

**GARAMBA NATIONAL PARK**

**PROJECT**

**Annual Report**

**1992**

**CONSERVATION AND DEVELOPMENT**

**Fraser Smith**

**MONITORING AND RESEARCH**

**Kes Smith**

# GARAMBA NATIONAL PARK, CONSERVATION AND DEVELOPMENT

## Annual Report 1992

Fraser Smith

### 1. INTRODUCTION

#### 1.1 Background

In order to try to rectify the economic and political situation of Zaire the country was holding a National Conference during much of 1991 and 1992. Nevertheless in September 1991 riots erupted in Kinshasa. Throughout most of 1992 the country has remained calm, but the situation has always been uncertain and at the end of the year riots and looting began in the provinces. While the situation did not directly affect the park, it has indirectly caused hardship to the IZCN (Institut Zairois pour la Conservation de la Nature ) staff, whose salaries have been uncertain, late in arriving and worth almost nothing by the time they did arrive and whose operational costs were reduced to virtually nil. Most international aid has been withdrawn from the country, which has meant that the project's development plans have had to be shelved.

It has been of vital importance that the World Wide Fund for Nature (WWF) and the Frankfurt Zoological Society (FZS) have continued to support the park through the project. This has maintained the motivation of the guards and conserved both the ecosystem and the investment of money, time and effort over the past eight years.

However, the world recession has meant that budgets have had to be cut at a time when more money was needed to balance the reduced IZCN contribution to running costs. In addition the influx of arms and ammunition from Sudan since 1991 has led to an increase in poaching in the north of the park and the anti-poaching capabilities needed to be developed to counteract this. Most of the project vehicles have reached the stage where more time is spent on maintenance than on action. A minimum of two new vehicles are urgently needed.

The combined situation has meant that major new development activities have been put on hold and that the priorities for the year have been on maintaining the conservation of the park in the face of increased pressure, with development activities limited to what is needed to achieve this, while at the same time planning for future development possibilities.

In February Jean Marc Froment resigned.

#### 1.2 Objectives

In view of this the objectives for 1992 were:

1. Maintenance of on-going conservation activities, with contingency plans to cope with possible deteriorating situations.
2. Development of on-going conservation activities to counteract the increased threat.

3. Planning only, of major new development activities outside and within the park.

## 2. PROJECT ACTIVITIES

### 2.1 Anti-poaching

#### 2.1.1 General Situation

There has continued to be a steady poaching pressure in the north, with more elephant poaching than in previous years. 28 tusks were recovered, of which 26 were recent. Considering ivory recovered and tuskless carcasses seen, 22 dead elephants were found during the year, of which at least 9 had been recently poached. Main poaching is still for meat, however, with 173 buffalos found poached and 67 other species. The latter include kob, warthog, hartebeest and waterbuck.

Poaching has been particularly heavy in the Mt Molobia area and between Mt Kpaza and N'Delele. The current workplan for developing the anti-poaching system is included in Appendix. It relies in part on having at least one vehicle stationed in the north, which is a problem with the current ages and lack of reliability of existing vehicles.

The presence of arms and ammunition from the civil war in Sudan and a greater demand for meat with the extra 20,000 refugees in the area, have been the main causes of the problem, although a general feeling of less control within the country and the need to survive during difficult times, has probably contributed. In August it was found from the air that a new refugee camp (Kaka 4) had begun to be established in the Domaine de Chasse Azande between the town of Dungu and the south-western tip of the park. As this was only 23 km from the park boundary it posed a potential threat. The Conservateur Principal followed up with the Commissaire de Zone and arranged to have the camp moved. By the end of the year it was being reduced.

A regular trade in meat to the town of Dungu was uncovered in the first half of the year and 20 bicycles and 8 sacks of meat were recovered. A vehicle carrying meat and a pair of tusks was found in Faradje during the second half of the year. Patrols are regularly made to the Domaines de Chasse and the need for the involvement of the Domaines and of the communities therein in conservation of the ecosystem is emphasised.

#### 2.1.2 Patrols

Patrolling was as follows:

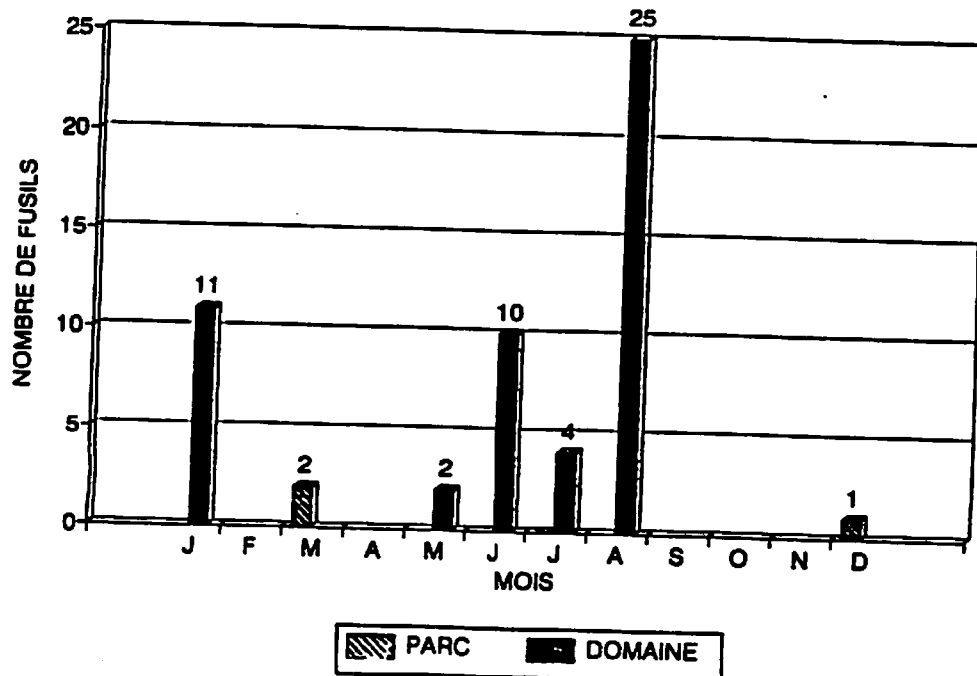
Table 1.

	SOUTH	NORTH	DOM.de CHASSE
Patrols Jan-June	13	18	8
Patrols Jul-Dec.	13	18	6
Av.no.guards/patrol	6.3	8.7	

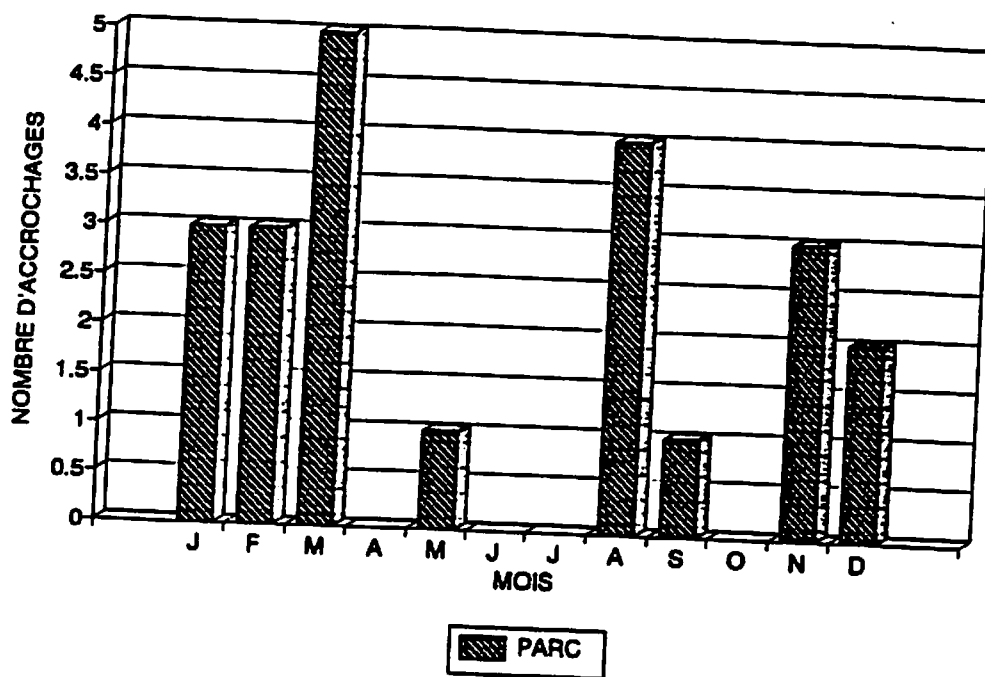
PARC NATIONAL DE LA GARAMBA  
 RESULTATS DE LA LUTTE ANTI-BRACCONAGE 1992

Mois	Fusils saisis		Cartouches saisis		Accrochages
	Parc	Domaine	Parc	Domaine	
J		11			3
F			2		3
M	2		18		5
A					
M		2	11		1
J		10			
J		4		476	
A		25		653	4
S					1
O				200	
N					3
D	1		9		2
<b>TOTALE</b>	<b>3</b>	<b>52</b>	<b>29</b>	<b>1329</b>	<b>22</b>

