important source of energy for cooking in most urban households. Charcoal production and trade is an important business in rural and urban areas with annual estimated turnover of 67 million bags or 2.4 million MT of charcoal (Cheboiwo and Mugo, 2011). The charcoal sector employs over 500,000 persons (Njenga, *et al.,* 2013) and generates an annual charcoal business turnover estimated at over KES 93 billion (Wamugunda, 2014).

Charcoal prices increased by 40% as a result of the moratorium. The national average price of a 50 kg bag of charcoal before the moratorium was KES.1,020 in urban areas, which rose to about KES. 1,430 per bag during the moratorium. The moratorium on harvesting therefore has had direct impact on production and distribution of approximately 2.4 million MT of charcoal which translates to an additional cost of KES 19.7 billion to consumers across the country. The moratorium has negatively affected the consumers of charcoal, employment and livelihood of many stakeholders.

3.2 Effect of the Moratorium on Market Prices of Timber and Wood Products

The market prices of sawn wood timber rose rapidly after the moratorium and this is attributed to a decline in supply of the materials. The main timber sold in the market was from Cypress, Pine, Eucalyptus and Grevillea.

3.2.1 Sawn timber

i. Cypress sawn wood

On average prices for Cypress timber rose by 36.1% (Table 5) nationally with the highest increases recorded in Nyeri, Laikipia and Meru counties and the lowest being in Bungoma, Kisumu and Kakamega counties. Before the moratorium in 2017, the price of Cypress sawn wood was on average KES 61 per BF or KES 25,967 per m^3, with the highest price recorded in Kisii at KES 82 per BF or KES 34,745 per m^3 and Kwale, Kitui and Embu at KES 74 per BF or KES 31,356 per m^3.

Table 5: Timber prices of key timber species in Kenya before and after the moratarium

Species	Prices before moratium 2017		Prices after moratium 2018		% increase in price
	Board Feet*	Cubic Metres (m^3)	Board Feet	Cubic Metres (m^3)	
Cypress	61	25,967	82	34,608	36.1
Pine	55	23,424	71	30,168	28.7
Eucalyptus	48	20,423	55	23,410	14.7
Grevillea	46	19,512	51	21,646	11.1

** A Board foot (BF) is 12 ft x 1 ft*

ii. Pine sawn wood

Pine wood has over the years been sourced from both public and private plantations. The wood is now on the decline in Kenya and this has resulted in increased imports of sawn pine timber from Tanzania. Before the harvesting moratorium, pine sawn wood traded at an average price of KES 55 per BF or KES 23,424 per m^3. The moratorium caused the prices to rise to an average of KES 71 per BF or KES 30,168 per m^3. Prices of pine sawn wood rose by 28.7% (Table 5) with the highest increase being recorded in Nyeri (57.7%), and the lowest in Kisumu (10.1%).

iii. Eucalyptus sawn wood

Eucalypts sawn wood is the most traded timber product in most timber markets in Kenya, mainly due to its preference among consumers and its availability in the market. The imposition of the harvesting moratorium did not adversely affect the prices of Eucalyptus sawn wood. The price of Eucalyptus timber rose from an average of KES 48 per BF or KES 20,423 per m^3 to KES 55 per BF or KES 23,410 per m^3. On average prices for Eucalyptus timber rose by 14.7% (Table 5) nationally with the highest increases being in Embu (36.3%), and the lowest being in Meru (4.4%).

iv. Grevillea sawn wood

Grevillea is one of the most preferred agroforestry trees that has been integrated into agricultural landscapes in Kenya. Its timber is widely traded in the markets. Just like Eucalyptus, the imposition of the harvesting moratorium did not adversely affect the prices of Grevillea sawn wood. The price of Grevillea timber rose from an average of KES 46 per BF or KES 19,512 per m^3 to KES 51 per BF or KES 21,646 per m^3. On average prices for Grevillea timber rose by 11.1 % (Table 5) nationally with the highest increases in Kitui (28.8%) and the lowest in Nyeri (1.6%).

