



NDF Workshop Case Studies
WG 1 - Trees
Case Study 9
Prunus Africana
Country - CAMEROON
Original Language - English

NON-DETRIMENT FINDINGS REPORT ON *PRUNUS AFRICANA* (ROSACEAE) IN CAMEROON

AUTHOR:

Dr Jean Lagarde BETTI

ITTO/CITES Project Africa Regional Coordinator.

1. INTRODUCTION

Prunus africana is a species of the Rosaceae family, known under its trade/pilot name as pygeum or African chery. It is a montane tree species of the tropical Africa including the Côte d'Ivoire, Bioko, Sao Tome, Ethiopia, Kenya, Uganda, South Africa, Madagascar, Congo, the Democratic Republic of Congo, and Cameroon.

Prunus Africana is classified by the World Alliance for Nature (IUCN) as vulnerable species, which led to its listing in the Appendix II of the Convention on International Trade in Endangered Species of Fauna and Flora (CITES). This decision had a significant impact on the revenues produced from this non timber forest product in the range countries. Since October 2007, the European Commission has banned the importation of *Prunus Africana* coming from Cameroon in Europe. This measure impacts both the economic operators and the local people for whom *Prunus* represents an important non timber forest product.

In various African countries, policies have been established to ensure the sustainable management of forests having *Prunus africana* stands in them. However, enforcement issues and control problems do persist. The development of clear procedures to deliver Non-Detrimental Findings (NDFs) remains a priority for most producer countries.

This work aims to gather and analyse data for dressing a Non-Detriment Findings Report on *Prunus africana*. The main objectives are to summarize the basic information on this plant species, its management, utilization and trade, and to present a comprehensive description on the procedure followed to make the non-detriment findings for *P. africana*.

The document is prepared to be presented at the International Expert Workshop on CITES Non-Detriment Findings, projected in Mexico, November 17th-22th, 2008. It is divided in two parties: Back ground information on the taxa, and the Non-detrimental Finding procedure.

2. MATERIAL AND METHOD

2.1. Method

Data presented in this report are based on the literature review, discussions with different stakeholders, and my own field experience.

Literature review focused on published papers dealing with *Prunus Africana* in Cameroon. Occurrence extent and area of occupancy were estimated based on the important work conducted by Vivien et Faure in 1985 on African trees (Vivien et Faure 1985). The *Prunus* map drawn by these two authors was then completed with results of the work done by the National Forestry Development Office (ONADEF) in 1999 and 2000. This work consisted of identifying occurrence sites of *Prunus* based on interviews conducted in different parts of Cameroon.

I largely used technical papers and the Proceedings of the Workshop on “a strategy for the conservation of *Prunus africana* in Mount Cameroon”, organised 21st and 22nd February 1996 in Limbé, by the Mount Cameroon Project. The objective of the workshop was to develop a strategy for *Prunus* Conservation on Mount Cameroon. The workshop brought together 46 participants including Government officials, private sector, and villagers. Experts presented papers on all fields concerning *Prunus* in Mount Cameroon including biology, ecology, exploitation (legal and illegal), and inventories (Glyn 1997). I also used the recent report of the *Prunus* inventory made in Mount Cameroon, Mount Manengoumba, and Mount Oku. This work was conducted within the platform on *Prunus* conservation in Cameroon (FAO/SNV/CIFOR/ICRAFT 2008). The comparison of data presented in the two documents (Glyn 1997 and FAO/... 2008), allowed me to appreciate the trends in Mount Cameroon in terms of population size and other parameters in spite of differences observed in the methods and some criticisms made on the previous inventories (Glyn 1997).

In 2001, ONADEF conducted an inventory in the Adamaoua province, using the “adaptive cluster sample method”. The study proposed sustainable quotas for Tchabal Mbabo and Tchabal Gang Daba, two sites of *Prunus* in the Adamaoua.

I exploited data from special permits issued by the Forest administration since 2004 to companies dealing with the exploitation of special products.

In 2007, I had the opportunity to conduct two important field trips to assess the exploitation of special products in Cameroon. The first trip was financed by the FAO and consisted of gathering and analysing statistical data on non timber forest products (NTFP) in Cameroon, (Betti 2007b). This study allowed me to understand the circuit of forest products and the related problems in Cameroon. The second trip was financed by the Cameroon forest administration, the CITES management authority to be precise (Akagou et Betti 2007). The trip aimed to establish the state-of-the-art on the exploitation of *Prunus africana* in Cameroon. I therefore had the opportunity to visit four provinces including Adamaoua, West, North west, and South west provinces. In each province, we discussed with all stakeholders including exploiters, local forest services, local authority, and local population. We also visit certain forests to appreciate the exploitation of *Prunus africana*.

In Yaoundé, I largely discussed with the Director of Forest, the CITES management authority, the Chief service in charge of agreements and permits, the president of the national syndicate for special products permit holders.

2.2. Limits

2.2.1. On the document

Data used in this report are not enough for a full and complete assessment of Non-detrimental Findings on *Prunus africana* in Cameroon.

Appreciation of trends in *Prunus* distribution in Cameroon is based on the work done by Vivien et Faure in 1985, and the one undertaken by the National Office for Forest Development (ONADEF) in 1999 and 2000 (letter réf N° 0352/MINEF/SG/DF/SDAFF/SN of 09 March 2005 addressed to the CITES Management Authority of Spain). The problem is that the methods used for identifying sites of extend occurrence differ from one author to another, which cannot authorize to be fix on the extension or declining of the distribution of *Prunus* in Cameroon.

Population abundance has never been conducted in all sites of exploitation of *Prunus* in Cameroon. For some scarce sites where the inventories have been conducted, authors used different methods (sample rate and designing) which cannot authorize to make any comparison. Mount Cameroon appears to be the only zone where inventories were made at least twice, in 1992 and 2008. Same is said to have been made for the North west province (Mount Oku) by the forest administration (Akagou. Pers. Com.) but reports are not published. The problem in Mount Cameroon is that inventories were made by different structures using different methods. Additionally data from the 1992 inventories have been criticised (Cunningham and Mbenkum 1993), for being biased towards the areas rich in *Prunus africana* thus giving over-estimates of the average population density over the entire area. All these problems constitute limits for appreciating any trends in population abundance.

2.2.2. Concerning the IUCN checklist for Non Detriment Findings.

The IUCN checklist is largely based on two global parameters: the abundance and the spatial distribution. No thing is said concerning author parameters such as the morphology, the mod of scattering, and external parameters.

In nature, the presence/absence of a given species in a précised milieu is regulated by diverse mechanisms which inter-act as "constraints". The notion of constraints reminds that all is not possible for a given species according not only to its proper nature, but also to many pressures that the species faces (Barbault 1997, Betti 2001, 2002). Constraints can therefore be distinguished in two broad groups including the external constraints and the internal constraints.

Globally, the ecological impact of the exploitation of forest resources is function of social factors (preference for example), economic factors (trade), the floristic composition of the forest and the nature of exploited species (Cunningham 1991, 1994, Peters 1997 cit. Betti 2001, 2002). The most threatened species are those which will be more popular, those which grow slowly, those which meet difficulties in their production system, those which prefer fragile or threatened habitats, and those which have a limit distribution area (Cunningham 1993. cit Okafor & Ham 1999).

3. BIOLOGICAL DATA

The genus *Prunus* belongs to the Rosaceae family group and consists of about 400 species mostly distributed in the north temperate one of America, Europe, and Asia. There are about 75 tropical species, mainly tropical Asiatic and tropical American (Mabberley cit. Nouhou Ndam 1996).

3.1. Scientific and common names

Prunus Africana (Hook.f.) Kalman (formerly *Pygeum africanum* Hook.f.) known under its trade/pilot name as *Pygeum* or African cherry, is the only sub-Saharan African species of the genus and is widely spread in mountain tropical Africa from west and East Africa to South Africa and Madagascar. Range countries include Côte d'Ivoire, Bioko, Sao Tome, Ethiopia, Kenya, Uganda, South Africa, Madagascar, Congo, the Democratic Republic of Congo, and Cameroon (Vivien et Faure 1985).

Prunus africana Hook f. (Rosaceae)

Common names: Pygeum, Iron Wood, (Red) Stinkwood, African Plum, African Prune, African Cherry, Bitter Almond.

Local or vernacular names for *Prunus africana* by region (Cunningham, 2006)

Southern Africa: *muchambati* or *muchati* (Central Shona), *umdomezulu*, *inkhokhokho*, *umlalume*, *ingobozinyeweni* (isiZulu), *umkhakhazi*, *inyazangoma* (Xhosa and Zulu), *mulala-maanga* (Venda), *mogothori* (North Sotho), *roostinkhout* (Afrikaans) (Wild, Biegel and Mavi, 1972; Palmer and Pitman, 1972; Pooley, 1993).

South-Central Africa: *Dedzi* (chiChewa), *msista* or *mkunu* (Yei), *mzumira* (Tu), *mmdondole* (Ngoni) and *mpuema* (Mg) (Williamson, 1975).

East Africa (Kenya, Uganda, Tanzania): *Muiru* (Kikuyu), *Mutimailu* (KiKamba), *ol-Koijuka* (Maa), *Tenduet* (Elgony, Kipsigis, Ndorobo), *Mueri* (Stand), Mweria (Meru), *Twendet* (Nandi), *mkonde-konde*, *msendo*, *muuri* and *mudy* (Chagga), *konde-konde* (Meru), *mdundulu* (Nguu), *ligambo* (Nyiha), *wami* (Rangi), *gwaami* (Fiome), *mufubia* (Zinza), *mfila* (Fipa), *mwiluti* (waHehe), *Murugutu* (Watende), *Armaatet*, *Oromoti* (Sebei), *Kiburubura* (Kisii), *Mwiritsa* (Luhya); *Ntasesa* (Luganda), *chiramat*, *chirumandi*, *gulumati*, *gumwirumani*, *namwini* (Lugisu), *mukombo* (Rukiga) *ngoti* (Lukonjo), *mugote* (Runyankole), *ntasera* (Lunyoro), *oromoti* (Sebei) (Beentje, 1994; Hamilton, 1991; Mbuya et al, 1994).

Ethiopia highlands: *Tikur inchet* (Amargna), *Beru* (Gimirigna), *Arara* (Haderigna), *Bourairo*, *Buraya*, *Homi* and *Mukoraja* (Oromugna), *Mrchiko* (Sidamgna) and *Garba* or *Onsa* (Wolayeigna) (Bekele-Tesemma, 1993).

West Africa: *Bihasa* (Buhi), used on Bioko. In Cameroon, *wotangue* (Bakweri) *dalehi* (Fulani), *eblaa* (Oku), *elouo*, *mowom* and *sola* (Kom), *kanda stick* (Pidgin) and *kirah* (Banso).

Madagascar: *Kotofihy* (most widespread name), also *sofintsohihy* (and *kotofihy*) in the Amparafaravola, Brickaville and Vohimena areas, *tsintsefintsohihy* (and *kotofihy*) in Ambatondrazaka area, *saripaiso* or *sary* (Bealanana, Mandritsara and North Befandriana, Paisoala (Betsileo area) and *tsipesopeso* (Moramanga).

3.2. Distribution

Table 1.- Distirbution of *Prunus africana* in Range State (Cunningham, 2006)

Range State	Distribution in Range State
Angola	Bailundu highlands, Mt. Moco
Burundi	Montane forest, Albertine Rift, possibly from Mt. Heha/Ijenda, Mt. Bururi or Teza forest.
Cameroon	Bamenda highlands (Mt Kilum, Oku, Mt. Manenguba, Adamawa plateau and Mt. Cameroon
DR Congo*	Kivu region, Rwenzori and Virunga mountains, and within Kahuzi-Biega National Park, probably also on Itombwe

Range State	Distribution in Range State
	massif.
Equatorial Guinea	Pico Basilé and Grand Caldera de Luba on the island of Bioko
Ethiopia	NW highlands to Lake Tana and SE Highlands to Harar. Widespread in montane and valley forests of Harerge (eg: Dindin forest), Illubabor, Kefa, Arsi, Wolega and other regions 1500-2300m asl.
Kenya	Mt. Kenya, Mt Elgon, Mau forests
Lesotho	One collection from Rock pools area, Sehlabathebe, but that tree no longer survives. One specimen reported from Maphotong Gorge (2)
Madagascar	Patchy distribution in moist Montane forests (1000-2000m asl) such as Zahamena Strict Nature Reserve, Mantadia, Antsevabe and Manakambahiny-Est.
Malawi	Mt Mulanje, Zomba and Vipya plateaus
Mozambique	Mt Chipirone and Chimanimani mountains and Mt. Gorongosa
Nigeria	Mambila plateau, SE Nigeria
Rwanda	Virunga mountains, Mukura and Nyungwe forests
Sao Tome e Principe	Central Principe, near the volcanic plugs of Joao Dias Pai e Filho and montane Sao Tome from 1200-1400m asl.
South Africa	Afromontane forest patches from Mpumalanga through KwaZulu/Natal to the Knysna forest
Sudan	Imatong mountains (1)
Swaziland	Forest patches near Malolotja (Forbes Reef) and Mbabane.
Tanzania	Moist evergreen forests in NE Tanzania, including Mt Kilimanjaro
Uganda**	SW Uganda, particularly Kalinzu, Bwindi, Mgahinga and Mt. Elgon and in the Imatong mountains on the Sudan border
Zambia	Relict forest patches in fire maintained upland grasslands
Zimbabwe	Chimanimani mountains and Inyanga

References (Cunningham, 2006): 1 = Friis, 1992; 2 = Golding, 2002; 3 = Songwe, 1990; 4 = Katende, 1995; 5 = Fa, 2000; 6 = DGEF, 2003; 7 = Tesfaye et al (2002); 8 = Sunderland and Tako, 1999.