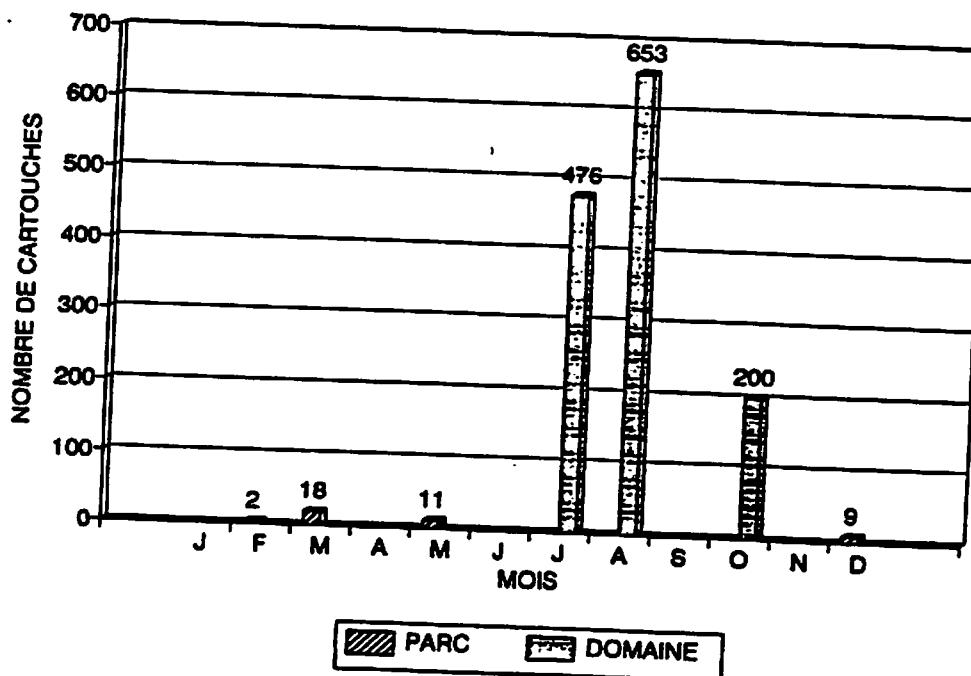
Parc National de la Garamba  
 FUSILS SAISIS 1992



Parc National de la Garamba  
ACCROCHAGES 1992



Parc National de la Garamba  
CARTOUCHES SAISIS 1992



Some of the patrols included both park and Domaine in one patrol. In this case they have been included under both headings. Table 2 and graphs 1-3 indicate the amount of arms and ammunition recovered throughout the year. Most was from the Domaine de Chasse on patrols specifically for that purpose rather than on chance encounters with poachers. Of the armed contacts with poachers, all but one were in the north. Minor discrepancies with activities and firearm recoveries from those reported in the first half of the year are due to returns from Gangala.

### **2.1.3 Aerial support**

Aerial support to anti-poaching comprises aerial reconnaissance and guidance of patrols, movement of personnel, transport of rations, equipment and the spare parts and mechanics needed to rescue broken down vehicles and evacuation of medical emergencies. The aspects of aerial reconnaissance and the ability to respond quickly to problems are of vital importance to the success of the anti-poaching. The installation of the new radio system has enabled effective ground-to air communications and made it feasible to carry out regular aerial reconnaissance in conjunction with ground patrols. This has been vital to help counteract the increasing poaching.

63.8 hours were flown on direct anti-poaching activities, but all other flying time contributes indirectly. A full breakdown is given later.

### **2.1.4 Radio Communication**

A radio repeater was installed in the first half of the year on top of Mount Bagunda and a communications system set up for within the park, using Motorola walkie-talkie radios. Base station radios are at Nagero and Gangala na Bodio. All mobile patrols, including the aircraft and senior staff have hand sets. Vehicles carry radio chargers and mobile patrols carry charging units with small solar panels. The guards have been trained in their use.

The system works excellently and communication is possible between almost anywhere in the park and the domaines. It has been a major step forward in improving the effectiveness of the patrol system and activities in general. In particular it has shown its value in ground to air communications in enabling regular communication between patrols and senior staff and observation posts, and in facilitating the ability to respond rapidly to any situation, from a poaching incursion to a vehicle breakdown. The repeater at Bagunda is now a regular observation post. A guard camp is permanently manned there and the guards climb the hill daily for radio communication and observation. In August an antenna and the repeater suffered a lightning strike which put it out of action for over a month, but it was finally successfully repaired in mid October and a new antenna erected.

The old Yaesu system will be set up at selected patrol posts around the northern periphery to link them with N'Delele sub-station and from there to the headquarters.

### **2.1.5 Training**

During August a month long intensive para-military training course for the guards was run in conjunction with the infantry unit at Faradje. This was a great boost to

their discipline, abilities and motivation as well as improving co-operative links with the military. Based on the results of this and of general performance, certain guards have been selected for further training as patrol leaders and inspectors.

### **2.1.6 Rations**

A system of long term storage of beans has been developed, by sealing them in empty Avgas drums and large plastic containers with a non-mammal-toxic insecticide. "Paddy" or rice in husk keeps almost indefinitely. Four tonnes of beans were therefore purchased from Aba and Rethy, with the kind help of the missionaries there, and ten tonnes of paddy was bought at Kurukwata. This is done when the crops are harvested and prices are at their lowest and it enables the park to have a year's stock on hand, for least expenditure.

For the system to work efficiently we need to purchase a small de-corticator for the rice. The nearest one is in Faradje, and the time it takes to mill a quantity means two return journeys to take and collect a load. In addition there is no way of knowing in advance if the machine is working or not.

## **2.2 Infrastructure development**

### **2.2.1 Roads, airstrips, river crossings**

An airstrip was constructed at Mt Bagunda with a drainage system and laterite surface. This is a key location as an observation post and for back-up to the anti-poaching in the north. A guard camp has been constructed and a repeater for the radio installed. These facilities also enabled Mt Bagunda to be used in August as a training camp. A vehicle is to be stationed there permanently to be used for rapid deployment foot patrols in the north, coupled with placement of guards by aircraft.

The peyote at Kpaza has been re-thatched. The crossing on the Magbwamu river was cut out, and the airstrip at N'Delele was surfaced with 300 tonnes of laterite.

### **2.2.2 Head-quarters**

Solar panels have been set up at all senior staff houses at Nagero, and maintenance has been carried. The dispensary is under-going renovation as a health centre and furniture and equipment have been constructed by the carpenters. A construction wood plantation has been started, with Eucalyptus. It is supervised by Ir. Amube Ndey, the new botanist/ forester with the research section.

A radio expert from Dungu, Frere Paul spent a few days at the park to inspect and improve the radio installation at Nagero and to assess damage to the radio repeater after it was struck by lightning.

Major renovations have been carried out on the second senior staff house at Gangalana-Bodio and these are almost complete. Unfortunately at the end of the year, half the roof blew off the main staff house there.

## **2.3 Vehicles and Equipment**

### **2.3.1 Aircraft**

A breakdown of my flying hours during 1992 is as follows:

Table 3:

	C-206	PA-12	Total
Logistics	296.7	4.7	301.4
Medivacs	10.8	-	10.8
Anti-poaching	55.9	7.9	63.8
Rhino recce	13.7	-	13.7
Radio collaring	7.4	16.9	24.3
Biopsy darting	2.6	36.5	39.1
<b>TOTALS</b>	<b>387.1</b>	<b>66.0</b>	<b>453.1</b>

100 Hour inspections on the C-206 have been carried out at Nyankunde. A 50 Hour inspection of 5Y-KEZ was done at Dungu

### **2.3.2 Vehicles**

The vehicle situation is critical. Rescue and repair of old vehicles now takes a large proportion of the time that should be spent on field work. In order to be develop the anti-poaching capability it is necessary to station a vehicle permenenatly in the north. I propose a Mercedes 911 4x4 small lorry as a tough, long lasting, reliable personnel and equipment carrier. A minimum of two new vehicles are urgently required for the park to be able to function effectively and contain the poaching pressure.

