in association with

SAMPLING PLAN

FOR NGUTI COUNCIL FOREST

ELABORATED BY SIMO HUBERT IN THE FRAMEWORK OF A SHORT-TIME MISSION

FOR GFA/DFS CONSULTANTS

PROGRAMME FOR THE SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES CAMEROON – SOUTH WEST PROVINCE (PSMNR-SWP)

November 2007

CENTRE INTERNATIONAL D'ETUDES FORESTIERES ET ENVIRONNEMENTALES

INTERNATIONAL CENTRE FOR ENVIRONMENTAL AND FORESTRY STUDIES

I.C.E.F.S

BP 2503 Yaoundé, Tél. (237) 22 23 97 02, Fax : (237) 22 23 97 01, E-mail : ciefe@iccnet.cm / ldjomociefe@yahoo.fr

TABLE OF CONTENTS

INTRODUCTION

PSMNR-SWP is supporting under its result 3, the elaboration of forest management plan for a council forest in a pilot scheme.
No council forest had been foreseen in the indicative zoning plan of 2001, phase V in SWP. Up to now no council forest has been created in SWP. This is due mainly to missing knowledge, and missing financial, organizational and technical capacities of the councils. Nevertheless council forests represent a promising form of sustainable forest management with the potential to enhance development in enclaved rural areas.
With the progressing implementation of decentralization the option of a council forest represents for a council and the villages around the concerned council forest area a big opportunity to create a sustainable source of revenue for investment in development issues and to take over the main stake in the management of their own forest heritage.

Council forests form part of the permanent forest estate and as such have to be gazetted and a forest management plan has to elaborated.

In September 2007 the technical note for the gazettement of Nguti Council Forest has been sent to the Ministry. On November 22nd 2007 the public notice for the gazettement of Nguti Council Forest has been signed by the Minister (cf.annex 1).
Meanwhile the gazettement process is continuing, other technical studies are undertaken for the elaboration of the management plan.
In this document the sampling plan for the management inventory of Nguti Council forest is presented.
The present sampling plan is established following the technical norms (Normes d'inventaire d'aménagement et de pré-investissement , ONADEF, 1991).
According to the legal procedures (arrête 0222/A/MINEF of 25 May 2001) the sampling plan has to be presented to the Sub-direction of Inventories and Forest management (SDIAF) for approval before starting the fieldwork.

1. BRIEF DESCRIPTION OF THE AREA

1.1. Location

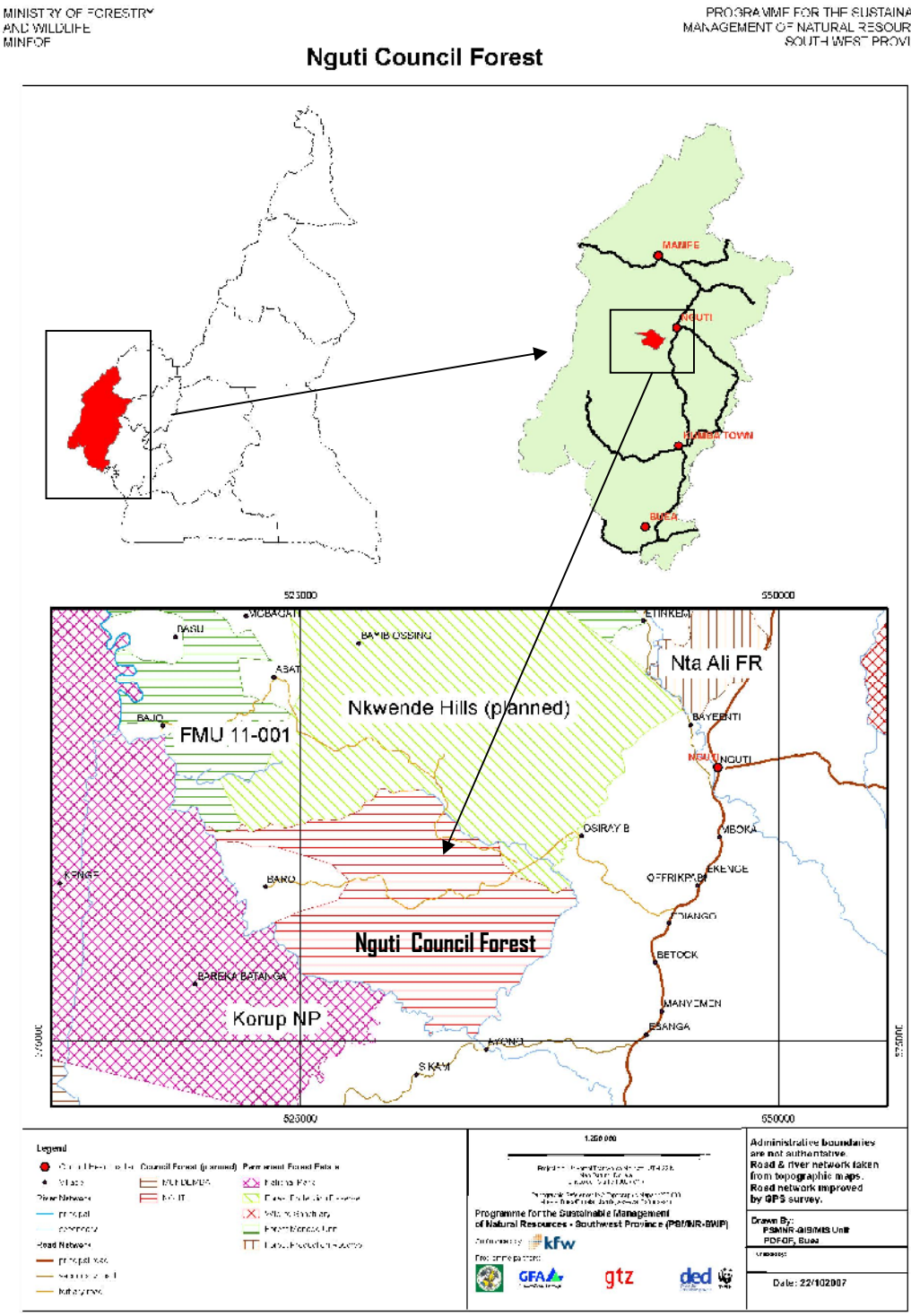
The proposed council forest of Nguti is situated in Nguti Sub-division, Kupe-Manenguba Division, South-West Province of Cameroon. (cf. map1).