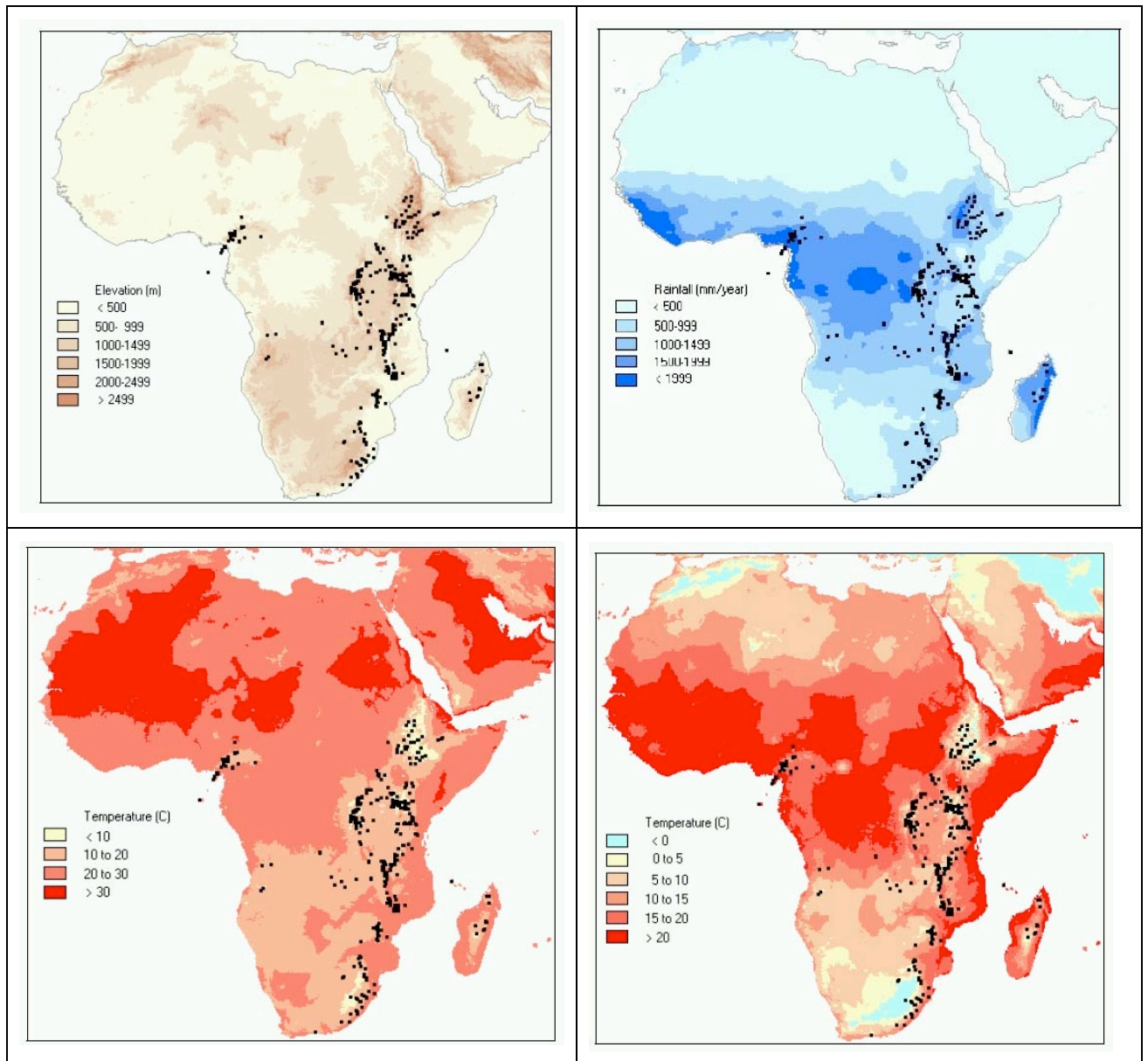


Figure 1.- Pan-african distribution of *Prunus africana* (Hall et al., 2000).

In the distribution area the natural range of *Prunus africana* is discontinued. Pygmy forests appear fragmented in several isolated sub-stands distributed in afro-montane forests (see Annex for Cameroon distribution)

3.3. Biological characteristics

3.3.1. *Life history*

Prunus africana is an evergreen canopy tree to 30 m tall with thick, fissured bark and straight bole that can reach a diameter of 1.5 m. Its leaves are alternate and simple. The flowers are small, white and fragrant. The fruit, which is intensely bitter, is a small pinkish-brown bilobed drupe. Fruits are 11 mm x 9-10 mm, ellipsoid or transversely ellipsoid, indehiscent drupe, deep red to purple-black, 0.5 g, Stalk round, 6-7 mm x 0.1 mm. Skin (epicarp) squeezes off easily in fingers, exposing green flesh (mesocarp) surrounding the bony endocarp. Glabrous. Seeds have same shape as fruit, contained in a bony endocarp. Cotyledons are white, with a thin papery, dry, pale yellow-brown testa. There exists one seed per fruit. Germination is epigeal. (Fraser et al. The flowering period extends from June to November and fruiting period from February to May. It is light demanding and responds well to cultivation (Vivien et Faure 1985, Fraser et al. 1996, Tchouto 1996).

The bark is black to brown, corrugated or fissured and scaly, fissuring in a characteristic rectangular pattern. The leaves are alternate, simple, long (8-20 cm.), elliptic, bluntly or acutely pointed, glabrous and dark green above, pale green below, with mildly serrate margins. A central vein is depressed on top, prominent on the bottom. The 2-cm petiole is pink or red. The flowers are androgynous, 10-20 stamens, insect-pollinated, 3-8 cm., greenish white or buff, and are distributed in 70-mm axillary racemes. The plant flowers October through May. The fruit is red to brown, 7-13 mm., wider than long, two-lobed with a seed in each lobe. It grows in bunches ripening September through November, several months after pollination.

Poor establishment conditions for the seedlings, is known to be one of the main causes of the species population decline. Seedlings grow well when they are established on exposed sites with good moisture such as road collapse (Ndam 1996). On Mount-Cameroon, a study has indicated a density of 5.5 trees \geq 20 cm dbh par ha with a low level of recruitment such as seedling density of about five individuals/m² (Ewusi et al. 1992). The same study also showed that seedlings were most abundant where there was a good light penetration into the forest and the undergrowth was sparse.

3.3.2. *Habitat type*

According to Vivien et Faure (1985), *Prunus africana* grows well in the sub-montane and montane forests at an altitude of 1500 – 3000 m). For (Tchouto 1996), *Prunus* is found at an altitude of 900 – 2500 m above sea level, though it has been observed to grow at lower altitude of 600 m. Studies conducted within the Mount Cameroon project suggested that fallows are the suitable habitat type than primary forest for *Prunus africana* in terms of density (4.69 seedlings/m²), survivorship/mortality (48.18%), recruitment, growth rate (11.52cm/year) (Ndam 1966).

Although *Prunus africana* is reported to be a light demanding species, it is present in closed-canopy forest (up to 20% of canopy composition) on Mount Oku. The lack of associated recruitment in such closed-canopy forest suggests that it is a mid to late secondary successional species (Eben-Ebai cit. Tchouto 1996). This lack of recruitment is evidence that in closed-canopy forest *Pygeum* is not replacing et al mature individuals coming to the end of their reproductive life. This supports the theory that in fact, the presence of *Pygeum* in mature phase forest may indicate that these individuals represent a relic population from mid-late successional processes, with little or no reproductive future without significant disturbance and opening successional opportunities (Sunderland and Nkefor 1996). Light is said to be needed for the promotion of regeneration (Eben-Ebai et al. cit. Tchouto 1996) although Geldenhuys (1981) cited by Tchouto (opcit.) reports that direct light inhibits seed germination and subsequent seedling development. Light is not necessary for germination but is vital for seedling development (Sunderland and Nkefor 1996).

3.3.3. Role of the species in its ecosystem

The fruits of *Prunus africana* are drupaceous, fleshy and red-purple in colours and are said to be eaten by a variety of birds and mammals (Cunningham and Mbenkum 1993). Most notable of these being the primate, Preuss Guenon (*Cercopithecus preussii*) and the Mount Cameroon Greenbul (*Andropogon montanus*) a montane bird, both of which are endemic to massif. According to Sunderland and Nkefor (1996), the suggestion by Cunningham and Mbenkum (1993) that the destruction of *Prunus africana* in a given area will affect frugivorous faunal populations significantly was an overstatement due to the irregularity of *Prunus* fruit production. It would be impossible to determine the reliance, and hence the effect of forest disturbance through the removal of Pygeum, of particular animal or bird on *Prunus* fruits given the masting fruiting characteristics exhibited by the species.

Frugivorous birds and mammals, however, must play an important role in seed dispersal. Observations indicated that dispersal from the parent tree was negligible and the majority of fruits had fallen within the crown line. Some villagers suggest that this might be due to intense hunting pressure, with not enough mammalian presence to disperse the fruits. However, caching of seed by small rodents seems to be common and this appears to account for the majority of predation of the seed set, although predation per seeds seems to be minimal (Sunderland and Nkefor 1996).

3.4. Population

3.4.1. Global population size

See Table 1

3.4.2. Current global population trends

Many authors outlined the decline in *Prunus africana* populations due to over-harvesting (Ewusi et al. 1992, Tchouto 1996, FAO/ICRAFT/SNV/CIFOR 2008). First observations regarding the declining of natural population inherent to overexploitation were made by Ewusi et al. (1996). Reports confirmed the fact that the natural population has suffered major damage from both legal and illegal exploitation (Ewusi et al. 1996), reducing the population from all previous inventory estimates by up to 50% in two years (1994 – 1996) (see fig. 2).

3.5. Conservation status

3.5.1. Global conservation status

Table 2.- Status of *Prunus africana* population in Range State (Cunningham, 2006)

Range State	Status of <i>Prunus africana</i> population
Angola	IUCN Category status Vulnerable (VUA1cd) (2). Small population, no effective protection yet Mt. Moco and the Bailundu highlands have been affected by over 20 years war
Burundi	Data deficient , research needed due to current commercial trade. May be threatened and in long-term decline.
Cameroon	Vulnerable (4). Current harvest levels considered unsustainable by Stewart (2001). Few large trees alive in NW and West Cameroon, and Western. Commercial exploitation has now spread to the remote Adamawa plateau.
DR Congo*	Data deficient . Bark harvest is opportunistic and unregulated. Densely populated surrounding area (up to 300 people/km ²). Controlled harvest not possible due to armed conflict.
Equatorial Guinea	Harvest considered unsustainable given impacts of large trees and current level of trade (8). More recent research conducted with funding from Spain, but report unavailable for this review.
Ethiopia	Probably not threatened. Subsistence use of bark only, although considered as a source of supply to France in the 1970's. Direct impacts due to fuelwood, charcoal and timber use (3). Poor recruitment of <i>Prunus africana</i> in Bale mountains (7)
Kenya	Needs non-detriment assessment of current bark harvest by sole exporter.
Lesotho	Rare . Only known from one sighting and one collection record.

Range State	Status of <i>Prunus africana</i> population
	IUCN Category status Data Deficient (DD) .
Madagascar	Vulnerable. Poor recruitment, few young trees and poor compliance with Forestry regulations. This could improve under the National Action Plan for <i>Prunus africana</i> (6)
Malawi	IUCN Category status Vulnerable (VUA1cd) (2)
Mozambique	Data deficient.
Nigeria	Data deficient. Not recorded as a Range State by WCMC-UNEP, but small population may occur in this locality. Needs further investigation.
Rwanda	Data deficient. Populations probably secure in the Virunga mountains and Nyungwe forest unless commercial bark harvest starts.
Sao Tome e Principe	Data deficient, probably not threatened unless commercial harvest starts. Habitat destruction the biggest threat.
South Africa	Not threatened. Internal commercial trade in <i>Prunus africana</i> bark for traditional medicines, but most populations relatively secure
Sudan	Data deficient. Status unknown due to warfare, montane forests in upland grassland vulnerable to felling and fire.
Swaziland	IUCN Category status Endangered C2aD (2). Small populations vulnerable to bark exploitation for traditional medicine traded internally and cross-border trade to markets in Johannesburg, South Africa.
Tanzania	Data deficient. Status of populations unknown and needs investigation due to increased commercial trade.
Uganda**	Not threatened. Healthy populations secure in Bwindi-Impenetrable National Park and Kalinzu Forest Reserve.
Zambia	IUCN Category status Lower Risk-nt, widespread but uncommon habitat (2).
Zimbabwe	Rare and restricted to small montane forest patches in eastern Zimbabwe. Secure at present.

References: 1 = Friis, 1992; 2 = Golding, 2002; 3 = Songwe, 1990; 4 =Katende, 1995; 5 = Fa, 2000; 6 = DGEF, 2003; 7 = Tesfaye et al (2002); 8 = Sunderland and Tako, 1999.

3.5.2. Main threats

Table 3.- Mean threats of *Prunus africana* forests in Range State (Cunningham, 2006)

Range State	Main threats
Angola	Forest islands in montane grassland vulnerable to fire and clearing for farmland.
Burundi	Additional threats are deforestation and unregulated timber felling by pit-sawyers, both of which have been worsened by warfare
Cameroon	The spread of large scale commercial <i>Prunus africana</i> bark harvest to the Adamawa plateau is of serious concern. Forest clearing outside Forest Reserves is a major threat in these densely populated highlands.
DR Congo*	Kahuzi-Biega NP is declared a UNESCO World Heritage site in danger. Additional threats are deforestation and unregulated timber felling by pit-sawyers, both of which have been worsened by warfare. Hunting and fuelwood harvesting for or by Rwandan 0.5 million refugees has also been issue near Kahuzi-Biega.
Equatorial Guinea	Forests a focus of a massive bushmeat trade (5).
Ethiopia	Livestock and clearing of forests
Kenya	
Lesotho	Marginal habitat, forest patches vulnerable to fire.

Range State	Main threats
Madagascar	Forest clearing for farming, charcoal and fuelwood collection.
Malawi	Harvesting for medicinal bark and timber.
Mozambique	Habitat loss to clearing for subsistence farming.
Nigeria	Forest clearing for farming.
Rwanda	Forest clearing for farming, timber cutting by pitsawyers.
Sao Tome e Principe	
South Africa	
Sudan	Forest within the Imatong Mountains Central Forest Reserve, but not accessible due to warfare.
Swaziland	
Tanzania	
Uganda**	
Zambia	Fire and forest clearing.
Zimbabwe	Fire and clearing of forest habitat.

