



**VALIHA  
DIFFUSION**

**BAMBOO PLANTATION FOR REFORESTATION, LAND  
RESTORATION AND CHARCOAL PRODUCTION IN  
MADAGASCAR**

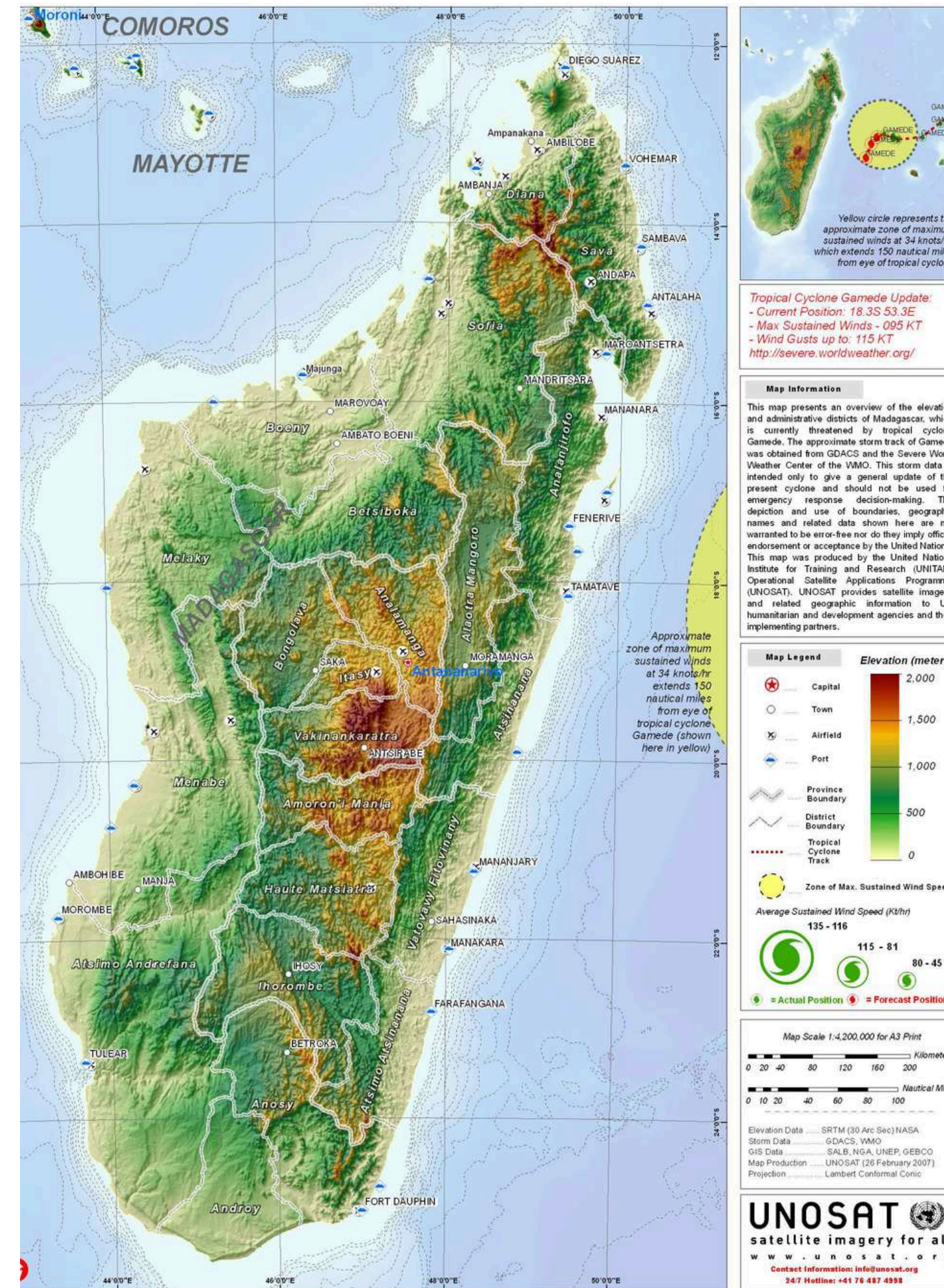
# MADAGASCAR PRESENTATION AND CHALLENGES

