Assessing ecological status, threat causes and implementation of conservation measures of *Prosopis africana* (Guill. Perr. & A. Rich.) Taubert in W Biosphere Reserve in Benin

Progress Report

By

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1. Introduction

1.1 Background of the work

Forests are the single most important repositories of terrestrial biological diversity. They provide a wide range of products and services to people throughout the world. In developing countries, issues related to poverty and gender revolves largely around forest and forest habitats. They lie at the base of food-webs, supporting most other life forms. They are essential elements of ecological systems on all geographical scales, helping provide us with equitable climates, fertile soils and reliable supplies of water. (Hamilton *et al.*, 2003; Ramesh, 2003). Conservation of forest biological diversity is essential for sustaining the productive value of forests, and for maintaining the health and vitality of forest ecosystems and thereby maintaining their protective, environmental and cultural roles. The key to success therefore lies in the development of programmes that harmonize conservation and sustainable utilization of biological diversity and forest genetic resources within a mosaic of land-use options (Sharma, 1996; FAO, 2004).

Plant conservation has been targeted as priority issue in biodiversity conservation during the 16th International Botanical Congress of Missouri in 1999.

Prosopis africana is one of the most valuable agroforestry tree species in the semi-arid regions of West Africa. Its wood is known to be hard, durable, resistant to termites, and easy to carve. It produces excellent charcoal and firewood. The bark and roots are used for curing diseases and leaves are pruned for livestock. The seeds are used as food condiment. Because of these multipurpose uses, *P. africana* is currently under severe human pressure around W National Park in Benin. The species can hardly be found except on hills where its regeneration is hard. But it is still unclear how the threat affects the abundance and conservation status of the species in its habitats. Furthermore, there is a gap on to which extend this species is conserved by protected areas in Benin. It is then important to assess its ecological status, the main threats it faces and implement practical scheme for its conservation.

1.2 Study objectives

Currently, there is a great awareness that *Prosopis africana* is highly threatened mainly in the northern part of Benin. This work aims at providing basic biological information and implementing practical community-based participatory conservation actions relevant for the conservation of the species.

Specifically, we aimed at:

- Comparatively assessing the abundance and population structure of *P. africana* in agricultural landscape and protected area in order to identify critical size classes which deserve more conservation priorities,
- Assessing use intensities and subsequent impacts on the species,
- Raising awareness of local population on the necessity to manage the species,
- Implementing an early stage propagation program for ex-situ conservation in agroforestry systems.

Study area

The study has been carried in the W Biosphere Reserve (WBR) of Benin. It is one of the two UNESCO-MAB Biosphere Reserves of Benin. It represents the Benin's part of the "W Transnational Park" which is held by three West African countries (Benin, Burkina Faso and Niger).

The study has been carried out in four municipalities (Karimama, Mallanville, Kandi and Banikoara) that surround the protected area. The study area belongs to the regional centre of sudanian endemism (White, 1983).