3.4.2. Harvest and International Trade in *Prunus africana* bark

Table 4 (Cunningham, 2006). Range States of *Prunus africana*, showing those countries which are exporting *Prunus africana* bark and those where only subsistence use of this tree species take place. Although *Prunus africana* is distributed in montane "islands" across Africa and Madagascar, restricted to high altitude (1500-3100m) montane forests in tropical Africa, many of which have been cleared for farming. Major exporting countries, in order of importance are Cameroon, Kenya, Madagascar, Equatorial Guinea (from the island of Bioko), followed by the DRC and Burundi. The most important importers are France, Italy, Belgium and Spain. Sources of information on uses numbered below.

Range State	Recorded Bark Export (1995-2004)	Export > 1000 kg /bark*/yr	Importing countries (Including re-exports)	Other uses of <i>Prunus africana</i> in Range State
Angola	NO	NO	-	No data, but subsistence use for fuelwood and traditional medicine likely
Burundi	YES	YES	Belgium, France	Traditional medicine, timber, fuelwood
Equatorial Guinea (Bioko)	YES	YES	Spain	No data
Ethiopia	NO	NO	-	Firewood, charcoal, poles, timber, medicine (leaves, bark), bee forage, mortars (1).
Cameroon	YES	YES	France, Spain, Canada*	Firewood, traditional medicine
DR Congo	YES	YES	Belgium, France, Madagascar, India	Firewood, traditional medicine, timber (2)
Kenya	YES	YES	France, China, USA	Timber for house building and furniture & traditional medicine (3)
Lesotho	NO	NO	-	Only 2 trees known, one of which has died (9)
Madagascar	YES	YES	France, Italy, India, Slovenia*	Fuelwood, charcoal, medicine
Malawi	NO	NO	-	Used for timber (4)
Mozambique	NO	NO	-	No data, but use for

Range State	Recorded Bark Export (1995-2004)	Export > 1000 kg /bark*/yr	Importing countries (Including re-exports)	Other uses of <i>Prunus africana</i> in Range State
				traditional medicine and fuelwood likely
Nigeria	NO	NO	-	No data
Rwanda	NO	NO	-	Fuelwood, timber, traditional medicine
Sao Tome and Principe	NO	NO	-	No data
South Africa	YES*	NO	Germany*, Netherlands*, Switzerland*	Commercially traded for traditional medicine (5)
Sudan	NO	NO	-	No data
Swaziland	NO	NO	-	Use for traditional medicine
Tanzania	YES	YES	USA, plus <5kg to Madagascar and South Africa	Firewood, charcoal, construction timber, poles, utensils (mortars), medicine (6)
Uganda**	NO	NO	-	Beer fermentation troughs ("beer boats"), traditional medicine, fuelwood, building poles, timber (2)
Zambia	NO	NO	-	No data.
Zimbabwe	NO	NO	-	Traditional medicine, timber (7, 8)

References: 1 = Bekele-Tesemma, 1993; 2= Cunningham, 1996; 3=Bentje, 1994; 4=Williamson, 1975; 5=Cunningham, 1993; 6= Mbuya et al, 1994. 7=Gelfand et al, 1985; 8=Goldsmith and Carter, 1992; 9= Golding, 2002.

Notes to Table 2 above: *Quantity 50 kg in 2003 for entire period (1995-2003). **In 1992, prior to CITES App.II listing, Uganda exported *Prunus africana* bark to France via Kenya, but this was stopped due to destructive effects on Kalinzu-Maramagambo Forest Reserve. Uganda has recently applied for a CITES permit. This needs to be considered with caution. The integrity of Kalinzu-Maramagambo Forest Reserve, which has high conservation value, but is under threat by illegal activity (hunting, charcoal burning, small-scale gold panning)) (Howard, Davenport and Balzer, 1996) and Bwindi-Impenetrable National Park has recovering *Prunus africana* stocks and vulnerable mountain gorillas populations, this recent request from Uganda needs to be carefully considered.

4. PRUNUS AFRICANA MANAGEMENT IN CAMEROON

4.1. National population size

Many independent inventories have been carried out in South west (Mount Cameroon) and Adamaoua (Tchabal Gang Daba and Tchabal Mbabo) provinces.

Two inventories were carried out in the Mount Cameroon (Ewusi et al. 1992, Tchouto 1996). Ewusi et al. (1992) recorded a total of 249 trees in 18 plots at between two and four elevations on seven transects. They estimated an average of 5.5 stems/ha of *Prunus africana* in Mount Cameroon. The population is not evenly spread on Mount Cameroon, with denser populations at higher altitude. While most of the 249 trees surveyed had survived debarking, some had died either from over-harvesting or from fire damage at the forest savannah boundary. The total exploitable population (with diameter 30 cm), was estimated at 3.5 stems/ha.

Tchouto (1996) reports the results from a general forest inventory conducted in 1992 in the Etinde Forest area, under the Limbe Botanic Garden and Rainforest Genetic Conservation Project. The density was 0.76 stems/ha with a mortality rate of 22%. The exploitable population is 7.2 stems/ha.

Results obtained from the recent inventories conducted within the project GCP/RAF/408/EC in the South west (Mount Cameroon and Mount Manengouba) and North west (Mount Oku) are presented as follow (FAO/SNV/CIFOR/ICRAFT 2008):

- Mount Cameroon: 11.40 stems/ha and 1.66 exploitable stems/ha;
- Mount Manengoumba: 1.89 stems/ha and 1.00 exploitable stem/ha;
- Mount Oku: 3.52 stems/ha and 3.35 exploitable stems/ha.

Inventories conducted by the National Office for Forest Development (Pouna & Belinga 2001) in two harvesting sites in the Adamaoua province revealed following results:

- Tchabal Mbabo: 12.29 stems/ha with 8.22 exploitable stems/ha;
- Tchabal Gang Daba: 2.15 stems/ha with 0.99 exploitable stems/ha.

The recent national forest resources assessment conducted by FAO/ICRAFT/SNV/CIFOR from 2003 to 2004 suggests the density of 0.01 stem/ha and the relative frequency of 0.00 % for *Prunus africana* in the whole country, which tends to show that this plant species is threatened in Cameroon (MINFOF - FAO 2005). This low density may be due to the fact that, the 2003 inventory covered many ecological zones of Cameroon, including those where *P. elata* does not occur. Also, this density includes trees with diameter less than 20 cm.

4.2. National population trends

Many authors outlined the decline in *Prunus africana* populations due to over-harvesting (Ewusi et al. 1992, Tchouto 1996, FAO/ICRAFT/SNV/CIFOR 2008). First observations regarding the declining of natural population inherent to overexploitation were made by Ewusi et al. (1996). Reports confirmed the fact that the natural population has suffered major damage from both legal and illegal exploitation (Ewusi et al. 1996), reducing the population from all previous inventory estimates by up to 50% in two years (1994 – 1996) (see fig. 2).

In 2007, the SNV Highlands in collaboration with the Western Highlands Nature Conservation Network (WHINCONET) assessed *Prunus* individuals in one transect of 3 km x 6 m covering the community forest of Emfveh Mii, Kedjem Mawes, meadows, and Mt Oku in the North west province (*Prunus* platform Meeting Report, Bastos Yaoundé, 16 January 2008). This work aimed to assess the impact of the exploitation on the fate of *Prunus* trees. Results indicated that about 90% of trees have been harvested using irrational techniques (debarking from roots to the branches) and 25% of those trees died or were dying.

Data compiled from the 1995 inventories conducted in the Mount Cameroon showed that the summit of the curve of overall distribution by diameter class was at 40-50 cm diameter class (Sunderland and Nkefor 1996), while the 2008 inventory revealed that this summit was reduced to 20-30 cm diameter class (FAO/SNV/CIFOR/CRAFT 2008) in the same area (Figure 3a and 3b), which is a reduction of two diameter classes. This means that, the populations of *Prunus africana* are continuously declining due to over harvesting and inadequate techniques practised. Mature trees have been destroyed following over exploitation with inadequate harvesting techniques such as debarking and total cutting.

Several threats can be observed for *Prunus africana* in Cameroon: habitat loss/degradation, inadequate techniques of harvesting, over harvesting.

Prunus bark exploitation started in 1972, and many trees around the Mt. Cameroon have been exploited several times with four-year intervals. Legally for all trees above 30 cm dbh, only two quarters of the bark are taken from the main stem up to the first branch. However, since 1985, many people were involved in the exploitation and the harvesting was done by untrained villagers. Many trees were debarked up to the smallest branches and others were felled with negative impact on the limited wild population of this tree species.

Forest clearance leading to population fragmentation, slash and burn cultivation, burning of the upper grassland, and commercial plantations are said to be also threats for *Prunus africana* (Ndam 1996).

Annual quotas proposed for the sustainable exploitation of *Prunus africana* in the Adamaoua province was 493 tons/year (Pouna Belinga 2001). These quotas are not currently applicable, due to over harvesting.

To promote the conservation of *Prunus* in the North west province, some initiatives (Birdlife project, and SNV) have assisted local people in the process of community forests. The problem is that, the harvesting campaigns were not monitored in good manner. Many of those community forests were totally debarked, before their simple management plans have been approved by the forest administration.

Although available data do not allow to establish the decline in extent area of occurrence, it is clear that *Prunus* population decreases over the time in Cameroon in term of tree density, declining in area of occupancy, decline in habitat quality, and decline due to actual level of exploitation. In Cameroon, *Prunus africana* can therefore be considered at least as **an endangered plant species according to population reduction as outlined in the IUCN check list for Non-Detriment Findings (IUCN 2001)**. This explains the ban recently pronounced by the European Commission on Cameroon's *Prunus*.

4.3. Management measures

4.3.1. Management history

4.3.1.1. THE LEGAL FRAMEWORK

Some important official texts drawing the legal framework for the exploitation of *Prunus* are presented in table 5.

Table 5. Important official Texts

Reference number	Date of Signature	Observation
Decree No. 74/357	17 April 1974	(Sections: 74, 97, 98) to regulate the exploitation of medicinal plants. - a "factory (cahier d'entrée des produits à l'usine) to monitor the quantity of bark which enter the factory was made available.

Reference number	Date of Signature	Observation
Law No. 81-13	27 November 1981	To lay down Forest, Wildlife and Fisheries Regulations
Decree No. 83-69	12 April 1983	To lay down Forestry Regulations
Arreté No. 11/A/MINAGRI/DF/SEF	28 February 1991	To ban the exploitation of <i>Prunus</i> in Cameroon (except Plantecam)
Arreté No. 48/MINAGRI/DF	14 February 1992	To lift ban on the exploitation of <i>Prunus</i> exploitation
Decision No. 0045/D/MINEF/DF	11 January 1993	To ban felling in the exploitation of <i>Prunus</i>
Law No. 94/01	20 January 1994	To lay down Forestry, Wildlife and Fisheries Regulations
Decree No. 15/531/PM	23 August 1995	To lay down forestry Regulations
Decision No. 0336/D/MINFOF/DF	06 July 2006	To fix the list of special products of a "particular interest"

4.3.1.2. PROCEDURE FOR THE EXPLOITATION OF *PRUNUS AFRICANA* ACCORDING TO THE LAW NO. 81-13 OF 27 NOVEMBER 1981 (FORMER LAW)

Any person or Company interested in the exploitation of *Prunus* had to be holder of a special permit. They had to submit, and file an application to the Ministry in charge of Forest.

Attached documents

- 1) Stamped application specifying:
 - a. full name, nationality, occupation and place of residence (for individuals);
 - b. name, articles of Association, Head Office, Registered Capital and its distribution, and name of the Director or Manager (for companies).
- 2) The capita
- 3) Invested (Attestation):
- 4) The investment plan and the financing guarantee (means of transportation envisaged, existing storage facilities and other facilities to be set up. Measures taken to process part of the products locally).
- 5) List of species and quantities to be exploited as well as the location.
- 6) A statement of honour stipulating that the applicant has acknowledged the laid down regulations; that he undertakes to respect them and to co-operate with the forestry services.

In case of renewal of permit the attached documents are as follows:

4. A stamped application;
5. a copy of a former permit;
6. Receipts testifying the payment of the registration fee and the selling price of the product;
7. Copies of certificates of origin if the holder exports the product;
8. A detailed report of the activities of the previous season, specifying the quantities of products exported or produced locally.

The application was forwarded to the Minister in charge of forest (Ministry of Agriculture) with comments from the Provincial Chief of forestry (Conservator of Forests).

The special permit was issued by the Minister in charge of forest following recommendations of the technical commission.

Holders of special permit had to obtain from Forestry services specifications whose clauses indicate:

- the conditions of exploitation of the products;
- the conditions of transporting them;
- the terms and conditions of paying taxes.

The permit was notified by the Provincial chief of Forest (Conservator of Forest) following the presentation of a copy of the permit and the receipt of payment of taxes. (This was not however stated in the law).

4.3.1.3. PROCEDURE FOR THE EXPLOITATION OF PRUNUS ACCORDING TO THE CURRENT LAW (REPUBLIC OF CAMEROON 1994, 1995).

The procedure is almost the same with only two main changes:

1. The applicant must be granted approval first for forest exploitation activities;
2. The Provincial Chief of Forest must attach his technical report. This technical report specifies the species to be exploited, their quantities as well as the area and the harvesting modalities.

According to Ndibi (1996), three main causes explained the irrational exploitation of *Prunus africana* in the Mount Cameroon.

4.3.2. Management plan

If the Cameroon policy is sufficiently well defined for what concerns timber, wildlife and more recently community forestry, the policy concerning Non timber forest products (NTFPs) remains globally vague and lack of some precisions (Betti 2004).

Although the Cameroon Government has recognised the promotion of NTFPs as a means to alleviate poverty in rural areas and to generate revenue for the national economy, no adequate management regimes have been developed.

Cameroon Government distinguishes therefore two categories of Non timber forest products. The first group is composed of non timber forest products that the Government does not require any taxes from the harvesters, and the second group is those products from which the Government perceives taxes from any person willing to harvest or commercialize them. *Prunus africana* belongs to the second group, also known as "special products".

The exploitation of special products is regulated in Cameroon mainly by the forest administration, Ministry of Forest and Wildlife. Two main Directorates are concerned in this administration: the Directorate of forests is in charge of the management of the resource, while the Directorate of promotion and processing is concerned with the valorization of that resource. The Ministry of Economy and Finances ensures the collection of taxes and fees through the Forest Revenue Enhancement Program (FREP). The only tax fixed till date by the national financial law for the exploitation of special products is called the regeneration tax, which is 10 FCFA/kilogram of the product (1 euro = 650 FCFA), while the fee perceived is 5% of any product exported.

