

# Institutional incentives and agroforestry parklands dynamics in North-Cameroon

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## Introduction

### Site characteristics (Tupuri region):

- semi-arid climate, rainfall: 600-800 mm/year
- population density: 160-200 inhabitants/km<sup>2</sup>
- mixed farming systems in *Faidherbia albida* (Del.) Chev.
- (= *Acacia albida* Del.) parklands
- cropland shortage
- scarce firewood resources
- shortage of rangeland.



Bundle of sticks of *Guiera senegalensis* used as firewood. Women have to walk 6 hours to collect one such bundle



### Relevant institutions

In order to improve the availability of wood and soil fertility, the Farmers' Development and Territory Management (DPGT) project has attempted to induce the reestablishment of *Faidherbia* in fields since 1996 by subsidising the retention of new trees. The DPGT project received funds from the French government (loan and subsidy) and was managed by Sodacoton (a Cameroonian cotton development company) from 1994 to 2001.

Since many farmers have now managed to extend and enrich their parklands, it has been decided that the project will cease.

## Objectives of the research :

- to assess the impact of the DPGT project on parkland extension
- to quantify current firewood resources of the parklands
- to examine future roles for managing this resource, which depend on technical and social factors.

## Land use: multipurpose agroforestry parklands

Tupuri farmers have been building up parklands for more than a century. These parklands are either cropped or grazed.

- Village territories are divided into three parts:
- *Faidherbia albida* parklands cropped with *Sorghum bicolor* and cotton
  - Tree-less bush-fields under cotton and cereal rotation
  - Uncropped areas (fallow and permanent rangeland).

Since the 1960s, population growth and the spread of cotton and cereal cultivation have led to a shortage of firewood.

Until the 1990s, Sodacoton's technical advisory services ignored parklands, and even encouraged the clearing of trees from fields because they hamper animal draught and mechanical tillage for cotton cultivation.



Bushfields



Parkland



Bush rangeland

## Research actions

Since 1985, research has highlighted the value of local agroforestry species:

- As a source of firewood and poles
- As a way of improving cotton and food grain yields under *Faidherbia* (Libert C. and Eyog Matic O., 1996)

In 1996 the DPGT project attempted to induce the reestablishment of trees (*Faidherbia albida*, *Prosopis africana*) in fields by subsidising the retention of all new trees.

## New issues for research and development

How fast could expanding parklands meet the population's firewood requirements?

- Is the expansion of parkland sustainable and to what extent is it reliant on the DPGT project?
- How should *Faidherbia* be pollarded to ensure the highest yields of wood and underlying crops?
- How can tree exploitation and regeneration be integrated into farming systems?
- And last but not least, how farmers' rights on pollarding and cutting trees should be redefined since *Faidherbia* has been classified as a protected species in Cameroon?

## The results of the research of the ENGREF-CIRAD-IRAD-PRASAC team, 2003-2004

Field work in the villages of Ganié and Sitawé has consisted of:

- A socio-economic survey of farmers to find out more about traditional knowledge and practices concerning parkland and tree management
- Participatory map-making of village land-use
- An inventory of parkland trees
- Drawing up a wood pollarding biomass table for *Faidherbia albida*.

### The study showed that:

#### 1/ Farmers have a solid understanding of tree and parkland management:

- The function and uses of *Faidherbia*: improves crop yields, provides shade, firewood, poles, fodder during the dry season and has medicinal uses
- Tree selection: the well-formed shoots and suckers of the clump are retained
- Shaping the trees: from 4 years old, lower branches are cut, pruning favours branch formation



Young *Faidherbia* shoots selected

#### 2/ Tree retention and increasing the area of parkland lead to two types of parkland:

- one is aging, but could have a future if properly trimmed and if regeneration is encouraged
- the other is young (6-10 years) and has a future but needs to be managed. Indeed, its density is currently so high in some places (200/ha) that farmers will not be able to cultivate as normal in a few years.



Young parkland

#### 3/ Biomass table: meeting firewood needs

- Biomass tables were compiled for pollarded *Faidherbia* wood. The best correlation was obtained with circumference at 1.3m height.
- It is possible to calculate the available firewood biomass derived from pollarding at the village level by combining data from the inventory and the biomass table.

To give an idea, it could supply the wood requirements for 5 years in Sitawé (on the basis of 300 kg/person and year).