3.2.2 Poles

i. Construction poles

Construction poles are mostly produced on farms from various tree species such as Eucalyptus, Casuarina and indigenous species. The major production areas are Uasin Gishu, Vihiga, Nandi, Nakuru and Kericho counties in Western Kenya, Kilifi, Kwale and Lamu in the Coast and Nyandarua in Central Kenya. The poles in the Coastal region are mostly harvested from Casuarina woodlots and are in high demand for construction and renovation of Makuti buildings (grass thatched buildings) that are popular with tourists. In Central and Western Kenya, construction poles are mostly sourced from Eucalyptus woodlots. In some cases, Cypress and Pine thinning are used for low value construction works. The imposition of the moratorium affected the harvesting and trading in poles since the moratorium initially affected both public and private plantations. As a result, the prices of various sizes of Eucalyptus poles increased from an average of 42.8% for the medium diameter poles, 44.8% for the small diameter poles and 61.5% for the large diameter poles (Table 6).

Table 6: Mean retail prices for small, medium and large untreated Eucalyptus construction poles

Year	Mean price of small (3") diameter poles	Mean price of medium (4") diameter poles	Mean price of large (5") diameter poles
2017	113	151	190
2018	155	210	294
Mean % increase	**44.8**	**42.8**	**61.5**

Note: *Tables showing changes in price of Eucalyptus construction poles in the various counties are presented in Appendix 1, 2 and 3*

ii. Treated poles

The combined national demand for treated power transmission poles in 2015 was 480,000 pieces. This was projected to increase to about one million poles by 2030. The production of treated power transmission poles is facing competition from concrete poles whose production has consistently increased over the years. Due to changing market dynamics and the harvesting moratorium, most of the pole treatment plants are operating below installed capacity of 40,000 to 100,000 poles per annum. Imposition of the moratorium on harvesting temporarily affected operations of the treatment plants for 2 months from February to May 2018 before the moratorium on harvesting in private plantations was lifted. Since imposition of the moratorium, prices of treated poles used for fencing and transmission poles increased. The prices of small diameter poles increased by 24.4%, medium diameter poles by 14.7%, large diameter pole by 16.6% and transmission poles by 5.5% (Table 7).

Table 7: Prices of treated poles before and after moratorium

Year	Prices in KES			
	Small poles	Medium poles	Large poles	Transmission poles
2017	822	902	1,357	9,000
2018	1,023	1,035	1,583	9,500
Mean % increase in prices	**24.4**	**14.7**	**16.6**	**5.5**

iii. Mangrove poles

Mangrove forests are spread along the coast of Kenya with formations in Vanga, Mombasa, Malindi and Lamu. Mangrove forests cover about 67,000 ha, out of which 37,000 ha is concentrated in Lamu. Mangroves are exploited for various uses that include timber and poles for making fences, boats, huts and fish traps. Trade in mangrove poles is one of the oldest along the Kenyan Coast however, the condition of mangrove forests has declined to the extent that export-quality poles are no longer available. In 1992, licensed extraction was estimated at 72,100 scores or 1,442,000 poles for domestic use mostly in construction industry.

The hotel industry at the Coast relies on mangrove poles for construction. Imposition of the moratorium led to the hoteliers resorting to use of alternative poles from Eucalyptus and Casuarina. Due to this shift, there was an increase in prices of alternative poles from an average price of KES 200 in 2017 to KES 400 in 2018 per pole which is an increase of 100% *(The Business Daily, 2019, February 8 - https://www.businessdailyafrica.com/news/counties/Lamu-hotels-bear-brunt-of-mangrove-logging-ban/4003142-4972722-lafo7dz/index.htm)*. However, a special exemption on harvesting of mangrove in Lamu County was given after the moratorium with conditions and safeguards to be complied with. The conditions and safeguards include sustainable management of the resource and monitoring to ensure proper harvesting and regeneration of harvested areas.

3.2.3 Reconstituted wood industry

The reconstituted wood sector is dominated by privately owned industrial complexes such as Rai Ply, Comply, Biashara Masters and Timsales among others. These mills are involved in integrated wood processing that include; saw milling, plywood and particle boards manufacturing. The companies use about 200,000 – 250,000 m^3 of round wood annually (MF&W & MFA, 2008). For example, Timsales based in Elburgon produces soft and hard fiber boards with an estimated capacity of 7,000 MT per year. The industry was dependent on high-quality logs which were sourced from public managed forests. With the imposition of the harvesting moratorium, the wood processing plants have scaled down operations and laid off staff. The available materials are from farms, of poor quality

and not adequate to sustain full scale operations. Some of the industry players have shifted their operations out of the country, diversified into manufacturing high quality furniture from imported hardwoods and manufacturing of non-forest industrial products to cushion their businesses.

