

Local NGO's initiative for the replacement of eucalyptus forests by multi-purpose agro-forestry species in the grassland region of Cameroon

Oghaiki Asaah Ndambi¹ and Stephen Ndzerem

ABSTRACT

Eucalyptus trees were introduced to Cameroon in the 1900's with an aim to solve a problem of wood shortage. These trees have an advantage that they grow fast, are easily self propagated and can spread very fast. They could serve as an important cash crop for both fuel wood and timber. In addition, the trees can develop under poor soil and water conditions.

Unfortunately, the fast dissemination of this species became a threat to farmers (mostly women), whose land was increasingly being encroached, forcing them to cover very long distances to reach new farms. The local water supply authority also noticed a great reduction of water available in its catchments, arising from a drop of the water table due excessive water absorption from the soil by *Eucalyptus* trees.

To remedy this situation, we applied for funds that helped us to fell *Eucalyptus* trees in targeted water catchments and farming areas, following written agreements with the local council, the water authorities and individual land owners. More than one million, mainly indigenous, trees (over 27 different species) were grown in nurseries and used to replace the trees felled. Many of these were also nitrogen-fixing, fruit producing, animal forage and medicinal, unlike the *Eucalyptus* which was barely used for wood and timber.

The outcome was as follows: More than 700.000 mature *Eucalyptus* trees were destroyed and replaced by indigenous African tree species, all capable of promoting wild life, usable by humans and increasing the badly lowered water table.

Many women returned from farming in far off areas to nearby farms. We made sensitisation campaigns on awareness of the negative effects of the *Eucalyptus* tree, which has pushed individuals, councils, churches and organizations to adopt the same strategy.

Finally, we found this approach, not only environmentally friendly, but also highly income-generating as very sustainable agro-forestry systems have now arisen. The use of indigenous multi-purpose agro-forestry species has brought in additional income rural families through the yearly sales of fruits, medicinal plant components and wood. Soils have also been enriched through nitrogen fixation, leading to greater crop yields without a corresponding increase in input costs.

We recommend an extension of this approach to other areas. However, much research needs to be done on the improvement of the germination rate of seeds of some useful indigenous species, which we found very low.

INTRODUCTION

Eucalyptus trees belong to the family Myrtaceae and are widespread in Australia, Africa, Asia, Latin America and Southern Europe. The trees have leathery leaves which hang obliquely or vertically, and are studded with glands containing a fragrant volatile oil. The flowers are covered with a cup-like membrane, which is thrown off as a lid when the flower expands. The fruit is surrounded by a woody, cup shaped receptacle and contains numerous minute seeds (Grieve, 2006).

¹ Strategic Humanitarian services (SHUMAS) Cameroon. P.O Box 5047, Nkwen – Bamenda, Cameroon. Current address: University of Hohenheim, Fruwirthstr. 7/4303, 70599 Stuttgart, Germany. Email: ndamboia@yahoo.com

Importance of *Eucalyptus* trees

The fast-growing nature of *Eucalyptus* makes them ideally suited to the production of wood for pulp, timber (including poles) and fuel wood (May and Ash, 1990). The trees produce straight stems which are suitable poles for carrying electricity and telephone cables. *Eucalyptus* oils are very important and have high commercial values in some countries. The oils may be roughly divided into three classes of commercial importance: (1) the medicinal oils, which contain substantial amounts of eucalyptol (also known as cineol); (2) the industrial oils, containing terpenes, which are used for flotation purposes in mining operations; (3) the aromatic oils, such as *E. citriodora*, which are characterized by their aroma (Grieve, 2006). In Cameroon, commercial *Eucalyptus* oil production is less common. The species is mainly used for wood, timber, poles and the leaves are also used as a component of herbal concoctions for the treatment of fevers and other diseases.

Problems related to *Eucalyptus* trees

Three main problems have been attributed to *Eucalyptus* cultivation (Shiva and Bandyopadhyay, 1985, Cited by Lawbuary).

1. *Eucalyptus* is water intensive, and reduces water available for other species, effectively out-competing them. This is worse in arid areas where the consequent suppression of other plant life, coupled with a high water demand, reduces soil moisture, preventing the recharge of groundwater, and can reduce local water tables. This is aggravated by a high transpiration rate indicative of the inefficient use of water. The introduction of such species with high water demand will destroy the hydrological balance and contribute to increasing aridity and eventual desertification.
2. *Eucalyptus* is nutrient intensive, which creates deficits for other plant life, a process that is exacerbated by its low returns in leaf litter to the soil. Thus it does not promote the building of humus, and by implication, does not contribute to the long-term fertility of the soil, as other species might resulting in an over all nutrient impoverishment of the soil

3. *Eucalyptus* is toxic, due to allelopathic properties, which serve to reduce not only other plant life, including crops, by restricting germination of other species, but is also detrimental to soil micro and macrofauna.

