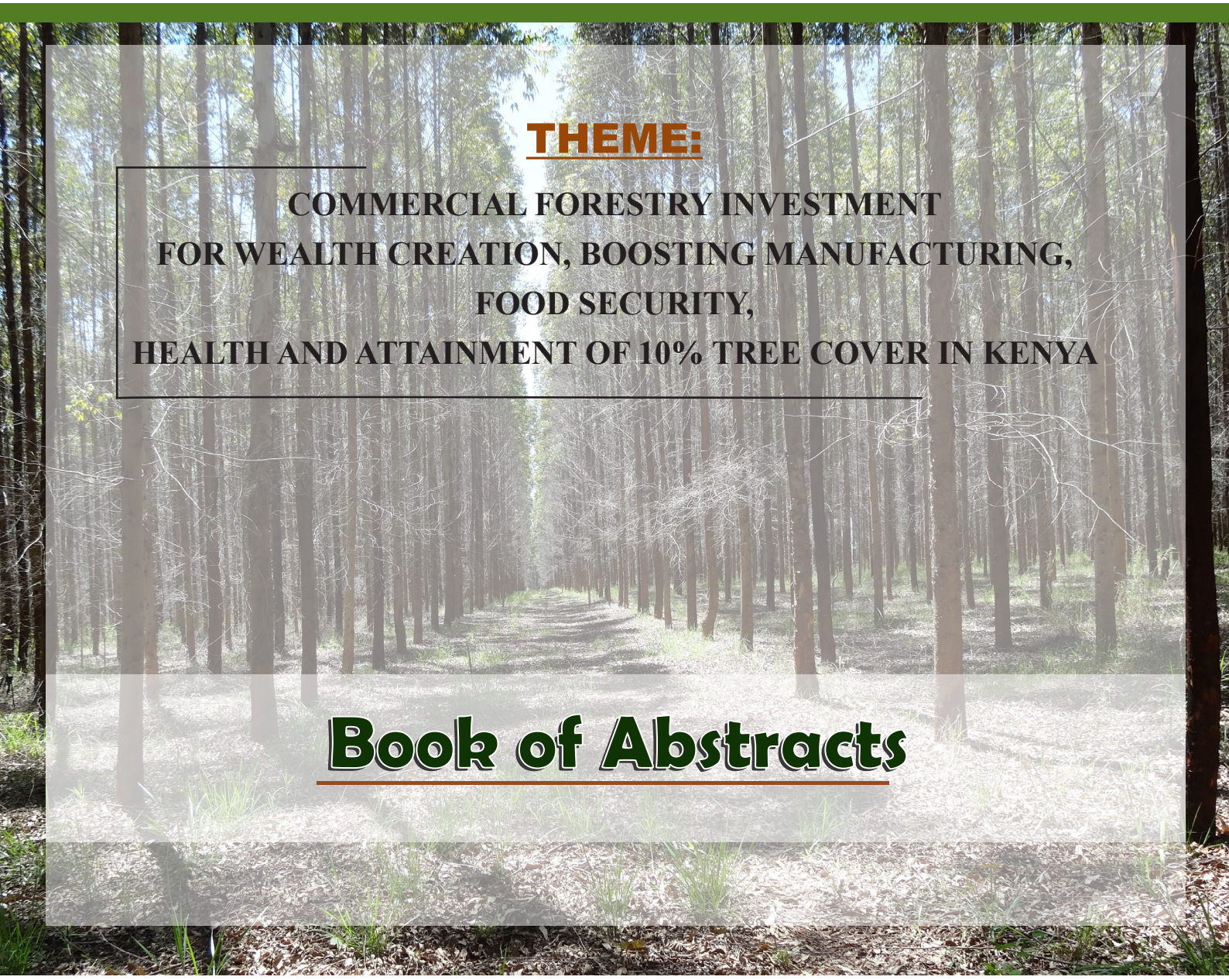
KENYA COMMERCIAL FORESTRY INVESTMENT CONFERENCE AND EXPO



THEME:

COMMERCIAL FORESTRY INVESTMENT
FOR WEALTH CREATION, BOOSTING MANUFACTURING,
FOOD SECURITY,
HEALTH AND ATTAINMENT OF 10% TREE COVER IN KENYA

Book of Abstracts

VENUE: KEFRI HEADQUARTERS, MUGUGA-KENYA

PARTICIPATION: PHYSICAL AND VIRTUAL

DATE: 23RD - 26TH NOVEMBER, 2021

Conference and Expo Organizers

Other Partners logos

BOOK OF ABSTRACTS

Compiled by:

Vincent Oeba, Joram Kagombe, James Kimondo, M.T.E Mbuvi, Abdalla Kisiwa, Antony Mwangi, Sheila Mbiru, Jonah Kiprop and Paul Tuwei

© KEFRI 2021
This publication may be produced in whole or in part and in any form for education only or non-profit uses without permission of the copyright holder provided acknowledgement is made.

Layout and Design: Evans Abuje

Published by:
Kenya Forestry Research Institute
P.O. Box: 20412 Nairobi 00200, Kenya
Tel: +254 722 157 414, +254 722 259 781/2+254 20 2010 651/2, +254 734 251 888
Email: director@kefri.org Website: www.kefri.org

CONTENTS

SESSION VII: Education and Skills Development

SESSION VIII: Policy, Legislation and Governance

SESSION IX: Policy Dialogue

1.0 BACKGROUND

Forests and trees outside forests have critical ecological, social, cultural, and economic functions. They contribute directly and indirectly to the national and local economies through revenue generation and wealth creation. It is estimated that forestry contributes to 3.6% of Kenya's GDP, excluding charcoal and direct subsistence uses. Forest and tree resources also support most productive and service sectors in the country, particularly agriculture, fisheries, livestock, energy, wildlife, water, tourism, and trade. Biomass comprises about 80% of all energy used in the country, while they also provide a variety of goods, which support subsistence livelihoods of many communities. The Kenyan population is projected to increase to over 80 million people in 2050. With this rapidly growing population and infrastructural development, the demand of wood products especially engineered wood and furniture is projected to increase exponentially. The national per capita wood demand is estimated at 1 m3 per year. Considering the current population of about 50 million people, the wood demand is at 50 million cubic meters projected to 66 million m3 by 2030 thus tripling the wood deficit in the country. Forecasting future wood demand reveals gradual increase of various wood products against a diminishing resource base and thus a dire need to secure sustainable forest management.

Currently, Kenya has an annual wood deficit of approximately 10.3 million m3 as the country is only able to meet 70% of its demand through sustainable supply. This has caused small and medium–sized enterprises to operate below capacity. The deficit is met through formal and informal imports as well as unsustainable extraction from public natural forests in the country. It is in this regard that commercial forestry has the potential to bridge the wood deficit in the country and increase forest cover. Commercial forests in public forests will not meet the growing demand of wood products in the country. This is due to limited geographical area of gazetted forest land and poor forest plantation management. There is thus need to extend commercial forestry to private and community lands as well as arid and semi-arid lands (ASALs) that constitute over 80% of the total land area in Kenya. Further, trees on farms and private forests have not experienced the accelerated decline of forest cover registered in public plantations, bushlands, and indigenous closed forests. This demonstrates that private sector efficiency in the management of trees and forests can provide an opportunity to leverage on Public Private Partnerships (PPPs). This can provide access to private sector financial capital as well as benefits from the transfer of technological and operational efficiencies from the private sector into public forest management.

In view of this, the Kenya Forestry Research Institute (KEFRI) and its partners, scheduled the first Kenya Commercial Forestry Investment Conference and Expo (KCFICE-I) to bring together stakeholders including producers, traders, processors/manufacturers, financial institutions, researchers, policy makers, academia among others, in the forestry sector from Kenya and the region to share ideas and experiences on ways to improve the performance of commercial forestry in Kenya. Improving the performance of the sector will not only contribute to reducing the wood supply deficit in the country but also create jobs along the value chain, raise incomes, increase tax revenues as well as contribute to the achievement of the Government’s Big 4 agenda through boosting manufacturing and affordable housing.

1.1 Kenya Commercial Forestry Investment Conference and Expo

The Conference and Expo is an opportunity for stakeholders in the commercial forestry sector in Kenya and the region, to showcase and exhibit commercial forestry technologies and opportunities that investors can tap into. The forum will bring together national and county government, timber merchants, timber industries, financial institutions, Tree Growers Associations, NGOs and Development Partners, professionals, researchers, wood processors, investors, and other key players in the commercial forestry sector to take stock of the status of the industry, challenges, and opportunities available. It will also provide a platform that will act as a springboard for the future development and financing of commercial forestry in the country and region.

The event creates a forum for policy dialogue and investment for sustainable timber value chain development. The Expo provides a "market place" for buyers and sellers of various exhibits from the wood industry, machinery and tools, forest products, handicrafts, non-wood timber products and services, supplies for the forest industry etc.

1.2 Partners organizing the Conference and Expo

The Conference and Expo was organized by a multi-institutional team from both private and public sectors that encompasses; Ministry of Environment and Forestry (MoEF), Kenya Forestry Research Institute (KEFRI), Kenya Forest Service (KFS), Food and Agriculture Organization of United Nations (FAO), United Nations Development Program (UNDP), Japan International Cooperation Agency (JICA), Base Titanium Ltd, GATSBY Africa, International Network for Bamboo and Rattan (INBAR) Family Bank, Kenya Climate Innovation Centre (KCIC), Cooperative Bank of Kenya, National Research Fund (NRF), We-Effect-Global, Kenya Commercial Bank (KCB), Better Globe Ltd, Ukulima Sacco, Asili Sacco, Komaza Ltd, Kakuzi Ltd, One Acre Fund, Forest Society of Kenya (FSK) Council of Governors (COG) and Kwale Tree Growers Association.

1.3 Justification and objectives of the Conference & Expo

Kenya's Vision 2030 implemented through Medium-Term Plans outline the importance of leveraging on resources and results through Public Private Partnerships (PPPs) that will provide the required resources to enhance commercial forestry in Kenya. They play a critical role in linking industry with academia; value chain actors through initiatives that enhance cooperation between the public and private sector. This implementation strategy has the potential to connect expertise in forestry research with enterprises and industries in the commercial forestry sector through provision of technologies and innovations to develop products and services in return for funding, equipment supports and practice platforms.

The Expo demonstrates the contribution of forest sector to the local and national economy that has been under-valued for a long time through: showcasing various forest and tree products including non-wood forest products; exhibition of equipment and machinery as well as latest innovation; and financing including investment opportunities in the forestry sector.

This Conference is a springboard to upscaling commercial forestry in the country that will contribute to the country's attainment of 10% tree cover, improved livelihoods, and competitive forest enterprise.

OBJECTIVES

Objectives of the conference are to:

1. Provide a platform to national and international investors, researchers and professionals to share knowledge, experiences, and opportunities in the commercial forestry sector in Kenya and within the region.
2. Provide an avenue for stakeholders and development partners to exhibit and showcase opportunities and current technologies, products, and services in the commercial forestry sector in Kenya and within the region.
3. Provide a platform for discussions and exchange of ideas and innovative thinking among stakeholders on the future of commercial forestry sector.
4. Provide an avenue for stakeholders to take stock of the status of the commercial forestry sector challenges and opportunities.
5. Provide an opportunity to create research, innovation and enterprise linkages with potential industry players.
6. Make strategic policy recommendations for promotion of commercial forestry in Kenya.

1.4 Conference Sub-themes and areas addressed

The Kenya Commercial Forestry Investment Conference and Expo covers various sessions are summarized below.

No.	Session
I	**Plenary** • Commercial Forestry Investment for Wealth Creation, Enhancing Manufacturing, Food Security, Health and Attainment of 10% Tree Cover in Kenya • Future of public forestry sector to meet the country timber needs and role of PPPs
II	Tree Seed and Forest Plantation Management
III	Forest Product Processing Value Addition and Technologies
IV	Regional Trade for Key Products and Bamboo Value Chain
V	Investment and Financing Models for Forestry Sector
VI	Commercial Forestry Investment Forum Dialogue • Opportunities and Challenges in Commercial Forestry in Kenya
VII	Education and Skills Development
VIII	Policy, Legislations and Governance
IX	International perspectives on Commercial Forestry
X	Policy Dialogue
XI	Commercial Forestry Tour and Expo

1.5 Forestry Exhibitions

The Conference exhibitions include;

- Certified tree seed suppliers
- Wood products from sustainable forest management
- Suppliers of equipment and machinery in forest products value chain
- Engineered wood products (CLT, MDF, etc)
- Non-wood forest products (gums and resins, fruits, herbals etc)
- Forest ecotourism

1.6 Forestry Investment Dialogue

Dialogue areas include;

- Key note addresses on potential for commercial forestry in Kenya
- Commercial forestry investment opportunities in Kenya
- Models for commercial forestry investment
- Financing in commercial forestry
- Business forums including business roundtables
- Business cases of small-scale farmers and forest users, social agri-entrepreneurs, communities and their Forest and Farm Producers and their Organizations (FFPOs)
- Public Private Partnerships

1.7 Forestry Policy Dialogue

During the dialogue the following will be discussed;

- Improving the enabling environment for forest and farm businesses from sustainably managed landscapes
- Certification of forest products
- Good governance in commercial forestry
- Concessions
- Supporting local industries within the commercial forestry value chain
- REDD+ Strategy
- Mechanisms for participation and inclusion across the value chain

