

Food and Agriculture
Organization of the
United Nations

Empowered lives
Resilient nations



SUMMARY FOR POLICY MAKERS



Copyright © United Nations Environment Programme 2017

Reproduction

This publication may be reproduced in whole or in part and in any form for educational or nonprofit purposes without special permission from the copyright holder, provided acknowledgement of the source is made. UN Environment would appreciate receiving a copy of any publication that uses this publication as a source. No use of this publication may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from the United Nations Environment Programme.

Disclaimer

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the United Nations Environment Programme concerning the legal status of any country, territory, city or area or of its authorities, or concerning delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent the decision or the stated policy of the United Nations Environment Programme, nor does citing of trade names or commercial processes constitute endorsement.

This publication has been made possible with funding from the UN-REDD Programme and with support from UNDP and FAO. The report should be referenced as follows:

UN Environment (2017) Improving efficiency in forestry operations and forest product processing in Kenya: A viable REDD+ policy and measure?

Acknowledgement

Jackson Bambo, Hugo Douglas Dufresne, Miharu Furukawa, Gideon Gathaara, Bernard Gitau, Dr. Githiomi, Noor Hassan, John Kapolon, Karega, Elsen Karstad, John Kihara, Philip Kisoyan, Obed Koringo, John Koskei, Joshua Laichena, George Makatelo, Joseph Mbagara, Francis Ngigi Mbogo, Jonathan Mitei, Edward Mungai, Julius Muchemi, Emilio Mugo, Friday Mugo, Grace Mukasa, Samuel Mureithi, George Muthike, Charles Peter Mwangi, Dr. Mary Nganga, John Njuguna, Nelly Oduor, Walter Ogada, George Oselu, Surest Patel, Kamau Waithaka, Phyliss Wakiaga, Wamae, Kishiki Diana Wavua, Simiyu Wekesa, Elizabeth Eggerts.

Authors

Jérôme Maurice (SalvaTerra), Maden Le Crom (SalvaTerra), Olivier Bouyer (SalvaTerra), Fabio Pesce (ForTeA), Paolo Cielo (ForTeA), Michael Gachanja (Consultant), Lyndall Bull (Lynea Advisory).

Edited by:

Ivo Mulder, Thais Narciso and Jaime Webbe (UN Environment).

Project coordination

Alfred Gichu (Kenya Forest Service), Rose Akombo (Kenya Forest Service), Thais Narciso (UN Environment) and Ivo Mulder (UN Environment).



SUMMARY FOR POLICYMAKERS



KEY MESSAGES

Kenya's constitution has set a minimum national tree cover target of 10%. Additionally, the country has demonstrated sustained commitment to anchoring REDD+¹ in its national policy framework and development strategy. In this context, Kenya is in the process of identifying the best ways to address the direct and indirect drivers of deforestation and forest degradation.

Both timber and fuelwood demand are increasing and the challenge ahead is to help public and private plantations to meet future demand in a sustainable way, by reducing the quantity of non-renewable biomass used to bridge the demand shortfall. According to the Kenyan Readiness Preparation Proposal (R-PP), the lack of security of timber supply to the sawmilling industry (i.e. low investment in timber processing technology, poor timber conversion ratios) is a key indirect driver of deforestation and forest degradation (KFS, 2010) as it may contribute to encroachment in forests not destined for timber production. Sustainable utilization of wood resources, including but not limited to enhanced efficiency in processing, is one way for Kenya to potentially achieve a reduction or removal of emissions and hence REDD+ results.

This report analyses whether increased efficiency in forestry operations and forest product processing and utilization are interesting REDD+ policies and measures (PAMs) for the Government of Kenya (GoK) to pursue, with the potential to attract public and/or private investments to enable REDD+ implementation. In particular, the report focuses on the extent to which efficiency improvements could address supply deficiency in the forest sector, thereby reducing pressures on existing forests and related emissions.