A new, heavy duty mower for the annual task of keeping roads open has been made by Turbo Mech in Kenya. It was due to arrive on a convoy from Kenya at the end of the year. However it is still delayed while the paper-work is processed and the transporters who were to have brought the convoy were evacuated from Zaire during riots.

### **2.3.3 Equipment**

A pre-fabricated hangar has been constructed by Pat Nalin of Naivasha. This was to have arrived on the same convoy as the mower, and is currently suffering the same fate.



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150 drums of fuel was brought in September by the transporters Bergmann and van der Woude, based in Aru. Unfortunately they failed to carry out a promised convoy of fuel and equipment in December. We later heard that they had been evacuated from Kisangani during riots and that their vehicles had been looted. This is being further investigated and other means explored, but it has delayed the arrival of both the above items of equipment and a load of urgently needed avgas.

A load of plywood, tyres and batteries was purchased in Bunia in October and transported gradually to the park in the C-206.

## **2.4 Maintenance Activities**

### **2.4.1 Vehicles**

Regular vehicle maintenance continued as usual. Common vehicle spares are now maintained in a store controlled by Amuta, the electrician, who has responsibility for day to day workshop activities.

The Marshall tractor was made serviceable again, thanks to help from Ron Morey, a missionary from Nyankunde. The old Massey Ferguson tractor was also made serviceable using a land-rover fuel pump.

The back of the Land Master truck was removed and re-built to withstand these roads. The rear bed of the Land-Master also underwent major repairs.

### **2.4.2 Water sources**

A survey of the water sources was carried out by the water engineers from Dungu. They plan to supervise renovations to the water source at Nagero and construction or reconstruction of other sources during the dry season. It has now been negotiated that for health purposes the park falls under the Diocese of Dungu, which has the advantages of enabling the park to benefit from the health and development schemes.

## **2.5 Domestic Elephants**

The domestic elephants were used a lot during the year out in the park, carrying visitors and for approaching rhinos for research. They featured prominently in Alan Root's film and will no doubt form a major attraction to the park as a result. In September the adults returned to Gangala, except for Zombie who is still loose around Nagero and who failed to follow them as anticipated.

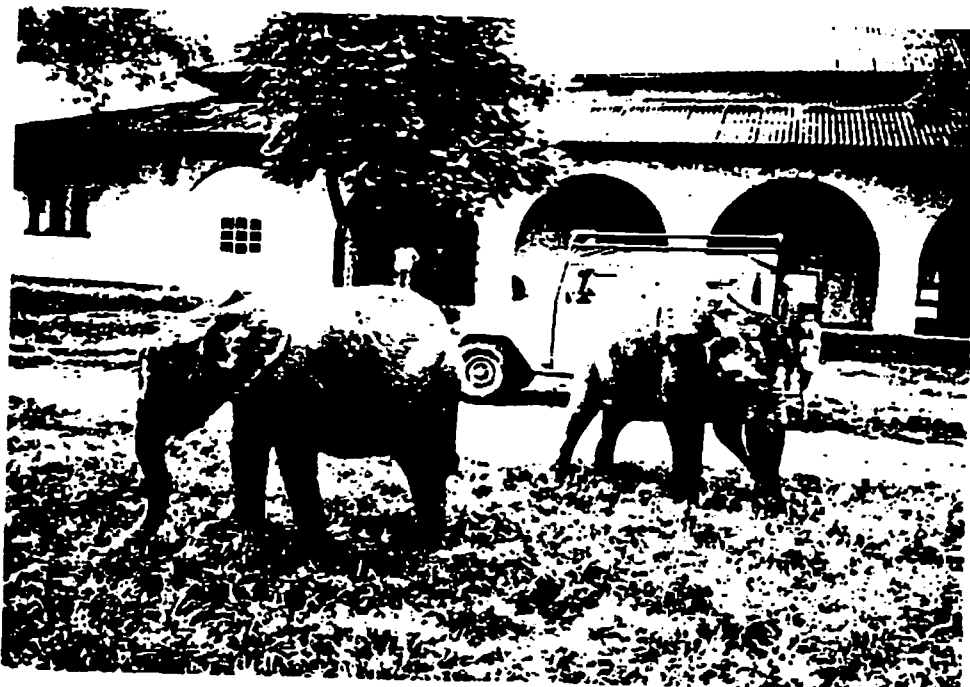
A young female elephant was caught in April, so that the existing young female, "Lungunya" would have a companion and they could both be trained together. "Meka", the young elephant developed abscesses, which had to be treated and collapsed on three different occasions in a hypoglycaemic coma. This may have been due to a combination of reduced nutrient absorption due to the anti-biotics, to worms and to competition with Lungunya as well as post capture trauma. She was revived



The aircraft is  
a work-horse for  
logistics and  
all park work



"Meka" supported  
in a sling while  
ill



"Meka", fully  
recovered with  
"Lungunya" at  
Nagero

and treated for worms and given intensive feeding and care. The third time it was necessary to support her in a sling for a month.

She is now fully recovered and both young elephants feed at will out of the boma, with a herder all day. Meka has responded well to training and both she and Lungunya are now ridden and trained daily.

## **2.6 General**

### **2.6.1 Administration**

Administration and accounting continues as usual. General bonuses were given to all IZCN staff on two occasions, as well as the usual bonuses for results. This was designed to help relieve the hardships caused by their salaries being unable to keep pace with the rate of inflation. Obtaining sufficient cash to pay these bonuses is in itself a major exercise and there is very little they can buy when they do have money.

### **2.6.2 Visits**

Steve Gulick an electronics expert visited the park in August to work on infra-sound recording of the rhinos.

A delegation from the Ministry of the Environment and the IZCN visited the park twice, in October and November and I transported them by aircraft. This was part of the investigations of aid projects being carried out under the orders of the interim government appointed by the National Conference. They reported being favourably impressed by the Garamba Project, particularly the degree of co-operation with IZCN.

Dr Robert Kasisi, WWF Central Africa Co-ordinator, paid a productive, though brief visit to Garamba in October.

Dr Kes Smith attended the IUCN/SSC African Rhino Specialist Group Meeting in Zimbabwe and presented both status reports and proposals for supplementary support to project activities.

In December we made a short but very productive and enjoyable visit to headquarters at Gland. We should like to thank everyone involved for their time and trouble.

Towards the end of December the Conservator Principal flew to Nairobi for an eye operation. We took the opportunity of his being there to introduce him to the Director and staff of Kenya Wildlife Services, and he got to know the Regional Offices of the donor organisations. He found it interesting and productive.

### **2.6.3 Leave**

From 17th December 1991 to 17th January 1993 we were in UK. Four days were spent purchasing or having : for the project, and 11 normal working days were spent on leave.

## Parc National de la Garamba

### ACTIVITES DE L'AMENAGEMENT DU PARC

#### ANTI-BRACONNAGE

(Version 25/09/92)

#### INTRODUCTION

Suite a la fuite des refugees Sudanaise de Maridi en Avril 1991, il y avait une visible augmentation du braconnage depuis le deuxieme partie de 1991. Des armes et des munitions sont actuellement plus environs du parc.

Le systeme actuel de 2 ou 3 patrouilles a pied dans le nord du parc a la fois ne peut pas s'en tirer le pression du braconnage. Un probleme additionel est le manque des gardes efficace.

Le succes du repeteteur VHF sur Mont Bagunda permet des nouveaux tactiques d'anti-braconnage.

#### PLAN

- Develop des Postes d'Observation sur des points hauts strategiques, chaqu'un equipe par deux gardes avec talkie-walkie. Idealement il y aura une piste d'atterisage pour chaque P.O.
- Unite mobile de 10 gardes avec vehicule qui peut patrouille le nord selon l'information des P.O.s
- Augment la duree des patrouilles de 15 jours a un mois, comme il ne sera pas necessaire pour les gardes d'apporter tous leurs rations. Ca sauvegardera le carburant et pourra compenser un peu la manque des gardes.
- 20 gardes sortent a la fois. Les gardes aux P.O.s font tourner avec les gardes dans le unite mobile pendant la patrouille.