PROGRAMME

DAY 1
TUESDAY 23RD NOVEMBER, 2021
OPENING SESSION

	Venue: Auditoruim **Chairperson:** Dr. Jane Njuguna; SDD-R&D KEFRI **Rapporteurs:** Dr. Stephen Omondi, Dr. Margret Kaigongi & Sheila Shefo Mbiru ***(Live Streaming on Social Media)***
0830-0900	**Registration:** Joyce Chege, Elizabeth Waiganjo, Viola Naser and Margret Njenga **Entertainment:** KEFRI Choir
0900-0920	**Tour of exhibition** Exhibitors: KEFRI, JICA, Plantech, GATSBY SSMT, Build_X CLT, Elifurni- furniture, Build Her, UoE, INBAR, WE Effect, KFS, UNDP, KCIC, Base Titanium, KOMAZA, Family Bank, KCB, Cooperative Banks, KCFP, UTGA, TGAs, Fruit producer, FSC, Forest Product Producers, Woodlife Sweden, Biashara Masters.
0920-1000	**Welcome Remarks:** Director, KEFRI: Dr. Joshua Cheboiwo CEOs from Government Institutions and NGOs Representative from Development Partners: FAO/ UNDP / Gatsby/ JICA/ KCIC/ Base Titanium/ Family Bank
1000-1030	**Official Opening:** Chairman Board of Directors, KEFRI: Dr. Sammy Letema Principal Secretary, Ministry of Environment and Forestry: Dr. Chris K. Kiptoo, CBS **Chief Guest:** Cabinet Secretary, Ministry of Environment and Forestry Mr. Keriako Tobiko, CBS, SC Launch of various technical documents and solar drying facility for tree seeds
1030-1040	Photo Session (ALL)
1040-1100	**HEALTH BREAK**

SESSION I: PLENARY

	Venue: Auditorium **Chairperson:** Dr. Jane Njuguna; SDD-R&D KEFRI **Moderator:** James Mwai - Gatsby Africa **Rapporteurs:** Angela Muthama, Abdalla Kisiwa & Sylvia Mwalewa ***(Live Streaming on Social Media)***
	Keynote Addresses:
1100- 1120	Overview of commercial forestry investment for wealth creation, boosting manufacturing, food security, health and attainment of 10% tree cover in Kenya *Dr. Joshua Cheboiwo, Director, KEFRI*
1120-1140	Future of public forestry sector to meet the country timber needs and role of PPPs *Mr. Julius Kamau, Chief Conservator of Forests, Kenya Forest Service*
1140-1200	The Role of KEFRI App in Commercial Forestry *Dr. Jane Njuguna; SDD-R&D KEFRI*
1200-1300	**Plenary Discussants:** Conservation Sectretary, CEOs/Represenatives (KFS, FAO, Gatsby, KCIC, Commercial Banks (KCB & Family Bank), Base Titanium, UNDP, KOMAZA ltd, Better Globe)
1300-1400	**LUNCH BREAK**

SESSIONS II & III

	Session II: Tree Seed & Forest Plantation Management **Venue:** Auditorium **Chairperson:** Dr. Samwel Kareithi CEO-Gatsby Africa **Rapporteurs:** Eugene Ojuku & Florence Cherono	Session III: Forest Product Processing Value Addition and Technologies **Venue:** Conference Room **Chairperson:** Mrs. Zipporah C. Toroitich Deputy Conservator of Forests, Kenya Forest Service **Rapporteurs:** Jonah Kiprop & Emily Njagi
1400-1430	**Keynote Paper:** Tree seed production, distribution and trade for commercial species *William Omondi et al.*	**Keynote Paper:** Status of forest products value chains and investment opportunities in Kenya *Joseph Githiomi et al.*
1430-1445	Forest plantation management of key commercial forest species in Kenya *J.Vandenabeele and J.Kimondo*	Technology in the wood industry in Kenya; drivers and inhibitors *George Muthike and Joseph Githiomi*
1445-1500	Status and management seed sources and other propagation materials for supply of quality germplasm for commercial forestry investment in Kenya *Stephen Omondi et al.*	Sustainable commercialization of non-timber forest products in Kenya: A situational analysis *Meshack Muga et al.*
1500-1515	Breeding of *Melia volkensii* and *Acacia tortilis* for commercial plantation Forestry in the Dryland of Kenya *Jason Kariuki et al.*	Mass timber construction in Kenya: Opportunities for manufacturing and a housing innovations to drive demand for sustainable forest products at scale *James Mitchell*
1515-1530	Promotion of industrial plantation forestry development: Key considerations *Thomas K. Kiptoo and Bekuta K. Balozi*	Status of wood pole treatment in Kenya *Godfrey Ali*
1530-1545	Insect pests and diseases of commercial tree species in Kenya *Eston Mutitu et al.*	Bioenergy analysis for 65 factories of the Kenya Tea Development Agency Ltd (KTDA) *Thomas Buchholz et al.*
1545-1600	Significance, threats and management of invasive tree species in commercial forest plantation *Thomas K. Kiptoo and James Ole-Kiyiapi*	Status and commercialization of gums and resins in Kenya *Abdi A. Somo et al.*
1600-1615	Solar drying facility for tree seeds *Harjt, Sammy Letema and Jane Njuguna*	Opportunity of high value processing linked to farm forestry in Kenya *Edward Onsongo, Charles Kimiti and Antony Ngugi*
1615-1630	**Plenary Discussants:** Presenters	
1630-1645		**Plenary Discussants:** Presenters
1730-2000	**COCKTAIL**	
2000	**DEPARTURE**	

DAY 2:
WEDNESDAY 24TH NOVEMBER, 2021

SESSION IV & V:

REGIONAL TRADE FOR KEY PRODUCTS AND BAMBOO VALUE CHAIN AND INVESTMENT AND FINANCING MODELS FOR FORESTRY SECTOR

0830-0900	**Registration:** Joyce Chege, Elizabeth Waiganjo, Viola Naser and Margret Njenga	
	Venue: Auditorium **Chairperson:** Dr. Nick Okello-Base Titanium **Rapporteurs:** Anthony Macharia & Emily Njagi	
0900-0920	**Keynote Paper:** Status of intra Africa forest products trade and the potential for positioning Kenya as a regional hub for forest products manufacturing *Joshua K. Cheboiwo, Jonah Kiprop and Anthony Macharia*	
0920-0940	**Keynote Paper:** Mapping of financial sources/ initiatives and action oriented strategies to catalyze investments in scaling up sustainable value chains in Kenya *Charles Mutua Wambua*	
0940-1000	**Keynote Paper:** Status of bamboo development in Kenya: challenges and opportunities *Nelly Oduor , Paul Ongugo and Gordon Sigu*	
	Session IV: Regional Trade for Key Products and Bamboo Value Chain **Venue:** Auditorium **Chairperson:** Dr. Nick Okello-Base Titanium **Rapporteurs:** Anthony Macharia & Priscillah Kimani	**Session V:** Investment and Financing Models for Forestry Sector **Venue:** Conference Room **Chairperson:** Mr. Philip Kisoyan- FAO **Rapporteurs:** Dr. Magret Kaigongi & Emily Njagi
1010-1025	Interventions for unlocking the value of bamboo commercialization *Caroline Kariuki*	Investment and financing models for forestry development in Kenya *Linus Wekesa et al.*
1025-1040	Bamboo as a solution to housing deficit and climate change *Luis Felipe Lopez Munoz*	Enhancing climate action in the Kenyan forestry sector – overcoming barriers to enhance investment *Emily Le Cornu*
1040-1055	Bamboo in construction *Sylvia Essendi*	Remote sensing and spatial forest management systems *Michael Breetzke*
1055-1125	**HEALTH BREAK**	

1125-1140	Unlocking the green economy by linking sustainable suppliers with responsible buyers *Michal Brink*	Commercial forestry development in a changing climate: optimizing returns of investment for wood and carbon benefits *Vincent O. Oeba and Zipporah Toroitich*
1140-1155	Win-Win wood trade linkages between Uganda and Kenya. *Mike Howard*	Harnessing the power of trees in Africa *Kevin Juma*
1155-1210	Use of Bamboo fibre for textiles making for environmental sustainability *Lydia N. Mburia*	Application of public private partnerships for increased forest cover, job creation and sustainable development in Kenya *Daniel M. Giti*
1210-1225	Building a Bamboo business - a whole value chain approach-learning from success and planning for future India/ Africa collaboration *Krunal Negandhi*	Production systems for high quality commercial forestry seedling *Ilad Bouton and John Wambugu*
1225-1240	Enhancement of industrial production of Bamboo incense sticks through small, medium enterprises (S.M.E.'s) *George Jenner, Thiru Selvan and Vipan Guleria*	Trends and drivers of private financing for sustainable forest management in Sub-Saharan Africa *Benjamin M. Kinyili and Ezekiel Ndunda*
1240-1255	Opportunities and constraints of wood products markets in Western Kenya *David Langat and Samson Okoth*	Challenges in development of forest value chains in Kenyan and opportunities to enhance their contribution to sustainable development goals *Michael Gachanja and Humphrey Ngubuini*
1255-1310	**Discussants:** Presenters	**Discussants:** Presenters
1310-1400	**LUNCH BREAK**	

Session VI

Commercial Forestry Investment Forum Dialogue

Venue: Auditorium

Chairperson: Mr. Alfred Gichu, Conservation Secretary

Rappoteurs: Anthony Macharia, Jonah Kiprop & Abdalla Kisiwa

1400-1420	**Keynote Address:** Opportunities and challenges in commercial forestry in Kenya *Jack Steege*
1420-1600	**Talks:** Commercial forestry investment opportunities in Kenya *(Jack Steege, Joram Kagombe, Esther Mutuma, Victor Ndiege, Representative UNDP, FAO, Biashara Masters, WE Effect, Local Farmers (Jonathan Kituku, Joseph Kabugi, Abdulkadir Aden Hassan)* Steps towards establishing the Kenya Commercial Forestry Innovation and Investment Centre
1600-1615	Research and Development of bamboo in Colombia *(Ximena Londono)*
1615-1700	Poster Session / Exhibitions
1700	**HEALTH BREAK**

DAY 3
THURSDAY 25TH NOVEMBER, 2021
POLICY, LEGISLATIVE FRAMEWORK & SKILLS DEVELOPMENT FOR COMMERCIAL FORESTRY

0830-0900	**Registration:** Joyce Chege, Elizabeth Waiganjo, Viola Naser and Margret Njenga	
	Session VII: **Education and Skills Development** **Venue:** Conference Room **Chairperson:** Thomas Kiptoo - University of Eldoret **Rapporteurs:** Anthony Macharia & Florence Cherono	**Session VIII:** **Policy, Legislations and Governance** **Venue:** Auditorium **Chairperson:** Dr. Harun Warui-UNDP **Rapporteurs:** Priscilla Kimani & Peter Mwangi
0900-0920	Education and skills development in commercial forestry *Prof: Balozi K. Bekuta*	Policy and legislative frameworks for commercial forestry Management in Kenya *Alfred Githu, Joram Kagombe and Joyce Ojino*
0920-0935	Commercial forestry skills for sustainable development: The case of KFS Londiani Forestry College *Johnstone Maloba*	Role of forest policy and legislation in enhancing commercial forestry in Kenya *Benjamin Kinyili*
0935-0950	Blending forest education and research: Case of KEFRI Graduate Research School *Michael Mukolwe et al.*	Potential and challenges of small-holder tree plantations in supplementing the wood market: The case of Kenya's timber moratorium *David Langat et al.*
0950-1005	**Plenary Discussants:** Presenters	Tanzanian experience with PPP/Concession Models *Busuyi Okeowo*
1005-1020		Catalysing growth of inclusive, commercial-quality, plantations – Lessons from Uganda *Dennis Kavuma*
1020-1050	**HEALTH BREAK**	

Session IX

International Perspectives on Commercial Forestry

Venue: Auditorium

Chairperson: Dr. Jackson Mulatya- KEFRI

Rapporteurs: Dr. Margret Kaigongi & Florence Cherono

1050-1140	The experience of Sweden: A nation of forestry *H.E. Caroline Vicini, Ambassador of Sweden*
	Experiences from Costa Rica on forestry for sustainable development *H.E. Giovanna Valverde Stark, Ambassador of Costa Rica*
	Experiences from Colombia on Foresty *Ms. Claudia Milena Vaca, Deputy Embassy of Colombia*
	Plenary Discussions

Session X

Policy Dialogue

Venue: Auditorium

Chairperson: Ruth Ndegwa - Director Corporate Service, KCIC

Rapporteurs: Abdalla Kisiwa & Syliva Mwalewa

1140-1300	**Talks** • Future role of PPPs in forestry sector development and REDD+ Strategy- *Alfred Gichu* • Concessions- *Zipporah C. Toroitich* • Certification of forest products- *Prof. Harrison Kojwang* **Discussants:** *Dr. Joshua Cheboiwo, Julius Kamau, James Mwai, Philip Kisoyan, Joseph Kabugi,* Representative from industry, Representative from financial institutions
1300-1400	**LUNCH BREAK**
1400-1500	Forest expo and exhibitions continues **Note:** Exhibitions will run throughout the conference period
1500-1700	**CLOSING CEREMONY** Conference key highlights (resolutions and way forward) Closing remarks Director, KEFRI: Dr. Joshua Cheboiwo Principal Secretary, Ministry of Environment and Forestry: Dr. Chris K. Kiptoo, CBS

DAY 4

FRIDAY 26TH NOVEMBER, 2021

SESSION XI:

Commercial Forestry Tour & Expo

0700-1700	Commercial Forestry Tour/Excursion to (Kakuzi and Better Globe)
	Commercial Forestry Expo

DAY 5

SATURDAY 27TH NOVEMBER, 2021

0830-1700	Commercial Forestry Tour/Excursion to Melia volkensii Site (in Tiva, Kitui) and return to Nairobi

List of Poster Presentations
1. Growth and yield of selected high quality genetic stock of Eucalyptus grandis *Mbinga et al.*
2. Casuarina species: Potential alternative source of industrial fuel wood in Kenya *Cherotich et al.*
3. A new disease causes dieback of seedlings and saplings of Eucalyptus spp. in Western Kenya. *Otieno et al.*
4. Pinus patula seed collection and processing for improved yield *Angaine et al.*
5. Enhancing technology transfer through knowledge sharing and networking: Lessons from CADEP-SFM/AI-CD project *Wanjiku J. et al.*

Session I

Plenary

Commercial forestry investment for wealth creation, boosting manufacturing, food security, health and attainment of 10% tree cover in Kenya

Joshua K. Cheboiwo[1], Jonah Kiprop[1] and Anthony Macharia[1]
[1]Kenya Forestry Research Institute, P.O.Box: 20412-00200, Nairobi, Kenya
*Author of correspondence: jcheboiwo@kefri.org