3.2.4 Furniture industry

The furniture industry in Kenya is an important source of livelihood, as it employs over 160,000 people and produces approximately 452 USD million worth of furniture per year and exports 22 USD million worth of furniture (World Bank, 2015). The study findings showed that prices of timber for furniture production has increased from KES 35 to KES 51 per board foot in two years due to scarcity occasioned by the harvesting moratorium. The high timber prices increased furniture prices to between KES 56,000 (568 USD) and 79,500 (795 USD) for a 7 seater sofa set while a standard bed of 6 by 4 feet made of softwood doubled from KES 4,000 (40 USD) to KES 8,000 (80 USD). A double-decker bed was selling for KES 22,700 (227 USD) from KES 11,400 (114 USD) in many middle-income estates. A set of furniture comprising of a table and four stools costed KES 34,100 (341 USD) from KES 11,400 (114 USD) and a TV stand was KES 20,500 (205 USD) up from KES 9,600 (96 USD). In general, furniture prices tripled due to high timber prices thus making furniture production expensive.

To promote a vibrant local wood manufacturing, it is critical to have adequate supply and fairly prized raw materials to support the growth of the forest sector. The challenges people undergo in procuring furniture in Nairobi is ably demonstrated by prospective furniture buyers.

The impact of the moratorium on local Wananchi is reflected by a Nairobi resident, Mr Onyango who in an interview indicated that from his savings, he intended to buy a five-seater sofa set. He has not achieved this dream because of the high cost of furniture. "My budget was KES 45,500 (455 USD) but I have walked into several furniture shops but could not get a nice seat worth that much," recounted Mr. Onyango. Another resident, an Accountant, who was three months into his new job narrated that he was almost losing hope of ever buying furniture.

Source: Xinhua News,2019

3.2.5 Wood carving

The wood carvers prefer specific tree species for carving, with *Dalbergia melanoxylon* being the most preferred. Other popular wood carving species include; *Terminalia brownii, Afzelia quanzensis, Jacaranda mimosifolia and Combretum schumannii.* The wood carving species are sourced mostly from farms, woodlands, public forests and minimal imports from Tanzania. Currently, the wood carving sector is facing several challenges that include; shortage of quality wood, ban on harvesting in natural forests, green consumerism in western countries, and competition from other countries. These challenges have made production and export markets for carvings to shrink. This situation may likely have been worse by the recent government harvesting moratorium.

3.3 Effect of the Moratorium on the Small and Medium Forest Enterprises

The Small and Medium Forest Enterprises (SMFEs) provide domestic markets for wood and non-wood forest products. The SMFEs constitute about 80–90% of all forestry enterprises and over 50% of forest sector employment in many countries (Macqueen and Mayers, 2006). The 2018 harvesting moratorium locked out the wood industries from accessing raw materials from the state and community forests. The moratorium led to a decline in wood supplies to wood processing industries including the SMFEs leading to a scale down of their production. As a result, there were increase in prices of wood products, upsurge in imports, loss of employment and overall decline in business turnover.

A case study in Rift Valley and Western regions of Kenya showed that the moratorium on harvesting led to a decline in quantities of traded forest products occasioned by scarcity of logs and increase in prices. For instance, on average a merchant would sell about 29,653 and 24,000 pieces annually of construction poles and fencing posts respectively. These numbers declined by about 78% and 66% respectively as result of the moratorium. Firewood, charcoal and timber registered a decline in quantity of traded products by 62%, 41% and 32% respectively (Table 8).

Table 8: Mean quantites of traded forest products from varous sources in 2017 and 2018 in selected markets in Rift Valley and Western Kenya

Year of Trade	Source of material	Forest Products				
		Timber (MT)	Firewood (M^3)	Construction poles (Pieces)	Posts (Pieces)	Charcoal (Bags)
2017	Sawmill	900.2				
	Farmers	30.73	6,834.73	29,652.63	24,000	3,837.36
	Wholesalers/ other retailers					4,194.87
	Others		31,448.80			
Totals		930.93	38,283.53	29,652.63	24,000	8,032.23
2018	Sawmill	84.12				
	Farmers	91.34	14,708.35	6,473.68	8,000	2,455.69
	Wholesalers/ other retailers					2,304.65
	Others	461				
Totals		636.46	14,708.35	6,473.68	8,000	4,760.34
Percentage decline		**31.63**	**61.58**	**78.17**	**66.67**	**40.73**

Charcoal, one of the most traded products, had a decline of 82% in turnover. The decline could be attributed to increase in prices coupled with unavailability of charcoal that made majority of the buyers to opt for other alternative energy sources. Firewood traders registered the least decline in turnover (21%) as the business was less affected by the harvesting moratorium (Table 9). This is because the key species for firewood production are Eucalyptus and Grevillea which were sourced from private farms and were later exempted from the moratorium.