To this end, cost estimates and emissions reduction potential were undertaken in the following sectors:

1. Forestry operations (commercial logging)
2. Timber conversion (sawmills)
3. Charcoal production
4. Charcoal and firewood use in cooking stove technology (households)
5. Wood usage in industrial processes

Although wood is a renewable material, it becomes non-renewable when the harvesting rates exceed the ecosystem's production capacity. Thus, for each sector, the fraction of non-renewable biomass (fNRB), which indicates the proportion of biomass used that is not renewable, was a key parameter to estimate the potential emission reductions from deforestation and forest degradation of each of the five sectors. The United Nations Framework Convention on Climate Change (UNFCCC) defines this as the "proportion of total annual (woody) biomass removals that is demonstrably not renewable".

With regards to forestry operations and timber processing from forest plantations in Kenya, while strong socio-economic benefits may be derived from efficiency improvements, there is no evidence that increasing efficiency will help alleviate illegal harvesting pressure on natural forests. According to Kenya Forest Service (KFS), most of the timber produced at national level comes from forest plantations. Small, illegal saw-millers rely mostly on timber from private farms and illegally accessed timber from forest reserves, especially through indiscriminate and uncontrolled selective cutting in forests. Plantation forest products such as pine, cypress and eucalyptus are hardly substitutable with the precious woods illegally harvested in natural forests. Moreover, rare commercial species such as camphor and sandalwood are not only exploited for their precious wood but also for other products (such as bark used in the perfume industry or for medicinal use) and therefore are not affected by increasing the efficiency of forestry operations in pine, cypress and eucalyptus plantations.

¹ Reducing Emissions from Deforestation and Forest Degradation (REDD) is a concept to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. "REDD+" goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.



Emission reductions or removals are only expected when investing in enhancing efficiency in charcoal production and fuelwood consumption at household and industrial levels. Investments to improve efficiency in charcoal production (increased supply) and fuelwood consumption (reduced demand) at household and industrial levels are both economically-attractive and have the highest potential to generate REDD+ results, with an estimated emission reduction potential of more than 20 million tons of carbon dioxide equivalent (tCO₂e) per year.

The assessment results support the mitigation activities proposed by the GoK in its Intended Nationally Determined Contribution (INDC) submitted to the UNFCCC in July 2015, including: “Enhancement of energy and resource efficiency across the different sectors” and “Making progress towards achieving a tree cover of at least 10% of the land area of Kenya”. The INDC states that Kenya’s total greenhouse gas (GHG) emissions were around 73 million tCO₂e in 2010, of which 75% were from the land use, land-use change and forestry (LULUCF) and agriculture sectors. **If Kenya were to implement the measures proposed in this report, the potential reduction of 20 million tCO₂e identified in this study could lead to a reduction of 27% of total GHG emissions** against 2010 numbers.

The assessment, therefore, supports the GoK by shedding light on how stimulating investments in the forest sector can create economic benefits while also reducing pressures on remaining forests. This is particularly the case for dry forests, where 75% of charcoal is sourced and the risk of over-harvesting of non-renewable biomass is higher.

FORESTS: MORE THAN TIMBER

Forests are an important feature of Kenya’s landscape, ranging from montane forests (also called ‘water towers’) in the mountainous areas, to western rainforests, dry forests, and coastal and riverine forests. Forests also have an understated importance to Kenya’s economy. While the system of national accounts (SNA), a set of rules that determine a country’s Gross Domestic Product (GDP), put the total annual contribution of forests at 1.1% of GDP in 2010, this is a gross underestimation (UNEP, 2012).

Aside from timber and other wood products, forests also provide a range of services that directly or indirectly support other key productive sectors such as energy (water regulation and soil retention for hydroelectric power generation), agriculture (enhancing soil quality, reducing soil erosion) and tourism. A report by the KFS, the Kenya Bureau of Statistics and international partners (UNEP, 2012) revealed that the economic contribution of forests is considerably undervalued. Instead of 1.1% of GDP, the contribution would rise to at least 3.6% of GDP if a broader range of ecosystem services provided by Kenya’s montane forests were included. Even this is an underestimate, because this work did not include the other types of forest in the analysis.