**587 000 km<sup>2</sup>**  
1580 km long - 580 large

**29,61 M**  
inhabitants in 2022  
*(World Bank)*

**3,98 children**  
per woman in 2018  
*(World Bank)*

**80.7%**  
poverty rate in 2023  
*(World Bank)*



## CAUSE OF DEFORESTATION AND CONSEQUENCES

- **200,000 hectares of forests disappear each year in Madagascar** due to bush fires and charcoal production.
- 22 million m<sup>3</sup> of wood are used each year by **82% of Malagasy households, who still use wood or charcoal as fuel for cooking.**
- The **primary forests** of Madagascar, which covered more than 30% of the territory in 1950, **only cover 10% today.**



## ENDEMIC BAMBOO SPECIES IN MADAGASCAR

- **32 species of bamboo endemic to Madagascar** which grow mainly along the central massifs and in the humid forests of the island.
- **In these regions with high rainfall**, bamboo has been used for centuries for different uses: housing, crafts, energy source, etc.
- But most of the **bamboo endemic species** are quite small and thin and have **low added value**.



*Valiha Diffusa in Tamatave, Photo by Maria Vorontsova*

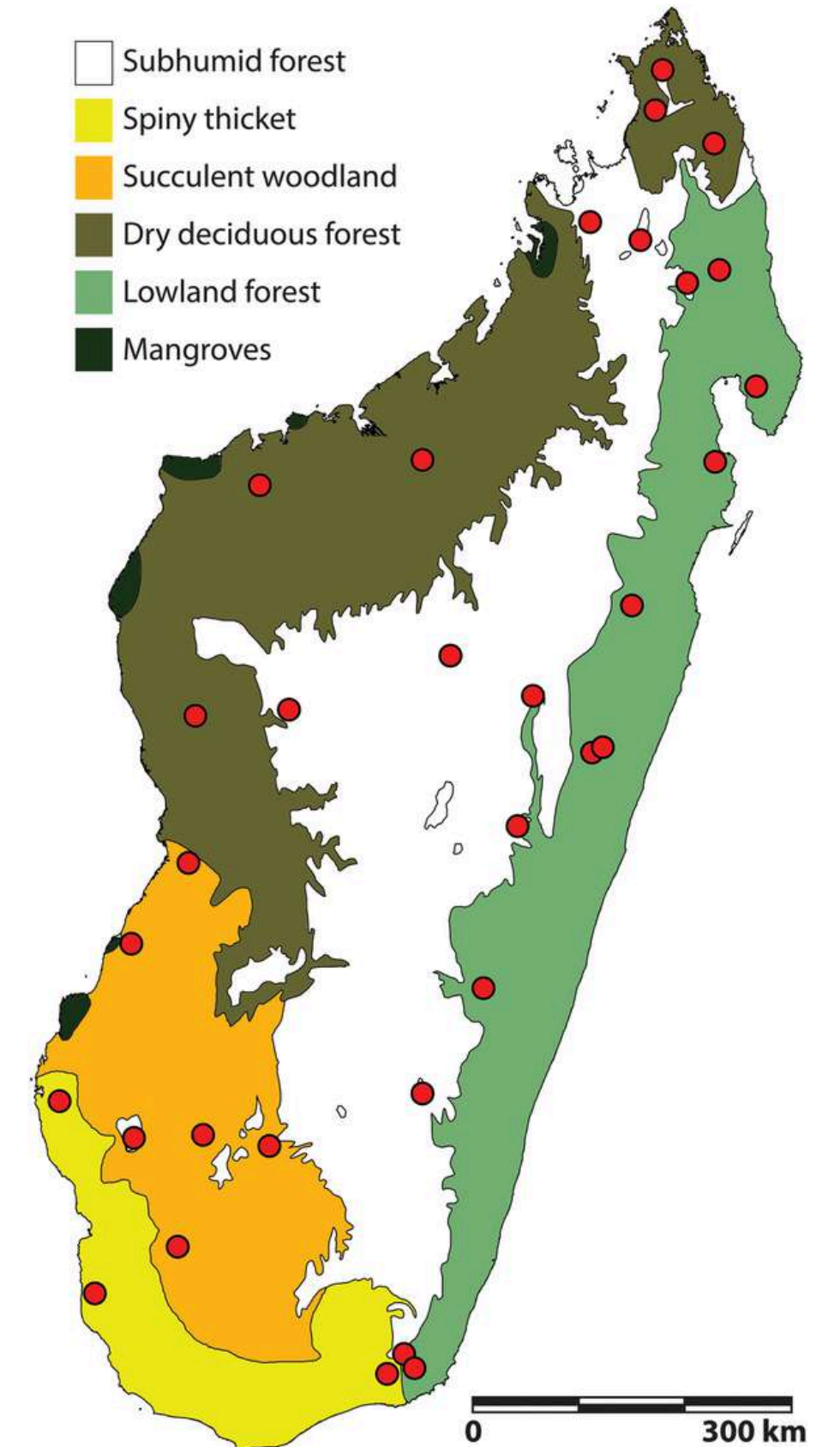
## OUR SOLUTION: HIGH BIOMASS BAMBOO SPECIES

- We use **15 different bamboo varieties** for our plantations, selected for their high biomass yield.
- Most of them are **varieties of Dendrocalamus and Bambusa**, species which are native to South-East Asia which grow “in dense clumps” with a so-called sympodial rhizome.
- These varieties **are not invasive** and represent no threat of hybridization with the endemic bamboo species of Madagascar.