It is situated in latitude between 5°12”10”” E and 5°19’20’’E and in longitude between 9°10’48’’ and 9°21’23””.

On its western part, the proposed Nguti Council forest will have a common boundary with the Korup National park, along the Bake river. In its northern part it will have a common boundary with proposed Nkwende hill protection forest.

The surface area of the proposed Nguti Council forest is about 12,083 ha.

Map 1: Geographic situation of Nguti Council forest



1.2.Topography

The topography of the area is in its whole extension flat to undulating land. The highest point is a hill with 428 m altitude at the northern border of the proposed forest area.

1.3.Hydrography

The hydrographic net of the forest area is composed of the Bake River and its affluents. Bake River originates from Nkwende Hills and flows in a southerly direction and starts marking the boundary of the proposed council forest to the south of Osirayib village.

Downstream, Bakebe River joins Bake River near Ayong village, and Bake River continues flowing in a north-westerly direction. The proposed council forest is therefore enclosed by Bake River and some of its affluent.

1.4.Vegetation

The forest is part of the Atlantic Biafran Forest as described by Letouzey and as such moist lowland evergreen forest. *Lejoly (1996)* proposes to nominate the zone Atlantic lower-Guinean domain to stress the influence of the Atlantic Ocean.

Most of the forest is dense forest on firm land. Only on the banks of the river Bake in some places small swampy areas can be found.

Frequently occurring species in the forest include; Azobe (*Lophira alata*), Ekop Naga (*Brachystegia spp*), Dabema (*Pipadeniastrum africanum*), Tali (*Erythrophleum ivorensis*), Okan (*Cycldiscus gabonensis*), Framire (*Terminalia ivorensis*). Others occurring species are Bilinga (*Nauclea diderrichii*), Ilomba (*Pycnanthus angolensis*), Niove (*Staudia stipitata*), Padouk (*Pterocarpus soyauxii*), Moabi (*Baillonella toxisperma*), Movingui (*Distemonanthus benthamianus*), Doussie (*Afzelia spp*), Aiele (*Canarium schweinfurthii*).

1.5. History of forest exploitation

Forest license N° 1669 of a surface area of 26 800 ha was granted to the company CTL. The license covered a big part of the proposed Nguti Council Forest. Timber exploitation took place from around 1987 to 1991. The exploitation is said to have been very selective and not quite systematic.

Some earlier exploitation is said to have taken place in the 1970s by a company named ATC.