Kenya's forestry sector contributes 3.6% to the GDP and offers employment and income generation opportunities in plantations, manufacturing and market value chains for diverse forest products. The available land for commercial forestry includes community woodlands at 24.5 million hectares scattered mostly in the ASALs, farms and private forests estimated at 10,385,000 hectares in agricultural landscapes and public forests estimated at 3,467,000 hectares with forest plantations accounting for 125,000 hectares. The country's wood supply potential stands at 31.4 million m^3 against a national demand of 41.7 million m^3 hence a current deficit of 10.3 million m^3. The private sector investors supplement public sector plantations by bringing land, financial capital and operational efficiency to expand the sector, forest product supply capacity and contribution to overall national economic development. Recent studies show that annual consumption of key forest products is valued at US$ 785,440,000 (KES 78.5 billion) that underpins the economic importance of the forest sector to the country's economy. The country has potential to add more than 200,000 hectares of private and farmlands into the commercial forestry sector that will generate an aggregated annual income of US$50 million (KES 5 billion) to tree growers and value-added turnover of US$261 million (KES 26.1 billion) per year. The expanded commercial forests will sequester about 28.7 M tCO2 equivalent in the long term hence contributing to the country's long term climate change mitigation goals. The secondary processing sector is huge business that includes sawmilling, reconstituted wood manufacturing, pulp, furniture and biomass energy with market potential of over 1.5 million m^3 of roundwood from public, private and farm forests. Some of the businesses such as furniture is valued at US$496 million (KES 49.6 billion) with imports accounting to KES 6.6 billion (US$66 million). The commercial biomass energy sector that includes firewood and charcoal is worth KES 70 billion per year an equivalent of 11.6 million MT of coal calorific imports worth KES 105.8 billion indicating a saving to the country of KES 30 billion. The country has put in place various policies and legislations to promote public and private sector investors to engage in commercial forestry operations in various sectors of commercial forestry mainly establishment of plantations/woodlots, wood processing and trade in forest products. The commercial forestry sector has diverse business opportunities that need enhanced investments to fully realize its socioeconomic potential and contribute to the country employment and wealth creation.

Key words: commercial forestry, economic contribution, production manufacturing

Future of public forest sector to meet the country timber needs and the role of PPPs

Mr. Julius Kamau,

Chief Conservator of Forests, Kenya Forest Service

Author of correspondence: director@kenyaforestservice.org

Important and innovative approaches for Commercial Forestry Investment in Kenya hold the key for the future in terms of wealth creation, boosting manufacturing, food security, health and attainment of 10% tree cover. The timber industry competitiveness should be enhanced as an avenue for the future of timber, supported by the private sector. The Government and the private sector are able to share risks, the burden of taxes on citizens and to overcome barriers to innovation. When well-designed and implemented in a balanced regulatory environment, Public Private Partnerships (PPP) can bring greater efficiency and sustainability in service delivery for the public sector. From the forest sector perspective, it is important to understand the timber value chains as a full continuum spectrum. The potential of plantation forestry will be attained through joint ventures for sustainable forest investment and incentivization of the private sector. There is need to create diversification in the economy by making the country's timber industry more competitive in terms of facilitating its infrastructure base as well as giving a boost to its business and industry associated with infrastructure development (such as construction, equipment and support services). Of essence will be to impose budgetary certainty by setting present and the future costs of public forest investments over time, and extracting long-term value-for-money through appropriate risk transfer to the private sector over the rotation period of timber tree species.

Keywords: Commercial Forest Investment, sustainable forest investment, plantation forests, Public Private Partnerships

Session II:

Tree Seed and Forest Plantation Management

Tree seed production, distribution and trade for commercial tree species

William Omondi*, Benard Kamondo, Jane Njuguna and James Kimondo
Kenya Forestry Research Institute, P.O.Box: 20412-00200, Nairobi, Kenya

* Author of correspondence: womondi@kefri.org

There has been an increase in establishment of exotic plantations of commercial species over the years in Kenya. These species were introduced during the colonial days. However, after the establishment of the Kenya Forestry Seed Centre in 1986, the species range increased to include some indigenous species such as *Markhamia lutea* and *Melia volkensii* for high/lowland and dry land areas, respectively. Kenya's blueprints in the forestry sector including the National Forestry Programme (2016) and the National 10% Tree Cover Strategy (2019) recognize the importance of high-quality tree seeds. In order to achieve some of the objectives of these policies, the estimated requirement of seeds to attain 10% forest cover by 2030 requires an annual production of about 360,000 kg seeds translating to 1.8 billion seedlings. The implication of this is that stakeholders in forestry sector need to be informed on high quality production of germplasm of different species in various sites and access. This paper therefore reviews the status of seed production, distribution, and trade for commercial tree species in Kenya. The main trees seed producer in Kenya is KEFRI among other emerging stakeholders in the forestry sector. KEFRI undertakes collections of high-quality seeds from established seed orchards (SO), seed stands (ESS), Selected Seed Stands (SSS), plantations and natural forests. The genetic gain from seed orchards estimated up to 67% have been achieved through improvement of some species such as *Eucalyptus. grandis.* Given that the process of tree breeding is expensive and time consuming, it is difficult to meet seed demand for commercial tree species exclusively from seed orchards. This category of seeds together with those collected from selected well performing stands in plantations and in natural stands and which have been managed for production of seeds of high genetic quality form the bulk of KEFRI's collections. Collected seeds are subjected to laboratory quality tests to ascertain their physiological, health and physical quality (absence of inert materials and seed of other species including weeds). Upon certifying acceptable standards, the seeds undergo packaging, labelling and distribution to users for various planting programmes. Seed production and supply chain is currently governed by the Seeds and Plant varieties Act (CAP 326) and the resultant Tree Seed Regulations. Training and education for development of skills and advisory services are important links in the seed supply chain. These are undertaken at all levels from academic (learning Institutions) purposes and to other stakeholders including community groups in seed production.

Keywords: Seed production, seed producers, seed certification, Kenya Forestry Seed Centre

Forest plantation management of key commercial forest species in Kenya

*James M. Kimondo[1] and Jan Vandenabeele[2]
[1]Kenya Forestry Research Institute, P.O.Box: 20412-00200, Nairobi, Kenya;
[2]Better Globe Forestry

* Author of correspondence: jmkimondo@kefri.org

Plantation forestry in Kenya started at the turn of 20th century when a large number of exotic species were introduced by the colonial administration of the time. These were mainly grown to stem the extensive clearing of natural forests to meet the local demand for timber as well as for export. As the population increases, more resources are required including forest products. Previously only certain tree sizes were considered appropriate for processing into timber. However, among products that are not very sensitive to the structural strength, young plantations are acceptable thereby attracting private farmers to grow trees for commercial purposes. These changes could dictate a difference in the management of plantations that could affect the forest systems of the future. To meet the growing demand for forest products, there are two options; increasing the area under plantation in the country and increase the productivity per unit area of land. The first option is not currently available in public land and is fixed at approximately 135,000ha in public gazette forest land. However, expansion could take place in private farms in different places in the country where different tree species are adapted. The second option offers at opportunity to utilize the best plantation management practices that include use of genetically high-quality germplasm developed locally or obtained from areas with similar climatic conditions. These should not only exhibit high growth rates but also be resistant to both diseases and pests. It also includes application of the best management practices that are free from interferences from outside the sector and dictated purely by science. Practices already adopted by farmers such as "thinning from the top" should be embraced so that the fast-growing trees are harvested first to provide some early revenue to the forest owner while creating space for the smaller trees to grow. The species are: *Cupressus lusitanica, Pinus patula, P. caribaea, Eucalyptus grandis, E. saligna, Grevillea robusta, Casuarina equisetifolia* and *Melia volkensii.* A short overview per species is given regarding potential yield and management practices, followed by a discussion on opportunities (forest concessions, dryland plantations, energy from woody biomass) and bottlenecks. This paper looks at plantation forestry of the key species in Kenya and how it can be commercialized for adoption by the private sector.

Keywords: Plantation forestry, high quality germplasm, plantation tree species

Status and management of seed sources and other propagation materials for supply of quality germplasm for commercial forestry investment in Kenya

Stephen F. Omondi*, Leonida Cherotich, Ebby Chagala, Jason Kariuki, Joram Mbinga, Priscilla Kimani, Florence Cherono and Phanuel Oballa
Kenya Forestry Research Institute, P.O.Box: 20412-00200, Nairobi, Kenya

* Author of correspondence: stephenfomondi@gmail.com and somondi@kefri.org

The forestry sector in Kenya contributes immensely to the country's socio-economic development. It has high potential because more than 80 percent of energy in Kenya is from wood. The demand for fuel wood and sawn timber has surpassed the current local production capacity, which has an approximate deficit of 30 percent due to population increase and other end uses. It is in this regard that commercial forestry is viewed to play an essential role in reducing the wood production gap, create employment, generate income for both small scale and large-scale ventures and enhancing forest conservation initiatives. In an effort to ensure the supply of high-quality planting material, KEFRI has established seed sources of various categories. These include Clonal Seed Orchards (CSO), Seedling Seed orchards (SSO), Established Seed Stands (ESS) and Selected Seed Stands (SSS). Periodic evaluation of these seed sources is of great importance as it advises on the production potential, ensures the integrity of these seed sources and informs the breeding programme. It is in this context that this study addresses the current status of various seed sources, productivity, location, and provide recommendations for each of the seed sources of selected species. Nine tree species with high potential in commercial forestry from different agro ecological zones and market of their products were considered. In total, 213 ha of seed sources of various species were recorded as follows; *Cupressus lusitanica* (39ha), *Pinus patula* (62.5ha), *Eucalyptus grandis* (36.5ha), *Eucalyptus camaldulensis* (10.7ha), *Eucalyptus urophylla* (6ha), *Grevillea robusta* (23.5ha), *Melia volkensii* (23ha), *Casuarina equisetifolia* (4.3ha) and *Casuarina junghuhniana* (7.5ha). It was evident from the study that the seed sources are inadequate to meet the current demand for commercial forestry. It is recommended that various strategies need to be put in place to ensure sufficient supply of high-quality planting materials.

Keywords: Seed sources, Clonal Seed Orchards, Seedling Seed orchards, Established Seed Stands, Selected Seed Stands,

Breeding of *Melia volkensii* and *Acacia tortilis* for Commercial Plantation Forestry in Drylands of Kenya

* Jason G. Kariuki, Hisaya Miyashita, Michinari Matsushita and Patrick Mwenje, Samuel Auka and Damaris Munyao

Kenya Forestry Research Institute

* Author of correspondence: jkariuki@kefri.org

Over 80% of Kenya land area is composed of arid and semi-arid areas that suffer severe effects of drought. However, these areas also have the greatest potential for commercial tree planting because of the prevailing competition for land between food production and forestry in the humid areas. This can be achieved with prudent choice of species that are not only drought tolerant, but also productive to meet the needs of the local communities. Promoting quality forest plantations in the drylands requires use of advanced and specialized breeding techniques including establishment of seed orchards based on the verified progeny test results and subsequent production of high-quality seed adapted to both biotic and abiotic factors of target sites. Quality tree plantations will also require development of the next generation of improved varieties and establishment of distribution and extension system on the seedlings of these varieties. In Kenya, Japan International Cooperation Agency (JICA) has collaborated with Kenya Forestry Research Institute (KEFRI) in social forestry development in the ASALs of Eastern Kenya for close to 30 years. From experience gained in past projects in the region and consultations with ASAL communities, Melia volkensii and Acacia tortilis were prioritized for breeding to enhance for provision of timber for Melia and for biomass energy and dry season fodder for A. tortilis. The main objective of tree breeding is to supply genetically superior materials that are adapted to target planting areas and produce desired products or services. Breeding of Melia started in 2012 with selection of superior trees (Candidate Plus Trees (CPTs)), followed by scion collection, grafting and establishment of 1st generation seed orchards. Genetic performance of the selected CPTs in terms of growth, stem form, flower and fruits bearing and health status was determined through analysis of data collected from the progeny tests. All progeny tests and seed orchards of Melia and Acacia are 50 hectares. Various Melia trails have been undertaken and the information obtained will aid in selection of more superior trees for establishment of second-generation clonal seed orchards and improve the existing orchards through removal of relatively poor performing families. The results will also guide selection for further breeding programs in subsequent Melia breeding generations ultimately leading to establishment of more productive Melia commercial plantations in Kenya. With regard to A. tortilis, the selection of 100 CPTs was concluded in mid-2015 and establishment of seed seedling stand at Kibwezi initiated in December 2015. Initially, seeds have been secured from 27 CPTs and used for first phase of the seed stand. The stand also served as a progeny test to assess growth of different families. Overall, growth of Acacia varied greatly with some families having an average dry weight of 45kg/tree and some as low as 2.6 kg. Selection into second generation is expected to improve the overall population mean through discarding inferior families.

Keywords: *Melia volkensii, Acacia tortilis* tree breeding, progeny trial, seed orchard, candidate plus trees

Promotion of industrial plantation forestry development: Key considerations

*Thomas Kiprotich Kiptoo and Bekuta Kirongo Balozi

Department of Forestry and Wood Science, School of Natural Resource Management
University of Eldoret, Kenya:

* Author of correspondence: kiprothom@gmail.com

Plantation forests satisfy increasing demand for forest products such as energy, timber, food and environmental benefits. In the past, most of the forests were natural and therefore commercial values obtained from them were limited by the need for environmental benefits. However, in recent years, there is increasing latitude of industrial commercial plantation forestry whose sole aim is to maximize forest resource and earnings. There are a number of factors that influence the pace of industrial plantation development. This study sought to: (1) summarize the current status of the forest plantation; (2) identify the future development and possible scenarios in forest plantation management for the various products; and (3) assess whether these developments in a plantation environment could affect the harvesting systems used. The results indicate that in the year 2000, plantations were only about 5% of the global forest cover, where 25% of these were for industrial purposes. However, by 2017, plantations had increased to about 40% and reached 291 million ha, an increase that has also been witnessed in Kenya. The type and nature of the plantation owner; the change in demand for different and new forest products; use of biomass for energy, carbon sequestration and trading; ecosystem services and other products and services are some of the key factors influencing the form of plantations.