Prunus africana has been recognized as a "special product with particular interest". The article n° 2 of the Decision n° 0336/D/MINFOF of the 06th July 2006 giving the list of "special products with a particular interest" states that, those are products that are relatively less abundant in the forest or for which some additional measures are indispensable, due to the threatening caused by the non sustainable harvesting

methods used by harvesters. The quotas of “special products with particular interest” are granted by an inter-ministerial commission comprising representatives from the forest administration, environment, research, finance, and other administrations.

In addition, the forest administration has identified *Prunus africana* as one of the six most important NTFPs in Cameroon that needs to be promoted for socio-economic development.

Prior to 1987, Plantecam Medicam, as it was known then, operated within a strict monopoly in the exploitation of *Prunus africana* in Cameroon. They set and adhered to strict harvesting guidelines such as no felling and no girdling but only the stripping of opposite quarters of the tree to allow for bark regeneration. Thereafter, a breakdown in this monopoly came with the issuance of licenses to a number of companies and individuals. This led to a dramatic increase in field operatives working in an area with corresponding increase in unsustainable practices, notably the felling of trees, total bark removal and non-respect for quotas set.

The lesson to be learnt here may be that increasing commercial competition without putting in place adequate management regimes, based on sound inventory data may probably lead to a corresponding increase in the amount and intensity of bark exploited. Therefore, the issuance of permits is not necessarily a guarantee of sustainability, especially when permits are issued with no harvesting controls being implemented (Sunderland and Tako, 1999 cit. Tieguhong & Ndoye 2004).

4.3.3. Restoration alleviation measures

4.3.3.1. EVOLUTION IN THE ALLEVIATION MEASURES ON PRUNUS

Moreover, the forest administration has often shown a great concern for the sustainable exploitation of *Prunus africana*. This concern could be well illustrated by the frequency of the regulation changes since 1972, suggesting that the administration is in permanent searching for the best way to manage the resources.

These changes and measures include among others: the conception of a field book in 1986 (Ndibi 1996), and recently in 2007 (Akagou 2008, Betti 2007). This field book enables the forestry services to monitor the exploitation weekly.

The partial ban of *Prunus* exploitation of 1991 which was lifted in 1992, the ban of felling decided in 1993, and the reduction of quotas in 2008 following the ban on the importation of Cameroon's *Prunus* in the Europe, after the decision undertaken by the European commission in October 2007.

But, even when the regulations were quite good, they were unfortunately insufficiently implemented, or not at all. Most often, the measures were prescribed only in the face of a tragedy such as the recent destruction of *Prunus* in Mount Cameroon and North west, when the tendency was to consider only the immediate causes, forgetting the root of the problem. For example, despite the official ban in 1991, a greater quantity (3900 tons) of *Prunus africana* was harvested and exported between 1991 and 1992 than in any preceding year, indicating the lack of law enforcement and a high level of corruption in the production zone (Cunningham, 1997 cit. Tieguhong & Ndoye 2004).

Concerns on the future of *Prunus africana* led to its listing in Appendix II of the Convention on International Trade in Endangered Species of wild Fauna and Flora (CITES) in 1994, becoming effective in 1995 (Sunderland and Tako, 1999 cit. Tieguhong & Ndoye 2004). The impact of listing *Prunus africana* by CITES has been partially effective in reducing threats because it has helped to raise awareness about the problems posed by international trade. Several nongovernmental, governmental and international bodies were involved in programmes to promote sustainable management of wild populations, cultivation and monitoring of the trade. For example, for some years the Mount Cameroon Project has been working with villagers to promote the sustainable management of *Prunus* South west provinces. Villagers were involved in monitoring the forest to guard against *Prunus* poachers and to help ensure,

in the event of legal harvest, that only a part of the bark is removed (Ndam, 2004 cit. Tieguhong & Ndoye 2004).

Same initiatives were conducted in the North west province by the Birdlife International. Birdlife initiated two main projects in the North west province. The first project led from 1987 to 1992 and covered 10 000 ha in the Bui division, while the second project led from 1992 to 2004 and covered the same area in the Boyo division. The project aimed to protect the mountain forests as the principal habitat of two birds, endemic and threatened in the Mount-Cameroon: Banded-water eye and Banama Touraco. For this, the project focused its activities on the conservation of *Prunus africana*, important plant species for local people and for the two birds. The project adopted two main approaches: delimitating the perimeter of the 20 000 ha of the forest covering the two divisions by a *Prunus* hedge and promoting the rural forestry.

Prunus africana was planted together with *Podocarpus sp*, another useful plant species for local people, along the perimeter of the forest using a distance of 5 m within the trees.

The strategy of the rural forestry consisted of encouraging villagers in the domestication and development of *Prunus* plantations in their own forests. For that, the project confectioned nurseries from seeds, and distributed seedlings or small plants of 8 months (high to 50 cm) to villagers. To encourage villagers to plant and conserve their *Prunus* against the bush fires and against cheeps (cheeps appreciate to eat seedlings and young *Prunus*), the project provided incentives to those of the villagers who presented good results. The incentives were as follow: 25 FCFA/plant at the end of the first year, 15 FCFA/plant at the end of the second year, 10 FCFA/plant at the end of the third year, and 5 FCFA/plant at the end of the fourth year. The idea here was to allow the young plants to attend a certain age and high as to be able to resist to the concurrence of undesired plant species. The dead plants were not paid. So, the villagers built fences to protect their plantations against bushfire, identified as one of the main threat on *Prunus* in those humid savannas.

Birdlife project also trained local people on the suitable techniques of harvesting of the barks of *Prunus*, such as: harvesting trees of at least 17 years old, move the ½ opposite side, and return 4 – 6 years later to move the remaining sides on the same trees. According to Mr NKENGLA, the local divisional delegate of forest and wildlife for the Bui division who has been working for the Birdlife project for a long time, research activities conducted within the Birdlife project revealed that the length of the rotation varies with the zone (division). Hence, in the Boyo division where the weather is too hot, results obtained tend to show that the harvester can return to the same tree after 4-5 years, while in the Bui division where it is too cold, this harvester must wait 5-6 years before returning back to the same tree. At 15 -17 years old without any fertilizer, *Prunus* can reach a diameter of 30-35 cm at high breast.

The problem is that, the villagers did not feel responsible for the development of those plantations. They did not wait till the plants get 17 years old as suggested before engaging in harvesting their *Prunus*. This exploitation started early by 1999 – 2000 (at 12-13 years old), so the product was not good in term of both quantity (volume of the barks) and quality (concentration on active compound). By 2002, so 15 years after the first plantations have been settled (1987), the forest administration who was working in partnership with the Birdlife project, initiated a circular letter asking to villagers to wait the control of the forest officers before harvesting their *Prunus* barks. The terms used in this letter were not appreciated by the villagers, who thought that the forest administration was trying to have the total control of their plantations. Also, the problem of distinction between the conditions of harvesting domestic *Prunus* and wild *Prunus* was not clarified by the forest administration. According to the current forest legislation, products of domestic origin are not subject to the payment of the regeneration tax. This tax is only required for the wild *Prunus*. But the forest administration has never applied this in the field. As a consequence of all those problems, villagers started engaging negotiations with some companies to harvest their

Prunus out of the control of the forest administration. Villagers sold their plantations to the companies who used easily to fell trees and move the maximum of barks. The price of tree varied from 4000 FCFA to 8000 FCFA, while that of the kilogram of the barks oscillated between 60 FCFA and 100 FCFA.

For the *Prunus* hedge strategy, the trees were destroyed more early, at 8-10 years old, than the rural forestry strategy. Villagers knew that the *Prunus* hedges did not belong to a specific person, but to the forest administration or to Birdlife. They therefore decided to destroyed those plantations and sell the products to companies, which illustrates once again the problem of lack of responsibility observed for those *Prunus*.

It is in such a situation that all the *Prunus africana* trees planted by the Birdlife project and villagers were destroyed in the North west province.

By 2000, when the planted trees were destroyed in the two former strategy, Birdlife profit of the clauses of the new forest law (Republic of Cameroon 1994, 1995) and the publication of the manual of procedures for community forests. The project therefore decided to experiment a third strategy, which was the community forestry. This strategy aimed to enhance the implication of villagers in the forest management, to enhance the appropriation of their plant trees, and to facilitate the transition between the project management phase and the local community management phase.

To make the villagers more responsible of their trees, Birdlife divided the 20 000 ha of the space in 17 community forests, with the *Prunus* exploitation being the main activity to conduct in those forests. As an international NGO, Birdlife made lobbying towards other NGOs and international organisms to ban the exploitation of *Prunus africana* barks in this forest. All was done well, as planned, since the forest administration did not allocated any special permits for *Prunus* in this forest. Birdlife financed and assisted local communities in the development of the simple management plans of those community forests. The first management plans were developed in 2002, the last in 2003. The inventories conducted for drafting those plans were the multi-resource inventories types, consisting mainly of prospecting the forest. The beginning of the activity in the community forests is conditioned by the approbation of the simple management plan and the signature of the management convention by the forest administration. Birdlife incited the forest administration to quickly approve those management plans and sign the convention. But the condition made by the forest administration was that, Birdlife should assisted communities in the realization of a fair and rigorous systematic inventory (at 100%) in each forest, before the villagers begin to harvest. This was possible, since the Birdlife project was planned to end by 2008. The five-years management scheme drawn in each simple management plant was as follow:

- year 1 (2003): organization of the community;
- year 2 (2004): systematic inventory (100%) of the community forest;
- year 3 (2005): research of the market, waiting that the forest administration approves the inventory;
- year 4 (2006): beginning of the exploitation of *Prunus* barks in the forest;
- year 5 (2007): exploitation of *Prunus* barks continues.

The problem is that, in 2004, the Birdlife project was closed. The only project on which was built all the hopes of the local populations ended, before the villagers have realized the systematic inventories planned the same year (2004). Local people started therefore to harvest the *Prunus* in their community forests with irrational techniques. Villagers faced the lack of funds to realize the systematic inventories.

Some communities such as the Emfveh-mii Forest Management Common Initiative Group (EMIFOMA) were assisted by the local forest administration to conduct their systematic inventories and win their annual certificate of exploitation. But these inventories were not conducted in fair manner. It consisted mainly to "the research of the resource", than to a systematic inventory. Only trees with diameter 35 cm were

counted. In spite of those weakness in the realization of the inventory, the forest administration delivered the annual certificate of exploitation to EMIFOMA. It is in such a way that, many community forests received their annual certificate of exploitation, which will be in the future detrimental to the conservation of the resource in the North west.

By 2005, some companies which exploit special products were informed by the departure of the Birdlife project. They also were informed by the existence in the area, of many community forests which were under management convention with the Government. And the companies were informed of the detention by those communities, with the annual certificate of exploitation. The companies therefore made pressure to the forest administration, to obtain to exploit *Prunus* barks in these zones. By February 2006, the forest administration signed four special permits to the following companies: CEXPRO, CATRACO, NNA & SONS, and FONGANG. Harvesting of *Prunus* barks began well, and the funds generated from the exploitation were used to develop community projects.

The problem is that, in two permits (FONGANG and NNA & SONS), the precision was not made to the target community forest. The forest administration has just put, the Kumbo forest, in the Bui division. This detail encouraged those companies to practice illegal harvesting, with some villagers. In fact, some villagers who were not satisfied with the way by which the funds raised towards the exploitation of the community forest, were used, used to return in the forest by night and move barks on the sides left by legal harvesters during the day. The poachers, used to sell their products to the two companies (FONGANG and NNA & SONS), which was detrimental to the conservation of *Prunus* in the North west province.

Also, legal permits holders used to stay far from the harvesting sites, often in the city of Kumbo. Some poachers used to come to Kumbo to sell their products to these permit holders. The permit holders were not often in the field to control and monitor the harvesting of barks. Due to the weakness observed in the realisation of the systematic inventories, many communities have finished all their *Prunus* potential before the term of the management plans in the North west province. The local forest services did not undertook any control.

The SNV Highlands in collaboration with the Western Highlands Nature Conservation Network (WHINCONET) examined the impact of the exploitation on *Prunus* trees (*Prunus* platform Meeting Report, Bastos Yaoundé, 16 January 2008). About 90% of trees have been harvested using irrational techniques (debarking from roots to the branches) and 25% of those trees died or were dying, which confirms what is saying here.

Following what precedes, it can be observed that both legal and illegal exploitation have led to the destruction of *Prunus* population in the North west province.

It was hoped that these and similar efforts made by both the Mount Cameroon project in the South province and the Birdlife project in the North west province, will suffice to ensure that future supplies of the bark are harvested in sustainable ways. But it was not the case, since these efforts stopped with the close of those projects.

Unsustainable harvesting of *Prunus* was also observed in the Adamaoua province where some sites hosting *Prunus* have been totally destroyed due to high poaching (Akagou & Betti 2007).

The lesson to be learnt here may be that inviting local communities to earn the community forests is not enough. The Government may explore associated measures to assist these communities in the development and implementation of those management plans.

4.3.3.2. SIMULATION OF SUSTAINABLE YIELD OF *PRUNUS AFRICANA*

Simulation of sustainable yield of *Prunus africana* was proposed for the Thabal Mbabo and Tchabal Gang Daba in the Adamaoua province (Pouna & Belinga 2001) and for Mount Cameroon in the South west province (Ewusi et al. 1996).

In the two provinces, a prediction of the sustainable yield of *Prunus* bark was made from estimates of the natural population, the average yield per tree and the length of time between successive debarkings required to allow total recovery of the bark.

$$Y_s = (D \times A \times H)/R.$$

Y_s = sustainable yield of bark per annum for the area;

D = population density of exploitation trees (stems/ha);

A = area of exploitable forest containing *Prunus*;

H = average sustainable yield of bark per tree (kg freshweight/tree/harvest);

R = rate of total recovery of the bark (in years).

In Mount Cameroon, quotas proposed are presented in table 6.

