**UNIVERSITY OF RWANDA**

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# Diversity of non-native tree populations in the different Districts of Rwanda

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34th Southern Forest Tree Improvement Conference

June 19-22, 2017

Melbourne, Florida, USA

# WHY THIS STUDY?

- An office in charge of forestry under MINERENA was contacted and it was found that there is no reliable and up-to-date information on forest and tree resources regarding their number, wood volumes and growth, etc....

- The status of forest industries is not well documented in Rwanda

# AIM

- The present study has the main objective to describe, examine, and discuss the current distribution of non-indigenous or native-trees, particularly *Eucalyptus* spp. in Rwanda.

- Based on the findings, it also aims to provide recommendations to the Directorate in charge of forestry under the Ministry of Natural Resources for better management of forests in Rwanda.

# 1. BACKGROUND



Fig 1. Different districts of Republic of Rwanda

- Rwanda is a landlocked country situated in central/Eastern Africa

- bordered to the north by Uganda, to the east by Tanzania, to the south by Burundi and to the west by the Democratic Republic of Congo.

- Rwanda has a total population of 11,780,000 (2013 estimates) occupying an area of 26,338 km$^2$.

(with a density among the **highest more than 400 persons per Km$^2$)**

- Rwanda is composed of four provinces and Kigali-City.

- The Eastern Province is composed of seven Districts

- Kigali-City is composed of three Districts

- The Southern Province is composed of eight Districts

- The Norhern Province is composed of five Districts, which are

- Finally, there is the Western province  composed of seven Districts

- **Rwanda faces a major problem in environmental protection due to:**

1. the pressure on limited resources exerted by a growing population

2. the war: 1990-1997 war destroyed a large amount of forest plantations

- **Forest currently covers 696,402 ha, representing 29.2% of the country:**

  this includes 283,128 ha of natural forest cover (11.9%) and 413,274 (17.4%) of forest plantation.

- *Eucalyptus* **accounts for 55% of the total forest cover and it constitutes 45% of wood supply**

- **Population resettlement in conservation areas represents a big challenge to land management**
  - In 1997, the Government legalized the occupation of one of the three main national parks (Akagera National Park)

- The proposed strategies to sustainably exploit forests in Rwanda include:

(i) institutional strengthening,

(ii) protect and conserve small natural forests,

(iii) promotion of agroforestry, and

(iv) conservation of old forest plantations

- Planted forest cover has increased 3.4% from 334,465 ha (in 2010) to 413,274 ha (in 2015).

- The average land size per household was hardly 0.5 ha.

# 1.1 Forest policies  institutions and stakeholders in Rwanda

**Forestry  contribution to vision 2020**

- Vision 2020: Vision 2020  is a Government development program in  Rwanda, launched in 2000 with the main objective of transforming the country into a knowledge-based middle-income country.

- New forest policy:  In order to enhance achievement of objectives and targets of vision 2020 on forests, in 2010 the Government put in place a new forest policy.

- This policy aimed at the proper maintenance and management of the present forest cover, and by 2020.

- In 2020, the forest cover will be increased to 30% of the country's total area.

## Institutions and Stakeholders

- Table 1: National institutions and international stakeholders contributing to forest sector in Rwanda

| National institutions | International Stakeholders |
|---|---|
| National Climate and Environmental Fund (FONERWA): guided by Rwandan Law and aims at protecting the environment and natural resources | Belgian Development Agency (BTC), which in collaboration with the Rwanda Natural Resources Authority (RNRA) is engaged in reduction of deforestation by planting trees in degraded and sensitive lands |
| Rwanda Natural Resources Authority (RNRA): The Forestry and Nature Conservation Department (FNCD) is one of the four departments RNRA. | the International Union for Conservation of Nature (IUCN), |
| | Congo Basin Forest Fund (CBFF) |
| | Embassy of Holland |
| | World Bank |
| | World Vision |

# 2. TREE SPECIES IN RWANDA

- [Table 2: Proposed non-native trees to be planted in Rwanda](#)

- Table 2 was proposed by MINERENA,

- through its national forestry authority, has recommended species to be planted in agroforestry and in forests in Rwanda .

- As shown in Table 2,
the amount of non-native species is 40.

- Of the non-native plants proposed, it was shown that:

*Acacia, Calliandra, Jacaranda, Morus, Grevillea, Acrocarpus, and Leuceana* are the most widely distributed.

- Table 3 shows the distribution of tree species in the 30 Rwandese Districts.

- This distribution shows that *Alder genus* is distributed in the all Rwandese Districts and

- *Acacia, Calliandra, Gliricidia, Jacaranda, Grevillea, Pithecellobium, Acrocarpus, Morus* and *Leucaena* are distributed in three provinces out of five provinces (Eastern, Kigali-City and Southern).

- Table 3: Distribution of non-native tree species in the 30 Districts of Rwanda

PDF File

# 3. *Eucalyptus*

- Eucalypts, introduced in the early 1900s, are grown in all the Districts of Rwanda;

- in 1911-1912, the first harvested poles were reported in Huye District of the Southern province

The main reasons of planting eucalypts in Rwanda are:

(i) to provide wood as source of cooking energy,

(ii) construction materials,

(iii) to provide firewood to be used in in the mining industries,

(iv) as a source of income to farmers through the selling of lumber and charcoal .

Today, *Eucalyptus* represents 55% of the total forest cover (384,000 Ha)

- By the 1970s the area planted with eucalypts was 23,000 Ha

- Today, *Eucalyptus* represents 55% of the total forest cover (384,000 Ha)

In less than 50 years, the area had increased by 361,000 Ha

Based on the resistance to parasites, the ability to maintain itself reasonably well, and the ability to grow on different types of soils.