Keywords: Industrial plantations, plantation management, drivers of industrial plantations, Kenya.

Insect pests and diseases of commercial tree species in Kenya

*Eston Mutitu, Jane Njuguna, Beryn Otieno, Linus Mwangi, Mercy Gichora, Joseph Machua, Ely Mwanza, Miriam Gathogo and Angela Mutham

Kenya Forestry research Institute, P.O.Box: 20412-00200, Nairobi, Kenya.

* Author of correspondence: emutitu@kefri.org and estonmutitu@kefri.org

Although the private commercial forestry sector in Kenya is at its nascent stage, the full threats posed by insect pests and diseases and resultant economic losses are being felt. The sector also suffers from lack of policies on forest pests and diseases that hinder the flow of information and management technologies. Furthermore, aspects of insect pests and diseases are inadequately integrated in the planning of forestry activities. The information on pests and diseases affecting the planted tree species dates back to 1952 under the East African Agricultural and Forestry Research Organization (EAAFRO). However, a directory of these pests has not been collated to guide the farmers on their management and general decision making. This paper describes the insect pests and diseases that affect the major commercial forestry tree species. The report is developed through desktop review of relevant literature and experiences from experts in Kenya and the region. There is a need to create and strengthen a forest health platform for dissemination of information on insect pests and diseases relevant to commercial forestry. Further research on emerging insect pests and diseases should be done through joint research with stakeholders. Another recommendation is the establishment of a forest health program to make insect pest and disease diagnosis and management timely and effective to avert losses due to invasions.

Keywords: forest pests and diseases, commercial forestry tree species, forest health platform

Significance, threats and management of invasive tree species in commercial forest plantation

*Thomas Kiprotich Kiptoo and James Ole Kiyiapi
Department of Forestry and Wood Science, School of Natural Resource Management; University of Eldoret, Kenya:

* Author of correspondence: kiprothom@gmail.com

Although the private commercial forestry sector in Kenya is at its nascent stage, the full threats posed by insect pests and diseases and resultant economic losses are being felt. The sector also suffers from lack of policies on forest pests and diseases that hinder the flow of information and management technologies. Furthermore, aspects of insect pests and diseases are inadequately integrated in the planning of forestry activities. The information on pests and diseases affecting the planted tree species dates back to 1952 under the East African Agricultural and Forestry Research Organization (EAAFRO). However, a directory of these pests has not been collated to guide the farmers on their management and general decision making. This paper describes the insect pests and diseases that affect the major commercial forestry tree species. The report is developed through desktop review of relevant literature and experiences from experts in Kenya and the region. There is a need to create and strengthen a forest health platform for dissemination of information on insect pests and diseases relevant to commercial forestry. Further research on emerging insect pests and diseases should be done through joint research with stakeholders. Another recommendation is the establishment of a forest health program to make insect pest and disease diagnosis and management timely and effective to avert losses due to invasions.

Keywords: forest pests and diseases, commercial forestry tree species, forest health platform

Session III:

Forest Product Processing Value Addition and Technologies

Status of forest products value chains and investment opportunities in Kenya

J. Githiomi[1], G. Muthike[1], M. Muga[1,2], N. Oduor[1]

[1] Kenya Forestry Research Institute
[2] UN Food and Agriculture Organisation

* Author of correspondence: jgithiomi@kefri.org

This paper provides a review of information on the status and potential investment opportunities, challenges and possible mitigation measures in the key forest products value chains in Kenya. The key value chains have been categorized into three groups: forest industries, biomass energy and non-wood forest products. The main forest products industry value chains in the 1st category include sawmilling, reconstituted wood-based panel, furniture and joinery, pulp and paper, wood carving and transmission poles. The second category of value chain is the biomass energy production which are woodfuel and agricultural wastes. The third category of the value chain include mainly non-wood forest products which are: aloe, gums and resins, indigenous fruits and natural plant products. The information was obtained through a desktop study that involved a review of existing literature on work done by KEFRI Scientist and other authors. The information obtained was analyzed, collated, synthesized and key findings, lessons learnt and recommendations reported. A number of challenges that hamper the development of the value chains are identified and broadly classified as technological, resource availability, human resource capacity, high investment costs, competition from imported products, financial constraints, poor market linkages and inadequate policy and legal framework. Several opportunities for the various value chains are identified and include: development of forest products bio-enterprises; availability of improved wood processing technologies; integrated harvesting of forest plantations; plantation development in ASALs; enhanced forest management practices; accessibility of forest certification standards; capacity building opportunities; growing demand of forest products, large quantities of agricultural bio-residues for production of bioenergy; availability of fast growing resources such as bamboo; enhanced trade due to devolved system of government, existence of the Forest Conservation and Management Act 2016 among others.

Keywords: forest products value addition, forest industries, non-wood forest products, biomass energy production, woodfuel, agricultural wastes

Technology in the wood industry in Kenya; drivers and inhibitors

George Muthike and Joseph Githiomi

National Forest Products Research Programme, P.O.Box: 20412-00200, Nairobi, Kenya.

* Author of correspondence: muthikegm@gmail.com

Natural resource-based sectors contributed about 42% of Kenya's GDP in 2014, out of which 1.4% was from forestry alone. Despite that, forestry contribution is largely unaccounted for, as most forest products are used for subsistence or are traded in informal markets. The timber industry has slowly grown both in size and technology despite the frequent disruptions as a result of moratoriums barring investors from accessing raw materials from public forests. Technology has improved from the old and inefficient models used at the onset of the industry before Kenya's independence to simple yet more efficient systems in saw milling, and composite production. The industry players have tried to respond to global technology trends to counter competition that come with the same. The growth and investment in technology particularly in the timber industry is however challenged by among other factors; uncertainty in availability of raw materials, lack of training and capacity building facilities and inadequate infrastructure. Access to financing is also challenged by the frequent business slowing down due to lack of raw materials. It is important for the Government and all players in the forestry sector to ensure the right policies are put in place and implemented to assure sustainable growth of the industry, which supports other key pillars of the economy.

Keywords: Forest industry, saw milling, wood composite products

Sustainable commercialization of non-timber forest products in Kenya: a situational analysis

*Meshack Muga[1], Rose Chiteva[2], Violet Oriwo[2] , Collins Obonyo[2], Emily Kitheka[2], Peter Ogutu[2], Shadrack Inoti[3], Elijah Mboko[1] and Philip Kisoyan[1]

[1]Food and Agriculture Organization of the United Nations
[2]Kenya Forestry Research Institute
[3]Egerton University

* Author of correspondence: meshack.muga@fao.org

Non-Timber Forest Products (NTFPs) play a significant role in the livelihoods of Kenyans especially those in the drylands. However, the policy/legal framework that governs these commodities is weak. This paper reports a situational analysis of the NTFPs sub-sector covering the key past and ongoing interventions, major stakeholders, barriers and opportunities for the development of the sub-sector, hence providing a road map for their sustainable commercialization in the country. This study was done in the framework of The Restoration Initiative (TRI) project supported by the Global Environment Facility and being implemented by FAO and other partners. It involved consultations with 50 institutions from the government, non–governmental organizations, private companies and community associations within Nairobi, Coast, Eastern, Lake Basin and Rift Valley regions. Relevant publications, reports, policies, legislations and strategies were also reviewed. The findings indicate that the key interventions in the sub-sector include research and development, resource assessment and mapping, value chain analyses, capacity building, value addition, piloting plantation production and policy reviews. However, it is recognized that these have been only for a limited number of products such as gums and resins, honey, aloes and mushrooms. The key stakeholders in the sub-sector consist of collectors, community groups, traders, National government agencies, County Governments, private sector actors, development partners and civil society organizations. Key barriers to the development and commercialization of NTFPs include; deforestation, traditional production and harvesting technologies, inadequate bulking facilities, insufficient value addition, weak market linkages and information systems as well as weak policy and institutional frameworks. It is concluded that in order to promote sustainable commercialization of these products in the country, it is critical to promote revision/domestication of laws and policies, public-private partnerships, research, innovation, value addition, technology development and transfer, capacity building, synergies and complementarities.

Keywords: Non-timber forest products, situational analysis, policy, Kenya

Mass timber construction in Kenya: opportunities for manufacturing and affordable housing innovations to drive demand for sustainable forest products at scale.

James Mitchell[1,2],

[1]BuildX Studio
[2] Kenya Green Building Society

* Author of correspondence: james@buildxstudio.com

In 2019, BuildX launched a research and development project to explore opportunities to tackle both the affordable housing shortage in Kenya and the negative climate impacts of buildings and construction at scale. Funded by Autodesk Foundation and DOEN Foundation, with support from Gatsby Africa, on mass timber - construction as the most compelling solution, and the most promising opportunity for eliminating carbon in buildings on a global scale. A full value chain approach was used to drive market transformation and create an enabling environment for wood buildings. The research includes both qualitative and quantitative data across three areas, namely; the Forest - including exploration of supply and demand forecasts for timber in Kenya and across the wider East African region, carbon sequestration potential, and analysis of appropriate species for mass timber; manufacturing & processing - including the development of a viable model for mass timber processing in Kenya; and buildings - including analysis of construction benefits using mass timber, application of green building principles, and the development of a flat-pack mass timber solution for urban affordable housing. A compelling data model to support the feasibility of a mass timber building market in Kenya wad developed with the following key strategic development areas: coordinated forestry to sustain growing demand for sustainable timber by closely working with forestry partners to plan for the future; establishment of Cross laminated timber (CLT) Factory close to demand in Nairobi with primary processing developed nearer the forest; developing CLT Buildings by establishing the first mass timber buildings in Kenya, and related structural accreditations; and an enabling environment for up-scaling a wood building market that will require public and private sector support in both the forestry and construction sectors. The study recommends drive for reforestation as the most impactful solution for global emission reductions needed by 2030. Encouraging the use of wood products to construct buildings to guarantee that carbon is locked away long-term and taking up mass timber construction to avoid the high carbon emissions from using concrete or steel.

Keywords: Mass timber, affordable housing, green buildings, carbon emissions, cross laminated timber

Status of wood pole treatment in Kenya

Godfrey Ali Odeny*

Alogo Enterprises

Author of correspondence: aliodeny@yahoo.co.uk

The wood preservation Industry in Kenya started way before the country's independence. Preservative treated poles have been used for power transmission, fencing, and building and construction. Research and development has supported tree growing initiatives, helping to build a fairly stable and sustainable pole business in the country to date. This has been successful through improvement of the land races and hybrids of Eucalyptus species with site-matching for different eco-regions including dry lands. The readily available market for Eucalyptus poles has in the recent years motivated farmers to grow the species as a reliable cash crop. The pole industry has seen the establishment of 46 pole plants to date with substantial level of direct and indirect employment creation. Due to the ongoing shift to concrete poles, many farmers and forest-based organizations that had heavily invested in the growing of Eucalyptus trees face a market dilemma for their mature trees, while the same has ripple effects on the people the industry supports. There is therefore need to investigate the factors that lead to this shift. There are needs also to support the industry develop in the region in which Kenya is well placed, to sustain the wooden pole business.

Keywords: Wooden poles, preservatives, concrete poles, Eucalyptus

Bioenergy analysis for 65 factories of the Kenya Tea Development Agency Holdings Company Ltd (KTDA)

Thomas Buchholz*, Hilarious Kifalu, Geoffrey Ronoh, Dr. Izael DaSilva, Veronica Ngunzi

Strathmore Energy Research Centre (SERC), Strathmore University, Nairobi, Kenya

* Author of correspondence: tbuchholz@strathmore.edu

Kenya Tea Development Agency Holdings Ltd. (KTDA) is Kenya's largest tea producer. Fuelwood provides over 99% of the process heat required for drying tea at KTDA's 69 tea factories. KTDA tea factories source fuelwood from third parties. Fuelwood quality, supply security, sustainability and price are major concerns to KTDA's management. For instance, energy expenses are the second highest cost category after labor costs. The goal of this research was to assist KTDA in identifying drivers of heat energy cost and specify performance and spread of 65 factories. Research objectives were to review existing information, design an analytical framework covering: i) fuelwood; ii) alternative biomass fuels supply chains; iii) onsite fuel logistics; and iv) boiler operations, perform field surveys, analyze results, provide factory (bioenergy) rankings, and identify information gaps. There is strong evidence that the ratio of stacked to solid fuelwood volumes most likely vary considerably within and across factories due to multi-dimensional and irregular-shaped fuelwoods used. We suggest to introduce a new benchmarking metric, fuelwood energy costs measured in KSh/MWh embodied in the fuelwood (considering fuelwood moisture content). Results suggest that it suffices to collect this metric at the boiler mouth; excluding costly boiler efficiency records. Results strongly suggest that using high-density fuelwood lowers fuelwood energy costs. In contrast, wood price (KSh/m3stacked), transport distance, fuelwood supply model, or fuelwood use efficiency as currently measured by KTDA factories did not provide a credible metric to measure fuelwood energy cost. Heat loss due to moisture in fuel had a muted impact on overall boiler efficiency. While reduction of moisture content played an important role and can be cost-effective, boiler design and maintenance (flue gas temp, etc.) leads efficiency results at the boiler. Alternative biomass fuels such as nut shells or briquettes were used at only three factories at substantial scales. In general, alternative biomass fuels were transported over much longer distances and were more expensive compared to fuelwood in terms of net heat content. Fuel cost of alternative biomass fuel was generally considerably higher on a per-energy unit than fuelwood. Suggested next steps, amongst others, include to: Improve biomass receiving procedures, provide and train staff in the use of biomass pricing lookup tables, introduce a new fuelwood benchmarking metric, consider annual fuelwood supply chain report; facilitate a stand-alone, extended and onsite fuelwood plantation survey (covering financial and site data), follow up measurements and benchmarking, and a continuation of energy audits.