Table 6. Sustained Yield calculation in Mount Cameroon: most pessimistic and most optimistic estimates (Ewusi et al. 1996)

	(D) Population density (stems/ha)	(A) Area of exploitable forest (ha)	(H) Sustained yield per tree (kg)	® Rate of recovery (years)	(Y _s) Sustained Yield (tons/year)
Lowest Estimate	3.5	12 000	55	7	330
Highest Estimate	7.2	18 000	137	4	4 438

Estimates from the results of inventory conducted in the Adamaoua province are presented in table 7.

Table 7. Sustained yield calculation in the Adamaoua province (Pouna & Belinga 2001)

	(N) Exploitable stems	(D) Population density (stems/ha)	(H) Sustained yield per tree (kg)	® Rate of recovery (years)	(Y _s) Sustained Yield (tons/year)
Tchabal Mbabo	833	8.22 (5.45 – 11.57)	55	10	493.6 (at the lowest estimate)
Tchabal Gang Daba	29	0.99 (0.41 – 1.57)	55	10	8.8 (at the lowest estimate)

For the both provinces, a wide range was extremely observed between the lowest estimate and the highest estimate, illustrating the lack of information on the size of the population (3.5-7.2 stems/ha in Mount Cameroon, 0.41-1.57 in Tchabal Gang Daba and 5.45-11 for Tchabal Mbabo), the sustained yield per tree and the rate of recovery of harvested trees. The calculation for Mt-Cameroon was based on inventory data from 1992, which have already been criticised (Cunningham and Mbenkum cit. Ewusi et al. 1996) for being biased towards the areas rich in *Prunus africana* thus giving over-estimates of the average population density over the licence area. Moreover, up to 50% have been reported to be dying or already dead, due to previous over-exploitation. Large scale felling by illegal exploiters has also taken place in extensive areas (Ewusi et al. 1996).

The Tchabal Gang Daba site has never been subject to any exploitation. Trees were not debarked. But the Tchabal Mbabo site has been subject to large and irrational exploitation. Poachers attacked trees (23.67%) with diameter less than the minimum

exploitable diameter (MED) fixed by the forest administration and which is 30 cm. Further, 11.3% of trees were fell or totally debarked till branches (Pouna & Belinga 2001).

Comparison of harvests with estimates of sustainable yield in Mount Cameroon

1970s to 1994

During this period exploitation was done by Plantecam employees from the west province, and the quantity granted in their exploitation licence was 6 500 tons over a period of five years (1 300 tons/year). This quota was initially given for three provinces including South west, North west, and West. But at subsequent renewal, this same quota has been maintained for much restricted zone of Mt-Cameroon. Available data from Plantecam records indicated that they have been exploiting below this figure. The estimated yields for ten year period are 4.478 tons, or 448 tons per annum (Ewusi et al. 1996).

1994-1996

Since June 1994, a major outbreak of illegal exploitation has considerably increased the offtake of bark of *Prunus* from Mt-Cameroon. From their figures, during the period 1 January 1994 to 30 June 1995, Plantecam harvested 1 388 tons of bark. This corresponds to an annual harvest of 926 tons (Ewusi et al. 1996).

During almost the same period (June 1994 to December 1995), reports from villages around Mt-Cameroon estimated a further 884 tons of bark exploited illegally. This corresponds to an annual harvest of 590 tons (Ewusi et al. 1996).

Thus over 1994 – 1995, total annual exploitation levels from Mt-Cameroon have increased to 1.516 tons per annum. This is more than three times higher than the previous exploitation level of the previous ten years, and is much higher than the lower estimate of the sustained yield from Mt-Cameroon which was 330 tons/year.

Reports confirmed the fact that the natural population has suffered major damage from both legal and illegal exploitation (Ewusi et al. 1996), reducing the population from all previous inventory estimates by up to 50% in two years (1994 – 1995).

4.3.3.3. SYNTHESIS AND RECENT ALLEVIATION MEASURES

Data discussed in the precedent section tend to show that, the exploitation of *Prunus africana* has never been conducted in sustainable manner in Cameroon, in spite of the effort made by the forest administration.

The development of simple development plans for the sustainable harvesting and trade of *Prunus* and other special products remains the gap and the challenge for the Cameroon Government.

Sustained yields of bark must be based on more accurate up to date estimates for all factors in the equation. It must also err on the side of caution given the uncertainty surrounding the rates of recovery of trees subject to 50% bark removal. Until these accurate figures are available from inventories and further studies, no quotas should be authoritatively given for any area.

Since 2007, the forest administration took some important measures to alleviate poaching in the exploitation of *Prunus africana*. These measures include: the restoration of the field book for the companies and harvesters, the instauration of specific way bills for the circulation of Special products, the erection of an important part of the Mount Cameroon in national park, and the reduction of quotas granted for *Prunus*.

5. UTILIZATION AND TRADE

5.1. Different uses

In Cameroon, *Prunus* is used in traditional medicine and for confectioning different materials.

The use for medicine varies between regions. In the North west, the leaves and roots, along with bark, are used to treat fever, as an infusion in hot water. In the Mt-Cameroon region, an infusion of the bark is used to treat chest infections or as a tonic. A tea from the bark is drunk in significant – unspecified – quantities. The patients epiglottis is then stimulated with the feather of a cock to induce vomiting (Sunderland and Nkefor 1996). *Prunus* was identified as the fourth most popular plant species used to treat malaria, fever and stomach ache around the Mt-Cameroon (Jeanrenaud cit. Ndam 1996). The bark is the major source of an extract used to treat benign prostatic hyperplasia, an increasingly common health problem in older men in the western world. Bark extracts contain fatty acids, sterols and pentacyclic terpenoids (Cunningham and Mbenkum 1993). The drugs processed from the bark extracts are sold under the brand-name of "Tadenan" in France by Laboratoire Debat, "Pygenil" in Italy by Idena Spa, and "Proscar" in UK by Merck Sharp and Dohme Ltd (ICRAFT cit. Nouhou Ndam 1996).

In both North west and South west provinces, the timber is valued as hoe, pick and axe handles. The poles are used for fencing and the wood is also used as firewood and for charcoal. The wood is hard and heavy, weighing about 720 to 768 kg/m³ when dried (Sunderland and Nkefor 1996, Vivien et Faure 1985).

Although some villagers have planted *Prunus* in their forests, the important quantity of bark currently export comes from wild populations.

5.2. Harvest and international trade in *Prunus* bark

5.2.1. Attribution of quotas

Plantecam was the largest single exploiter of *Prunus* bark in Cameroon. This firm had the monopoly on exploitation until 1987 (Table 8).

Table 8. Quotas of *Prunus* attributed to Plantecam company between 1972 and 1986 (Ndibi 1996).

COMPANY	QUANTITY	YEAR	AREA
PLANTECAM	500	1976	NWP, SWP
PLANTECAM	500	1977	SWP
PLANTECAM	500	1978	NWP
PLANTECAM	500	1978	SWP
PLANTECAM	500	1979	NWP
PLANTECAM	500	1979	SWP
PLANTECAM	500	1980	NWP
PLANTECAM	200	1980	W
PLANTECAM	300	1980	SWP
PLANTECAM	1000	1982	NWP, SWP, W
PLANTECAM	800	1983	NWP, SWP, W
PLANTECAM	1300	1986	NWP, SWP, W

Plantecam had an interest in protecting the existing resource and adhered to the forestry Department recommendations for bark stripping.

The economic crisis in the latter half of the 1980s and the structural adjustments implemented subsequently contributed in enhancing massive forest operations (both timber and non timber forest products) and accelerating the forest degradation. All economic sectors being affected by the crisis, the forest sector (timber and non timber

forest products) sector was representing the one that was still going well and was attracting everybody. The importance of the forest sector at this period did not only attract formal companies, but also citizens from towns and villages, thus leading to the proliferation of illegal logging and poaching in *Prunus africana*.

As a result of the high demand, in 1987, 50 new licences were issued to contractors who began to sell to Plantecam themselves. This led to an increase in exploitation, much of it uncontrolled.

The 50% devaluation of CFA, was now worth only 400 CFA. It then became far more profitable for other companies, especially in Italy, to import bark from Cameroon. The national contractors, eager to supply, began to exploit *Prunus* bark around Mount Cameroon. The majority of this exploitation was illegally undertaken with entire trees being felled and/or stripped completely (Sunderland and Nkefor 1996).

Table 6 presents the quotas (tons) of *Prunus* barks attributed by the inter-ministerial Commission for quotas for the period 2004 – 2007.

A total of 33 companies have been authorized to exploit *Prunus africana* between 2004 and 2007 (table 9). Some 6 544 tons of barks were granted to those companies, with the year 2005 being the most important in terms of the quantity of bark (2000 tons).

Table 9. Attribution of quotas (in tons) in *Prunus* to different companies by the Inter-ministerial Commission of Quotas from 2004 to 2007.

COMPANY	YEAR-2004	YEAR-2005	YEAR-2006	YEAR-2007	TOTAL
ETS EFFA JBP & Cie	50	50			100
ETS ERIMON	50	75	50		175
ETS ESSAM & FILS		10			10
ETS ESSAMA	10				10
ETS FONGANG & FILS	30	100	50		180
ETS IK NDI & BROS Enterprise	50	50			100
ETS KAMDEM	30				30
ETS KOPGUEP	50	50		44	144
ETS MEDOU NJEMBA & FILS	50	50	40		140
ETS NAH & SONS	50				50
ETS NFORKEMBA	20	5			25
ETS NGAH DIMA DAMIEN	50	50			100
ETS NGAKO & FRERES	50	50			100
ETS NGUENANG EMMANUEL	50	50	20		120
ETS SOCAMBA	20	20			40
ETS TAY & FRERES	20	20			40
STE AFRICA PHYTO INTERNATIONAL	50	200		160	410
STE AFRIMED	500	500	520	550	2070
STE BOIS & METAL DU CAMEROUN			50		50
STE CATRACO	100	100	10		210
STE CEXPRO	100	100		200	400
STE CRELICAM	20				20
STE GENERALE DES PRODUITS				300	300
STE ITTC	100	100		50	250
STE MARCO				20	20
STE MOCAP		100			100
STE MPL	100				100
STE MUKETE PLANTATION		100	10		110
STE PHARMAFRIC			170	170	340

COMPANY	YEAR-2004	YEAR-2005	YEAR-2006	YEAR-2007	TOTAL
STE PRODEGON				20	20
STE SACO	50	50			100
STE SGPA	150	150	340		640
STE SIFAM	20	20			40
TOTAL	1770	2000	1260	1514	6544

As it can be observed in figure 2, the number of companies decreases from 2004 (25 companies) to 2007 (9). Many companies which have not paid their taxes for the previous years were eliminated by the Commission.

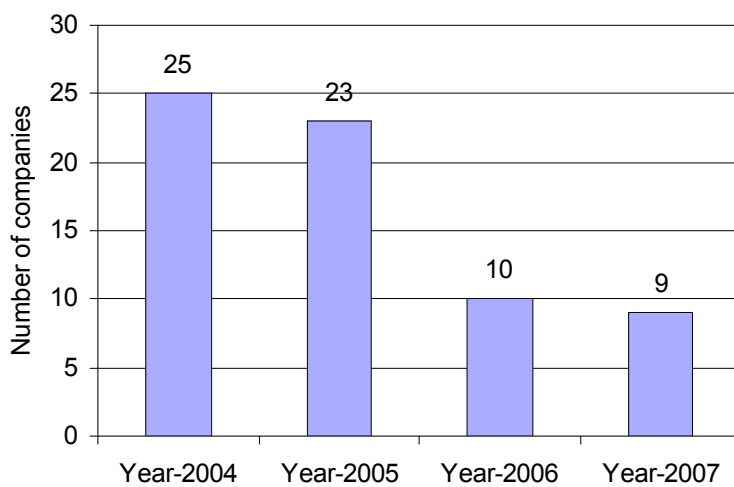


Figure 2. Distribution of number of companies per year

Figure 3 illustrates the relative importance of companies in term of percentage of quotas attributed during the four years. Only the ten most important companies were selected. AFRIMED (31.63% of quotas) and SGPA (9.78%) appear to be the two most important companies to whom the Government has allocated quotas for *Prunus* between 2004 and 2007.

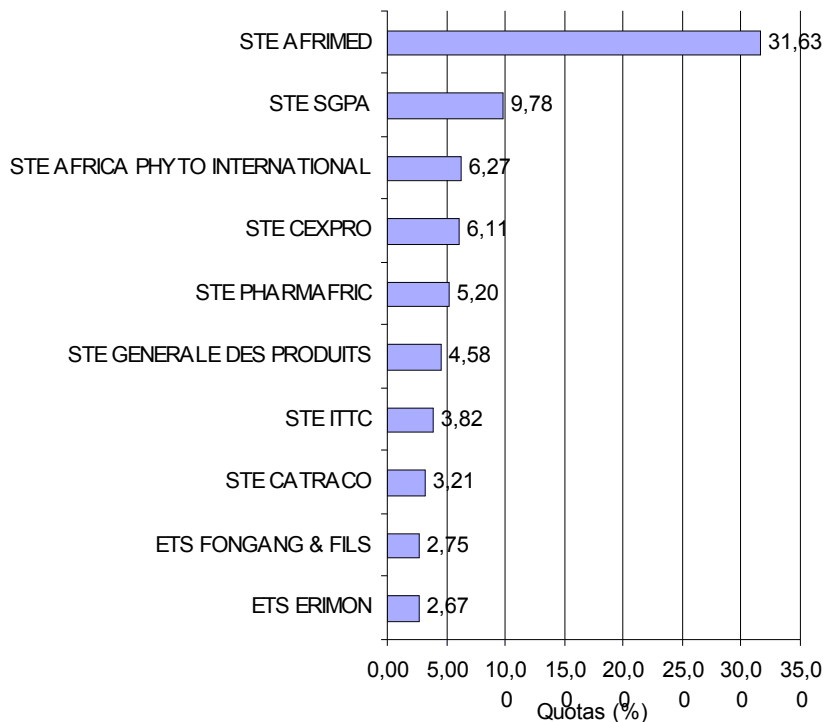


Figure 3. Relative importance of companies according to quotas allocated between 2004 and 2007.