Table 9: Mean forest products turnover in 2017 and 2018

Product	Turnover 2017 (KES)	Turnover 2018 (KES)	Percentage decline
Timber	4,844,611	2,557,552	47.2
Firewood	64,733,340	51,070,559	21.1
Construction Poles	3,012,631	776,842	74.2
Posts	2,400,000	960,000	60.0
Charcoal	18,908,611	3,367,370	82.4

The decline in traded products cascaded to loss of employment and reduced business turnover. A case study in Rift valley and Western Kenya regions showed that on average, about 27.5% of employees working in SMFE's were laid off, most of them being youth. For instance, 55% of employees working in timber yards were laid off leading to an estimated income loss of KES 807,724 per annum. Firewood traders maintained the same number of employees as the bulk of the materials were obtained from farmlands. The total overall loss for the five sampled enterprises is estimated at KES 1,286,047 per annum (Table 10).

Table 10: Mean number of SMFEs employees engaged before and after the moratorium and respective income losses in Western and Rift Valley regions

Product	Employees in 2017	Employees in 2018	Employees laid off	Percentage change in staffing	Estimated earning lost / year (KES)
Timber	11	5	6	54.5	807,724
Firewood	25	25	0	0.0	38,624
Construction poles	18	18	0	0.0	201,600
Posts	6	4	2	33.3	201,600
Charcoal	4	2	2	50.0	36,499
Total	**64**	**54**	**10**	**27.5**	**1,286,047**

3.4 Effect of the Moratorium on Forest Dependent Urban Centres and Families

Several urban centres thrived in areas with sawmills before the moratorium. For instance, at the peak of forestry operations, Maji Mazuri and Makutano in Rift Valley region had over 30 sawmills and a population of over 10,000 people with about 2,000 being employed in various forest activities. Elburgon had over 15 large sawmills and more than 100,000 people directly and indirectly engaged in the timber industry. However, imposition of the moratorium has negatively impacted these urban centres. Other urban centres impacted negatively included; Mau Summit, Molo, Kaptagat and Bugar. These centres face high unemployment, leading to increased social ills such as high crime rates. The closure of the sawmills resulted in collapse of retail business due to reduced purchasing power of the local population.

During the moratorium, the saw milling sector lost competent and professionally skilled labour that were forced into early retirement and diversion to non-forest activities. The redundancy cost and losses incurred associated with idle or partially operational machinery is estimated at KES 10 billion. Large scale sawmills were the worst hit with foregone annual income loss of about KES 6 billion (Table 11). As a result of disruption of operations and related losses, sawmillers defaulted on loans repayments accessed for purchase of forest materials, assets and equipment. During the survey, some sawmillers had lost property to financial institutions due to the moratorium with reports indicating that some had faced social issues such as divorces and strained family relations, loss of social status and even death. The towns are now a pale shadow of the once vibrant townships.

Table 11: Redundancy costs of sawmills after imposition of the moratorium

Sawmill category	Mean redundancy cost (KES)	National total redundancy cost (KES)
Large	160,078,571	6,403,142,857
Medium	8,760,000	1,471,680,000
Small	5,864,800	2,955,859,200
Total		**10,830,682,057**

The sawmilling sector used to employ about 52,000 workers directly and indirectly providing employment to about 300, 000 people in forest and wood processing operations. As a result of the moratorium, about 85% of the employees were laid off. This translated to income losses of about KES 3.9 billion per annum to the employees (Table 12).

Table 12: Employment and income losses of sawmills before and after the harvesting moratorium

Category	Total employees in 2017	Total employees in 2018	Total employees laid off	Estimated lost earnings (KES)
Large	27,990	3,510	24,480	1,755,179,885
Medium	7,000	1,540	5,544	517,608,000
Small	17,090	2,872	14,753	1,713,401,011
Total	**52,081**	**7,923**	**44,777**	**3,986,188,897**

The income losses did not include loss of employment from sawmills involved in secondary processing. In addition, the sawmillers were expected to pay severance benefits to redundant workers. Some sawmillers could not afford to pay these benefits which could lead to lawsuits.