There is, therefore, a clearer domestic economic rationale to reduce deforestation rates and increase efforts to rehabilitate degraded forest areas. **The underlying idea behind this study is to assess if efficiency improvements can address the supply deficiency, reduce subsequent pressure on forests and**



therefore be an interesting REDD+ policy or measure to pursue by the Government of Kenya in order to reduce or remove forest carbon emissions.

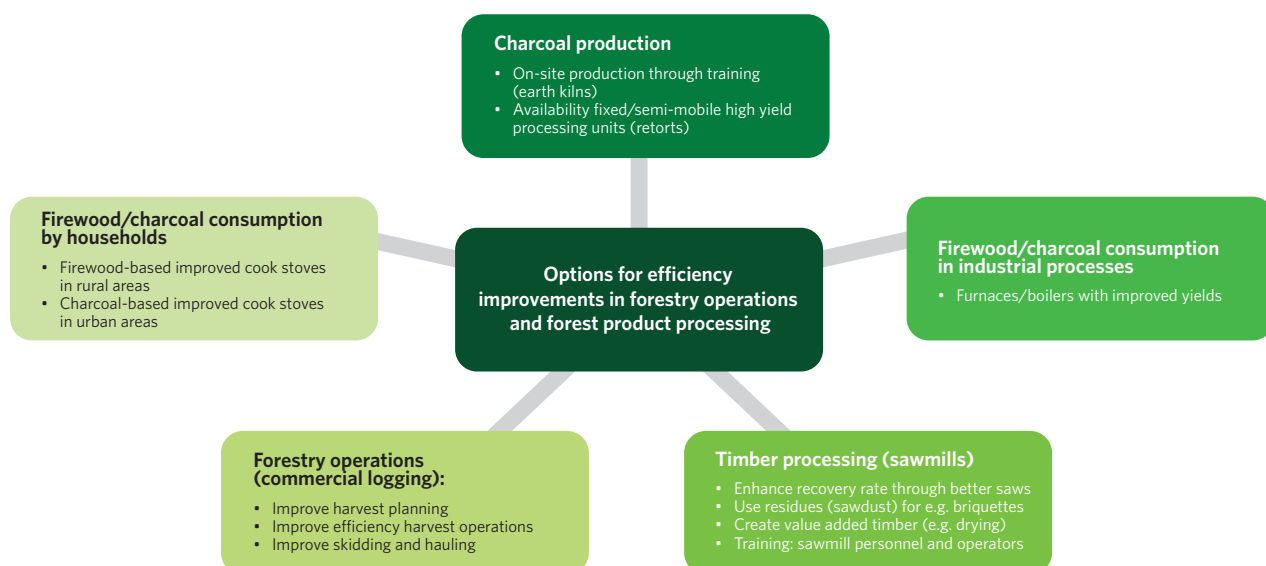
OPPORTUNITIES FOR EFFICIENCY IMPROVEMENTS

- 1. Forestry operations (commercial logging).** There is great potential to improve the quality and quantity of plantation resources in Kenya, both in the public and private realms. In order to ensure adequate wood supply, improved management practices are needed to address the current poor performances of public plantations, while increased investments will be necessary to increase the stocked plantation areas. Improved sawn log quality from appropriately managed plantations is a precondition for investments in more efficient equipment in the timber processing sector to increase the timber processing average recovery rate. Afforestation and reforestation as well as improving plantation management by appropriate silvicultural practices such as thinning, pruning and extension of rotation age, can reduce forest carbon emissions from both public and private plantations. Improving harvesting techniques has the potential to cut logging waste from harvesting volumes by 5%. However, given that there is no evidence that increased rate of recovery from harvesting in forest plantations will decrease the pressure on natural forests for timber production, and given that the non-renewable biomass fraction (fNRB) in public and private plantations is close to zero, these measures are unlikely to generate emission reductions from deforestation and forest degradation. The efficiency measures to enhance forestry operations might have positive socio-economic impacts, though, such as increasing the safety of harvesting operations and harvested timber quality.
- 2. Timber conversion (sawmills).** Greater efficiency in timber processing could increase national timber production by about 238,000 m³ round wood equivalent (RWE) per year. To reach this goal, investments in sawing and drying technologies as well as in vocational training are required. The timber and wood industry is closely linked to the construction sector and the Government of Kenya's 2030 Vision places sawmills, as small and medium enterprises (SMEs), at the heart of the country's development plan. The sector has rebounded from the effects of a 1999-2011 countrywide ban on logging in public forests and developed steadily in recent years, with almost three times the volume of sawn wood produced compared to the level of 1999. However, for the same reasons described