Sites suggeres pour les P.O.s:

- Mt Bagunda
- Mt Paza
- Mt Mese
- Mt Amangwa
- Mt Nabagu
- Mt Oliepate

Pour aider le controle du nord ouest du parc, il y a besoin d'une piste d'atterisage et une phonie Yaesu installee a P.P.2 Bangiliwi

Un systeme similaire est necessaire au sud avant que le braconnage arrive au secteur rhino. Sites suggeres pour les P.O.s sont:

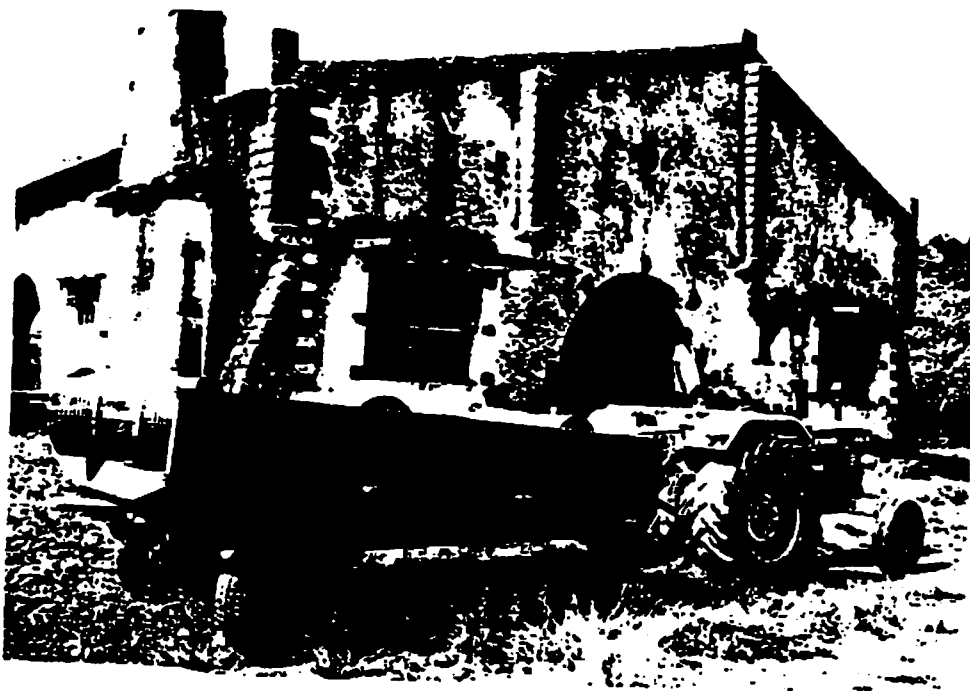
- Bac Garamba
- Mt Bawezi
- Mt Baboru
- Mt Namolombia

- Le cours de formation des gardes a eu un effet tres positif sur les gardes. Base sur les resultats on doit forme certains gardes dans les champs specifiques. La formation para militaire doit etre repete chaque 18 mois.



Construction of  
solar electric  
enclosure plot

Nurse Merci  
Nganzi at  
Nagero Dispensary



Rehabilitation of  
buildings at  
Gangala na Bodio

# GARAMBA NATIONAL PARK, RESEARCH AND MONITORING

## Annual Report 1992

Dr Kes Smith  
Technical Advisor, Ecology

### 1. INTRODUCTION

#### 1.1 Objectives

The overall objectives of the monitoring and research project are to contribute to and to improve the conservation of the ecosystem. Means of achieving these objectives are through the collection of information on priority issues, the provision of feed-back for planning, implementation, monitoring and development of conservation and management activities, and through generating an active field presence.

Activities are principally:

1. Continued monitoring and reporting on the rhino population.
2. Basic monitoring of the whole ecosystem and of poaching and anti-poaching activities.
3. Carrying out and promoting research on priority aspects of the ecosystem
4. Training and the establishment of standardised systems for the long term continuation of the monitoring.
5. Contribution to planning and feed-back on the results of activities.

Specific objectives for 1992 were:

1. To continue monitoring the rhinos and to facilitate this by radio-telemetry.
2. To carry out biopsy darting of the rhinos to obtain material for genetic analysis to assess the potential for in-breeding problems, and at the same time to update the identifications.
3. To immobilise selected individual rhinos to attach radio-collars to them in order to improve our monitoring and data collection and to facilitate studies.
4. To carry out specific studies on the rhinos of:
  - a) feeding ecology
  - b) communication
  - c) Inter-individual and age group relations relative to the known individuals and the sub-adult identifications verified through genetic analysis.
5. To carry out a general aerial census of the whole ecosystem.
6. To test and develop a simple method of monitoring poaching and anti-poaching activities.
7. To continue vegetation monitoring in the fire experimental blocks and to set up enclosure plots.
8. To continue and develop vegetation measurements for habitat descriptions.
9. To encourage local students to carry out field studies at the park.

## 1.2 Personnel

The research group now comprises: 1 Technical Advisor (WWF)  
1 Conservateur Researcher (IZCN)  
2 Researchers (IZCN/GNP Project)  
5 Guard technicians (IZCN/GNP Project)

## 2. PROJECT ACTIVITIES

### 2.1. Rhino monitoring

312 observations were made of 724 rhinos during the year. These could be attributed to 29 different individuals. Two sub-adult males, 5a and either 1a or 4a could not be certainly identified as having been seen. The sub-adult males tend to disperse into peripheral areas. There was one birth during the year. A female calf, named 4e Sifa, was born to F4 in February. The current population structure is given in Table 1.

Most of the observations were made during the first half of the year. During this period the grass is short and there is a greater concentration on field work. During the second half of the year the aircraft 5Y-KEZ was in Nairobi for maintenance, which reduced the amount of rhino monitoring possible.

### 2.2. Biopsy sampling

A large part of the dry season was spent on biopsy darting the rhinos, as reported in Smith et al 1992a. Dr Karesh of the New York Zoological Society, who had developed the technique came to work with us and teach the method. We obtained samples from 14 rhinos just less than half the individuals, of which 10 were good samples from 9 individuals and 5 were traces. It was a time-consuming operation in this environment, with such low density of rhinos, and there were problems with the biopsy equipment purchased from Daystate. The sampling involved simultaneous aerial searching for the rhinos and ground approaches and had the dual purpose of enabling us to carry out an intensive search for all the different individuals and to up-date identification features for them. The sub-adults who had left their mothers have been particularly difficult to distinguish and identify for certainty.

The biopsy material, frozen in liquid nitrogen was given to Dr Rashid Aman, Director of the Dept. of Molecular Genetics, National Museums of Kenya. In November, they began to extract the DNA and to develop PCR and micro-satellite techniques suitable for rhinos.

### 2.3. Radio-telemetry

The immobilisations were carried out in June, which is well into the wet season, after full permission had been obtained and the materials purchased and sent. Dr Morkel, from Namibia, of International Wildlife Veterinary Services came to carry them out with maximum security for the rhinos. This was very successful, as reported in Smith et al (1992b) despite the length of the grass at that time. We limited this preliminary operation to placement of three collars as a test and since time was limited. These were on one young male and two sub-adult females. Follow up was from both the air and the ground.

Parc National de la Garamba

NORTHERN WHITE RHINOCEROS (Ceratotherium simum cottoni)

POPULATION STRUCTURE, APRIL 1992

ADULT MALES		STATUS
M2	'Elet'i'	dominant, territory changed in 09.88.
M3	'Kondo akatani'	prior to 09.88 classed as old sub-adult, took over territory of M2
M4	'Bac'	probably dominant.
M5	'Bawesi'	dominant
M6	'Longuecorne'	dominant
M7	'Moitier'	young male
M9	'Notch'	dominant
ADULT FEMALES		
F1	'Mama Moke'	with JF
F3	'Kunalina'	with JM
F4	'Boletina'	with IF
F5	'Mama Giningamba'	with JM
F6	'Pacque'	with JM and SF
3aF	'Kuni'	born c.9-10/83, with JM
SUB-ADULTS		
1aM	'Moke'	S2, male, born mid 1983
4aM	'Bolete moke'	S2, male, born c. 08-09.1983
5aM	'Giningamba'	S2, male, born 02.85
4bF	'Mai'	S2, female, born 05.85
3bF	'Juillet'	S2, female, born 07.85,
6aF	'Oeuf de Pacque'	S1, female, born 03.86
4cF	'Noel'	S1, female, born 10-11.87 (M2 sire?)
5bF	'Grizmek'	S1, female, born 10.87 (M4 sire?)
6bM	'Elikya'	S1, male, born 06.88
1bM	'Mpiko'	S1, male, born 03-04.89
4dF	'Minzoto'	S1, female, born 08-09.89
5cM	'Molende'	S1, male, born 08.89 (M3 sire?)
3cM	'Solo'	J3, male, born 12.89, partially independent
JUVENILES		
3aaM	'Bonne Annee'	J2, male, born 12.90 (M6 sire?)
1cF	'Nawango'	J2, female, born 02.91
5dF	'Jengatu'	J1, female, born 07.91 (M3 sire?)
3dM	'Mamu'	J1, male, born 09.91
4eF	'Sifa'	I2, female, born 01.92
TOTAL KNOWN INDIVIDUALS		
Male adults (MA)		7
Female adults (FA)		6
Male sub-adults (SM)		7
Female sub-adults (SF)		6
Male juveniles (JM)		2
Female juveniles (JF)		2
Female infant (IF)		1
TOTAL		31
SEX RATIO		16M : 15F
ADULT:SUBAD.+ JUV.RATIO		1 : 1.4



The collars were modified with elastic to avoid the possibility of damage to the rhinos' ears. The modification worked well, but in this wet climate, two of them broke after two months. The third came off over the head after about three months. All three were recovered for replacement on rhinos next season.