Of course, a productivity table is required in order to assess the sustainability of *Faidherbia* exploitation.



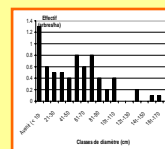
Pollarding *Faidherbia*



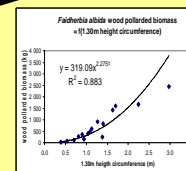
Well-formed trees



Basal area



Effect of diameter (cm) on wood yield (kg m<sup>-2</sup>)



*Faidherbia albida* wood pollarded biomass (t/30m high circumference)

4 tons dry matter ha<sup>-1</sup> of wood

#### 4/ The issue of tree appropriation rights

The main problem with the management of new parklands is that the Forestry Administration does not allow farmers to pollard *Faidherbia* and charges a tax (about five to ten times the daily wage) for cutting branches from ones own tree. This is a local interpretation of the law, because there is no official text on the subject. It is a constraint on the future sylviculture of young new *Faidherbia* stands and discourages investment by farmers.

## Discussion

There are several reasons for the successful extension of parklands:

- training given to farmers on the advantages of *Faidherbia*, although farmers are already aware of them
- the payment of subsidies, although little money is earned (0.05 to 0.1 US \$) compared to the income from cotton
- the promotion by the technical advisory services of a new socially accepted cultivation system that includes the presence of trees in cotton fields
- and as trees in a field are the result of human work, it reinforces farmers' land-use rights and strengthens their claim to tree ownership.

The future development of the positive trend that has been achieved in the parklands of the Tupuri villages now depends on:

- the ability of village associations to manage the subsidies without the DPGT project
- formalising an agreement with the local Forestry Administration on how to regulate and control tree cutting or pollarding by farmers, so as to ensure their rights and not discourage investment
- considering parklands as part of Community Forests, in order to transfer responsibility for their management to the local population, as allowed in forest law
- more research on tree management methods (density, pollarding techniques and periodicity), supported by modelling of the dynamics of village tree resources.

However, the next steps towards sustainable parkland management must be:

- 1/ an institutional agreement between the Forestry Administration and farmers to ensure tree use rights
- 2/ to continue participatory research on wood resource management, in order to switch from actual management to deliberate management

- actual management: the set of management actions that are applied to the environment
- deliberate management: a set of management actions intended to resolve an environmental problem (Mermet L., 1991)



Young parkland

## Conclusions

In the Tupuri area, over a million trees have been planted over the last five years. In the future, this will save millions of hours of work for women, such as carrying bundles of wood that weigh an average of 22 kilograms.

Institutional action based on incentives for farmers can thus sustain agroforestry systems in African savannas, thereby increasing wood, crop and cotton production, biodiversity and even carbon storage.

Future work that would be required in order to develop this project further:

- Prepare a wood pruning productivity table for *Faidherbia albida*
- Draw up a pruning pattern at the farm area level (including inter-farm agreements)
- Compare pollarding production with the population's needs
- Secure farmers rights on *Faidherbia*.



Parkland wood and fodder

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### Résumé :

In the sudano-sahelian zone of North-Cameroon and for more than a century farmers have been building multipurpose agroforestry parklands, which are either cropped, under fallow, or grazed, and provide various products. Until the 90's, technical advisory structures have ignored these parklands, and even encouraged tree clearing from field, for trees hamper animal draught or mechanical tillage for cotton cultivation. From 1985 onwards research stressed the interest of local agroforestry species; but only in 1996 did the DPGT (Farmer's Development and Territory Management) project attempt to induce tree (*Faidherbia albida*, *Prosopis africana*) resettlement in the fields, by subsidising retaining of every new tree. The study shows that farmers hold firm knowledge of tree and parklands management, and that tree retaining and parkland area increase. However, this evolution hangs on the ability of local organisations to take over from DPGT for subsidy management and to reach agreement with the Forestry Administration on how to rule and control tree cutting or pruning by peasants. Tree management will be improved by: (1) pursuing research on thinning, pruning and cutting practices and supporting it by modelling of dynamics of village tree resources, and (2) considering parklands as part of community forests in order to transfer management responsibility to local population, like the forest law allows it. Institutional action based on incentives to farmers can thus sustain agroforestry systems in African savannahs, thereby increasing production, biodiversity and even carbon storage.