In 2007, Institut des Sciences Agronomiques du Rwanda (ISAR) proposed , five species:

1. *Eucalyptus  tereticornis (Introduced in Rda in 1934 from Australia,  Burundi and SA)*

2. *E. microcorys (Introduced in Rda in 1943 from SA)*

3. *E. globulus (Introduced in Rda in 1982 from SA)*

4. *E. maidenii (Introduced in Rda in 1945 from Australia)*

5. *and E. camaldulensis (Introduced in Rda in 1934 from Zimbabwe)*

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**Interests:**

- Provision of fuel for cooking

- Production of timber and fodder

- Maintain the land ownership

- Eucalyptus forest can be used as collateral to obtain loan from the bank

## Consequences:

- **Invasiveness:** In Rwanda, *Eucalyptus* species could cause challenges of invasiveness in the future, especially because plantations are preceded by bush clearing and even uprooting of existing plants

**BUT THE GOOD THING,**

*Eucalyptus* spp are planted on marginal land where other crops would not do well.

- **Water use:**

- Some dominant plantation species such as eucalypts do not allow undergrowth, especially when they are planted at small spacing

People in Rwanda are not advised about the spacing

Forest poor management and tight spacing of *Eucalyptus* trees in Ruhango District

- Most forest plantations with high growth rates, like some *Eucalyptus* species, use large amount of water daily for their growth and this lowers the water table

This has led to the on-going debate on merits and demerits of plantations with *Eucalyptus* species.

- In Rwanda, it is forbidden to plant eucalypts in marshlands.

- In some places, the eucalypts are planted on the top of mountains

when it rains, water runs downhill and during the process soil nutrients are carried away, therefore causing various problems including the desertification of cultivated areas.

It also causes problems in downstream water bodies where sediments from upstream are deposited.

- In order to remove grasses, which can severely reduce growth of young *Eucalyptus* trees, local farmers use hoes and prefer not to mix eucalypts with crops such as maize, potatoes, peas, and beans.

- Local people are, however, not aware of the allelopathic effect of eucalypts on other plants.

# Pests & Diseases of Eucalyptus in Rwanda

## 1. *Thaumastocoris peregrinus*



*Eucalyptus* leaves infested by *Thaumastocoris peregrinus* in Rugondo-Tambwe, District of Ruhango

- ***T. peregrinus*** is a serious sap-sucking insect pest infesting *Eucalyptus* plantations in Rwanda.

- The main mechanism for *T. peregrinus* spread is by air travel.

- If the problem is unattended it may become severe in all the eucalypt-growing areas in Rwanda and may lead to heavy economic loss to the farmers and other planting agencies

## 2. *Leptocybe invasa*

- *Leptocybe invasa* is causing an infection, known as *Eucalyptus* lice,

- It is eriously damaging young eucalypt plantations, leaves and nurseries in Rwanda

- Some previous studies showed the seriousness of *Leptocybe invasa*.

*For example: E. camaldulensis* was stopped in Israel due to attack by a wasp.

- movement of eucalypt seedlings is one of the ways wasp can spread because it is very small and cannot fly long distances .

- Adult wasps can fly short distance and are able to spread very quickly by flying and/or by wind.

- This pest was first reported in 2015 in Gakenke District (Northern Province) and it has now attacked almost all E. forests in all Districts.

- Taking into account the relatively small size of Rwanda (26,338 km$^2$), wasps spread very quickly.

# 4. CONCLUSION AND RECOMMENDATION

- Despite the Rwandan Government's will to increase the area of forest plantations, there are no silvicultural operations that follow the original plans and many plantations are now over-mature and of poor quality.

- In Rwanda, most forestry activities continue to depend on external assistance instead of developing economically self-sustaining entities.

- At the moment there is no other genus or species as productive and well-adapted as *Eucalyptus*.
- In Rwanda, there is a low private investment in the creation of forest resources.

- *Alder* genus are the only species distributed in all Rwandese Districts.
- Rwanda has a total of 63 different species, of which 40 are non-native and 23 are native species.

**We recommend the following:**

- There is an urgent need for the national forestry directorate under MINERENA to obtain tree data.

- There is a need for better education of communities on how different tree species should be maintained starting with the widely occurring eucalypts. This can be achieved during community service exercises.

- There is a need for research on the optimum spacing of eucalypt plantations for different purposes, to ensure soil protection and the development of ground vegetation without compromising the productivity of the trees.

- There should be a monitoring system, that will assist communities and NGO's to plant trees in a sustainable and coordinated way.

- Before undertaking tree planting projects, there should be a comprehensive research to determine impacts on soil nutrients, water hydrology, wildlife, and biodiversity.

- Communities should be consulted and informed both before a tree planting project begins and during the actual implementation; they should also participate in the decision-making phase.

- There is a need to conduct a research on eucalyptus effects on soil productivity and land use in Rwanda.

# WAY FORWARD

- To determine the best, efficient and less pollutant type of Eucalyptus which can be used to produce charcoal in Rwanda.

Which Eucalyptus species charcoal has the **highest** heating value?

HEATING VALUE (HV) The calorific value (or heating value) is the standard measure of the energy content of a fuel. The Heating Value of the E species charcoal samples will be obtained and compared.

# PERFORMANCE EVALUATION OF CHARCOAL SAMPLES

BurnRate (F) will be calculated for each species

Time Spent in Cooking (Here beans are going to be cooked)

- To introduce an improved basic earth kiln to produce charcoal more efficiently. This is because when charcoal stove burns poor quality charcoal can cause exposure to high levels of carbon monoxide (CO).

# Thank you for your kind attention