1.6 Accessibility of the forest

The forest can be reached on an abandoned logging road, leading westwards in the north of Ediango village. This abandoned logging road with several broken bridges continues to Baro village. It can be used by motorbikes.
The distances are the following:

- Kumba – Ediango 89 km, tarred from Kumbe to Ediango (29 km)
- Nguti – Ediango 9 km, tarred road
- Ediango-Osirayib 8 km, abandoned logging road
- Osirayib – Council forest limit 6 km, abandoned logging road
- Council forest limit-Baro 16 km
- Road south from Ebianga to Ayong, 8 km, abandoned logging road, can be used by motorbikes. The use of special equipped 4-wheel drive vehicles has been possible in July 2007.

2. METHODOLOGY FOR THE ELABORATION OF THE SAMPLING PLAN

2.1. Documents used for the elaboration of the sampling plan

The following documents have been used for the elaboration of the sampling plan and are integrated in the GIS of PSMNR-SWP, run by provincial Delegation of MINFOF in Buea:

- INC topographic - Map 1/200.000 , Sheet NB 32X Mamfe
- LANDSAT image ¨P187r56 of 30/01/2002
- Data on permanent forest estate
- Reserved community forests
- GPS-data for village positions and roads

2.2. Elaboration of the sampling plan

2.2.1. Exclusion of sectors not to be covered by the inventory

The map and the satellite image allowed to carve out swamp forests of the inventory area, which exist at the sides of Bake river but in marginal extensions.

2.2.2. Sampling Design

The sampling is a systematic sampling at 1 degree with sampling plots positioned contiguously on transects which are equidistant and parallel.

The sampling lines shall be as far as possible perpendicular to the general orientation of the river network so that the variability of vegetation types is best represented in the sampling The departure points of transects of enumeration shall be on accessible points situated on a road. If not possible a baseline transect is realized from which all enumeration transects branch off..

The plot as the basic unit of sampling is situated longitudinally on the enumeration transect ; its surface is 0.5 ha with the dimensions of 250 m length(in the direction of the transect) x 20 m width (perpendicular to the transect direction).

2.2.3. Sampling intensity

The sampling intensity depends on the variability of a required parameter in the whole population and the decision which is taken concerning the precision of the estimation of this parameter. The required parameter in our case is the volume of the group of the principal exploited species[1]. The Cameroonian norms argue that due to already realized inventories in the past a number of 500 plots[2] shall be sufficient to obtain a precision of 10% for the volume of the main exploited species on the probability threshold of 95%.Accordingly, the sampling intensity in our case shall be:

250 ha/12.083 ha = 2,07%

The corresponding equidistance (E) of the transects will be:

Equidistance E = Area to be covered by the inventory (ha) x 20 m/250 ha

E=12.083 ha x 20m /250 ha = 967 m

For practical reasons an equidistance of 1000 m is chosen, which will slightly reduce the sampling intensity.

2.2.4. Description of the sampling plan

Observing the general direction of the river network which is mainly oriented in a northern-southern direction the enumeration transects shall be opened in eastern-western direction (cf. 2.2.2.).

The abandoned logging road serves as primary access to the forest area. As it is orientated in eastern-western direction, baseline transects have to be established, one to the south and one to the north.(cf. map 2 with sampling plan).

For the starting point of the baseline transects, named P1, a point on the road was chosen which with the north-south extension of the baseline transect would be the largest (11.5km). This point will be identified with the GPS.

[2] This number of plots is corresponding to a coefficient of variability (CV) of 110-120%

The largest extension in eastern western direction is found on transect T9/T10 (14,3 km).

From P1 the baseline transect TB 1 is oriented to the south with a length of 5.5 km and the baseline transect TB 2 is oriented to the north, also with a length of 5.5 km.

From this two baseline transects the enumeration transects are branching off in eastern and western direction.

The enumeration is only realized on the enumeration transects not on the baseline transects.

The naming of the enumeration transects is starting from the south with T1 and ending in the north with T 23. The enumeration transects T1 – T 12 are branching off from the baseline transect TB1, and the enumeration transects T13 – T23 are branching of from the baseline transect TB 2.

All details of the baseline and enumeration transect are shown in the table 1: azimuth, theoretical starting and ending point in UTM coordinates, length in meters as well as the distance at which the enumeration transects are branching off the baseline transects TB1 and TB 2.

2.2.5. Magnetic deviation

On the 1/200.000 map sheet for Mamfe the magnetic deviation is indicated with 5°49' western direction for the center of the map and diminishing 4 minutes each year. That means that in 2007 the the magnetic deviation shall be 3°29' in western direction.