3.5 Effect of the Moratorium on Regional Trade in Forest Products

After the imposition of the moratorium, timber imports increased from 3,231.38 m^3 in 2016/2017 to 26,124.01 m^3 in 2017/2018 financial year leading to a foreign exchange loss of about KES 1.04 billion. The moratorium led to 9 times increase in the importation of timber softwoods from Tanzania and Uganda and 4 times for hardwood timber imported from Democratic Republic of Congo (DRC). For instance, the imports of Pine at Namanga border rose rapidly from 84 m^3 in 2017 to 9,240 m^3 in 2018 and hardwood importation from DRC increased from 2,502.50 m^3 in 2017 to 10,395 m^3 in 2018 (Table 13).

Table 13: Imported timber volumes from various border points in 2017 and 2018

Border point entry	Species/ product	Volumes of products imported in 2017 (m^3)	Volumes of products imported in 2018 (m^3)	Change in imports (m^3)
Holili	Pine	-	1,102.00	1,102.00
Loitokitok	Pine	308.00	3,399.00	3,091.00
Lungalunga	Pine	-	1,960.00	1,960.00
Malaba	Cypress	96.25	-	(96.25)
	Mahogany	2,502.50	10,395.00	7,892.50
	Mvule	144.38	48.13	(96.25)
	Pine	96.25	2,550.63	2,454.38
	Teak	-	529.38	529.38
Mombasa	Poles	-	105.00	105.00
	Red wood logs	-	26.25	26.25
Namanga	Pine	84.00	9,240.00	9,156.00
	Eucalyptus	-	84.00	84.00
Total		**3,231.38**	**29,355.39**	**26,124.01**

The Government decision to zero rate duty on imported timber from 10% in July 2019, has increased regional timber trade. The zero rating on duty has led to new networks of local importers, clearing agents and transporters leading to reduced lead-time in meeting timber needs. Increase in timber inflows is manifested by the large increase in Pine timber imported from Tanzania through the Holili, Lunga Lunga, Loitokitok and Namanga border points in 2018 as compared to 2017 (Figure 1).

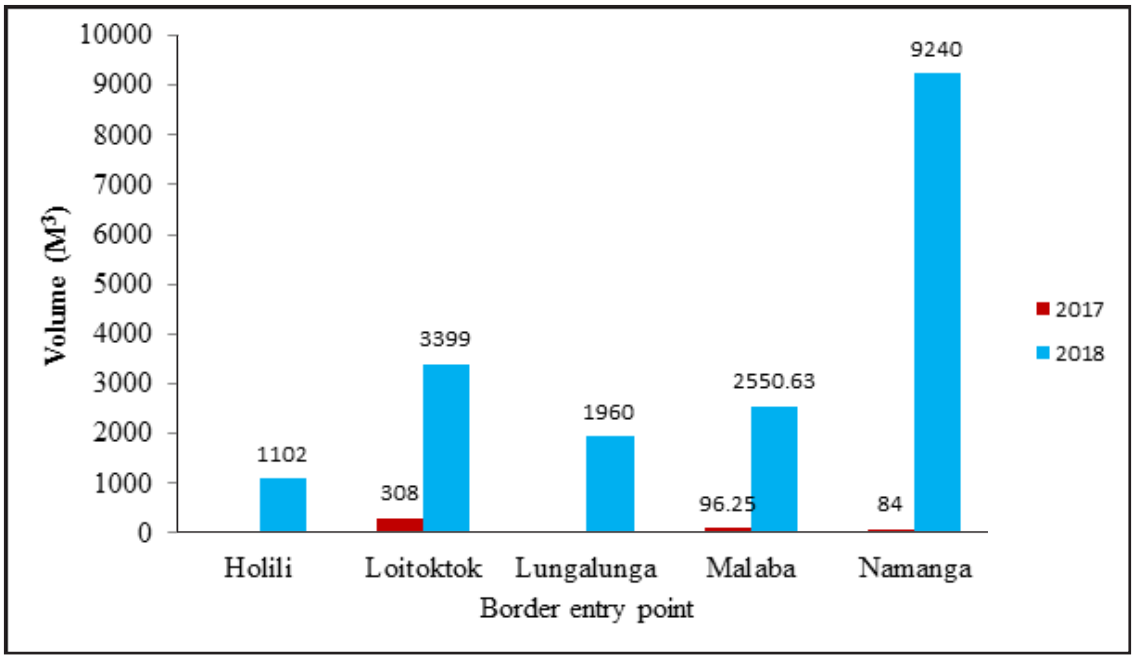

Figure 1: Imported Pine timber at various border points

Imports of Mahogany timber from DRC quadrupled from 2,502.50 m3 in 2017 at Malaba border point to 10,395 m3 in 2018 (Figure 2).