Key words: Fuelwood, biomass, pricing and energy costs

Status of wood pole treatment in Kenya

Godfrey Ali Odeny*

Alogo Enterprises

Author of correspondence: aliodeny@yahoo.co.uk

The wood preservation Industry in Kenya started way before the country's independence. Preservative treated poles have been used for power transmission, fencing, and building and construction. Research and development has supported tree growing initiatives, helping to build a fairly stable and sustainable pole business in the country to date. This has been successful through improvement of the land races and hybrids of Eucalyptus species with site-matching for different eco-regions including dry lands. The readily available market for Eucalyptus poles has in the recent years motivated farmers to grow the species as a reliable cash crop. The pole industry has seen the establishment of 46 pole plants to date with substantial level of direct and indirect employment creation. Due to the ongoing shift to concrete poles, many farmers and forest-based organizations that had heavily invested in the growing of Eucalyptus trees face a market dilemma for their mature trees, while the same has ripple effects on the people the industry supports. There is therefore need to investigate the factors that lead to this shift. There are needs also to support the industry develop in the region in which Kenya is well placed, to sustain the wooden pole business.

Keywords: Wooden poles, preservatives, concrete poles, Eucalyptus

The opportunity of high value processing linked to farm forestry in Kenya

*Edward Onsongo[1], Charles Kimiti[2] and Antony Ngugi[1]
Gatsby Africa
KOMAZA

* Author of correspondence: Edward.Onsongo@gatsbyafrica.org.uk

Kenya's forestry sector provides a paramount opportunity for job creation and raising of incomes which will lead to poverty reduction. The growth of the commercial forestry sector has been constrained by supply-side constraints such as the logging ban on KFS plantations. Farm forests have been identified as a resource base of significant scale and can play a key role in reducing Kenya's wood supply deficit, and increasing value-addition, job creation and livelihoods, and environmental benefits. Eucalyptus is one of the main commercial species planted in farm forestry systems in Kenya. However currently its commercial value is limited due to supply into informal markets and inefficient technologies used to process the material, limiting the quality of end product and market value. New technologies in sawmilling could realise more efficient processing and higher quality end products and create opportunities to access higher value markets. In turn this could create new investment opportunities for saw-millers and benefit a large number of farm forestry growers that could benefit from access to higher value markets. However, this will require the development of local markets to ensure there is sufficient demand willing to pay for such quality products.

Keywords: Job creation, income, environmental benefits and investment

Session IV

Regional Trade for Key Products and Bamboo Value Chain

Status of intra Africa forest products trade and the potential for positioning Kenya as a regional hub for forest products manufacturing

*Joshua K. Cheboiwo , Jonah Kiprop and Anthony Macharia
Kenya Forestry Research Institute, P.O. Box: 20412-00200, Nairobi, Kenya

* Author of correspondence: jcheboiwo@kefri.org

Africa is endowed with a large population, estimated at more than 1.3 billion people and vast natural resources including forests. Forest resources in Africa provide opportunities for intra country trade and investments that create employment, income generation and overall continental economic development. The African Union ratified Africa Continental Free Trade Area building on existing African Economic Community trade blocks such as the East African Community (EAC), Common Market for Eastern and Southern Africa (COMESA), Southern African Development Community (SADC) and Community of Sahelian-Sahara African States (CEN-SAD). A review is presented of the status of forestry resources, industrial capacities, intra trade opportunities and potential investments in Eastern Africa and Kenya in particular. In general, the Congolian Tropical forests zone, stretching from West Africa to Central Africa, is well endowed with forest resources as compared to Northern, Sahelian, Eastern and Southern Africa that have low forest cover, largely depending on trees on farms and plantations for roundwood requirements. Key forest-based industries in the continent are highly correlated with forest resources endowment. The Tropical Congolean zones are dominated by large foreign industrial complexes for lumber production, plywood, and particle board. Most roundwood from the region is exported to Europe and Asia. In contrast, Eastern and Southern Africa countries are dominated by wood dependent industries for biomass energy such as textile and food processing, transmission pole treatment plants, sawmills, wood panels and constituted wood processing industries, mostly from woodlands and plantations. The intra Africa trade in forest products from Tropical Congolean zones of West and Central Africa is estimated at 5% of the global trade, a paltry performance. In Eastern Africa, intra trade between Kenya, Tanzania, DR Congo, Uganda, and South Sudan, is mostly composed of timber, treated poles, charcoal and reconstituted wood. The EAC member countries are net importers of various manufactured wood-based products, mostly paper/ paper products and reconstituted wood from Europe and Asia which can be manufactured within the region. There exist vast opportunities in the region for investment in wood processing to meet the growing regional demand for processed wood, and wood-based products. Kenya could leverage on this by importing raw materials from neighboring countries for further processing/manufacturing for its large growing markets as well as export surplus regionally. Policy, legal and infrastructure need to be improved to facilitate efficient trade in forest products between member countries.

Keywords: Forest resources, trade, economic development

Mapping of financial sources/ Initiatives and action oriented strategies to catalyze investments in Scaling up sustainable value chains in Kenya

Charles M. Wambua, Rural Finance/Microfinance Expert
Magnifique Consult.

Author of correspondence: Magnifiqueconsult@outlook.com

The importance of financing to invigorate investment and sustainable development in the forestry sector cannot be gainsaid. To-date challenges of getting finance within forestry value chains, their actors (e.g. producers) are quite evident. Studies have shown that very little finance actually gets to forest farm producer organizations (FFPO) and small and medium enterprises (SMEs). In Kenya there are inadequate financial mechanisms to support forestry investments. The available financial mechanisms are not well suited for forestry investments. Forest industries accessing funding from local banks pay very high interest rates charged and the repayment period provided is too short. Most private actors in the forest sector do not have the additional collateral required to cover loan facilities. In addition, in order to support and scale up inclusive and sustainable forest value chains, a significant increase is needed in private financing and investments.The challenges notwithstanding, Kenya has made significant steps towards inclusiveness and sustainability of its forest-based value chains and food systems, review of its national forest policy, social protection policy including COVID-19 pandemic response, and this has drawn the attention of companies, funds, and development agencies in promoting the sustainability of its forest value chains. Based on a mapping exercise of financing sources/initiatives targeting smallholder producers and SMEs by FAO and We Effect and lessons drawn from the prevailing financial landscape, it is undeniably clear that strategies ought to be put in place to build the confidence of financiers to invest in the forestry value chains, whilst and more importantly, seek to build the capacity of the smallholder farmers, their FFPOs to become more bankable. Some of those strategies, may entail: (i) Growing farmer groups into larger-scale groups (e.g. cooperatives) to reduce transaction costs of dealing with FFPOs; (ii) improving business incubation services which improve FFPO creditworthiness and increase confidence in the returns to be had from investment; and (iii) finding ways to de-risk investments to those FFPO businesses. The mapping exercise also identified existing financial institutions that have financial instruments for the forestry sector and at the same time revealed key requirements from either side (the supply and demand side respectively). This paper presents the findings and provides the basis for the draft strategy recommendation meant to catalyse investments in, improve coordination within, and scale up, sustainable forest value chains in Kenya.

Keywords: Farm Forestry Producer Organizations, Small and Medium Enterprises (SMEs), financial mechanisms, sustainable forest value chains

Status of bamboo development in Kenya: challenges and opportunities

* Oduor N., P. Ongugo and, G. Sigu
Kenya Forestry Research Institute

* Author of correspondence: nelliecoduor@gmail.com

Most of the bamboo resources in Kenya comprise one indigenous species, *Oldeania alpina,* which was formerly known as *Arundinaria alpina* and more recently *Yushania alpina.* The current coverage of the country's indigenous species which is found in the highlands of Mau, Mt. Elgon, Cherang'any, Mt. Kenya and the Aberdares is about 133,000 Ha down from 450,000 Ha. This reduction was due to unsustainable felling of forests and conversion of forest land into agricultural land, leading to a Presidential ban in 1986. As a result of the ban, KEFRI sought to introduce 22 exotic species from Asia in various ecological zones in the country and over 10 species were successful. This paper looks at the status of bamboo planting, management and the experiences in processing bamboo. It will also highlight the recent subsidiary legislations and emerging investment opportunities in the bamboo value chain.

Key Words: Bamboo management, bamboo development, *Arundinaria alpina, Yushania alpina, Oldeania alpina,* Kenya

Interventions for unlocking the value of bamboo commercialization

Caroline Kariuki
Green Pot Enterprises Limited

Author of correspondence: ckariuki@greenpotenterprises.com

Globally, the bamboo sector contributes over USD 75 billion (2020) with the potential to grow to over USD 98.3 billion by 2025 employing over 7.5 million people in China alone. Africa, while having over 12% of the natural bamboo stands in the world, only contributes 1.2% of the trade. As a country, it is time to seriously look at the bamboo sector as a means of achieving the 10% tree cover, create wealth for communities and make bamboo a significant contributor to the GDP of Kenya. This paper seeks to unpack the key interventions necessary to unlock the opportunities for bamboo in Kenya, setting sector goals, streamlining the bamboo value chain as well as address policy and fiscal interventions that are required to realize this vision.

Keywords: Bamboo, bamboo value chain

Opportunities and constraints of wood products markets in Western Kenya

*David Langat and Ojung'a Samson Okoth
Kenya Forestry Research Institute, P.O.Box: 20412-00200, Nairobi, Kenya.
* Author of correspondence: dkipkiruilangat@gmail.com

Currently the domestic market of the wood products as increased dominating the local markets of the urban centers within western Kenya. Volumes of timber harvested from both the farms and natural forest has decreased due to increasing demand of the wood products to a growing market within the western counties. The demand for forest products has increased over the last 10 years driven by urbanization, economic growth, housing and construction, and these trends are largely expected to continue with preference for high quality wood products. With the continued shrinkage of wood supply from public forests, wood and tree products are increasingly obtained from farms. Though there has been extensive tree planting on the farms in the recent years, there is little information on the quality of tree products, and product specification, potential demand and prices of various wood products for each market segment. The information is useful in aligning the production of wood at the farm to the needs of various markets segments. A survey was therefore conducted in Western Kenya Counties of Kisumu, Bungoma and Busia targeting wood product traders to identify market specifications for tree products, assess potential demand of tree products, identify criteria for pricing of various tree products and determine market prices of various tree products. The data was summarized using descriptive statistics. Results has shown that most of the timber products are obtained from public plantations, community and private forests, and from surrounding farms. The majority of the customers for the tree products were individuals (43%), retailers (21%), contractors (18%), education Institutions (12%) and industries (2%). The main constraints experienced by wood products merchants are scarcity of products, low quality of products, unpredictable fees from county governments and unfair competition from imports. It is recommended that wood products traders be linked with wood producers (farmers) so that the right materials and management of trees not compromise the quality of desired products.

Keywords: wood products, wood product traders, wood producers

Bamboo as a construction material in Kenya

*Sylvia Essendi

Kenya depends on wood for timber, poles, firewood and charcoal. The construction industry consumes timber directly through production of doors, frames, wall panels and flooring among others. In addition, wooden poles are used when casting slabs, as scaffolding material as well as fencing. Currently Kenya has an annual deficit of timber of about 10.3million m3 against a demand of 41.7million m3. Bamboo has many uses including being used for construction. This paper seeks to address and inform on opportunities for use of bamboo in the construction industry.

Keywords: wood industry, bamboo, construction

Unlocking the green economy by linking sustainable suppliers with responsible buyers

Michal Brink

CMO Group CEO

Author of correspondence: michal@cmogroup.io

As awareness of climate change, resource scarcity, pollution, and social inequality rises, businesses and governments are being held increasingly responsible. As a result, there have been several global initiatives and calls to action to assist both governments and businesses in their progression towards sustainability. In September 2015, the United Nations (UN) adopted the 2030 Agenda for Sustainable Development. This is intended to be a "plan of action for people, planet and prosperity" and "seeks to strengthen universal peace in larger freedom" (UN, 2015). It sets the priority to eradicate poverty in all its forms and dimensions, which is seen as an indispensable requirement for sustainable development. Halting deforestation and forest degradation and practising sustainable forest management are important for limiting climate change and its impacts, protecting biodiversity and freshwater supplies, providing raw materials for a 'low ecological footprint' economy, and protecting the livelihoods of hundreds of millions of people. The Sustainable Development Goals (SDGs) can be major drivers in efforts to halt deforestation and forest degradation worldwide, and to strengthen the positive contributions that forests play in the future of sustainable development. In today's business landscape, it is no longer sufficient for organisations to simply acknowledge global sustainability challenges like climate change, resource depletion, and inequality – they are expected to implement and to adhere to strict certification standards in order to access markets. However, they still have to retain and improve profitability. The Forest Stewardship Council® (FSC®) with their certification standards brings together environmental, social, and economic interests, and FSC certification has become the world's leading scheme for promoting sustainable forest management, with a strong focus on mobilizing consumers through its chain of custody and labelling schemes. This paper highlights how CMO will apply a 2-phase strategy to unlock the opportunity to link small growers and forestry companies with the mainstream global trading market for FSC certified forest products: Phase 1: Utilise the existing supply chain for a specific product in a particular country and introduce FSC certification for the product, with a focus on small growers and commercial farmers. This is done through the offering of group scheme certification. CMO therefore uses the existing supply chain to implement FSC certification nationally by using its PerForm software and maintaining the existing supply chain to ensure rapid deployment and maintenance of trust of the existing role players in the market. Phase 2: Create an online trading platform to trade globally in certified forest and non-forest products and provide the first two links in the group scheme supply chain – growers and processors/agents - with the option to also trade their certified products using this avenue

Key words: SDGs, FSC, phases, business landscape and certification

Win-win wood trade linkages between Uganda and Kenya

*Mike Howard1 and Anthony Ngugi[2],
[1]Fractal Forest Africa
[2]Gatsby Africa

* Author of correspondence: mdhoward@iafrica.com

Uganda has successfully developed a high-quality and inclusive commercial forestry resource base through implementation of private sector concessions and a supporting technical assistance and performance-based finance mechanism to drive new investments. However, Uganda now faces a challenge with the supply of commercially grown wood set to increase from about 200,000 m^3 to 1.2m m^3 in the next few years. This growth is outpacing local demand and investments in primary processing capacity required to manufacture quality wood products with higher value and export potential. As a result, commercial tree growers and primary timber processors are not realizing the value potential from their investments at the scale required. However, relaxation of export regulations for processed timber could open the door to new opportunities. Prompting first mover firms to invest in processing technologies which would enable access to higher value markets, particularly in Kenya. The sectors in both Kenya and Uganda have huge potential for sustainable, inclusive, and competitive growth. Uganda has a competitive advantage today in its ready availability of privately grown sustainable timber - and an in-principal opportunity to realise the value of the same through strategic investments in high quality primary processing (e.g. optimized sawmilling). While Kenya has a comparative advantage in the scale and proximity to end markets for secondary processed products (e.g. furniture, construction grade timber). Effectively linking the value chains between these sectors, could unlock significant opportunities for green livelihoods, job creation, and business growth.