To obtain that the transects are oriented more or less in geographical North/South and East/West direction , the deviation is rounded up to 3° and applied to the compass readings for the azimuth (cf. table 1).

2.2.6. Summary of Sampling Plan

In total 126.7 km of transects are opened from which are:

- baseline transects: 11.0 km
- enumeration transects: 115.7 km

That means that 231.4 ha are sampled, which gives a sampling intensity of 1.9 %.

This sampling intensity corresponds to all trees with a minimum diameter of 20 cm DBH which are enumerated on the whole plot (250x20 m).

Map 2: Sampling plan for Nguti Council Forest

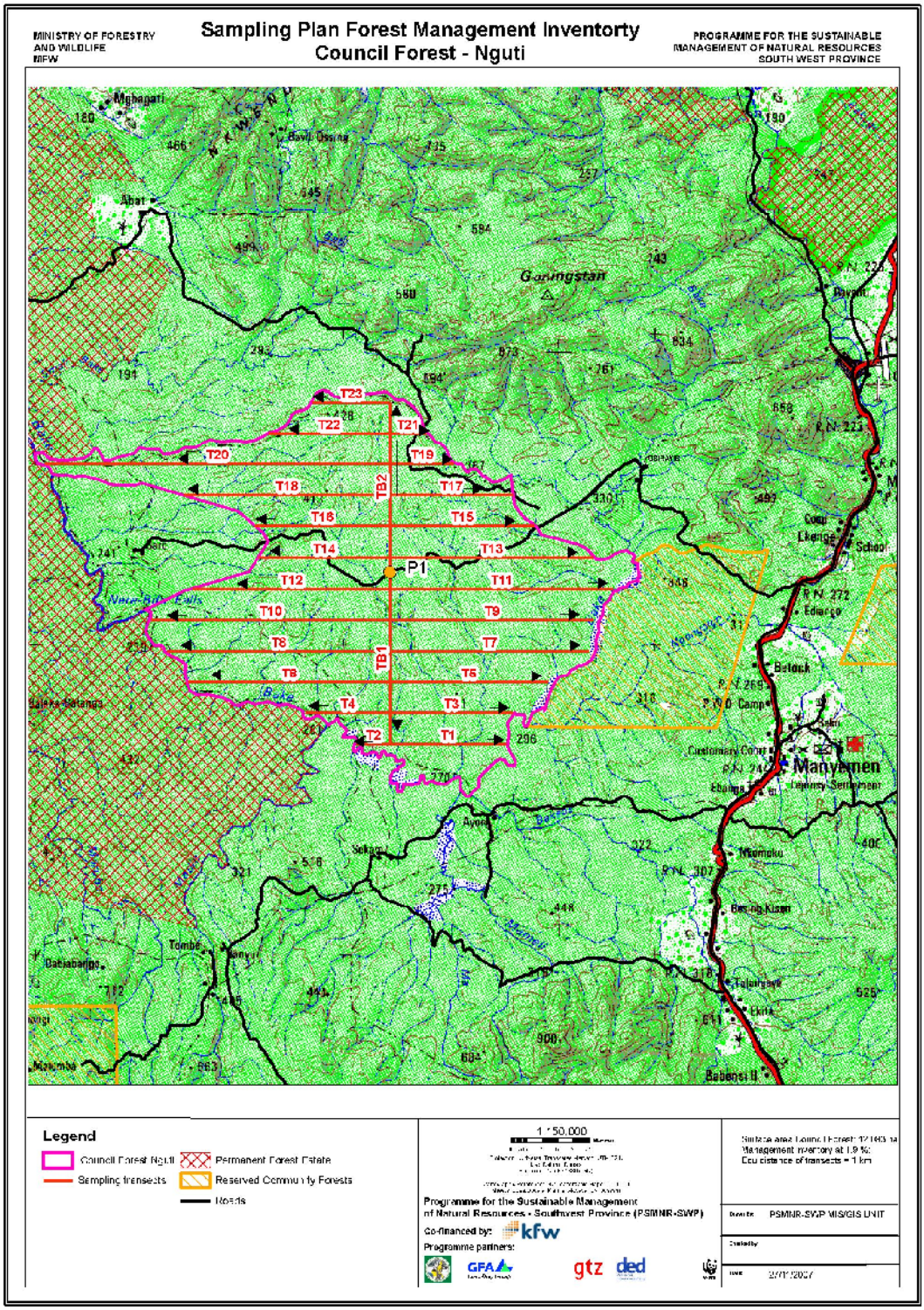


Table 1: Description of transects

Transects	Azimuth			Coordinates UTM				Length (m)
				Starting point		End point		
Baseline transects:				X	Y	X	Y	
TB1	183°			531,451	582,302	531,451	576,802	5,500
TB2	003°			531,451	582,302	531,451	587,802	5,500
Sub-total Baseline transects (m):								11,000
Enumeration transects:		Starting point on baseline Transect:						
T1	93°	TB 1	TB1 5500 m	531,451	576,802	535,201	576,802	3,750
T2	273°		TB1 5500 m	531,451	576,802	530,362	576,802	1,089
T3	93°		TB1 4500 m	531,451	577,802	535,414	577,802	3,963
T4	273°		TB1 4500 m	531,451	577,802	528,716	577,802	2,735
T5	93°		TB1 3500 m	531,451	578,802	536,547	578,802	5,096
T6	273°		TB1 3500 m	531,451	578,802	524,939	578,802	6,512
T7	93°		TB1 2500 m	531,451	579,802	537,866	579,802	6,415
T8	273°		TB1 2500 m	531,451	579,802	524,262	579,802	7,189
T9	93°		TB1 1500 m	531,451	580,802	538,022	580,802	6,571
T10	273°		TB1 1500 m	531,451	580,802	523,749	580,802	7,702
T11	93°		TB1 500 m	531,451	581,802	538,642	581,802	7,191
T12	273°		TB1 500 m	531,451	581,802	525,089	581,802	6,362
T13	93°	TB 2	TB2 500 m	531,451	582,802	538,001	582,802	6,550
T14	273°		TB2 500 m	531,451	582,802	527,205	582,802	4,246
T15	93°		TB2 1500 m	531,451	583,802	536,098	583,802	4,647
T16	273°		TB2 1500 m	531,451	583,802	527,091	583,802	4,360
T17	93°		TB2 2500 m	531,451	584,802	535,405	584,802	3,954
T18	273°		TB2 2500 m	531,451	584,802	524,795	584,802	6,656
T19	93°		TB2 3500 m	531,451	585,802	533,507	585,802	2,056
T20	273°		TB 3500 m	531,451	585,802	520,319	585,802	11,132
T21	93°		TB 4500 m	531,451	586,802	532,616	586,802	1,165