5.2.2. Harvest zones, seasons and harvesting techniques

Informations presented in this section are based on my own experience, following the monitoring mission which I participated in 2007 (Akagou et Betti 2007). Permits for *Prunus* barks as for other special products are granted to companies for one year. The area of exploitation is vague, just at the level of the province. Before, permits were allocated for three provinces: West, North west, and South west. Now, those permits are restricted to the two last provinces. Nothing is said about the precise site where the product may be collected. This is one of the causes of weakness in the actual system of control and monitoring at the local level.

The season of harvesting is not specified also in the permits. This depends on the conditions of the milieu. For example, exploitation on Adamaoua can only be possible during the dried season, due to the bad conditions of roads. This problem was largely outlined by Mr MBIYNDZENYUN Julius, a representative of the company AFRIMED, one of the two societies who are working in harvesting *Prunus* barks in the Adamaoua province. Mr MBIYNDZENYUN Julius, 34 years old, is the Chief of exploitation of AFRIMED. He was sent in Banyo (Adamaoua) in 2003 Contrary to the North west and South west provinces where vehicles can reach the site of harvesting for transporting products, in the Adamaoua the situation is too difficult, mainly in the Mayo Banyo and Faro Idéo divisions. The only vehicle which is used in these zones is called "STYR". This is a sort of military truck which is used in dried season to climb hills and transport barks. Due to the bad conditions of the roads, some stocks of *Prunus* barks are often abandoned in the forest. The dry season is the suitable period for harvesting *Prunus* barks in the Adamaoua hills, during the month of April, May, June, and rarely December.

For Mr MBIYNDZENYUN Julius, the stems of *Prunus* are harvested at 1 m height, until the first large branch, and only on trees of 30 – 40 cm of diameter. The first harvesting collects the first ½ of the stems at opposite sides. The harvester may be careful and should avoid to injure the sapwood. The second harvesting comes to the same stem after 4-5 years to collect the remaining ½ of the barks at the other opposite sides. This

time (4-5 years) is known to be enough to allow the two former sides which were debarked to regenerate a little bit as to permit the tree to resist to the second harvesting. The regenerate side can also be used, but according to Julius, the juice (active compound) is not yet good for medicines. Also, the quantity of the barks is still small for exploitation. The minimum period required for a bark to regenerate and be good for harvesting is 8 years.

The problem is that, these regulations are not often practised in the field by harvesters. The chain of harvesting of *Pygeum* in the Adamaoua province is as follow (table 10): the harvester – the Chief of team (chief of harvesters) – the Chief of exploitation - the Representative of the company – the Director of the Factory (Company).

Table 10. Chain of exploitation of *Prunus* in the Adamaoua province, from the tree to the factory

Level	Task
Harvester: often from the North west origin, "anglophone people"	He is based in the forest. He removes barks from trees; transports the barks first to the forest park and then to the Car. Sometimes they can transport the products on 15 km before reaching the car.
Team Leader	He is based in the forest and more often in the surrounding villages. He coordinates the work of harvesters; dresses the financial report for any harvester for the Company
Chief of exploitation	He is based in the city of Banyo. He ensures the liaison between the harvesters and the representative of the company. He supervises the job of two to three teams of harvesters in the area. He goes to the forest once a month to pay the harvesters, distributes logistics (goals, cutlass, ...) and food, and transport the green products from the hills (forest) to the city of Banyo by a specific vehicle called "STYR". This car of about 2.5 tons is often rented at 150 000 FCFA/tour. In Banyo, the Chief of exploitation dries the products and put them in bags. The price of one kilogram of the green product is 50 FCFA in the forest, and 150 FCFA if the harvester has transported it by himself to Banyo.
Representative of the Company	He is based in Bafoussam, at the factory. He comes in Banyo once a month to pay people, gathered dried products and transports them to the factory settled at Kamkop Palace, in the city of Bafoussam by big trucks (12 tons).
The Director of the factory	The factory of AFRIMED is based in Bafoussam, at Kamkop Palace quarter to be précised. The factory is built on a surface area of 0.7 ha and deals mainly on the primary processing of the barks of <i>Prunus</i> (Ø 04 mm and Ø 25 mm).

As it can be observed, neither the representative of the Company, neither the chief of exploitation, and nor the team leader do not know with exactitude, how the harvesters operate really in the field. One thing is certain for the harvester: more he gets the product, more he will be paid. Consequently, the harvester collects the maximum of barks, using sometimes felling techniques in order to obtain the tonnage he has fixed or required by his patrons. This confirms what was observed by the National Office of Forest Development (Pouna Belinga 2001) during the field inventory conducted in this zone in 2001. In fact, in the Tchabal Mbabo site, 23.67% of trees with diameter less than the minimum exploitable diameter (MED) were attacked by poachers. To conserve the products against the humidity (rains), harvesters use to bury (enterrer in french) the barks in the soil and wait the arrival of the "STYR".

Mr WANKY, 34 years old, is also coming from the North west province. He is the equivalent of Mr MBIYNDZENYUN Julius for the ERIMON company, based at Bamenda. He is supervising the activities of two teams of harvesters of the *Prunus* barks in the same province and zones. For Mr WANKY, the problem of road remains the main

limiting factor for the exploitation of *Prunus* in the Adamaoua hills. Due to the bad conditions of transport, ERIMON has already lost about 2.5 tons of products following the accident of its STYR. For that reason, the company has decided to wait the dried season (December) before transporting the 8 tons of the products harvested and stocked in the hills since the month of July. Such a situation is currently observed in the harvesting sites, which is not good for both the company and the Government. For the Representative of AFRIMED (Julius), this practice is not good, since the after 3 – 4 months of stocking in the forest, the product degenerates and loses its active compounds.

One of the problems outlined by both the chief of exploitation and the Director of the factory of AFRIMED in Bafoussam was related to the administrative procedures. The Administrative procedures for issuing special permits are lengthy and complicated. These procedures are not adapted to the local context. Special permits are issued for one year. Really, the holder of this permit works for only three to four months during the year, since he cannot work in the rainy season. More often, the inter-ministerial Commission in charge of attribution of quotas holds its meeting by the month of January, and permits are issued by February or March of the year. By November, the holder of the special permits is requested to submit his annual activity report to the forest administration. This means that the months of January and December which are considered as dried months are not effectively exploited by the company.

Mr SOULEYMANOU is native from the Sambo Labo village, in the Mayo Banyo division. He was elected by local populations at the post of fourth deputy of the Mayor. Mr SOULEYMANOU firstly outlined the irrational techniques of harvesting used by the harvesters, before denouncing the conflict relations existing between the local populations and the companies and harvesters. Mr SOULEYMANOU reminded that the exploitation of *Prunus* began in their area since 10 years ago, in 1997. The previous sites of exploitation have totally been destroyed due to inadequate and irrational techniques of harvesting used by the harvesters. The techniques of harvesting used were the systematic felling of trees and total debarking of stems. Consequently *Prunus* population declined drastically. Two forests have in such away, been totally damaged including the site of Danwark and that of Dadawal, next to Sambo Labo. The permit holders used to go into the forest without contacting local authorities (the Mayor, the Lamido and the chiefs of villages). These declarations were confirmed by the local Chief of forest and wildlife control post of Sambo Labo.

When the permit holder was asked to contribute to the local development projects, he used to refuse, claiming that he has nothing to treat (deal) with the villagers, since he has already paid all his taxes to the forest administration in Yaoundé. For Mr SOULEYMANOU, the permit holders do not respect the local populations because they are not educated enough to make any claim. This situation generated many conflicts and tensions among the two groups of stake holders. Mr SOULEYMANOU said that he has dressed many letters to the Government to claim the payment of some taxes for the benefice of local people for the exploitation of *Prunus* barks in their area. No reaction has been done by the Government. Finally the "Sous Prefet" of Banyo invited all stake holders in Banyo for a meeting of reorganisation of the sector of *Prunus* in the Banyo subdivision. Any company willing to harvest *Prunus* in the Banyo subdivision was requested to pay some additional taxes. These taxes include: a fix sum of 300 000 FCFA per year to the local Council (the Mayor), a sum of 5000 FCFA per vehicle transporting the product (STYR) to the Council. Also, the company was asked to engage local young people in the harvesting activities as to combat unemployment in the area. AFRIMED began paying regularly their taxes. They also proposed to engage some young persons, who finally ran away following the hard conditions of harvestings. In fact, harvesters have to resist to the high degree of cold in the Mayo (hills), and they have to transport huge quantity of barks (about 70 kg) on a distance of 15 km to reach the vehicle (STYR). These conditions can only be supported by the "anglofone boys" who come from the North west province, but not by the local young persons who prefer work on livestock.

The local Divisional Delegate of Forestry and Wildlife for the Mayo Banyo division together with the local Chief of forest control post of Sambo Labo recognised their incapacity to monitor efficiently the harvesting the *Prunus* barks in the hills of Mayo Kélélé and others. They underlined the problem of collaboration with the companies. Often, harvesters are working in the forest without any signalization to the Delegate or the local Chief of the Forest control. They use to treat only with the provincial Delegate who is based at Ngaoundéré, too far from Banyo. Same situation was made for the Faro Idéo division, that is next to Mayo Banyo and which also gets some *Prunus*. Another problem outlined by the local forestry services was that of lack of vehicle to transport them to the harvesting site to undertake control and monitoring. This problem together with that of lack of precision in specific sites of harvesting in the permits cannot allows the local forest services to gather statistics on *Prunus* in the Adamaoua, which is detrimental to the conservation of the resource.

The lesson to be learnt here may be that the procedure of issuing the special permits should be in accordance with the reality of the sector, aiming to maximise the exploitation of the *Prunus* barks during the dried months which include: January, April, May, June, and December. Also, the forest administration should enhance the synergy between its external services and provide them with sufficient logistics for enhancing control and monitoring of the harvesting of *Prunus* bark in the Adamaoua province.

5.2.3. Exportation

Data recorded for two years (2005-2006) by the Trade forest products database (COMCAM) based at Douala, are presented in table 7. These data are recorded from the specific bulletins (bulletins de specification in french) dressed by the Chief of Forest and Wildlife post n°1 based in the entrance of the Port of Douala.

A total of 2558.37 tons of *Prunus* bark exported from the Douala port was recorded by the COMCAM database. The most important quantity of the barks was exported in 2005 (1498.5 tons) and the remaining (1059.87 tons) was exported in 2006.

Table 11. Exportation of *Prunus* from the Port of Douala (COMCAM cit. Betti 2007)

COMPANY	Weight (tons)	Destination	Year
AFRIMED	346,87	France	2006
AFRIMED	270	Espagne	2006
CEXPRO Sarl	160	France	2006
CEXPRO Sarl	38	Madagascar	2006
PHARMAFRIC	60	France	2006
SGPA	185	France	2006
AFRICAPHYTO	50	France	2005
AFRICAPHYTO	60	Espagne	2005
AFRIMED	361	France	2005
AFRIMED	662	Espagne	2005
CEXPRO Sarl	139	France	2005
CEXPRO Sarl	27	Madagascar	2005
CEXPRO Sarl	18,5	Maroc	2005
CEXPRO Sarl	14,5	Espagne	2005
ETETKAM	3,5	USA	2005
IK NDI & BROS	13	France	2005
SGPA	150	France	2005
TOTAL	2558.37		

What ever be the year, AFRIMED, CEXPRO Sarl, and SGPA are in this order, the three most important and regular companies exporting *Prunus* barks from the Douala port (figure 4).

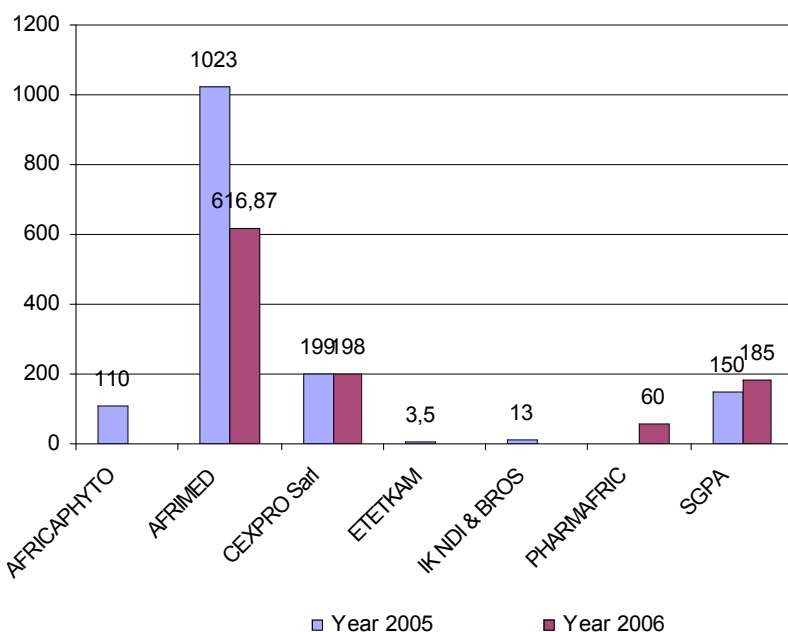


Figure 4. Distribution of quantity of *Prunus* barks in different companies in 2005 and 2006.

Table 12 presents data from the CITES permits issued by the Forest administration in 2006 and 2007.

According to the Cameroonian CITES management authority, a total of six companies exported 2144 tons of *Prunus* barks from Cameroon in 2006 and 2007. The most important quantity was exported in 2006 with 1497.5 tons, which is largely different from the records of the COMCAM database (1059.87 tons).

Only 646.5 tons were exported in 2007, following the ban observed by the European Commission on the Cameroon *Prunus* in October 2007.

Table 12. Records from the CITES permits on *Prunus* for 2006 and 2007.

COMPANY	QUANTITY (ton)	YEAR
AFRIMED	709	2006
AGRODENREE	40	2006
CEXPRO	284,5	2006
IK NDI	9	2006
PHARMAFRIC	120	2006
SGP	335	2006
AFRIMED	245	2007
CEXPRO	161,5	2007
PHARMAFRIC	120	2007
SGPA	120	2007
TOTAL	2144	

Six companies obtained CITES permits on *Prunus* in 2006, which is less than the 10 companies to whom the inter-ministerial commission allocated quotas of the same product.