Key words: Commercial tree growers, strategic investment, market and export

Use of bamboo fibre for textile making for environmental sustainability

Lydia Nyawira Mburia,

Wote Technical Training Institute, Kenya,

* Author of correspondence: lydiamburia@gmail.com

In a bid to conserve the environment, the bamboo tree comes in handy in the manufacture of durable clothes. The objective of the study was to determine the benefits of using bamboo tree appropriate technology in clothes manufacturing and for environmental sustainability. The research adopted a descriptive survey design through desktop information analysis and field visits were conducted in collaboration with NEMA, Ministry of Agriculture and KFS. Data was collected through administration of structured questionnaires to a target population of 50% small scale farmers growing bamboo trees and indigenous tree species and 50% large scale farmers growing bamboo trees and exotic tree species in Makueni Sub-county. Local farmers observed that cultivation of bamboo trees had enhanced environmental sustainability. The study sought to advance knowledge regarding bamboo tree appropriate technology as an innovation in the textile industry for environmental sustainability. Bamboo trees have played a crucial role towards increasing the current 7.3% tree cover to the intended 10% in Kenya. Bamboo trees are recommended since they grow fast and are biodegradable, help in purifying the air, and are used to conserve water catchments. Moreover, bamboo trees do not require fertilizers and pesticides to grow and are easily propagated through pruning of their culms. Bamboo trees have played a crucial role in greening the arid and semi-arid regions since they don't need a lot of water for their growth and are drought resistant, therefore helping to raise the water table.

Keywords: Environment, appropriate technology, environmental sustainability, bamboo

Enhancement of Industrial Production of Bamboo Incense Sticks through Small, Medium Enterprises (S.M.E.'S)

* George Jenner V*[1], Dr.Thiru Selvan1 and Dr Vipan Guleria[2]

[1]Department of Forestry and Biodiversity, Tripura University, India
[2] RHRTS, Dr Y S Parmar UHF, Jachh, India

* Author of correspondence: vgjenner@gmail.com

Bamboo is a fast-growing plant from the family Poaceae, and some species grow as much as three feet in a day. Globally, more than 1600 species comprising 115 genera and two distinct groups have been observed, namely, monopodial and sympodial. Due to its strength properties and flexibility, bamboo is considered an alternative to timbers, plastic, and even steel. Bamboo plants generate 30-35% more O2 than trees, and they tolerate extremes of weather. Agarbatti or Incense stick, as known otherwise throughout the world, popularly called the fragrance ambassador, is widely used in religious and non-religious ceremonies. Physically, the incense stick resembles a long, cylindrical stick-like structure. It consists of a bamboo core surrounded by a black or brown powdery substance, which produces a pleasant fragrance upon burning. Bamboo culms are the primary raw material, and the attributes of the bamboo sticks significantly contribute to the economic viability of the agarbatti enterprises. The present research was executed in the North-Eastern part of India. The species studied were Bambusa polymorpha, B. vulgaris, B. cacharensis, B. tulda, B. balcooa, M. baccifera, Dendrocalamus asper, and D.longispathus. Identifying appropriate species, age, and the portion of culm best suited for incense stick production, along with several physical attributes of the finished incense stick, determines the enterprise's returns. The investigation recommends that the middle portion of the third-year-old bamboo culms be the preferred raw material in the incense enterprises to maximize the outturn. Similarly, enterprises should consider the most preferred size, weight, shape, and thickness while manufacturing incense sticks. These best practices would increase the profitability of all the stakeholders.

Keywords: Bamboo; Outturn; Mechanised Incense Stick; Likert scale; M.S.M.E.

Session V:

Investment and Financing Models for Forestry Sector

Investment and financing models for forestry development in Kenya

J.K. Cheboiwo, *L. Wekesa, D. Langat, J. Kiprop, L. Ndalilo, G. Rutto and S. Nadir

Kenya Forestry Research Institute, P.O.Box: 20412 – 00200 Nairobi

* Author of correspondence: lwekesa@kefri.org

Forestry plays an important dual purpose of income generation and environmental conservation. Studies have demonstrated that forestry has the potential to reduce poverty as well as achieve conservation because of its profitability as well as being resilient to poor and unreliable rains as a result of climate change. However, forestry development in Kenya has been sluggish due to, inter alia, inadequate capital resources by targeted actors for forest investment. The government and donor financing for public forests development is not adequate. Equally, private actors including smallholders participating in forestry development are constraint with financial resources. The Government necessitated a review of the forest investment and financing to help elucidate opportunities for invigorating forestry development. Information presented in this paper include: evolution of forest financing, challenges and emerging opportunities; status of policy and legislative frameworks on forest financing; public private partnerships, experiences, lessons and future sustainability; and emerging financing models for forestry development in Kenya.

Keywords: financing, forest, investment, partnerships, sustainability

Enhancing climate action in the Kenyan forestry sector – overcoming barriers to enhance investment

Emily Le Cornu,
AECOM Kenya, 4th Floor, Laiboni Centre, Lenana Road, Kilimani, Nairobi, Kenya

Author of correspondence: Emily.LeCornu@aecom.com

Climate change is a significant issue in Kenya, with the impacts being faced now and expected greater extremes in the future. Kenya's forests play an important role in not only mitigating against future climate change as a carbon sink, while also supporting communities and ecosystems become more resilient to future change by providing natural defences and protection. Yet, over the past 25 years, they have been depleted annually due to population pressure for settlement and agriculture, illegal logging, forest encroachment, unsustainable grazing and poor forest management. Through the GNIplus project, a Status Review of Climate Action in the Kenyan Forestry Sector report has been developed in consultation with the Ministry of Environment and Forestry and other public and private stakeholders to help inform decision making to promote climate action in the sector. The report outlines key barriers and challenges for implementing climate mitigation and adaptation projects in the forestry sector, as well as presents opportunities and recommendations for overcoming some of the issues. Building up on the Status Review, a Forestry Sector Roadmap is being developed to map out, prioritise, and support the design and implementation of viable projects in the sector for the Kenyan Government to meet its international climate change commitment as outlined in its Nationally Determined Contribution (NDC). However, to achieve this goal, significant funds must be directed to the forestry sector as there is a substantial shortfall in investment. The roadmap is intended to be used by the Ministry to highlight its priority areas to help guide project implementation by the public, private and development sectors. Using a multi-criteria analysis, the roadmap links up various national strategies and findings from the GNI^{plus} Status Review report with a prioritised list of possible actions. It is hoped that this tool will provide clear signals to the private sector to highlight priority areas for investment.

Keywords: Climate change, climate action, Nationally Determined Contribution, GNI^{plus}

Remote sensing and spatial forest management systems

Michael Breetzke*

Swift Geospatial Solutions

Author of correspondence: michael@swiftgeospatial.solutions

Remote sensing technology has been used to track forest cover at landscape level and to determine trees by genus and quantify them, with varying degrees of accuracy and associated costs. To gauge the feasibility of determining and monitoring supply of fragmented commercial timber resources from farm forestry for timber processing, Gatsby Africa, through its Kenya Commercial Forestry Programme (KCFP) commissioned a remote sensing project to test technologies for this purpose. The output being linked to the identification, quantification and monitoring of Eucalyptus resources in sample landscapes in Bungoma and Nyandarua. The project made use of satellite-based remote sensing technology to identify Eucalyptus tree woodlots in the landscape as well as quantifying volumes of the identified woodlots. Maxar's 50cm stereo imagery was the satellite chosen as best suited to derive elevation data, used to derive a tree height model for the woodlots. Eight spectral band optical imagery was used to spectrally differentiate between Eucalyptus and non-Eucalyptus species. The spectral classification to map Eucalyptus woodlots resulted in an overall accuracy of 85% for Bungoma and 87% for Nyandarua. Height accuracy were 82% for Bungoma and 86% for Nyandarua. Volume was predicted using individual tree equations realizing an accuracy of 61 % in Bungoma and 77% in Nyandarua. A satellite-based monitoring model of these derived woodlots using 3m Planet imagery and dashboard visualisation was demonstrated as a viable model for monitoring the woodlots. Indicative monitoring costs of $0.5/Ha and $0.3/Ha for a minimum area of 50,000 Ha if monitored weekly and monthly were quoted. The technology used in this pilot project is to provide a pathway to the development of a commercially viable spatial technology product, for use in commercial forestry and afforestation scenarios.

Keywords: Remote sensing, woodlots, monitoring and commercial forestry

Commercial forestry development in a changing climate: optimizing returns of investment for wood and carbon benefits

*Vincent O. Oeba[1] and Zipporah Toroitich[2]

[1]Kenya Forestry Research Institute, P.O.Box: 20412-00200, Nairobi, Kenya.
[2]Kenya Forest Service, Headquarters, Karura, Nairobi, Kenya.

* Author of correspondence: vongusoeba@gmail.com and voeba@kefri.org

Commercial forestry from private farms is proving to be a better alternative in meeting deficits on demand of wood products in sub-Saharan Africa. This has continued to attract investments in forestry sector for job creation in primary, secondary and tertiary forest production. Gazzeted commercial forest plantations in government owned land are not adequately meeting the increasing demand of wood products. For example, Kenya is net importer of wood. It has an annual deficit of 10.3 million m^3 attracting private sector investment to meet the balance. This demands for better principles of sustainable commercial forestry to capitalize on climate finance especially with green climate and adaptation fund that is currently an incentive in forestry sector for addressing mitigation and adaptation to climate change and climate variability. In view of this development, investors in forest and tree resources are faced with the task of optimising the joint production of wood and carbon sequestration for climate change mitigation and adaptation. For instance, investors might find it profitable to give up some timber returns in exchange for carbon credits or choose to optimize both for wood and carbon investment. This study addresses investment needed in establishing commercial plantations, expected returns and those from sale of carbon. It uses data on key forest plantations species in Kenya, namely; *Cupressus lusitanica* Mill., *Pinus patula* Schiede ex Schltdl. & Cham., *Eucalyptus saligna* Sm. and *Juniperus procera* Hochst. ex Endl. It was evident that at the economic rotation of 30 years with stand density of 532 trees ha−1 of *P. patula* and *C. lusitanica* yielded US$28,050 and US$23,650, respectively, from sale of carbon compared with US$59,000 and US$51,000, respectively, from sale of wood. This was twice the value investors would receive from clear-felling as compared with sales from carbon. Similarly, at economic rotation of 33 years with stand density of 150 trees ha−1, a forest investor in *E. saligna* would earn US$15,400 from sale of carbon compared with US$33,000 from sale of wood. This demonstrates that an investor who chooses to grow trees for sale of wood and carbon market is likely to benefit more considering the appropriate economic rotation that will result to lock carbon for example in timber for construction. In conclusion, climate finance continues to incentivize the farmers to optimize on sustainable commercial forestry that encompasses afforestation and reforestation of degraded lands, financial returns for private sector and economic growth, natural resource value chain development, carbon sequestration and climate change mitigation, job creation and improved livelihoods for women and men living in forest-adjacent communities, positive gains for countries' policy objectives toward meeting Sustainable Development Goals (SDGs), National Determined Contributions (NDCs) and private sector development.

Keywords: Sustainable commercial forestry, climate finance, NDCs, changing climate and investment

Harnessing the power of trees in Africa

Kevin Juma
Africa Forest Carbon Catalyst Director | The Nature Conservancy:

Author of correspondence: kevin.juma@tnc.org.

The climate change emergency requires a radical transformation of the society to reduce emissions from land use, energy, transportation, eventually bringing them to net-zero by 2050. However, industrial emission reduction alone will not be adequate to limit global temperature rise below 2°C as set out in the Paris Agreement. In sub-Saharan Africa, 4 million hectares are deforested annually, and an even larger area is degraded. with more people dependent on forests than any other continent, and by 2050, 450 million livelihoods—mostly smallholder farmers living on degraded lands are projected to be at risk from climate change. Protecting forests is among the most cost-effective natural defenses against climate change and in Africa will help hundreds of thousands of people earn a better living. Yet to date there have not been enough reforestation and forest conservation projects ready to absorb the significant investment they need to achieve outcomes at scale. The Nature Conservancy (TNC), a global conservation organization, developed the Africa Forest Carbon Catalyst to find and refine more of these forest restoration and conservation projects that will slow or even reverse forest loss while helping tackle climate change. This TNC initiative gives technical and operational advice, helps build their teams and networks, and prepares them to successfully seek investment. In the past, previous approaches have struggled to take projects to scale and sustainability, owing to limited technical capacity, inadequate markets, insufficient policy frameworks, and a lack of political will. But there are recent advances and reforms, and the Catalyst will capitalize on these improved global conditions. Most African nations also have targets for conserving and restoring forests within their "Nationally Determined Contribution (NDC)" commitments. This is a critical first step in creating a fundamentally positive policy environment. As the infinite cost of climate change reaches irreversible highs, now is the time for bold collective action.

Keywords: climate change, carbon emission reduction, Africa Forest Carbon Catalyst

Application of public private partnerships for increased forest cover, job creation and sustainable development in Kenya

Daniel Mutegi Giti1,[2]
[1]University of Nairobi
[2]State Department for Housing and Urban Development. P.O. BOX: 30119-00100 Ardhi house.