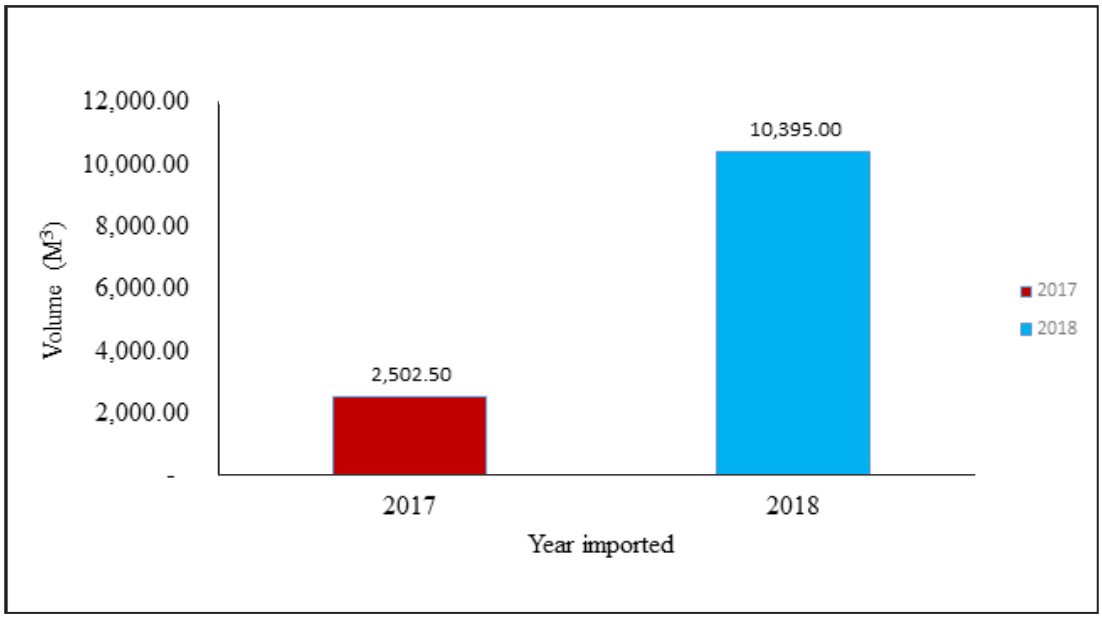

Figure 1: Imported Mahogany timber from DRC through Malaba border

3.6 Effect of the Moratorium on National Conservation Efforts in Forestry and Tree Growing

3.6.1 National tree planting efforts

The harvesting moratorium and the associated publicity created awareness on the state of public forests in the country has motivated various stakeholders to volunteer their resources for rehabilitation of forests and tree planting in the country. The tree planting campaigns has led to many areas in public, community and private being planted with trees. These efforts have culminated in the development of a 'National strategy for achieving and maintaining over 10% tree cover by 2022'. There has been an increased interest in forestry from the government, development partners and corporate bodies to support forest conservation activities in the country. The moratorium has created interest in proper siting of plantation areas with some of the former plantation areas being converted to natural forests. Some of the recent initiatives include repossession and rehabilitation of Maasai Mau, Kirisia Forest and South West Mau. There is also an increase in tree planting in public institutions.

Though the impact of the moratorium on conservation have been largely positive, the control and management of invasive species such as *Prosopis juliflora* 'Mathenge' has been constrained. Prosopis management by utilization approach had brought the invasive species to manageable levels. However, this has been affected by the moratorium and there is proliferation of Prosopis in most invaded areas.

3.6.2 Commercial forestry

The increased scarcity of forestry-based materials has created interest by farmers, corporate bodies, syndicated organizations and social investors to finance tree growing for commercial and conservation purposes. The moratorium has created large domestic market for on-farm trees due to high demand for forest products. Farmers with mature trees on their farms have realized increased income from tree sales. The enhanced incomes have motivated many farmers to venture into commercial tree growing. Shortage of firewood has prompted KTDA to buy or lease land to grow trees for firewood. Other investors such as KOMAZA, ASANTE Foundation, KAKUZI and GATSBY Foundation have expanded their portfolio investment in tree growing.

3.6.3 Investment in alternative sources of energy

The moratorium has led to increasing interest by companies to invest in alternative energy sources other than wood-based fuel. Such alternatives include: agricultural waste, briquettes, biogas and construction of micro-hydro and solar power. For example, KTDA managed tea factories are using briquettes to cure tea.