T22	273°		TB 4500 m	531,451	586,802	527,523	586,802	3,928
T23	273°		TB 5500 m	531,451	587,802	528,928	587,802	2,523
Sub-total Enumeration transects (m):								115,792
TOTAL LENGTH OF TRANSECTS (m)								126,792

3. REALIZATION OF THE MANAGEMENT INVENTORY

A registered company ("cabinet agree") will be chosen for the realization of the management inventory, the data treatment in TIAMA and the writing of the inventory report.

A protocol for the management inventory of the Nguti Council Forest has been elaborated. It is based on the norms for pre-investment and management inventories (ONADEF, 1991) and gives clear description how the work has to be executed.

The programme will supervise the realization of the inventory by MINFOF staff from the Provincial Delegation in Buea, a short-time consultant and the GFA technical adviser.

Before the fieldwork is starting the programme will check the field equipment used by the registered company and organize a short training to harmonize inventory techniques.

The programme will organize also formal missions of control in which the transect opening is checked and in particular sampling plots are re-enumerated. The control procedures will be based on the existing norms (Normes de verification des travaux d'inventaire de reconnaissance, d'aménagement et de pré-investissement, ONADEF,1991).

3.1. Time frame of the inventory work

With a total length of 126.8 km of transects the transect opening will need 64 working days on the base of an average transect opening distance of 2 km/day.

With a total length of 115.7 km of enumeration transects the enumeration will need 58 working days on the base of an average enumeration of 8 sampling plots/day.

Considering 20 days/month as effective fieldwork days and employing two transect opening teams and two enumeration teams, the inventory shall be realized in 1.5 – 2 month time.

Literature

MINEF, 2001. Arrêté N° 0222 fixant les procédures d'élaboration, d'approbation, de suivi et de contrôle de la mise en œuvre des plans d'aménagement des forêts de production du domaine forestier permanent

NGUTI COUNCIL/PSMNR-SWP, 2007. Preliminary technical note for the gazettement of Nguti council forest, 12p.

ONADEF, 1991. Normes d'inventaire d'aménagement et de pré-investissement, 32 p avec annexes.