Very interesting information was obtained while the collars were operating, particularly from the male. He had horn wounds when immobilised and had apparently been trying to take over a territory. While he recovered he was invariably in long grass in a peripheral area for the first few weeks. Then he began to move around the edge of the main rhino area and made another bid for M9's territory. In August, we found him retreating from a fight with M9 in which his collar had been broken off.

All the rhinos immobilised were measured and ear-notched for future identification. The ear notch material was given both to Dr Rashid Aman and to Professor Eric Harley, University of Capetown. The latter has successfully cultured it and is using the material in a comparative study of northern and southern white rhinos (Ceratotherium simum cottoni and simum) and black rhinos (Diceros bicornis). Blood samples were also taken for genetic and disease analysis.

Ticks were collected and have been identified by Dr Jane B. Walker of Onderstepoort Veterinary Institute. They were:

Amblyomma cohaerens 286 females, 214 males, 4 nymphae  
Dermacentor rhinoceros 5 males  
Rhipicephalus senegalensis 1 male

Amblyomma cohaerens are normally regarded as a parasite of buffaloes. The increase in buffaloes and decrease in rhinos since the 1960s associated both with poaching and habitat change may have led to the excesses of the former parasite, which may then be feeding on any available hosts.

Tooth impressions were taken, using dental acrylic and a lever device for opening and holding open the mouth. For a number of reasons, outlined in the report they were not very successful and a new method is to be tried next time, using both dental acrylic and plasticene and a commercially manufactured mouth gag.

## **2.4. Rhino studies**

### **2.4.1 Feeding ecology, relative to termitaria and seasonal availability.**

This is being investigated by direct observation of the rhinos and their habitat use, by quantification of selection, where they have fed and by quantification of seasonal availability. Faecal matter has been collected and preserved for analysis.

### **2.4.2 Communication.**

Following our own observations, which indicated the presence of medium distance communication, and recordings in captivity of infrasound from rhinos (von Mugenthaler et al 1991), we have been trying to record infra-sonic and sonic communication and relate this to behaviour.

The preliminary method was to use an infrasound frequency translator, developed by Thomas Kirkpatrick and kindly loaned by Dr Joyce Poole. This was first tested on the domestic elephants. It enabled us to hear infrasonic communication between the elephants, but maximum distance was 70 metres. It was used in the field with the rhinos throughout the dry season, but with no conclusive results. One reason was

suspected to be the sensitivity of the equipment, which has only a small built in microphone.

Later an opportunity arose to try out more sophisticated equipment developed by Steven Gulick. He spent 10 days at the park in August and although the grass was long we were able to find the radio-collared rhinos each day. Again the results were inconclusive. His equipment also proved to be extremely heavy to carry on foot, having been designed for use in a vehicle.

It is well known that rhinos do communicate by audible sound as well as by odour. Norman Owen-Smith described 10 different sounds made by rhinos (Owen-Smith 1973) and it is quite feasible for a large bodied animal such as that to produce infrasounds. Our lack of success in recording infrasounds so far could be attributed to the following:

1. The infrasound produced is at a low volume. The infrasounds recorded by von Mugenthaler were at maximum 40 dB (Katy Payne pers. comm.), whereas elephant infrasounds can be as loud as 103+3dB (Poole et al 1988). On the other hand the frequency of sound recorded from the rhinos (5-75Hz) went lower than that from elephants (14-35 Hz). Tests of the Kirkpatrick equipment with its built in microphone, indicated a maximum distance for detecting elephant infrasound of 70 metres. In order to watch the rhinos without disturbing their behaviour one has generally to remain at least 50 metres away.

2. Because the rhinos have to be found on foot, it usually takes a long time to find them each day, though this is considerably aided by the radio-telemetry. It is often well after 08:00 or even 09:00 before one is close to them, even starting out at first light. A large part of the day that one is able to spend with them is the least active part of the 24 hours, much of it spent resting, with little reason to communicate. Their most active time of the day is very early morning evening, and I have found through radio tracking that black rhinos are often very active at night.

Both of these problems could be overcome by attaching a sensitive solid state recording device to a radio collar. Gulick has proposed developing such a device. In order to combine sound recording with behavioural observation and to maximise the information that can be obtained from the radio-collared rhinos, we ideally need night vision equipment as well, not to mention a sensitive means of detecting odour.

The field of communication is particularly relevant to investigate when considering the problems of rhino social interactions when reduced to very low densities. The Garamba population has provided some interesting clues. The animals range over far larger areas than recorded for rhinos elsewhere. Our aerial monitoring of a low density population with known individuals has enabled us to detect frequent loose aggregations, often of related animals, and similar responses of such groups at distances of over a kilometre apart. We propose to continue this line of investigation combined with other rhino observations as well.

#### **2.4.3 Inter-individual and age class relations.**

With the aid of the radio-telemetry and the up-dated individual recognition file, we are trying to investigate the behaviour of sub-adults relative to their mothers and siblings and in general the behaviour of related individuals towards each other.

Table 2

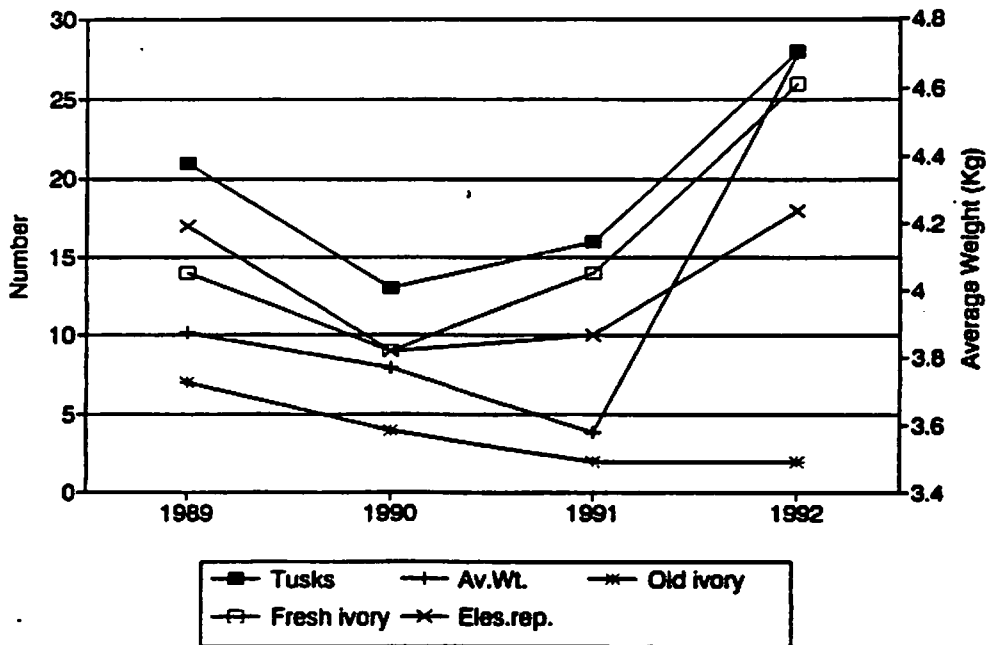
Parc National de la Garamba  
 ELEPHANTS FOUND DEAD AND IVORY RECOVERED

YEAR	TUSKS	AV.WT.Kg	OLD IV.	FRSH.IV.	ELES RE	ALL ELES
1989	21	3.87	7	14	17	
1990	13	3.77	4	9	9	
1991	16	3.58	2	14	10	
1992	28	4.70	2	26	18	22

nb. ALL ELES includes the elephants represented by ivory recovered plus fresh carcasses without ivory.