Figure 5 illustrates the repartition of the quantity of *Prunus* barks within the six exporting companies in 2006. AFRIMED, SGPA, and CEXPRO appear to be in this order, the three most important companies which exported *Prunus* bark from Cameroon in 2006.

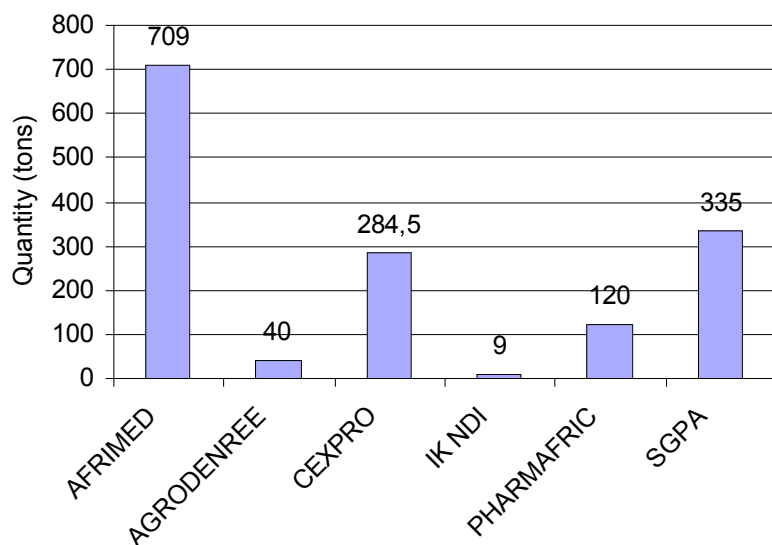


Figure 5. *Prunus* barks recorded in CITES permits and per company in 2006.

Data from the COMCAM database and from the CITES management authority are presented in table 13. As it can be observed, the quantity of *Prunus* bark recorded by the CITES management authority is more high (1497.5 tons) than those recorded by the COMCAM database (1059.87 tons). Some 437.63 tons of *Prunus* barks exported in France (270.63 tons), Spain (120), Madagascar (38) and China (9) were not registered in the COMCAM database, which tends to confirm the weakness of the control and monitoring system of the Cameroon Government on forest products. COMCAM/Douala is for the moment, the only database in charge of gathering forest products trade data for the forest administration, forest companies, and the National Institute for Statistics in charge of the compilation of data on trade products in the whole country.

Table 13. Comparison of data recorded by the trade products database (COMCAM) and the CITES Management authority for the year 2006.

COUNTRY	COMCAM	CITES PERMITS	DIFFERENCE
Espagne	270	390	120
France	751,87	1022,5	270,63
Madagascar	38	76	38
Chine		9	9
TOTAL	1059,87	1497,5	437,63

But what ever be the source of data, France, Spain, Madagascar, and China are in this order the main importing countries for *Prunus* barks coming from Cameroon.

The lesson to be learnt here may be that issuing the special permits without a good system of traceability to monitor the quotas is detrimental to the resource.

6. MONITORING SYSTEM

6.1. Circuit of special products in the country

The main services working in the classical circuit of exploitation, transport, and exportation of special products belong to the Ministry of Forest and Wildlife/Fauna (MINFOF), Ministry of Agriculture and Rural Development (MINADER), and Ministry of Economy and Finances (MINEFI). This circuit is described as follow:

- MINFOF/Service in charge with agreements and titles: issuing of agreements and titles (special permits);
- MINEFI/ Forest Revenue Enhancement Program (FREP): issuing of receipts of the payment of the regeneration tax;
- MINFOF/Service in charge with the management of the forest database: issuing of the carnets for the way bills, monitoring of the quotas;
- MINFOF/ Provincial Delegation: issuing of the notification for the beginning of the exploitation (harvesting) of the resources granted and listed in the permit at the scale of the province;
- MINFOF/Divisional Delegation: issuing of the notification for the beginning of the exploitation (harvesting) of the resources granted and listed in the permit at the scale of the division;
- MINFOF/Control post n°1: issuing of the notification for the beginning of the exploitation (harvesting) of the resources granted and listed in the permit at the level of the post, monitoring of the exploitation of the resource in the field (respect of the standards according to the current forest law, rigorous planning of harvesting in the space and time taking in to account, the rhythm of growing of individuals to avoid over exploitation), respect of the quotas attributed, issuing of the certificate of origin and signature of the way bill;
- MINFOF/ Control post n°2: verification of the authenticity of the way bill, verification of the conformity of data of way bill with the products really transported by the vehicle, signature (or visa) of the way bill and report of the data of the way bill in the register of the post;
- MINFOF/ Control post n°3: same;
- MINFOF/ Subdivision for Non Timber Forest Products: issuing of the certificate for exportation after having verified that the exporter has present the permit and the receipts for the payment of the regeneration tax issued by the FREP ;
- MINFOF/ Control post of the Port n°1 at Douala: verification of the way bill, and the receipts issued by the FREP, issuing of the specification bulletins after verifying that the tonnage is in conformity with data contained in the way bill, report of the data of the way bill in the register of the post;
- MINFOF/ Control post of the Port n°2 at Douala: verification of the bulletins for specification, signature of the report of "connaissance" together with the customs service, issuing of "See Good or Vue Bon" before the packing of the products in the container;
- MINFOF/ Trade products database or COMCAM at Douala: registering data of the permits, way bills, bulletins for specification, reports of "connaissance", production and dispatching of reports to the forest administration, and economic operators (exploiters and exporters);

- MINADER/Post for plants health police: verification plants health documents accompanying the products inside or outside the country, issuing of plants health certificates;
- MINEFI/Customs service: issuing of the “connaissance” and perception or gathering of export allowances.

Documents required for the exploitation of special products in Cameroon are précised in the forest law (Republic of Cameroon 1994, 1995).

In 2000, a Unité Centrale de Contrôle (UCC) was set up by the forest administration to coordinate forestry controls nationally and to support provincial Brigades de Contrôle. Since 2004, that unit (UCC) became the National Brigade of Control (Brigade Nationale de Contrôle in French). To reinforce transparency in control measures the forest administration has appointed an independent observer, Global Witness (MINEF, 2002). Global Witness is currently working together with the National Brigade for Control to ensure the sustainable harvesting of forest products (timber and Non timber forest products).

6.2. Problems observed in the field of control

Many problems were observed in the monitoring of the exploitation and exportation of special products in Cameroon (Betti 2007). Problems were observed at all levels of the control, from the forest till the points of exports, and from the central administration to the external services.

At the level of the central services (in Yaoundé), the quotas attributed by the inter-ministerial Commission are based on no scientific data. Further, the Commission does not take in consideration the reports coming from the external services or from the legal harvesters, and giving an approximate situation of the abundance of the products in their zone. The forest database (SIGIF) settled in the Directorate of Forests only gathers data on logs. Data regarding special products are not concerned. Reports published every year by the National Institute for Statistics do not reflect the real data on special products in Cameroon.

In the field, and mainly at the level of control posts and check points, control on special products is not done in fair manner. The lack of precisions on the area of harvesting in the permits, the multiples prolongation of some permits, the lack of security on way bills (contrary to what is done for logging with the way bill being issued by the forest administration, way bills for special products are edited by harvesters and companies themselves), the lack of sufficient norms and standards for the sustainable harvesting as tools for control and monitoring, the lack of sufficient and qualified personal, and the lack of motivation for the forest agents are among many problems observed in the field of special products.

Along the transport routes, problems observed include the lack of sufficient and qualified personal, the lack of material of control, the lack of motivation for the forest agents, the competence conflicts with other administration. In many forest posts and check points settled along the road, there are one, two or three forest agents who are currently doing control. This number is not enough to ensure the control of log trucks all days and nights (24 hours/24). Also, many of the agents affected in those posts are too old now and do not get sufficient material for staying awake and resisting to cold all night long. Many forest agents do not record data from checking in their register book, as required by the forest administration. So many of these register books cannot be used, for further verifications.

Special products can be exported from the ports of Douala, Kribi, Limbé, Tiko. The first and main problem observed here is the lack of synergy between the custom officers and the forest officers. Often, the custom officers, who are posted at the end of the exportation chain, refuse to consider the specific bulletins dressed by the forest officers. Also, they used to refuse that the forest officers check the final container and co-signs

the transport document "connaissance in french". In this condition, some products are exported without the visa of the forest officers.

The second problem in export is at the level of the chief of post N°1. Normally, the chief of forest and wildlife post n°1 must transmitted all specific bulletins to the Trade products database (COMCAM). This is not always the case, since some specific bulletins do not exist or disappear. Such behaviour which is certainly link to corruption is detrimental to the monitoring, and checking of statistical data on the trade wood.

The third problem is that of the non existence of COMCAM database in other ports. Only COMCAM Doula has functioned till date. COMCAM Limbé, Kribi, Tiko have not been functioning in fair manner. COMCAM Kribi has just started working.

The fourth problem is that of lack of such a system for monitoring domestic trade in wood and special products. Till date, the forest administration has never developed a fair system for controlling and monitoring domestic trade, which cannot help to get a global trade volume of forest products in the country.

The fifth problem observed in the control of timber products is that of the proliferation of the "criques". "Criques" are informal points of export, found in many localities settled along the frontier Cameroon – Nigeria, in the south province of Cameroon. These are unsafe sites, where forest officers cannot undertake any control mission (Betti 2007). A total of 1265/1281 tons of special products were exported from five "criques" based in the Akwaya subdivision (South west province) to Nigeria between March and July 2002. Those products were sold for 413.1 millions of FCFA (Ojong Ayuk 2002).

The sixth problem is related to confusion made between the domestic and wild products. The actual forest legislation does not clarify management issues concerning each group of products. The Government continues to perceive tax for *Prunus* coming from some plantations settled in the North west province.

The seventh problem is related to the activities of the National Brigade of Control and the independent observer, Global Witness. These two structures focus their activities on forest logging, and not on special products.

CONCLUSIONS

Prunus africana is classified by the World Alliance for Nature (IUCN) as a vulnerable plant species in Cameroon, which led to its listing in the Appendix II of the Convention on International Trade in Endangered Species of Fauna and Flora (CITES). The annual quota of export volume attributed to the Cameroon government is 2000 tons.

Natural populations of *Prunus africana* are continuously declining in Cameroon due to over-harvesting and inadequate techniques practised. Several reports confirmed the fact that the natural population has suffered major damage from both legal and illegal exploitation, reducing the population from all previous inventory estimates by up to 50% in a short period.

Since 2007, the forest administration took some important measures to alleviate poaching in the exploitation of *Prunus* including: the restoration of the field book for the harvesters, the instauration of specific way bills for the circulation of Special products, the erection of an important part of the Mount Cameroon in national park, and the reduction of quotas granted for *Prunus*. But many problems still remain in the monitoring of the exploitation and exportation of *Prunus* in Cameroon. Problems are observed at all levels of the control, from the forest till the points of exports, and from the central administration to the external services.

This report tends to confirm that *Prunus* is a threatened plant species in many areas in Cameroon. We can even consider that *Prunus africana* is at least an endangered plant species in Cameroon according to the IUCN check list for NDFs, and due to the level of exploitation and the monitoring measures currently used by the forest administration.

The elaboration and implementation of simple development plans for the sustainable harvesting and trade of *Prunus* and other special products remains the gap and the challenge for the Cameroon Government.

The main problem encountered in the process of dressing the NDFs report was the lack of scientific and published data on the area of extent occurrence, area of occupancy, abundance, mortality rate, and others. Also, due to lack of financial support, It was not possible to undertake some field trips for verifications. All these limits did not allow to conduct some analyses and appreciated different trends.

The IUCN checklist for NDFs is largely based on two global parameters: the abundance and the spatial distribution. No thing is said concerning parameters such as the morphology, the mod of scattering, and external parameters. The popularity of the species used, the type of plant part used, the mod of harvesting are some external parameters that should be used to better appreciate the endangerment of a given plant species.

REFERENCES

- Akagou Zedong H.C. 2008** Note sur la gestion de *Prunus africana* au Cameroun : situation actuelle, Ministère des Forêts et de la Faune, 5p.
- Akagou Zedong H.C. & Betti J.L. 2007** Etat des lieux sur l'exploitation de *Prunus africana* au Cameroun. Rapport de mission dans les provinces de l'Adamaoua, Ouest, Nord ouest et Sud ouest, 19 p.
- Barbault R. 1997.** Ecologie générale. Structure et fonctionnement de la biosphère. *Masson (eds.), Paris.*
- Betti J. L. 2007** Plan d'action/stratégie pour une meilleur collecte des données statistiques sur les Produits forestiers non ligneux au Cameroun et recommandations pour les pays de la COMIFAC. *Projet Renforcement de la sécurité alimentaire en Afrique centrale à travers la gestion et l'utilisation durable des produits forestiers non ligneux, GCP/RAF/398/GER, FAO – COMIFAC - GTZ 180 p.*
- Betti J. L. 2004** Politique forestière sur les produits forestiers non ligneux au Cameroun : vers un élargissement de l'assiette fiscale. *Conférence des Etats des Forêts Denses Humides d'Afrique Centrale (CEFDHAC), Yaoundé,, Cameroun. UICN. 10 p.*
- Betti J. I. 2002** Vulnérabilité des plantes utilisées comme antipaludiques dans l'arrondissement de Mintom, au sud de la réserve de biosphère du Dja, Cameroun. *Syst. Geogr. Pl., (71): 661-678 (2001).*
- Betti J. L. 2001** Usages traditionnels et vulnérabilité des plantes médicinales dans la Réserve de Biosphère du Dja et dans les marchés de Yaoundé, Cameroun. *Thèse Doc. Sci. Agro., ULB, Bruxelles, 418 p.*
- Cunningham, A.B 2006.**
- Cunningham, A.B. et Mbenkum, F.T. 1993.** Sustainability of harvesting *Prunus africana* bark in Cameroon: A medicinal plant in international trade. UNESCO, Paris, France.
- Ewusi B.N., Tako T.c., & Acworth J. 1996.** Bark extraction: the current situation of the Sustainable Cropping of *Prunus africana* on Mount Cameroon. In Glyn D (eds). A strategy for the Conservation of *Prunus Africana* on Mount Cameroon. technical papers and workshop proceedings, 21st and 22nd February, 1996, Limbé Cameroon. Mount Cameroon Project, pp: 39 – 54.
- Forni E 1997** Types de forêts dans l'Est du Cameroun et étude de la structure diamétrique de quelques essences. Mémoire présenté en vue de l'obtention du diplôme d'études approfondies en Sciences agronomiques et ingénierie biologique. *Faculté universitaire des sciences agronomiques de Gembloux.*
- Fraser P.J., Healy J.R. & Cheek M. 1996.** Seedling identification. In Glyn D (eds). A strategy for the Conservation of *Prunus africana* on Mount Cameroon. technical papers and workshop proceedings, 21st and 22nd February, 1996, Limbé Cameroon. Mount Cameroon Project, pp: 1-11.
- Glyn D. 1996.** A strategy for the Conservation of *Prunus africana* on Mount Cameroon. technical papers and workshop proceedings, 21st and 22nd February, 1996, Limbé Cameroon. Mount Cameroon Project, 93 p + annexes
- MINEF-FAO 2005.** Evaluation des ressources forestières nationales du Cameroun 2003 – 2004. *Ministère de l'Environnement et des Forêts, République du Cameroun/Organisation des nations unis pour l'alimentation et l'agriculture 187 p.*
- Ndam N. 1996** Recruitment patterns of *Prunus africana* (Hook F.) Kalkman, on Mount Cameroon: a case study at Mapandja. In Glyn D (eds). A strategy for the Conservation of

Prunus africana on Mount Cameroon. technical papers and workshop proceedings, 21st and 22nd February, 1996, Limbé Cameroon. Mount Cameroon Project, pp: 19 - 34.