# THE BAMBOO VARIETIES WE PLANT IN THE DIFFERENT ECOREGIONS OF MADAGASCAR

Bamboo varieties	Lowland forest	Subhumid forest	Dry deciduous forest	Succulent wood lands	Spinny Thicket	Mangroves	seedlings to plant per hectare
Bambusa bambos	+++	+++	++	+			350
Bambusa balcoa	+++	+++					350
Bambusa polymorpha	+++	+++	+				400
Bambusa tulda	++	+++	++				400
Bambusa vulgaris	+++	+++	++	++			400
Cephalostachyum pergracile	+++	+++					400
Dendrocalamus asper	+++	+++					300
Dendrocalmus giganteus	+++	++					300
Dendrocalmus mambranaceus	+++	++	+				400
Dendrocalmus Strictus		+++	++	+	+		400
Gigantochloa pseudoarundinacea	+++	++					300
Oxythenanthera abyssinica			++	+	+		400
Thyrsostachys Oliveri		+++	++	+			400
Pseudoxytenanthera Stocksii		+++	++	+			400



*Map of terrestrial ecoregions of Madagascar  
From the study: "Primates as Predictors of Mammal Community Diversity in the Forest Ecosystems of Madagascar"*

## HOW WE PRODUCE BAMBOO PLANTS

- **From seeds imported from India or China:**  
Germination yield is uncertain because bamboo seeds have the ability to germinate for only a few weeks.
- **By cuttings:** Requires already having young or mature bamboo plants
- **By rhizome splitting:** Has the ability to propagate young bamboo plants obtained from germinating seeds or mature bamboo plants.
- **By tissue culture:** Technical process requiring a precise level of humidity and temperature. Can produce bamboo plants in large quantities.



## BAMBOO YIELD

**4 to 5 Years**

to get mature after planting

**1/3 of the poles**

can be harvested every  
year as bamboos have an  
annual regrowth

**4 Tones**

of biomass per ha/year in  
natural bamboo forest

**15 to 40 Tones**

of biomass per ha/year in  
managed plantation





## BAMBOO VS EUCALYPTUS YIELD

- Eucalyptus takes **10 years** to be mature for logging at one time.
- Bamboo yield is based on **20 tonnes** per ha/year, which is the low production figure.