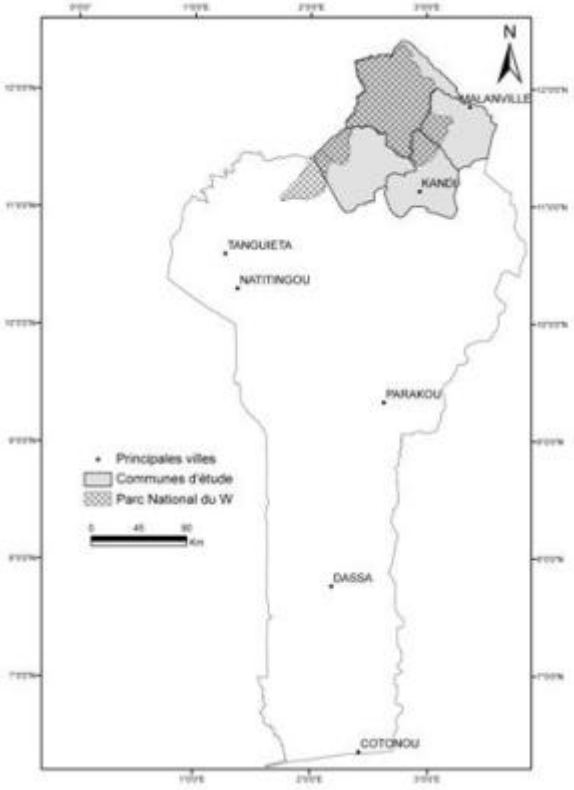

Figure 1.1 Location of the study area in Benin

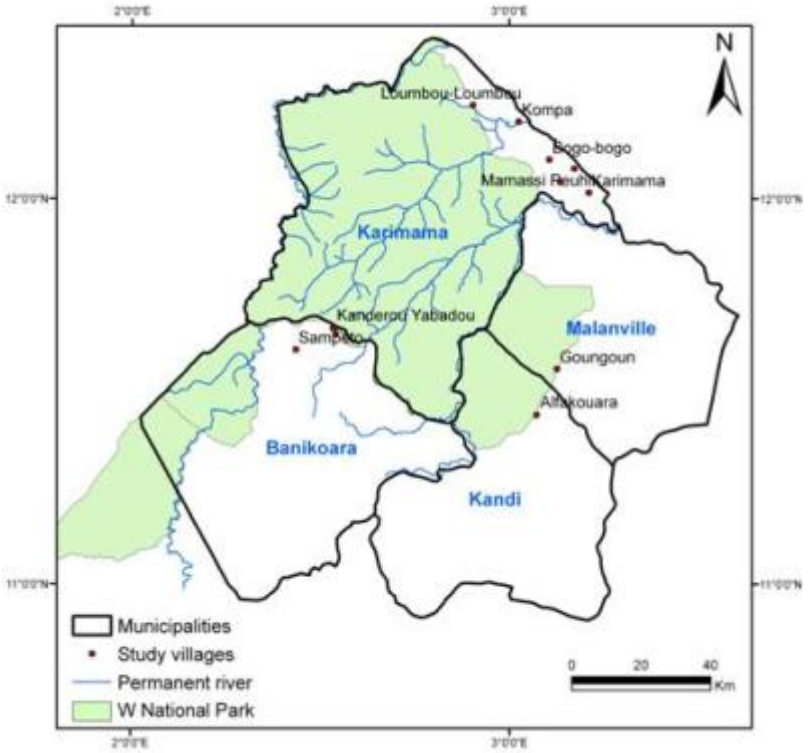

Figure1.2 Map showing the W Biosphere reserve and study villages

Description of present status

- ✓ **Activities already achieved**

1- Comparative assessment of the abundance and population structure of *P. africana* in agricultural landscape and protected area: *Quantitative ecological study*

This activity was carried out through November 2010 to February 2011.

The population structure and the abundance of the species was assessed using line transect laid out in both land use type (Protected area and open area). In the non protected area three types of habitat were distinguished for the species: farmland, fallow and hills. In each type of habitat, data relative to the dendrometric characteristic (Height and DBH) and regeneration were collected as well as apparent threat to the species on individuals with DBH > 5cm.

These transects were laid out so as to take into account all some possible variations in habitat and plant communities.

On each transect, we collected data to be used for the estimation of the abundance of the species. This was done using the line transect method. We recorded the redial distance between the principal operator walking on the defined azimuth and a target individual tree. The angle defined by the walking azimuth (transect line) and the line formed the observer and the target tree was also recorded. The two sets of data were used to calculate the perpendicular distance from transect line to the individual plant that will be used to estimate the abundance of the species in each habitat using Distance software.
The diameter at breast height (DBH) was recorded on each individual tree and will be used to assess the population structure of the species across habitat types.

Dendrometic and structural analysis of the data are ongoing. This will allow having insight in the conservation status of the species with respect to land use and geographical location to the protected by the species' natural populations.

2- Assessing use and subsequent impacts on the species: *Ethnobotanical survey*

This activity has been carried out from through January 2011 to April 2011.

To assess the species socio-economical importance, use value and threat and endogenous conservation techniques of the species, we have carried out an ethnobotanical survey. This was performed using a questionnaire. 20 respondents (10 women and 10men) were surveyed in 8 villages (Table 1) taking into account the existing socio-ethnic, professional groups and age classes. The surveyed villages were chosen taking into account their proximity to the protected area. The detail of sampling is provided in the table below:

Table 1: Details of the sampling in the study area

Location to the park	Municipality	Village	Ethnic group	Professional group	Number of respondents
North to the park	Karimama	Loumbou-Loumbou	Gourmantché	Farmers	20
		Bogo-bogo	Dendi	Farmers and fishers	20
		Kompa	Dendi	Farmers and fishers	20
		Mamassi-Peulh	Peulh	Breeders	20
Along the park	Malanville	Goungoun	Monkollé	Farmers	20
	Kandi	Alfakoara	Monkollé	Farmers	20
South of the park	Banikoara	Sampéto	Bariba	Farmers	20
		Kanderou	Bariba	Farmers	20

Analysis of ethnobotanical data is now in process, using quantitative and qualitative ethnobotanical tools. The uses and factors affecting the use values of the species are being analysed taking into account the gender, the ethnicity and the geographical location of respondents. This will allow us to understand the uses and factors affecting the uses of *P. africana* within and between communities. Compared with the ecological status and in each region of the protected area, this will allow us to derive appropriate management recommendations.

3- Environmental education

This activity has been carried out during in May 2011.

From 8th to 10th of May we have carried out an environmental education. This activity has involved schoolboys and schoolgirls of the secondary school of Guéné (CEG of Guéné). This village is one of the surrounding villages of the W National Park. This activity was carried with the assistance of the environmental education staff of CENAGREF (National Wildlife Reserve Management Center), located at Kandi, who helped us in the choice of the school. This school was chosen to ensure an even coverage of environmental education activities they were already performing.

A total of 33 schoolchildren (including 7 schoolgirls) and one teacher have participated in the environmental education.

The activity was made of two main components:

- Field visit to the W National
- Sensitisation to the protection of wildlife habitat and plant resources

In fact, the second point is embedded in the first since the sensitisation activities have been carried out inside the park in some specific sites managed to welcome visitors. This site called “Point Triple” is located at the center of the West African W biosphere and is the common border of Niger, Burkina Faso and Benin. That is also where we spent the first night.

During the field visit, the schoolchildren had the opportunity to discover some wild animals such as savannah elephants (*Loxodonta Africana*), Roan antelope (*Hippotragus equinus*), Western Buffon’s kobs (*Kobus kob*), buffalos (*Syncerus caffer*), Gray duiker (*Sylvicapra grimmia*), warthog (*Phacochoerus aethiopicus*), olive baboons (*Papio anubis*) and many bird species.

The sensitisation activities were made of movie projection and participative discussion sections. The main discussion topics were:

- Wildlife habitat protection
- Importance of plant communities and trees in our daily life (medicine, food, construction) and the necessity to well manage them

- Importance of trees in providing safe environment for life (oxygen production from carbon dioxide, carbon sequestration and attenuation of climate change effects)
- Importance of tree (mainly *Prosopis Africana)* in improving agricultural production (Protection again erosion and soil fertility improvement with its ability to fix air nitrogen).

The sensitisation session have been co-directed by Mr. Bienvenu ABALLO, environmental educator in RC NGO (Research and Cooperation NGO) located at Kandi.

Some small presents (copy books, pens, pencils, mathematical sets, coloured pencils, and pamphlets) were distributed to participants, after a small quiz organised at the end of the education session, based on their level of participation and assimilation.

- ✓ **Remaining task to be achieved**

The next step in this project will be the second phase of the environment education. This will involve 40 volunteers' local farmers chosen around the reserve. They will be educated on alternative land use options to reduce threats on plant resources and importance of tree species in protection against soil erosion and the potential of some trees to improve soil fertility.

This activity is scheduled to be conducted simultaneously with tree planting activities. Tree planting will be carried out during August-September corresponding to the rainy season in the area. For this sake we have already collected some mature seeds of *Prosopis africana* during the forest inventory phase and a two nursery are now in process; one in Karimama and one at CEG Guéné. The later is supervised by the teacher that participated in the field visit.

Some pictures illustrating the field activities achieved

Gerard Gouwakinnou measuring the height of a *Prosopis Africana* tree in the W National Park

Picture of a young sapling of *Prosopis africana* in the savannah of W national Park

A tree of *Prosopis africana* near the village

Mature fruits of *Prosopis africana*

Presentation of the W Transfrontier Park to schoolchildren at the beginning of the field Visit

Participants watching movie on the importance of the W transfrontier Park for biodiversity conservation in West Africa

Group photo of participants in the field visit. Bienvenu ABALLO, the environmental educator at the right side on the picture. The second person leftwards after him is the participating teacher, Mr Aliou ADAM.

Group picture (Mr Gerard Gouwakinnou squatting in front at the center of the group)