* Author of correspondence: mutegigiti@gmail.com

Forests, oceans and other water bodies are key in provision of life supporting mechanism for planet earth, since they support ecologies for sustainable development. Kenya forest cover is 7.4% of total land mass, against the recommended global minimum of 10%, despite the fact that the environment contributes 42% of our GDP, hence its importance to attainment of Kenya Vision 2030. Sustainable management of forests faces many challenges in Kenya like: inadequate budgetary support, policy and market failures, poor economic performance, and lack of incentives for private sector and communities. The nexus between high population growth rates, high urbanization rates of 4.2% above the global average of 2%, poor agricultural productivity, increased rural poverty, increased environmental, application of inappropriate policies and incentives for attracting the private sector, application of inappropriate technologies have all accelerated deforestation in Kenya. This has hampered sustainable management and utilization of forest resources. Application of Public Private Partnerships (PPPs), which are collaborative and cooperative undertakings between the public sector and private sector has been suggested as a solution to the deforestation and other forestry management challenges in Kenya. PPPs brings about increased access to capital, improved technologies, innovative approaches, new management and governance approaches, efficiency and effectiveness in forest management. Under PPPs the partners undertake comprehensive identification of tasks and applicable risks, rewards and incentives. Kenya has the necessary legal and regulatory frameworks for applicable of PPPs including the PPP Act, 2013. A qualitative literature review of the state of forestry management in Kenya and potential for PPPs applicability has been explored in this paper. It was found that PPPs are indeed among the best approaches to be used to undertake afforestation, deforestation and increased forest cover in the country.

Keywords: Public Private Partnerships; forest management, private sector; public sector/government; sustainable development, ecosystem.

Production systems for high quality commercial forestry seedlings: a case of Plantech Nurseries Limited, Naivasha, Kenya

Ilad Bouton and John Wambugu

Plantech Nurseries Limited, Naivasha, Kenya

The quality of planting material used by commercial forestry growers in Kenya has been poor, with this trend occasioned by the use of low-to quality seed and poor nursery practices. The result has been low tree productivity and inferior quality wood products. The current average productivity for farm forestry stands at approx. 14m^3 /ha/yr with a production potential of 20m^3/ha/yr if growers used the right germplasm and high-quality plants are matched to the right sites. This gap in the quality of seedlings presents an investment opportunity for the sector players to raise and supply the right seedlings. Plantech is a commercial nursery based in Naivasha that uses expertise from Israel and cutting-edge technology to produce high-quality planting material. The nursery can produce two million seedlings monthly, including vegetable, ornamentals, flowers, and fruit seedlings. Gatsby Africa (GA) through the Kenya Commercial Forestry Program (KCFP) partnered with Plantech to test the mass production of high-quality eucalyptus seedlings using improved seeds. The seedlings were raised from 1st February 2021 to 16th April 2021 and planted out in the field in April 2021. This was a pilot whose objectives were to: determine the cost of production of mass-produced high-quality seedlings; to test the operational practicalities and logistics needed to distribute the seedlings to small growers; and to determine how well the seedlings would perform at the farmer level using parameters such as survival, growth, and seedling health at 30 and 90 days after transplanting. KCFP provided Plantech with unigrow trays and improved seed which were used to produce 5,000 seedlings. A mixture of peat moss and vermiculite was used as growth media while the direct sowing method was used to sow the seed. The trays were placed in temperature-controlled germination chambers. The study revealed that within 14 days, up to 90% of the seed had germinated and the seedlings attained the recommended transplanting height within seven weeks. The seedlings were distributed to smallholder farmers who recorded an average of 95% survival rates a month after transplanting. An exposure visit to Plantech by key stakeholders (JICA, OAF, Komaza, Biashara Masters, Anarrosi, Mavuno Afya, and Tree Growers Association of Nyandarua) was undertaken and some of them are keen to work with Plantech. KCFP will be working with Plantech to further optimize production systems and produce seedlings at a targeted price of Ksh.15 ($0.15)

Keywords: seed quality, tree seedlings, farm forestry, Kenya Commercial Forestry Program

Trends and drivers of private financing for sustainable forest management in sub Saharan Africa

*Benjamin Mutuku Kinyili[1], Ezekiel Ndunda[2],

[1]Kenya Forest Service,
[2]Department of Environmental Sciences and Education, Kenyatta University,

* Author of correspondence: bmkinyili@yahoo.com

There is currently less emphasis in private financing in forest sector within the Sub-Saharan Africa including Kenya. However, in more recent time, the recognition of commercial value of forest and forest resources, the emergence of payment for forest ecosystem services and the drive towards commercialization of forest and forest resources has accelerated financial inflow into the sector from private sources. However, there is lack of coordinated and systematic effort to collect and synthesize information on private investment inflows in the forest sector more specifically in the Sub-Saharan Africa (SSA) including Kenya. The objective of this paper is to provide updated, comprehensive information to inform dialogues on the role of private financing for forest management, including commercial forest plantation development in SSA, with more emphasis laid on Kenya. It has been estimated that the overall demand to fully finance the forest sector is approximately US $40–70 billion per year in Kenya and almost $120-145 billion in SSA. In Kenya, public financing only contributes 15% of the required funding for forest sector in Kenya. It is further estimated from multiple sources that private sector in Kenya account for just a mere 7-10% of the required funding for the forest sector, with 2-5% of the estimated total financing sourced from donor related sources, which may not qualify as private financing. Despite the significance of private sector financing in other sectors, information on private commercial forest financing is scarce and inadequate especially in Kenya. Although private sector must in the future play an even bigger role in the financing of forestry, surprisingly little is known about why this potential has not been fully realized and what are the main impediments. To scale up funding for forest sector, policy on private forest financing and investments in Kenya should be formulated to improve funding for the sector.

Keywords: Private Financing; Sustainable Forest Management; Plantation Establishments; Commercial Forestry; Private Investment; Kenya

Use of bamboo fibre for textile making for environmental sustainability

* Michael Gachanja and Humphrey Ngubuini

* Author of correspondence: gachanja2000@yahoo.com

It is estimated that the forest sector contributes approximately 3.6% to Kenya's Gross Domestic Product (GDP), although this does not capture the total value of ecosystem services and products. Forest value chains therefore play an important role towards social and economic development of Kenya. In Kenya, the UN Food and Agriculture Organization (FAO) is supporting smallholders, forest producer organizations (POs) and small and medium-sized enterprises (SMEs) as key agents to accelerate the achievement of Sustainable Development Goals (SDGs) including facilitating the integration of these agents into value chains and in improving their access to finance and markets. FAO is working with We Effect Regional Office of Eastern Africa in developing a vision for wood value chains, identifying potential sources of funding as well as formulating a policy and an investment roadmap for SMEs. Commissioned by FAO and We Effect, this study reviewed and assessed forest value chains contribution to SDGs in Kenya, challenges and opportunities for their development. The study focused on four key value chains: the timber, transmission poles, charcoal and Non Timber Forests Value Chains (NTFPs). The study mostly relied on desk review of literature and interviews with key informant and actors in the four value chains. Initial findings indicate that these forest value chains play a major role towards achieving the national economic development goals of the county as outlined in Vision 2030 as well as in the 2030 Agenda and the SDGs. Forests are not only relevant to SDG 15 (protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss), but also relevant to a wide range of other SDGs. However, there are many barriers in the development of forest products value chains ranging from issues concerning national policies, governance and institutional frameworks. Other barriers include social- economic factors such as demography and cultural issues. Overcoming the above barriers is vital for sustainable development of forest value chains in Kenya. Government support towards commercial forestry and the Public- Private- Partnerships for example could enhance productivity in private and government forests and increase the volume of wood available for sawn timber and transmission poles. Commercialization and better management of NTFPs could improve production and sustainability of the resource base but also increase the volume and earnings along the value chain. Improving efficiency in wood conversion and processing would not only enhance better utilization of a scarce resource but also improve the volume of sawn timber available in the market and the profitability of the value chains. Developing appropriate national policies and strategies on commercial forestry and NTFPs on the other hand could motivate many actors to engage in commercial forestry and development of NTFPs value chain. From the results of this assessment and lessons learnt, implementation of the measures recommended in this study in the development of the forest sector value chains would enhance the contribution of the forestry sector to the GDP and SDGs.

Keywords: Value Chains, SDGs, commercialization, forestry

Session VII:

Education and Skills Development

Education and skills development in commercial forestry

*Balozi K. Bekuta and James Ole Kiyiapi
Forestry and Wood Science Department, School of Natural Resource Management, University of Eldoret

* Author of correspondence: balozibk@hotmail.com

Forestry in Kenya has a long history, from the time of steam engines in the 1890s to the current large scale planting for commercial purposes. But the business aspect of forestry has not advanced very much in Kenya with only a few companies venturing into serious commercial forestry and meaningfully investing in the sector. Forest Education on the other hand has come of age with various qualified personnel working in the sector (Education, Research, Management and Industry), albeit with some performance challenges. The current curricula are laden with up-to-date topics to equip graduates with the necessary skills to grow and manage the business of forests. However, the practical aspects to ensure graduates adequately master these skills may be wanting; theoretical aspects being more emphasized in lecture rooms. The main reason may be lack of adequate funding and relevant infrastructure to ensure that students undertake rigorous 'hands on' practical work while on study. Building effective collaborations between training Institutions and commercial forestry Investors is key. Notwithstanding the completeness of the curriculum, there is need to build capacity in Silviculture, Biometry, Business, ICT and Product modelling skills to enable graduates to fit in today's dynamic work environment. It is possible that some graduates find themselves 'out of place' when newly employed and may need to quickly learn on the job. There is also need for stakeholders in forestry to invest in enticing more college-going young people get interested in forestry and forest businesses. In the just concluded Climate change conference of parties (COP 26), the need to reduce Deforestation was overemphasised. This may call for a paradigm shift in our logging approaches (e.g. modify clear felling) to ensure compatibility with climate change challenges. This paper presents the pertinent issues in education and skills development in commercial forestry. The paper further advocates for closer partnerships and collaborations between the academia, research, management and Industry players in forestry. There is an urgent need to bridge the gap between theory and practice in forestry education to ensure relevant skills development for commercial forestry. In the face of little or no funding from the central Government, the Industry may need to come in strongly and add value in the training of its professionals to ensure that necessary practical skills are adequately imparted.

Keywords: Commercial forestry, forestry education, skills development, climate change compliance

Blending forest education and research: case of KEFRI Graduate Research School

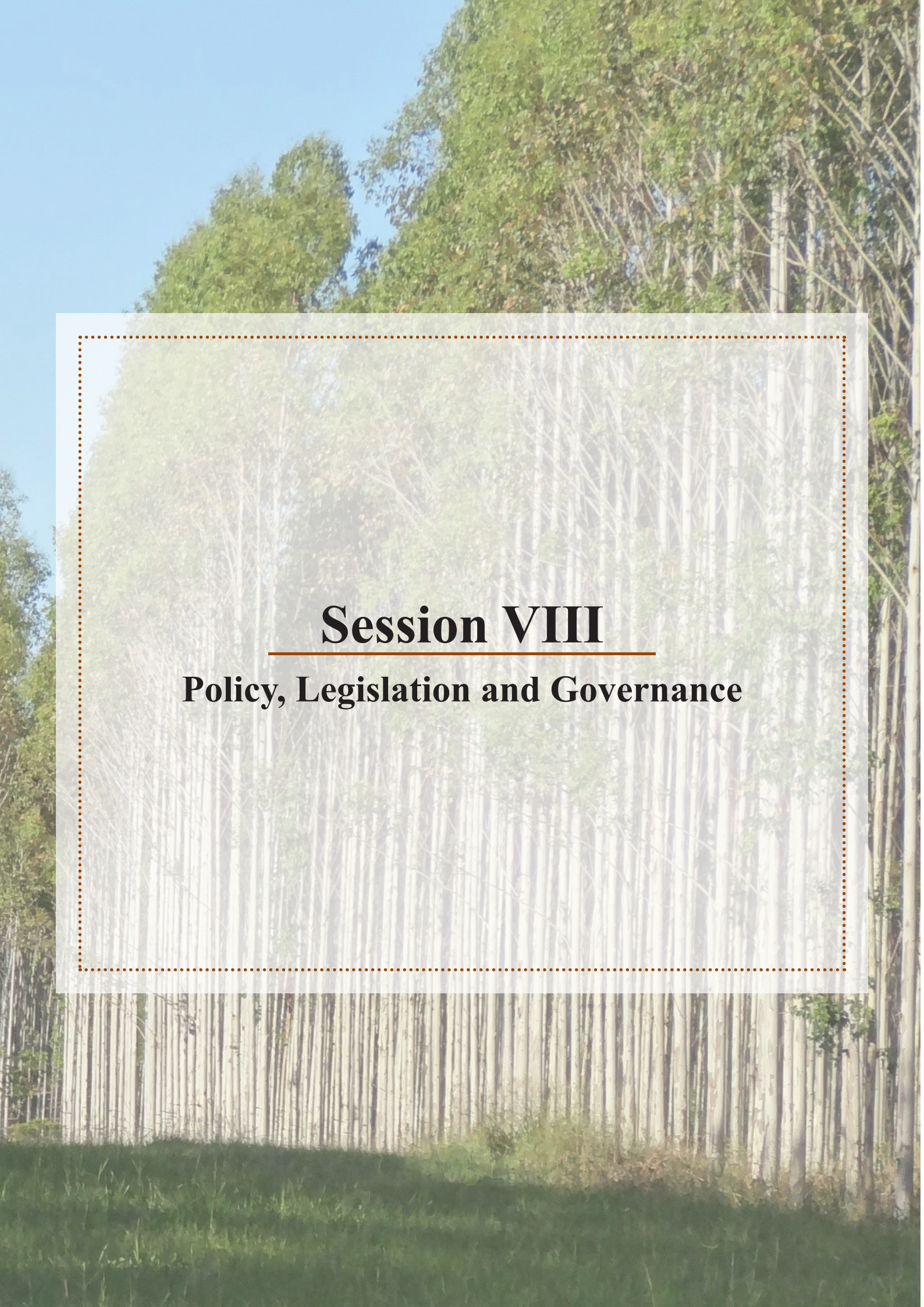
Mukolwe M., Wanjiku J., Mwalewa S., Nenkai R., and Kemboi N.