Figure 1

Parc National de la Garamba  
 IVORY AND DEAD ELEPHANTS, 1989-1992



**PARC NATIONAL DE LA GARAMBA**  
**CALENDRIER DES MESURES DE LA VEGETATION 1992/93**

PAR.	COUV.HER	VEG.LIG	COUV.B	RECENS.AERIEN		FEU
				AVANT	APRES	
A1	1-10.10	1-10.10				
A2	1-10.10	1-10.10				
B1	1-10.10	1-10.10	5.93	2/3.93	5.93	3.93
B2	1-10.10	1-10.10	5.93	2/3.93	5.93	3.93
C1	6/7.92	6/7.92	10-30.9	6/7	10-30.9	00.7
C2	6/7.92	6/7.92	10-30.9	6/7	10-30.9	00.7
D1	1-10.10	1-10.10	1/2.93	00.11	1/2.93	11/12
D2	1-10.10	1-10.10	1/2.93	00.11	1/2.93	11/12
E1	6/7.92	6/7.92	10-30.9	6/7	10-30.9	00.7
E2	6/7.92	6/7.92	10-30.9	6/7	10-30.9	00.7
F1	1-10.10	1-10.10	1/2.93	00.11	1/2.93	11/12
F2	1-10.10	1-10.10	1/2.93	00.11	1/2.93	11/12

**PARAFEUX**

NAA	25.9.92	11/12
NAB	25.9.92	11/12
NAC	25.9.92	11/12

**CLOTURE EXPERIMENTALE DE FEU DE BROUSSE**

Date de construction:

Nombre de parcelles: 2 parcelles protégées  
 2 parcelles de feu precoce  
 2 parcelles de feu tardif

**MESURES REALISEES**

<u>Parcelles</u>	<u>Date</u>	<u>Feu</u>
A1	6.11.1992	-
A2	6.11.1992	-
B1	7.11.1992	
B2	7.11.1992	
C1	22.06.1992	9/ 20.12.1992
C2	20.06.1992	11.12.1992
D1	8.11.1992	9/ 16.12.1992
D2	7/8.11.1992	20.12.1992
E1	20.06.1992	12/13.12.1992
E2	22.06.1992	19.12.1992
F1	6.11.1992	4/5/6.12.1992
F2	7.11.1992	19/20.12.1992
NAA	6.10.1992	
NAB	6.10.1992	
NAC	6.10.1992	

**Clôture expérimentale de feu de brousse.**

IIa & IIb (F.Prec)	5.11.1992	1.12.1992
IIIa & IIIb (F.Tard)	5.11.1992	9.02.1993
Ia & Ib (Protégé)	5.11.1992	-

## **2.5. Ecosystem monitoring**

### **2.5.1 Aerial Count**

The general aerial sample count planned for April had to be postponed twice, first due to the anticipated fuel being delayed, then to the sudden arrival of the vet for the immobilisations. Following that it was considered necessary to cancel it as the results would not have been comparable with other years. A general census is planned for April 1993 and it is hoped to be able to carry it out in conjunction with personnel from GRID (Global Resource Information Division) of UNEP and to plot distributions in a format compatible with a GIS system.

### **2.5.2 Patrol monitoring**

The basic system of collection and presentation of information on poaching and anti-poaching activities on grid maps was put into practice throughout the year. A few changes have been made, and during the forthcoming dry season selected guards will be given more detailed training on the information recording.

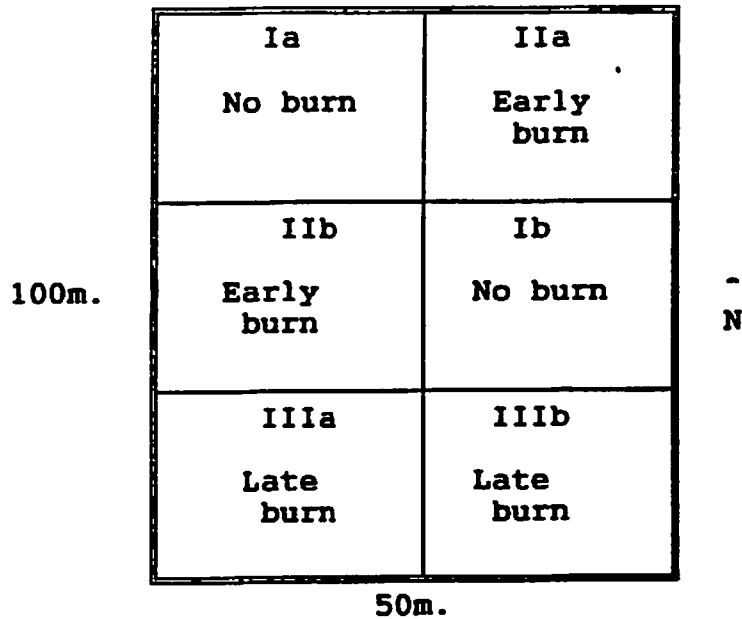
Table 2 and Figure 1 summarise ivory collected over the past four years as indicators of poaching, with the addition in 1992 of freshly dead elephants seen without tusks. The latter is obtained from a summary map built up over the year. The figures show an increase in ivory recovered in 1992 relative to the preceding two years. It is not a massive increase, being only 7 tusks more than in 1989, but there is a change in ratio, with more freshly dead and less old ivory. At least 9 of the freshly dead elephants, can definitely be attributed to poaching. Of the 26 tusks in good condition recovered, 19 were from the north, 5 from the south and two from the domaine. Three freshly dead elephants were found in the domaine, and as the area is wooded and far less well covered than the park, there were undoubtedly many more.

However main poaching is still for meat. Guards recorded approximately 173 buffalo and 67 other species poached. The other species included Hartbeeste (Alcelaphus buselaphus lelweli), Kob (Kobus kob thomasi), Waterbuck (Kobus defassa harneri) and Warthog (Phacocoerus aethiopicus).

## **2.6. Vegetation**

### **2.6.1 Fire experiment**

Most of the southern section of the park burned in January, with fires that escaped. With a combination of lack of old combustible material and a particularly high rainfall, the "contre saison" fires in July were impossible. However the early burns were carried out in December two weeks after the rains ceased. Vegetation measurements and fires were according to the accompanying table 3.



**Fig.2 Plan of Source Nambira Exclosure Plot**

In August an exclosure plot was established in a "no burn" area near to Source Nambira. It comprises 6 blocks: 2 no burn  
2 early burn  
2 late burn.

One of each type is in half of the plot fenced with single strand 6' high electric wire against elephants. The other of each type is in the other half of the plot, fenced with three stranded electric wire against other large and medium mammals.

Baseline measurements using the standard methods of Walker (1976) as applied in the rest of the fire plots, were made within the blocks. Measurements were also made within the termitaria to see how they changed with and without animal use.

**2.6.2 Marked trees.**

The marked trees have been re-measured by Monungu and a second series marked in the tree/bush savanna near to Dodo.

**2.6.3 Herbarium.**

The new researcher Amube Ndey has been given responsibility for continuing to organise and up-date the herbarium and identify the plants brought in. The labelling system has been up-dated. He is planning a programme for increasing the descriptive vegetation measurements in habitats that have been poorly covered to date.

**2.6.4 Termitaria.**

In conjunction with the rhino feeding study, Amube has begun a series of measurements of vegetation condition and availability within and without termitaria at different seasons . These are made in early, mid and late wet season and mid dry season.

PARAMETRES DU CLIMAT: NAGERO 1992

Place: Nagero Alt: Lat:03°46'N Long:29°32'E

Annee: 1992

Mois	PRECIPITATION		TEMPERATURE			HUMIDITE REL.			EVAP'N	VIT. VENT
	Total (mm)	No/jours	Moyen (C)	Max moy (C)	Min moy (C)	6:00	15:00	18:00	(cm*3) Total	(km/hr)
J	36.0	3	23.7	33.1	15.4	97.3	47.1	66.6	341.1	3.5
F	39.3	2	24.5	34.0	15.5	89.5	60.0	62.8	301.6	3.2
M	27.9	7	27.2	35.3	18.3	91.3	44.5	65.8	346.5	3.2
A	309.1	11	26.0	32.2	20.0	94.6	62.2	76.8	90.7	2.0
M	139.4	17	25.7	32.1	13.3	96.5	72.4	83.2	87.8	2.7
J	162.8	12	24.5	30.4	18.7	96.7	70.5	81.7	74.1	2.3
J	179.0	16	23.6	28.9	18.3	96.9	70.1	83.5	56.1	2.2
A	269.0	13	23.1	28.6	17.8	98.8	73.0	87.1	60.3	2.2
S	157.2	19	23.4	29.7	17.2	98.7	71.6	90.0	75.4	2.3
O	279.7	19	23.4	29.4	17.5	98.7	68.9	84.8	71.9	1.4
N	39.1	13	23.3	30.5	16.1	99.0	62.3	85.5	107.9	2.8
D	15.5	10	23.4	31.3	15.1	97.6	53.8	74.1	101.9	1.8
Tot./moy.	1654.0	142	24.3	31.3	16.9	96.3	63.0	78.5	1715.3	2.5
Sais sech	118.7	22	24.7	33.4	16.1	93.9	51.4	67.3	1091.1	2.9
Sais.plui	1535.3	120	24.1	30.2	17.4	97.5	68.9	84.1	624.2	2.2

Saison Seche : Dec-Mars; Saison de Pluie : Avr-Nov.