3.7 Effect of the Moratorium on Key Forestry Public Institutions

3.7.1 Kenya Forest Service

Kenya Forest Service is mandated to manage all public plantation forests. In 2018, due to the imposition of moratorium KFS reported a loss of KES. 2.75 billion in form of lost revenue that is critical for its forest management operations. In addition, some sawmillers had paid for forest materials which were yet to be harvested, others had partially harvested, and those harvested had not been removed. The harvested logs and not removed are now deteriorating in the forest and pose serious threats of pests and fires. There is a likelihood of litigation from affected sawmillers claiming compensation from KFS for the materials paid for and not removed.

In areas with mature trees that cannot be harvested as well as partially harvested areas, KFS has lost opportunity for establishment of new plantations. The total area with partially harvested plantations is 5,156 ha; out which 3,469 ha have no trees while 1,687 ha have trees. The moratorium has also caused a backlog in silvicultural operations such as thinning and pruning because the materials cannot be removed. KFS has also lost goodwill from sawmillers who were supporting the Service in seedling production as well as repair and maintenance of forest roads. The moratorium has affected the implementation of forest management plans and tree felling cycles.

3.7.2 Kenya Forestry Research Institute

The harvesting moratorium has negatively impacted forestry research. Mature research trials, demonstration plots, old seed orchards and seed stands cannot be harvested to create room for new ones. Non replacement of old seed sources and writing off closed experiments will affect supply of quality seeds which is essential to achieving 10% tree cover as well as land for research. Forest research also involves silvicultural management such as thinning to improve the quality of plantations has been hampered by the harvesting moratorium. Research in forest products has been affected since selective harvesting of trees is sometimes required for research purposes.

4.0 OVERALL SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACT OF HARVESTING MORATORIUM

4.1 Effects of Moratorium on Trees on Farms

The moratorium led to severe shortage of timber in the country resulting in increased farm gate prices. Various reports indicate that the level of harvesting of trees on farms increased hence the risk of overharvesting and harvesting immature trees. The early harvesting of immature trees results in loss in revenue to the grower since trees are harvested before attaining optimum size. Increased harvesting of trees may also reduce the gains made in on farm tree planting and overall tree cover.

4.2 Effects of the Moratorium on Big 4 Agenda and Kenya Vision 2030 Targets

The forestry sector is classified as a key enabler of the Big 4 Agenda that is of critical importance to the country's generation of value-added capital, creation of employment and contribution to social development. The harvesting moratorium has negatively affected the achievements of the Big 4 Agenda through scaling down of various wood dependent sectors such as wood manufacturing, construction of affordable housing, indirectly food security and universal health. The country's development blueprint, Kenya Vision 2030 emphasizes promotion of industrialization as a pathway to tapping the country's resources for sustainable economic growth into middle level income status by 2030. However, the wood processing industry has been shrinking over the years due to various reasons, key being dwindling wood resources, mismanagement and governance challenges resulting in frequent moratoriums.

4.3 Experiences Learnt from Past Forest Moratoriums

The country has imposed two forest harvesting moratoriums. The first one was from 1999 to 2012 and current one was from 2018. The first moratorium imposed in 1999 was to give the Forest Department time to complete the inventory of all forest plantations in the country. During the first moratorium, large-scale timber millers like Pan Africa Paper Mills, Raiply, Timsales and Comply were exempted from the harvesting moratorium to the disadvantage of small-scale sawmillers. The moratorium was lifted in 2012 after Forest Department provided information to the Ministry of Environment and Natural Resources that contained measures to monitor and control harvesting. The measures included; mapping of harvesting areas, implementation of clear-felling plans, a planting programme and employment of 1,000 additional Forest Rangers. The report also led to the establishment of a rapid response team to strengthen field units and curb illegal activities. Forest Department developed policies and legislations to regulate community and private sector involvement in the management of forests.

The current moratorium, unlike the past one applies to all users harvesting wood from public and community forests. After the moratorium was imposed, the Task Force formed recommended specific actions to be undertaken by the key stakeholders. The recommendations include; paradigm shift in the management of commercial plantations, review of disposal methods of forest products, improvement of governance systems and establishment of clear monitoring systems.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The moratorium had both positive and negative socio-economic impact on the forest sector, and livelihoods of various stakeholders. The key actors and players affected were; sawmillers and wood processors, Small and Medium Forest Enterprises (SMFEs), tea industry and forest dependent communities. The moratorium resulted in a lucrative market for trees from farms and private plantations. The moratorium triggered increased interest in financing tree growing by the government, individuals, private sector and corporates. The moratorium led to increased inflows of timber from countries within the region which was enhanced by the zero rating of duty on imported timber. The harvesting ban also led to economic downfall of forest dependent urban centres due to job losses increasing the level of poverty among the local communities.