Kenya Forestry Research Institute, P.O.Box: 20412-00200, Nairobi, Kenya.

* Author of correspondence: michaelmukolwe@yahoo.com

Education, training and research in forestry and allied natural resources are imperatives for sustainable management and conservation of these natural resources as well as for socio-economic development. The demand for forest products and ecosystem services continue to increase against a declining supply. Inevitably, relevant institutions are expected to provide competent and reliable professionals as desired by the industry and other stakeholders. However, it is increasingly recognised that new graduates lack the requisite exposure to tackle practical issues, concerns and emerging challenges in forestry in Kenya, which is as a result of; inadequate practical skills, low focus on priority research, minimal collaboration between research and industry. This necessitates sustainable interventions to support productive engagement at the interface of education, training and research. To address the market-felt needs, Kenya Forestry Research Institute established the KEFRI Graduate Research School as a skills-oriented intervention to unlock its research potential and enhance relevance by providing a shared platform for scientists, scholars and young graduates to link and translate research of institutional and national importance into actions and impact for sustainable forestry development in Kenya and beyond. Therefore, KEFRI Graduate Research School is a complementary initiative to the graduate academic programmes implemented by institutions of higher learning in Kenya and beyond in accordance with standards, procedures and legal requirements of the regulatory institutions. Equal opportunity Masters and Doctorate research programmes are offered to students who competitively meet set eligibility criteria for KEFRI research grants and on a self-sponsored basis. This paper provides insights on establishment and operationalisation of the KEFRI Graduate Research School since July 2019 and its potential aspiration to provide the desired competencies in forestry and allied natural resource science and industry.

Keywords: Graduate Research School, practical skills, forestry and allied natural resources, industry



Session VIII

Policy, Legislation and Governance

Policy and legislative frameworks for commercial forestry Management in Kenya

Joram Kagombe, Alfred Gichu and Joyce Ojino

Kenya Forestry Research Institute, P.O.Box: 20412-00200, Nairobi, Kenya.

* Authors of correspondence: jokagombe@gmail.com

Population growth is driving demand for wood products in Kenya, which is facing a wood deficit of 10 million m3. The country is only able to meet 70% of its demand through sustainable supply, that has caused small and medium –sized enterprises to operate below capacity. One of the reasons for this deficit is poor forest plantation management. To resolve this, commercial forestry has been suggested as a solution where private actors can be involved in the management of public plantation forests through forest concessions and other joint management arrangements. The rationale is that, unlike public plantations, bushlands, and indigenous closed forests, trees on farms and private forests did not experience an accelerated decline of forest cover. This demonstrates the private sector efficiency in the management of trees and forests. Public-private partnerships could provide access to private sector financial capital as well as benefits from the transfer of technological and operational efficiencies from the private sector into public forest management. It could also boost employment, income generation, and alleviate poverty. This paper explores the policy and legislative framework for commercial forestry in Kenya that includes: the Public-Private Partnership (PPP) policy, law and regulations, and sustainable forest management approaches like forest management certification and chain of custody certification for forest products. Forest Management and Coordination Act (FMCA) 2016 contains most of the requirements outlined in the FAO Voluntary guidelines on forest concessions, though there is need to address some gaps such as: the harvesting value of an area, forest revenue collection, management of rescinded concessions, evaluation of the concession process, the mode of bidding, gender inclusion and independent observation. With regards to certification, although the socio-economic and environmental benefits of certification are sometimes not clear, it has played a major role in the adoption of sustainable forest management practices in forest concessions. In conclusion, to promote willingness to invest in a long-term venture such as commercial forestry, there is need for secure land tenure, respect for private ownership, reliable economic guidelines and standards, transparent governance, effective measures for tackling corruption, and efficient conflict resolution mechanism.

Keywords: Public Private Partnerships, concessions, forest management certification, chain of custody.

Role of forest policy and legislation in enhancing commercial forestry in Kenya

*Benjamin Mutuku Kinyili1, Ezekiel Ndunda[2],
[1]Kenya Forest Service,
[2]Department of Environmental Sciences and Education, Kenyatta University,
* Author of correspondence: bmkinyili@yahoo.com

Forests in Kenya provide suites of environmental, economic, social and cultural benefits. The economic values of the forest can be enhanced through making the sector to be commercial. As a result, the issue of forest legislation and policy has remained an important consideration to achieve increased commercial value of the forest. However, the laws, policies, regulations, rules and legislation guiding the forest sector in Kenya remain low in advancing commercial forestry. For a while the forestry sector was been guided by Forest Act (2005), which was later revised to Forest Conservation and Management Act (FCMA) of 2016 to conform to the governance structural changes in the Constitution of Kenya of 2010. Kenya forestry is also guided by the National Forest Policy of 2015. More recently, The Kenya's Ministry of Environment and Forestry has initiated a review of the country's National Forest Policy with a view to amending the existing Forest Conservation and Management Act of 2016. The Forest Act (2005) is quite patchy on aspects of commercial forestry. There is considerable improvement of commercial forestry in the (FCMA) of 2016 and the National Forest Policy of 2015. The aim of this review study report is to adjudicate the role of forest policy and legislation in enhancing commercial forestry in Kenya. Based on the analysis of the existing legislation, there is need for: (1) Integrated approach to forest management, conservation and development with commercial forestry development; (2) Management to entail sustainable multiple forest uses and benefits and in the process identify ways through which commercial forestry can be enhanced; (3) Existence of adequate planning tools such as management plans, which aim to promote commercial forestry; (4) Transparent in the potential of forest concessions and other contractual arrangements, with provisions for accountability for enhancing commercial forestry; and (5) commitment to inter-sectoral development, sustainable use of forest resources and other agreements to promote funding for commercial forestry.

Keywords: Forest Policy, Forest Legislation, Forest Conservation and Management Act 2016, Forest Utilization, Commercial forestry, Forest Governance, Kenya

Potential and challenges of small-holder tree plantations in supplementing the wood market: The case of Kenya's timber moratorium

*D.K. Langat, A.K Kisiwa, N.C Leley, J.K. Kagombe and J.K. Cheboiwo

Kenya Forestry Research Institute, P.O Box: 20412-00200, Nairobi, Kenya

* Author of correspondence: dkipkiruilangat@gmail.com, dlangat@kefri.org

The public forest sector has a projected deficit of 26.5% of industrial wood. The growth of smallholder forestry over the last three decades has demonstrated capacity to supplement this wood demand. Following the imposition of a moratorium on logging in public forests in 2018, small holder forest resources have had increased demand. This paper presents the potential and challenges of farm forestry to complement wood from public plantations. This was achieved by assessing the status of farm-based wood resources and the markets dynamics of wood products from farms. Data was collected using 56 semi-structured household interviews, 20 key informant interviews, inventory of standing and harvested trees from 146 on-farm plots (0.01ha) and secondary sources. The main tree species found on-farm were; *Cupressus lusitanica, Eucalyptus sp, Pinus patula, Grevellia robusta* and *Acacia mearnsii.* Eucalypts were the most planted trees with an average area of 1.08 ha. The farms tree resources have sustained the wood processing market since the ban. About 40% of current wood resource consisted of trees less than 5 years, and most harvests were of small diameter range of 10.0-19.9 cm which is essentially juvenile wood. Sawn wood from immature wood is not suitable for construction and furniture use. The lack of appropriate silvicultural and management knowledge among farmers raises concern about the quality of future tree resources from farms. Most farmers preferred smaller growing space of (2 by 2and 1 by 1 at 36% and 24% respectively) metres to maximize on quantity as observed from high density about 1659 stems per ha on-farm. Use of inferior germ-plasm was also common. There is need for rigorous capacity building on tree growing and management techniques and the need for progressive and supportive policy framework on harvesting and trade of trees on-farm.

Keywords: Small holder, farm forests, timber moratorium, plantation management

Tanzanian experience with public private partnership and concession models in forestry

Busuyi Okeowo,
Forest Development Trust, Tanzania, 20 Balozi Road, Gangilonga, Iringa, P.O. Box 1;

Author of correspondence: info@forestry.trust.org

Tanzania has a unique history regarding the relationship and partnership with the private sector. Diverse experience with public private partnerships has had mixed results, making key actors in the public sector cautious.. Any public private partnership (PPP) initiative would have to address the initial mistrust of public sector stakeholders and provide solid framework for a successful implementation. Experience from successful PPP initiatives in the forestry sector showed that privatization without a guiding law and investment framework would only result in transfer of public assets to private sector without a clear outcomes and benefits to the economy. This led to some forest companies acquiring forest estates, plantation land and/or state-industries with some of them gaining long-term lease and total ownership of the assets. The past attempts at PPP had limited legal guidance and transparency which created loopholes for direct intervention by state leaders, 'rent-seeking' suspicions and mistrust to foreign/private capital under both FDI and PPP. This experience has brought to the fore the need to focus on the development of legal frameworks which align with clear sector vision for growth to drive and manage PPP initiatives in forestry. Forestry Development Trust seeks to align incentives and relationships key to a successful PPP initiative in forestry with focus on review, amendments and development of existing legal frameworks to guide its implementation. The programme is collaborating with stakeholders to review The Forest Act with a view to identifying gaps to successful implementation of three PPPs models (concessions, lease, and joint management agreement) and will propose amendments, new provisions, and rationale to guide PPP implementation. This will be followed by the Forest PPP Regulations Review, and development of PPP Guidelines which are currently not existing. In conclusion, there is an increase desire by government institutions to explore PPP in commercial forestry to scale plantation expansion. Tanzania Forestry Services (TFS), Local Government Authorities and some public institutions have particularly expressed interest to embrace PPP once the enabling legal framework is in place.

Keywords: Public Private Partnership, Forest Development Trust, commercial forestry, Tanzania

Catalysing growth of inclusive, commercial-quality, plantations – Lessons from Uganda

Dennis Kavuma,

Ugandan Tree-Growers Association

Author of correspondence: dennisk@utga.ug

In the early 2000's Uganda had only 3,500 ha of commercial plantations. Today, it is approaching 100,000 ha of high-quality commercial plantations. While larger international firms have an important role to play, more than 75% of this area is locally owned by small to medium-sized growers. The introduction of concessions, allowing private investment in the management of publicly owned plantation areas, was the initial enabler of this growth. However, provision of land is not enough to drive quality commercial planting. In Uganda, it was not until the concessions policy was complimented by technical assistance and performance-based financial incentives, provided by the Sawlog Production Grant Scheme (SPGS), that improvements in quality were achieved. The inclusive nature of this growth was achieved through the design of the concessions framework. Concession areas were allocated to enable access for growers of different sizes, from several thousand ha down to 25 ha and auctioned transparently. Forestry policy often involves communities through different types of benefit sharing mechanisms, but the best way to align incentives and drive community engagement is through local ownership. Expansion of quality plantations through greenfield investments is expensive, however. All too often the technical know-how to establish quality plantations is lacking. So SPGS sought to support growers with technical assistance and performance-based grants. Support was also provided to nurseries, who were supplied with imported improved seed. Linking the grants to clear performance targets spread over the first 2 years of plantation establishment provided the necessary incentives for growers to invest in their plantations. The provision of technical support helped them achieve these targets. As a result, growers saw for themselves the added benefits of commercial quality plantations, and planted even greater areas than that which were supported by SPGS. The improvements in productivity also benefited the Ugandan Government, as revenues from concessions also increased.

Keywords: Concessions, Uganda, Incentives, Technical Assistance

Commercial forestry skills for sustainable development: The case of KFS Londiani Forestry College

Johnstone Maloba

Kenya Forest College, Londiani

Author of correspondence: lobastonmalingu2015@gmail.com

Kenya Forestry College is a technical training Institution which is the training arm of Kenya Forest Service, a parastatal within the Ministry of Environment and Forestry. It is responsible for training personnel required in the forest and related subsectors. It was started in 1957 and was legally established under section 17 of the Forest Conservation and Management Act, 2016.The College runs two competence based forestry programmes namely Diploma in Forestry and Certificate in Forestry with seven different forestry related short courses lasting two weeks. The trainers are registered assessors and verifiers with Technical Vocational Education and Training - Curriculum Development, Assessment Certification Council (TVET-CDACC). Currently, College has 270 students. The Competence Based Curricula (CBC) cover wide range of skills required for commercial forestry for example nursery establishment and management, nursery records keeping and maintenance, plantation development/establishment, pruning, thinning, inventory, creating and maintaining compartment register, survey of plantations, developing and implementing plantation management plans and many other forestry skills. In execution of its mandate, College also has partnered with Kenya Forestry Research Institute in areas of training, students' attachment and excursion and also in developing protocols through Centre Research Advisory Committees including our public institutions, County Governments, Communities among others. Kenya Forestry College aims to deepen its engagements with relevant stakeholders in commercial forestry business to develop the human capacity in all aspects of forestry development from production to all value chains.

Keywords: Commercial Forestry, Forestry Training, Kenya Forestry College, TVET, Capacity building

Session IX

Policy Dialogue

Talks

- Future role of PPP in forestry sector development
- REDD+ Strategy
- Concessions
- Certification of Forest Products

List of Posters

Growth and yield of selected high quality genetic stock of Eucalyptus grandis

Mbinga J., Adongo A and Siko R.,

Casuarina species: Potential Alternative Source of Industrial Fuel Wood in Kenya

Cherotich L., Cherono F and Mbuvi M.T.E

.

A new disease causes dieback of seedlings and saplings of Eucalyptus spp. in Western Kenya.

Otieno B. and Makatiani E.

Pinus patula seed collection and processing for improved yield

Angaine P., Adongo A and Owino J.

Enhancing technology transfer through knowledge sharing and networking: Lessons from CADEP-SFM/AI-CD Project

Wanjiku J., Tuwei P., Mukolwe M., Mbuvi M.T.E., Mwalewa S. and Nenkai R

KENYA COMMERCIAL FORESTRY INVESTMENT CONFERENCE AND EXPO

THE BIG 4
EMPOWERING THE NATION

KENYA VISION 2030