above, most of these measures are unlikely to generate emission reductions or removals from deforestation and forest degradation. Promoting the substitution of fuelwood from non-renewable forest sources with briquettes made of recycled sawn wood can lead to a small amount of biomass savings per year (36,000 m³_{RWE}). Around 111,000 tCO₂e per year of emission reductions from deforestation and degradation are generated. It is reasonable to assume that improved timber production will increase safety and healthcare on working sites, create more value added and jobs in the wood supply chain and contribute to sustainable development of the country.

- 3. Charcoal production.** The proposed measures range from basic improvements, such as the training of 100,000 charcoal producers to apply best practices to improve earth kilns, and the construction of 50,000 Casamance kilns (with metal chimneys, as promoted by the Kenya Forestry Research Institute (KEFRI) for several years), to technological substitution such as the use of retort kilns instead of traditional direct-combustion earth kilns. Increasing efficiency in charcoal production can reduce the pressure on forests: instead of using 10 kg of wood to produce 1 kg of charcoal, improved technologies can cut the use of wood down to 3 to 6 kg according to the technology used and best practices applied. Considering the high proportion of non-renewable biomass used to produce charcoal (between 90% and 95%), these measures could lead to 5.7 million m³_{RWE} of non-renewable biomass savings per year from dry forests, generating about 16.5 million tCO₂e per year of emission reductions from deforestation and forest degradation. Moreover, charcoal production efficiency measures can generate other positive impacts such as the reduction of accidental burning and respiratory problems amongst charcoal producers. These measures can also generate more qualified jobs in the sector. Therefore, improving charcoal production could be an attractive measure for the Kenyan government as part of its National REDD+ Strategy and implementation plan.
- 4. Use of charcoal and firewood in cooking stove technology.** The proposed measures target the large-scale adoption of 5 million improved cook stoves in urban and rural areas to replace the current inefficient cooking devices and reduce the demand for fuelwood (firewood and charcoal). Increasing efficiency in the consumption of fuelwood, mainly sourced from natural forests where high levels of non-renewable biomass are estimated, could lead to 960,100 m³_{RWE} of non-renewable biomass savings per year from natural

FIGURE 1: Investment opportunities to enhance efficiency in the forest sector



forests, generating about 2.4 million tCO₂e per year in terms of emission reductions from deforestation and forest degradation. Moreover, these measures will generate positive impacts such as the reduction of respiratory problems among fuelwood consumers, especially women and children, and can create additional jobs in the cook stove manufacturing sector. These measures are therefore potentially attractive for the Kenyan government as part of its National REDD+ Strategy, generating both emission reductions from deforestation and degradation and positive co-benefits.

5. **Increasing efficiency in wood usage in industrial processes** may represent nearly 1.2 million m³_{RWE} of non-renewable biomass savings per year, generating more than 2.0 million tCO₂e per year in

CONCLUSION

Kenya submitted its INDC to the UNFCCC in July 2015. In the INDC, Kenya pledges to cut its carbon emissions to 30% below business-as-usual (BAU) levels by 2030. The Kenyan government has indicated that, to meet this ambitious target, a number of measures will be required including expanding solar, wind and geothermal power, and bringing national forest cover up to 10% while reducing reliance on wood fuel. The analysis carried out in this project is therefore very relevant in the context of Kenya's INDC, but also to its National Climate Change Response Strategy (2010) and National Climate Change Action Plan (2013).

Table 1 provides an overview of the costs (in terms of annual investment) and benefits (in terms of potential

预览已结束，完整报告链接和二维码如下：

https://www.yunbaogao.cn/report/index/report?reportId=5_14506