5.2 Recommendations

1. The current licensing system for forest logging should be reviewed taking into cognizance the Forest Conservation and Management Act 2016 and Public Procurement and Asset Disposal Act 2015. The licensing system should be fair, equitable and transparent and to include an independent agency.
2. The government should fast-track forest sectors reforms that will create good governance structures for enhanced sustainable management of the remaining forest resources and attainment of accelerated target of 10% tree cover by 2022.
3. There is need to strengthen and develop evaluation and monitoring systems of managing harvesting and sale of logs which include monitoring of pre-harvesting inventory, volume assessment and stock valuation and disposals.
4. Strengthen an effective monitoring system to ensure sustainable management of the country's forest resources with special focus on periodic independent multi-stakeholder reviews. Such a monitoring system should address sustainable off take levels, biodiversity, forest cover and forest products supply and demand.
5. Strengthen sector non-state umbrella institutions to enable them play their respective roles in forest sector development and governance (TMA, CFAs, KWPA, and KTGA)
6. To attract private sector players there is need to hasten approval of the concession policy and subsidiary legislation which will guide concession management framework. In addition, incentive mechanisms should be availed to promote private sector and farmers investment in commercial tree growing to reduce pressure on public forests.

7. Undertake additional studies on environmental impacts of harvesting moratorium, particularly those relating to tree growing on farms and forest regeneration.
8. There is need for Kenya to invest in secondary processing to enhance employment creation in wood-based industry by taking advantage of the vast regional high-quality forest resources.

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APPENDICES

Appendix 1: Retail prices for small (3'') untreated construction poles (15-18 ft long) in selected towns in the country

County	Prices of construction poles before moratorium in 2017 (KES)	Prices of construction poles after moratorium in 2018 (KES)	Percentage increase in prices
Nairobi	150	180	20.0%
Mombasa	175	225	28.5%
Kisumu	60	150	150.0%
Nakuru	100	120	20.0%
Eldoret	50	100	100.0%
Embu	100	120	20.0%
Nyeri	120	180	50.0%
Kitui	130	180	38.5%
Malindi	200	250	25.0%
Machakos	130	145	11.5%
Kitale	90	120	33.3%
Kericho	80	120	50.0%
Kisii	100	150	50.0%
Embu	100	130	30.0%
Mean % increase			**44.8%**

Appendix 2: Retail prices for medium (4'') untreated construction poles (15-18 ft long) in selected towns in the country

County	**Prices of construction poles before moratorium in 2017 (KES)**	**Prices of construction poles after moratorium in 2018 (KES)**	**Percentage increase in prices**
Nairobi	160	200	25.0%
Mombasa	250	310	24.0%
Kisumu	80	180	125.0%
Nakuru	120	150	25.0%
Eldoret	75	110	46.7%
Embu	150	150	0.0%
Nyeri	140	215	53.5%
Kitui	140	250	75.5%
Malindi	250	400	60.0%
Machakos	150	175	16.7%
Kitale	155	200	29.0%
Kericho	120	180	60.0%
Kisii	180	250	38.9%
Embu	150	180	20.0%
Mean % increase			**42.8%**

Appendix 3: Retail prices for Large (5'') untreated construction poles (15-18 ft long) in selected towns in the country

County	Prices of construction poles before moratorium in 2017 (KES)	Prices of construction poles after moratorium in 2018 (KES)	Percentage increase in prices
Nairobi	180	300	66.7%
Mombasa	290	325	12.0%
Kisumu	120	300	150.0%
Nakuru	150	250	66.7%
Eldoret	175	200	14.2%
Embu	200	200	0.0%
Nyeri	150	325	116.7%
Kitui	150	350	133.3%
Malindi	300	500	66.7%
Machakos	215	220	2.3%
Kitale	180	300	66.7%
Kericho	150	250	66.7%
Kisii	200	350	75.0%
Embu	200	250	25.0%
Mean % increase			**61.5%**

Kenya Forestry Research Institute (KEFRI)
P.O. Box 20412-00200, Nairobi Kenya
Tel: Tel: +254-724259781/2, +254-722-157414, +254-20-2010651/2
E-mail:director@kefri.org Website:www.kefri.org