Precipitation et Evaporation en totaux; Humidite et Temperature en moyennes par mois

Table 4

Figure 2

PARAMETERS DU CLIMAT: NAGERO 1992  
Temperature et Precipitation

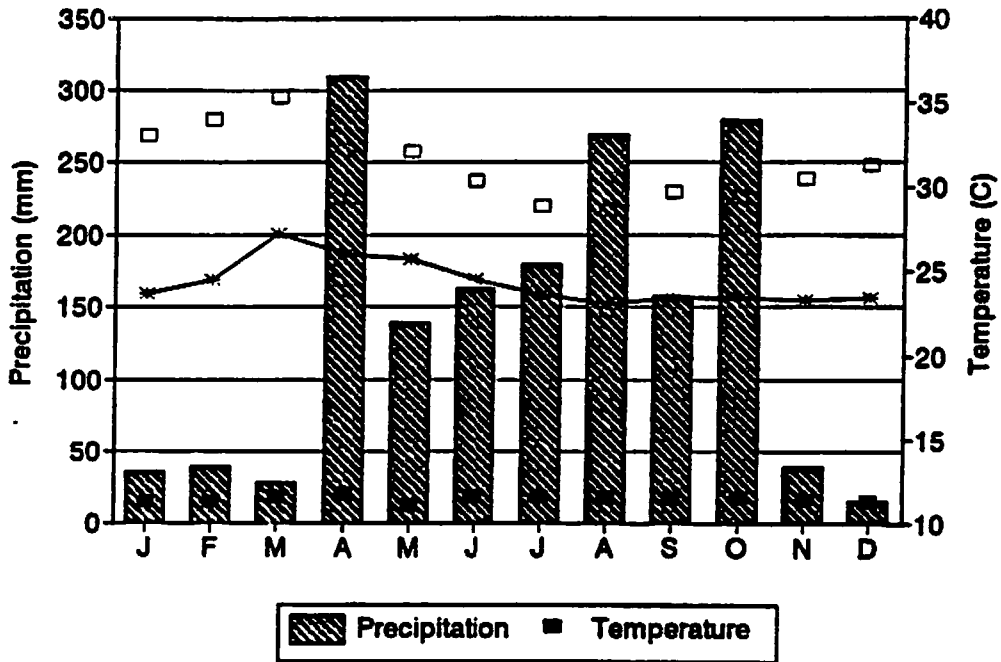
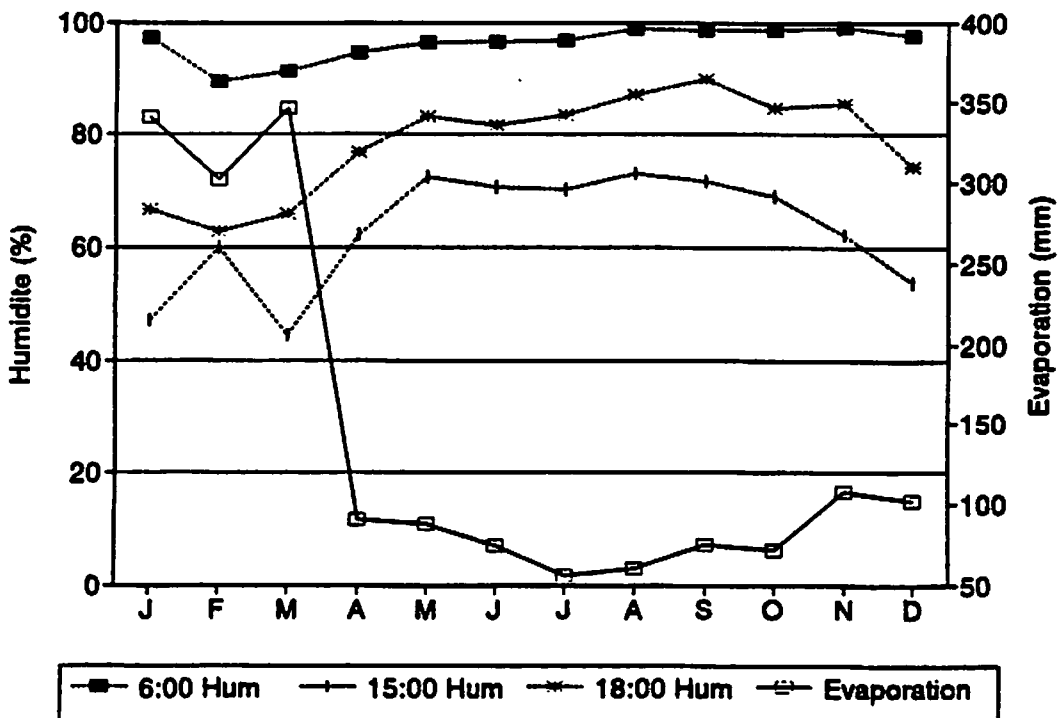


Figure 3

PARAMETERS DU CLIMAT: NAGERO 1992  
Humidite and Evaporation





## **2.7 Elephant study**

The NYZS data from the satellite collared elephant continued to indicate movements outside the park and a definable range within the park, until the battery failed towards the end of the year.

An IZCN researcher has not been sent to replace Ir. Mwema, and we have not yet found a suitable candidate to employ to carry out the elephant study outlined in the 1991 report. The need still exists, however, and is being pursued.

## **2.8 Meteorology**

The climatic readings continued as usual, by the technicians trained to do so. The guard Atolo Bako, who had received training at Yangambi is in overall charge of the meteo and of training other technicians. Since his training an anemometer has been added to the equipment in use.

Table 4 summarises climatic data for 1992. Figures 3 and 4 plot the Rainfall and Temperature, and the Humidity and Evaporation. It was a particularly high rainfall year, with a total of 1654mm, and a total monthly rainfall in April of 309.1mm. The annual total was 308 mm higher than the annual average since 1980 reported in the annual report for 1991. It was in line with the average recorded for the period 1957-63. Total evaporation still exceeded total rainfall, however, unlike the average for the period 1957-63, where the reverse was the case.

In the 1991 report the data were presented showing an average trend to a drier climate compared with that 30-40 years ago. Although this year was exceptional, the rainfall/evaporation relationship was still negative. It is possible that this trend may be contributing to the loss of trees within the southern section of the park. Fire and elephants are certainly proximal causes, and outside the park, in the same latitude, the woodland of the tree/bush savanna is increasing. But there is also a general loss of typically forest species from within the riverine and source woodland, with no regeneration of these species. It is possible that there may be a change in ratio between forest and savanna species even outside the park. This will be investigated as far as possible in the habitat transects to be done by Amube.

## **2.9 Birdlist**

The birdlist was up-dated during the year, re-typed from the Kaypro (CPM) computer into Dbase in the desktop operating in MS-DOS. From the print-outs, small checklists were produced for field use, to be filled in monthly and to be available for visitors.

## **2.10 Personnel**

### **2.10.1 Researcher, Ir. Amube Ndey.**

A botanist, graduate from Kisangani University, Ir. Amube Ndey, joined the group in August. He had carried out his field practical at Garamba during his studies and had proved to be a good botanist and conscientious worker. Following agreement from the Direction General of IZCN he had therefore been offered a job as researcher, to be supported initially by the project and if he proved suitable to be employed later by IZCN.

His first tasks have been to work on the herbarium, set up a tree plantation for the production of construction wood, to co-operate on the fire experiment vegetation measurements and to work on the faecal analysis of the rhino feeding study. He has also taken on the baseline monitoring of vegetation availability relative to the above study and is developing a plan for improving the quantitative habitat descriptions to support the vegetation map, particularly with data collection in the least sampled areas. This will provide a basis for up-dating the vegetation map with a GIS system and for mapping the Domaines de Chasse as part of the whole ecosystem. He has proved excellent so far.

## **2.11 Training**

### **2.11.1 Study Visit, Dr Mbayma.**

In November Dr Mbayma made a two week study visit to Kenya to gain experience working with Dr Rashid Aman's laboratory in the Department of Molecular Genetics at the National Museums of Kenya. They began the extraction of DNA from the rhino biopsy samples and attempted to replicate it by PCR. Some of the samples produced good quality DNA, in others it was found to be degraded. Considerable developmental and experimental work is still needed to work out the indicator sequences for rhino material. A summary of his report is included.

Under the auspice of the WWF East African Regional Office he also attended the preliminary UNEP Rhino Range States Meeting, accompanied by the Second Secretary from the Zaire Embassy in Nairobi. They made a presentation on the conservation needs for rhinos in Garamba, which represent all the rhinos of Zaire.