Eucalyptus can jeopardise the biological productivity, principally of arid regions due to allelopathic properties. It also has a deleterious effect on other plant life, including crops, by restricting germination of other species, and is also detrimental to soil micro and macrofauna (Shiva and Bandyopadhyay, 1985, Cited by Lawbuary).

Various *Eucalyptus* species can yield allelopathic chemicals which may be effective in suppressing under storey vegetation. This allelopathy was found to be in relation to rainfall and the soil water balance. Though decay could reduce the allelopathic effects of substances from *Eucalyptus* leaves and bark, some inhibitory chemicals remained in the soil after 5 months (May and Ash, 1990).

Experiences from Cameroon

Before the 1920's, there was an abundance of unexploited and untitled land especially in the rural areas of Cameroon. Nowadays, due to population growth and urbanisation, arable land is decreasing and there is a need for the application of sustainable management schemes for land resources. The first introduction of *Eucalyptus* trees to the grassland area of Cameroon dates as far back as the 1900's aiming at improving on fuel (wood) availability. There was a widespread popularity of these trees in this area, which appears to have followed the extensive planting by German missionaries. Later on, around the 60s, came a drastic fall in the price of coffee in Cameroon and the world. This problem was coupled with high infection rates of the coffee pod disease, which led to great losses for local coffee farmers. Coffee was the major cash crop of this area, generating income only to men (farmers), as only men own land.

For men to get a substitute source of money, they unconsciously resorted to indiscriminate planting of *Eucalyptus* trees on most available arable land, pushing women, who were less influential on land utilization, to move further and

further away from their homes in search of farmland.

The results of indiscriminate *Eucalyptus* planting were:

- 1) Women had to walk long distances (sometimes greater than 10 Km) to find new farming areas. They had to construct temporal huts on these farms, where they sometimes spent 2 to 4 weeks before returning home with food and other stuffs carried on their heads. Many also took along babies and young children with them.
- 2) People in general, usually women and children, had to walk further and further each year to fetch water.
- 3) Water catchments areas were also harmed by this development of *Eucalyptus* plantations. By the late 80s, this resulted to generalized water shortages and low crop yields within the target area.
- 4) This problem continues today and is probably the cause of an even greater impact on the National Electricity Corporation of Cameroon, AES-SONEL, as their dams are not adequately supplied to propel their machines throughout the year.

Expert studies have found that the use of these trees caused soil acidification and a drastic drop in the fish population of nearby rivers. They also increased the risk of fires in the savannah region of Cameroon (WRM, 2000).

From the mid 80s to the early 90s, Government Departments and Traditional Authorities sought solutions through administrative orders with some punitive sanctions against defaulters who continued planting of *Eucalyptus* trees. Traditional leaders also introduced serious injunctions against this practice. All these efforts failed because of the complex and unrecognized nature of the sited problem.

Strategic Humanitarian Services (SHUMAS)-NGO thought it would be unfriendly, to sit and watch the situation aggravating.

METHODS

The project was carried out in the highlands of the Northwest Province around the small town of

Kumbo and covered districts of Donga-Mantung and Bui Divisions of Cameroon. These villages fall in the Western Highland agro-ecological zone of Cameroon. The Western highlands lie between latitudes 5°20' and 7° North and longitude 9°40' and 11°10' East of the Equator, where two main seasons exist: the rainy season, which runs from mid-march to mid November, and the dry season, which runs from mid-November to mid-March. Annual rainfall ranges from 1500–2500 mm. Farming is mainly rain-fed; hence, activities are concentrated in the rainy season.

We first of all made agreements with local council and water authorities as well as with individual landowners, giving us an accord to fell these trees. The above-mentioned persons as well as the local populations were sensitised on the problems related to *Eucalyptus* utilisation and the advantages of other multi-purpose agro-forestry trees, over the *Eucalyptus*. Most beneficiaries were already aware of these problems, but lacked a means of felling the trees.

Trees were felled by hired contractors, using petroleum engine powered chainsaws. Straight trees were used as poles or simplified into planks, while rough ones were cut into small logs for fuel wood. All landowners claimed proprietorship over felled trees on their land, and sold out most of it, reserving some for household use.

Indigenous tree species with multi-purpose uses such as: having medicinal properties, good for craft work, for carpentry and joinery, for attracting bees, for animal feeding and for nitrogen fixation were selected, nursed and used by these communities to replace *Eucalyptus*. New and complex agro-forestry systems have arisen, for example, a small farm of half a hectare having as many as nine tree species and six crop species.

About one million seeds were planted in two main nurseries at Mah and Kongir villages with 27 species (Table 1).

Seedlings from the nurseries were distributed to 11 local water catchment areas and to *Eucalyptus* owners whose trees were felled.