Ndibi B.P. 1996. Regulatory framework for the exploitation of medicinal plants in Cameroon: the case of *Prunus africana* on Mount Cameroon. In Glyn D (eds). A strategy for the Conservation of *Prunus africana* on Mount Cameroon. technical papers and workshop proceedings, 21st and 22nd February, 1996, Limbé Cameroon. Mount Cameroon Project, pp: 55 – 67.

Ojong Ayuk M. 2002 Quantitative evaluation of Non-timber Forest Products leaving the Takamanda Forest Reserve Area – Akwaya Subdivision. *Memoir presented in partial fulfilment of the requirements for the award of the "Diplome d'Ingénieur des Eaux, Forêts et Chasses, Faculty of Agronomy and Agricultural Sciences, University of Dschang.*

Okafor J. & Ham R. 1999 Identification, utilization, and conservation of medicinal plants in southeastern Nigeria. *Issues in Africa Biodiversity*, n° 3. PP : 1-7.

Peters C.M. 1997 Exploitation soutenue de produits forestiers autres que le bois en forêt tropicale humide : Manuel d'initiation écologique. Série générale du Programme d'appui à la biodiversité, n° 2. *WWF-NC-WRI/USAID*, 49 p.

Pouna E. & Belinga S.J. 2001 Inventaire national de *Prunus africana*, Phase II: Adamaoua – sites de Tchabal Mbabo et Tchabal Gang Daba. *Office National de Développement des Forêts (ONADEF)/Projet 3 - Conseiller GT auprès du MINEF (CIMINEF) PN 95 25 46 0 00 100* », *Ministère de l'Environnement et des Forêts (MINEF) et Coopération allemande au Développement (GT)*, 52 p + annexes.

République du Cameroun 1994 Loi 94/01 du 20 janvier 1994 portant régime des forêts, de la faune et de la pêche, 57 p..

République du Cameroun 1995 Décret n° 95/531 du 23 août 1995 fixant les modalités d'application du régime des forêts, 66 p.

Sunderland T. & Nkefor J. 1996. Conservation through Cultivation: a case study of the Propagation of *Prunus Africana*. In Glyn D (eds). A strategy for the Conservation of *Prunus Africana* on Mount Cameroon. technical papers and workshop proceedings, 21st and 22nd February, 1996, Limbé Cameroon. Mount Cameroon Project, pp: 68 - 87.

Tchouto P. 1996. *Prunus* population on Mount Cameroon. In Glyn D (eds). A strategy for the Conservation of *Prunus africana* on Mount Cameroon. technical papers and workshop proceedings, 21st and 22nd February, 1996, Limbé Cameroon. Mount Cameroon Project, pp: 12 - 18.

Tieguhong J.C. & Ndoye O. 2004 Development of trade and marketing of non-wood forest products for poverty alleviation in Africa. *A report prepared for the project Lessons learned on the Sustainable Forest Management in Africa, KSLA/AAS/FAO* 46 p.

UICN 2001 Catégories et Critères de l'UICN pour la Liste Rouge : version 3.1. Commission de la sauvegarde des espèces de l'UICN, *UICN, Gland, Suisse et Cambrige, Royaume-Uni.* ii + 32 pp.

Vivien J. & Faure J.J. 1985 Arbres des forêts denses d'Afrique centrale. Ministère des relations extérieures, Coopération et Développement - ACCT, Paris. 551 p.

Annexe 1

In 1999 and 2000 (letter réf N° 0352/MINEF/SG/DF/SDAFF/SN of 09 March 2005 addressed to the CITES Management Authority of Spain), the National Office for Forests Development (ONADEF) conducted some field trips to identify different sites of occurrence of *Prunus africana*. A total of 64 sites were identified. They are distributed in 23 divisions and 6 provinces (Table 1). North west (27 sites), west (15), South west (8) and Adamaoua (7) are the four most important provinces in terms of number of sites of occurrence.

Table A.1. Occurrence sites of *Prunus africana* in Camaroon

Province	N° of locality	Locality (Division)
Adamaoua (7 sites)	1	Tchabal Mbabo (Mayo Banyo)
	45	Tchabal Gang Daba (Faro & Déo)
	46	Gandoua (Mayo Banyo)
	47	Nyamsounré (Mayo Banyo)
	48	Sambo Labo (Mayo Banyo)
	49	Mayoke Lélé(Mayo Banyo)
	2	Galim Tignère (Faro et Déo)
West (15 sites)	23	Santc hou (Ménoua)
	20	Owafa (Ménoua)
	26	Malantouen (Noun)
	18	Bangourain (Noun)
	39	Kutupit (Noun)
	40	Massif du Mbam (Noun)
	19	Mt Bamboutos(Bamboutos)
	17	Babadjou (Bamboutos)
	30	Mt Bana (Haut Nkam)
	42	Bangangté (nde)
	25	Baham (Nde)
	27	Bapa(Nde)
	28	Badenkop (Nde)
	24	Bafang (Haut plateau)
	41	Mboébo – Foyentcha (Ht plateau)
Littoral (3 sites)	34	Mt Nlonako (Mbungo)
	29	Mt Manengouba (Nbungo)
	31	Mt Koupe (Mbungo)
South west (8 sites)	32	Mt Cameroun (Fako)
	33	Mt Cameroun (Mfeme)
		Mt Kupe (Kupe Manengouba)
		Mt Kupe (Kupe Manengouba)
		Mt Manengouba (Kupe)
	43	Mt Bakossi (Kupe Manengouba)
	22	Fontern (Lebialem)
		Wabane (Lebialem)
	Akwaya (Manyu)	
North west (27 sites)	10	Kumbo (Bui)
	11	Mbiarne (Bui)
	12	Jakiri (Bui)
	9	Oku(Bui)
	6	Korn (Bui)
	50	Kilum Ijim (Bui)
	51	Nvem (Bui)

Province	N° of locality	Locality (Division)
	52	Vakovi (Bui)
	5	Fundong (Boyo))
	8	Njinikom (Boyo)
	13	Belo (Boyo)
	53	Njini Kijem (Boyo)
	54	Sabga (Ngoketunjia)
	15	Njikwa (Momo)
	55	Acha – Tugi (Mono)
	56	Mfenka (Mono)
	57	Oshey (Mono)
	14	Santa (Mezam)
	58	Awing(Mezam)
	59	Bafouchu (Mezam)
	60	Mbot (Mezam)
	61	Abizenaku (Menchun)
	62	Abor (MENCHUN°)
	63	Adou (Menchum)
	3	Furawa (Donga Mantung)
	64	Akweto (Donga Mantung)
	65	Tabenkem (Donga Mantung)
Centre (4 sites)	38	Mt Ngora (Mbam et Kim)
	37	Mt Yangha (Mbam et Kim)
	36	Mt Golep (Mbam et Kim)
	35	Mt Eloumdem (Mefou Akono)

Ecological Map of Cameroon from ONADEF

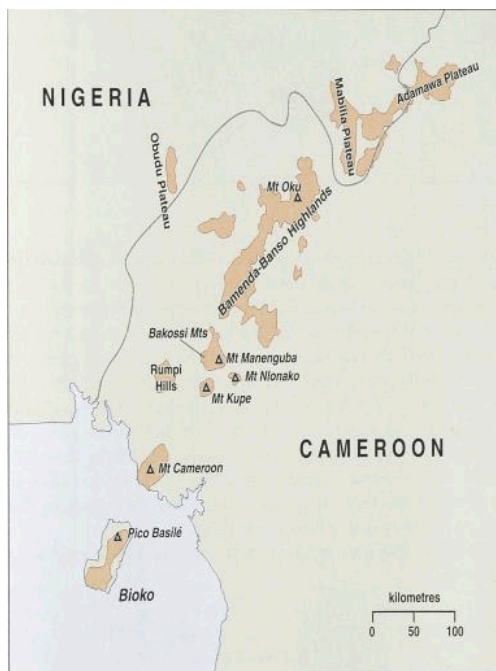
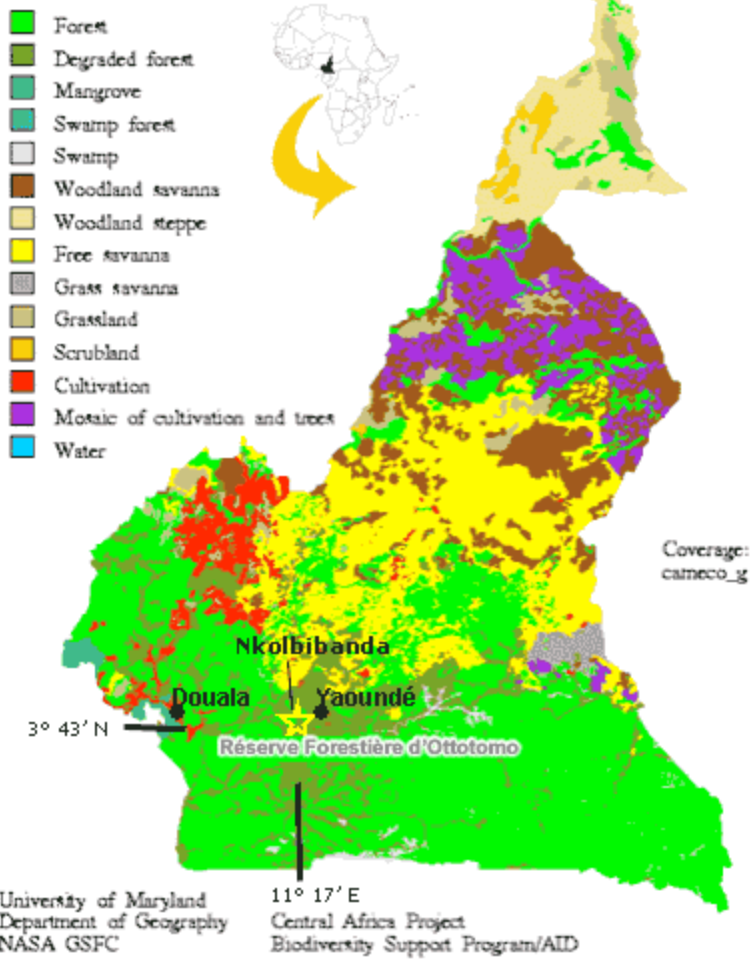


Table A.2 Summary of Cameroon Inventories.

Province	Division	Location	Inventory methodology	Total hectares estimated Prunus zone (CIFOR 08)	Invetried by	financed by	date of inventory	valid date	total Hectare of zone	Density per hectare	Density exploitable per hectare (DME > 30 cm)	yield per stem Kg/stem	Sampling Zone hectares	quantity exploitable m3	wider zone prunus	quantity exploitable m3	estimated qty TONNES per year	Timescale validity inventory	Reference
Adamaoua	mayo banyo	Samba Pelmali Boudounga (par Nyamsoure)			Minfo F Adam	?	2008	?	35	21.75	21.75		12	28.21	213	4632.75			report in French document for CITES
Adamaoua	mayo banyo	Tchabal Mbabo	ACS Transacts	27446	Anafor	GTZ	2001	Y meeting Aug 08	44	12.29	8.22		101.38				493	2011	onadef
Adamaoua	mayo banyo	Tchabal Gang Daba	ACS Transacts	10060	Anafor	GTZ	2001	Y meeting Aug 08	101375	2.15	0.99		29.5				8.8	2011	onadef
NW	Bui, Boyo	Kilum Ijum	ACS Transacts	480.52	CIFOR - Encod ev	FAO project	2008	Y meeting Aug 08		3.52	3.35		42	1.04	1.04			2013	cifor
NW	Bui, Boyo	Kilum Ijum			Whiconet	self	2007	N	18	12.83	5.4								
SW	Fako				Minfo F SW	Plantecam	1992	Y?		5.5	3.5		5						
SW	Fako				LBG	MCP	1992	Y?		10.25	3.5		10						
SW	Fako				ONAD EF	Plantecam	1996	Y?	48609	0.76	0.76	69					300		
SW	Fako		ACS Transacts		LBG	GTZ	1999/2000	Y meeting Aug 08	23383	0.66	7.2	43					209	2005	
SW	Fako	Mt Cameroon	transacts	9324	Studnet K Meurs	GTZ	2007	N	9324	0.24									gtz

SW	Kupe Muane ngouba	Mt Kupe	ACS Transacts	6 237.88	CIFOR - Encod ev	FAO project	2008	Y meeti ng Aug 08		1.89	1		66	0.25		0.25		2013	cifor
SW	Fako	Mt Cameroon	ACS Transacts	73 128.31	CIFOR - Encod ev	FAO project	2008	Y meeti ng Aug 08		11.4	1.66		271	0.37		0.37		2013	cifor
total										83.25	57.33					0.6		509	