### Yield 10 years after planting

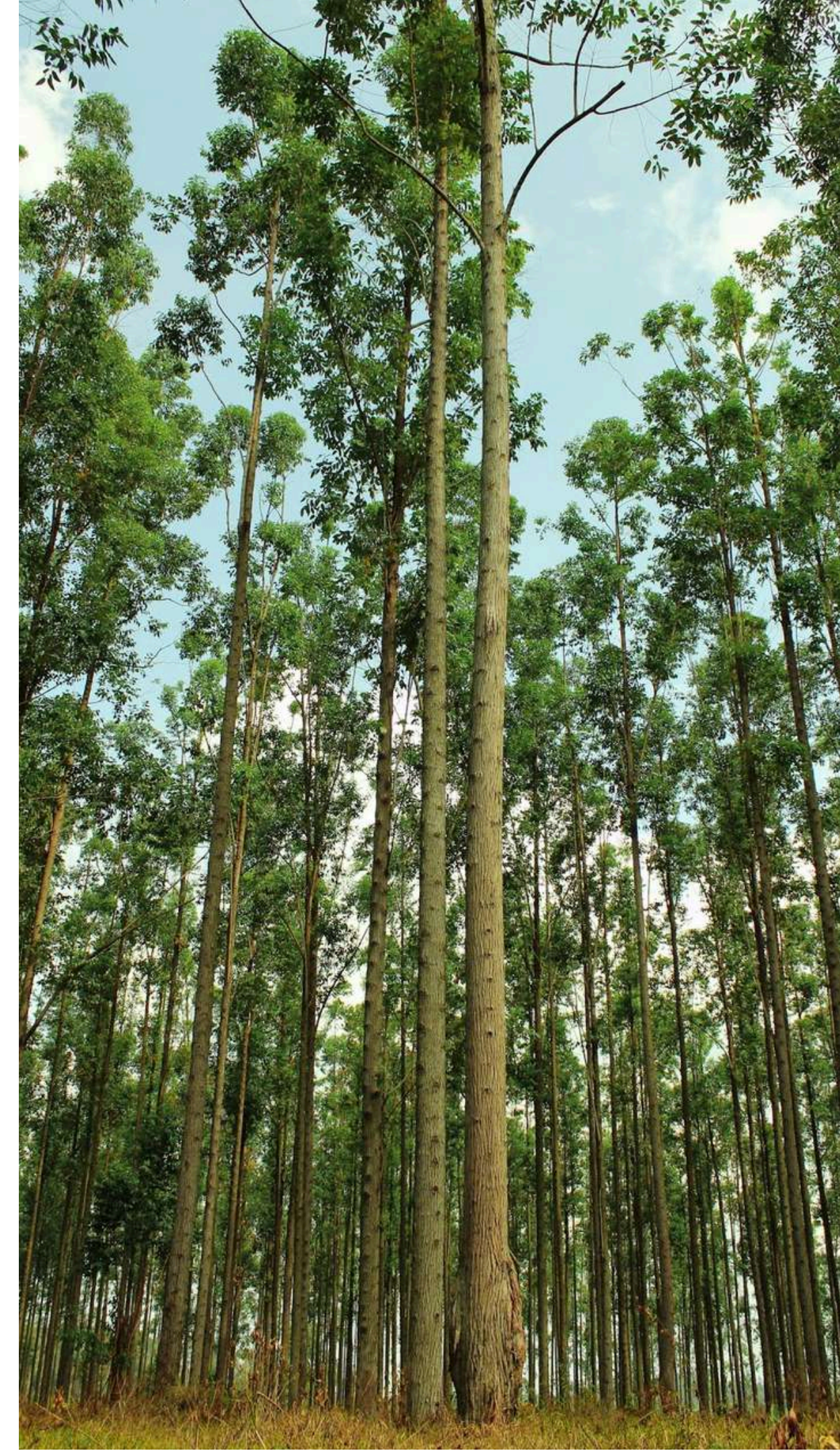
Eucalyptus: 80 tonnes

Bamboo: 100 tonnes

### Yield 20 years after planting

Eucalyptus: 100 tonnes

Bamboo: 300 tonnes



## BAMBOO CHARCOAL PRODUCTION

- The calorific value of **bamboo charcoal** is approximately 30.5 MJ/kg. it's a very **efficient fuel for cooking as it produces intense, long-lasting heat.**
- It takes **24h to 48h to carbonize** dry bamboo pieces in brick kiln specially made for.
- **The ratio of carbonization is between 20 % to 30%** depending on the bamboo varieties.
- Unlike wood charcoal, **bamboo charcoal does not emit smoke when burned** and therefore limits lung diseases.



## BAMBOO AGAINST SOIL EROSION AND BIODIVERSITY PROTECTION

- **Bamboo rhizome system is useful for preventing soil erosion** when planted along banks and on steep hillsides. Each clump of bamboo can hold on average 6 m<sup>3</sup> of soil.
- **Bamboo preserve groundwater** by improving water infiltration, water conservation and protecting wetlands.
- **The bamboo leaves** that fall regularly help to naturally fertilize the soil by forming **natural compost**.
- Animal species such as **Gray Bamboo Lemur feed** almost exclusively on **young bamboo shoots**.



## BAMBOO FOR CARBON OFFSETTING (VCM)

**30 to 35 %**

more CO<sub>2</sub> captation than  
regular tree forest

**96 to 392**

tonnes of CO<sub>2</sub> absorbed  
per Ha/year during its  
growth

**30 %**

more oxygen produced  
during its growth than trees

**1000 ha**

minimum area requested  
by VCM project developer



## WHY BAMBOO HAS BEEN UNDERRATED FOR REFORESTATION AND CHARCOAL PRODUCTION TO AVOID DEFORESTATION ?

- **Getting a bamboo plant is not as simple** as getting a plant tree.
- **Lot of misconception about the invasiveness of bamboo**, especially in occidental countries with temperate climate.
- **Lack of knowledge on the benefits of bamboo**, especially for the much higher biomass production compared to trees.
- **But things are changing**, more projects are developed in several countries in Africa.





**THANK YOU**



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