Table 1: Trees planted in the main nursery and some uses (besides fuel wood)

MAH NURSERY			
Species	Seeds Planted	Seeds germinated	Some uses
<i>Vitex doriana</i>	300,000	250,000	Medicinal plant, edible fruit, wood for craftwork, water catchments
<i>Calliandra calothyrsus</i>	18,000	17,000	Honey production, nitrogen fixing, animal feed, erosion control
<i>Maesopsis</i>	450,000	400,000	Animal feed, water catchments
<i>Acacia angustissima</i>	180,000	180,000	Medicinal plant, animal feed, nitrogen fixing
<i>Leucaena diversifolia</i>	21,000	20,000	Animal feed, nitrogen fixing, honey production, water catchments
<i>Cassia spectabilis</i>	1,600	1,100	Nitrogen fixation, fencing
<i>Croton macrothysus</i>	12,000	12,000	Craftwork, joinery, erosion control
<i>Podocarpus</i>	120	90	Craftwork, joinery, fencing
<i>Leucaena leucocephala</i>	21,000	21,000	Animal feed, nitrogen fixing, honey production, water catchments
Whistling pine	100	80	Medicinal plant
<i>Karapa</i>	150	75	Water catchments
<i>Jakaranda</i>	275	250	Honey production, craftwork, joinery
<i>Glyricidia</i>	5,200	5,200	Animal feed, nitrogen fixation, Medicinal plant, water catchments
<i>Policia fulva</i>	300	NA	Honey production, fencing, craftwork
<i>Njomsa</i>	60	NA	Craftwork, joinery
White croton (kibaay)	100	70	Fencing, craftwork, joinery, erosion control
<i>Entada abisinica</i>	30	11	Fencing, erosion control, nitrogen fixation
<i>Prunus africana</i>	2,500	700	Medicinal plant
<i>Pituaia</i>	24,000	20,000	Honey production, erosion control
Dzeng	100	NA	Craftwork, erosion control
<i>Consilia anaxacta</i>	700	NA	Craftwork, joinery
TOTAL	1,037,235	927,576	

NA = Data not available

OUTCOME

- More than 700,000 mature trees were destroyed and replaced by indigenous African tree species (nitrogen fixing, fruits trees, water catchments, medicinal, etc.) all capable of promoting wild life, usable by humans and increasing the badly lowered water table (Table 1).
- More than 200,000 trees were provided to some women for Agro-forestry purposes.
- Many women returned from farming in far off areas to farms close to their homes.
- There is now a general awareness of the negative effects of the *Eucalyptus* trees.

Individuals, councils, churches and organizations are now trying to replicate the project, though on a very limited scale.

- More farming land has been created with the Permanent Farming System introduced on the process such as agro – forestry, organic farming, etc.
- Wood obtained from the felled *Eucalyptus* plantations has been a good source of income for the owners, and many of them have used the money to improve their farms while others have used it for other income generating activities.
- Wood obtained from the felled *Eucalyptus* trees has been a good source of income for their



Figure 1: Catering for the tree nursery



Figure 2: Agro-forestry system arising from indigenous species

owners, who have used the money to improve their farms. In some areas goats are allowed to wander freely. This means that adjacent land owners must fence their land to protect their crops. Therefore some tree branches were used for fencing.

- Since the *Eucalyptus* trees have been felled there has been a noticeable increase in the availability of water during the dry season due to a rise in the water table.

CONCLUSIONS

This problem is being partly overcome by the availability of eucalyptus branches arising from the project but nevertheless fencing increases the cost of farming the land and takes away the income that would otherwise be available from selling the wood for fuel.

Due to technical limitations, it was difficult to carry on a detailed scientific evaluation of project impact. We came up to the conclusions that:

1. The introduction of exotic species to a region should be a gradual process that can permit detection of possible negative effects early enough. If such effects are noticed, then introduction could either be halted or continued, putting in place control measures. Indispensable cases of introduction may also arise; for example the *Eucalyptus* tree, due to its tolerance to poor soils and its firm soil-gripping roots, is useful on hilly areas with acidic soils in the Western Highlands of Cameroon, to control landslides.

2. Local resources are well adaptable to the natural conditions and are likely to produce less harm to the environment. If at all any negative effects would be noticed, then other plants within the same ecosystem could counteract such effects, therefore
3. Research should be encouraged in the direction of bringing out interactions between species in their natural ecosystems (especially tropical countries), and adapting them only to suitable new environments. Also, studies need to be conducted on possibilities for improving on the germination rate of local species.

REFERENCES

- Grieve M: A modern herbal: *Eucalyptus*. <http://www.botanical.com/botanical/mgmh/e/eucaly14.html#des#des>. Retrieved 06/02/06
- Lawbuary: *Eucalyptus* Planting in 'Social Forestry' in India: Boon or Curse? <http://www.ganesha.co.uk/Articles/Eucalyptus.htm#Introduction#Introduction>. Retrieved 06/02/06
- May and Ash (1990). An assessment of the allelopathic potential of *Eucalyptus*. *Australian Journal of Botany* 38(3) 245 - 254 1990
- WRM (2000) Tree plantations: a false alternative to deforestation in Cameroon (World Rainforest Management) WRM's bulletin N° 39, October 2000