### **2.11.2 Stagier, Kiwa Musukuna**

A University student, Guillaume Kiwa Musukuna, son of the local army major, who was studying geography, did his field practical at the park in July. He worked with Monungu Likango, examining the agricultural practices of the Azande in the Domaines de Chasse and the succession of re-colonisation of fallow land. Sadly at the end of the year he died of a kidney complaint.

## **2.12 Medical support for IZCN staff**

Support for medical expenses is an important motivating factor for the guards and their families. Since this can no longer be covered by IZCN, the project is buying medicines and paying a bonus to the nurse seconded from Dungu, who is running the Dispensary. The responsibility for ordering medicines and giving overall supervision in their use falls 'de facto' on to myself. The C.T.A. and the Conservateur Principal supervise the practical aspects of the development.

It is proposed by Dr Atua, the Supervisory doctor in Dungu, that the Nagero Dispensary becomes up-graded to a Health Centre with the ancillary facilities of pre and post-natal care and maternity, health education and vaccination. Renovations have been made to the building and furniture constructed. A vaccination programme has been started and the nurse has begun making rounds of the patrol posts. Patrols all go out with a small stock of emergency medicines. Table 4 and Figure 5 summarise the medical cases since the nurse started work in April.

## **2.13 Meetings**

### **2.13.1 Delegation from Kinshasa**

A delegation from IZCN head quarters and from the Ministry of the Environment visited the park twice in October and November during a tour of assessment of all conservation aid projects. They appeared to be satisfied with the results of the project to date and with the high degree of co-operation in the working relations.

### **2.13.2 Visit of Dr Robert Kasisi.**

Dr Robert Kasisi, WWF co-ordinator for Central Africa was able to make a brief visit Garamba in October. This was most valuable for discussion on the current situation and on project proposals he was promoting to try to seek support for the monitoring and research and for the health care programme.

### **2.13.3 IUCN/SSC African Rhino Specialist Group Meeting.**

I attended the ARSG meeting in Zimbabwe in November, and made brief presentations on the current status of the Northern White Rhinos and the Elephants at Garamba (Annex I). We were required to prepare proposals for conservation support needs for priority rhino populations. Three proposals for supplementary support to develop the existing programme were accepted by the Group. Two were rated Priority and one as the second category, Important. Summaries are included in Annex II.

These were forwarded to the President Delegee General of the IZCN and were presented by the delegation from the head-quarters, and by Dr Mbayma at the UNEP Preliminary Rhino Range States Meeting. The proposals were developed and written jointly by the in situ Project Management Unit (Conservateur principal, Chief Technical Advisor, Conservateur Chercheur and Technical Advisor (Ecology)). They are based on the assumption that the project will continue to be funded and that supplementary development funds only are necessary.

### **2.13.4 Head-quarters visit**

In December we made a brief visit to WWF Head-quarters, before going on leave over Christmas. It was a very useful visit and we are very grateful for the welcome we received. It was, however, so tightly scheduled that we missed seeing a few people and inside the new IUCN head-quarters.

## **2.14 General**

### **2.14.1 Action plans**

It is proposed that the contributions of the project management unit to the preliminary draft of a Management Plan are made by means of a series of workshop meetings. For each meeting a management group or a research group covers a particular section and prepares additional or modified text and comments as necessary. This is then examined during a general working meeting and a final text agreed upon.

Drs Mbayma and Smith are drafting an Action Plan for the Conservation of the Rhinos, to be used as background at the UNEP meetings and for other planning.

### 2.14.2 Administration

Reports, accounts, project proposals, project supervision, correspondence and general administration inevitably take a considerable amount of time, but we try to orientate this part of the work more towards the wet season, when less field work is possible. This occupied a large part of the second half of the year.

### 2.14.3 Equipment

The aircraft 5Y-KEZ had to be re-fabriced in order to obtain its Certificate of Airworthiness, due in July. It therefore spent the whole second half of the year in Nairobi under-going this maintenance work.

The desk-top computer is under virtually constant use by members of the research group. We find that the 40Mb hard disc is insufficient for the requirements. We should therefore like to purchase a supplementary hard disc to increase the capacity sufficiently to handle the work load and a GIS programme.

There is a major vehicle problem. The Rhino Protection Officer's vehicle, which is used both for rhino research and conservation, although it has only done 60,000 km requires such frequent repairs that much time is lost in rescue and repair. The Land-Rover available for the other researchers is in extremely poor condition and also spends more time being rescued and repaired than on effective work. All this also greatly increases the work load of the workshops staff. At least one, ideally two new vehicles are badly needed. My own vehicle is running well, though with 110,000 km, but it needs a new soft-top.

### 3 REFERENCES

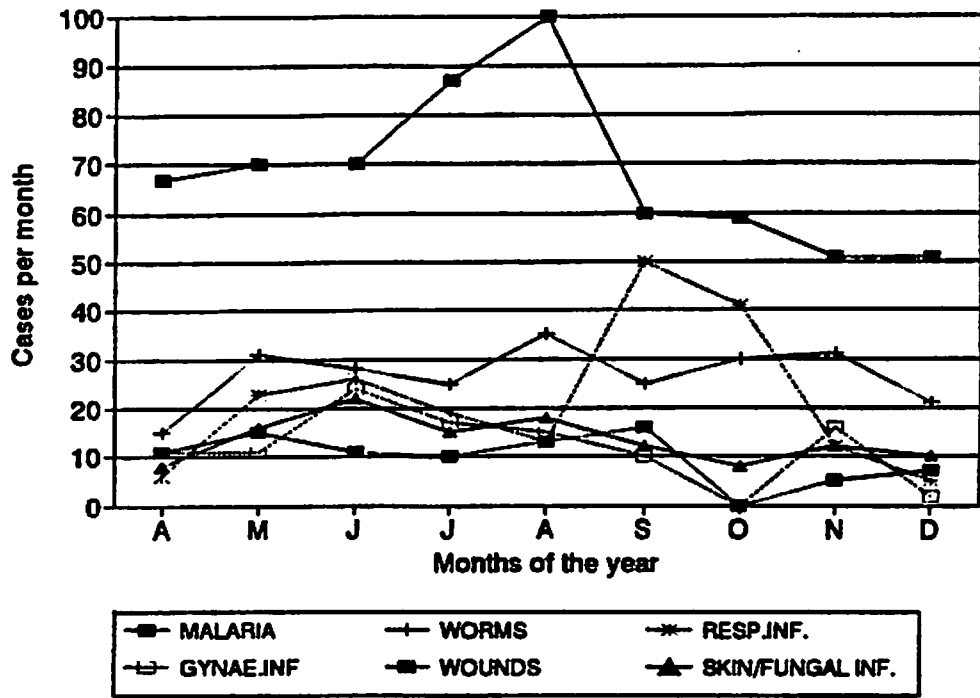
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Table 5

NAGERO DISPENSARY  
CASES PER MONTH FOR THE YEAR 1992

DISEASE	A	M	J	J	A	S	O	N	D
MALARIA	67	70	70	87	100	60	59	51	51
WORMS	15	31	28	25	35	25	30	31	21
RESPIRATORY INF./FLU	6	23	26	19	13	50	41	12	5
HEADACHES	25	25	40	50	48	38	0	28	28
GYNAECOLOGICAL INFECTIONS	11	11	24	17	15	10	0	16	2
TOOTHACHE	4	4	2	5	8	10	7	5	0
ABCESS/BOIL	2	3	6	8	5	5	0	13	0
LUMBAGO/RHEUMATISM	6	14	2	6	5	11	0	10	10
DIARRHOEA	4	6	3	9	10	4	20	5	5
EYE/EAR INFECTIONS	10	3	5	6	11	10	7	0	0
WOUNDS/TETANUS	11	15	11	10	13	16	0	5	7
BIRTH	1	1	4	3	0	0	0	0	0
MISCARRIAGE/THREAT MISCARRIA	3	1	0	0	0	1	0	1	0
TONSILITIS/SORE THROAT	2	3	10	2	3	6	0	5	0
FEVERS	33	47	0	33	25	30	30	26	26
SHINGLES	1	0	0	0	0	0	0	0	0
MINOR SURGERY	3	3	0	0	0	0	0	0	0
HERNIA	1	4	5	6	2	2	0	0	0
COUGHS	13	10	0	0	10	0	0	12	12
MENINGITIS	0	0	0	0	0	0	1	0	0
SKIN/FUNGAL INFECTIONS	8	16	22	15	18	12	8	12	10
OTHER INFECTIONS	28	0	20	19	22	0	1	0	0
ANEMIA	0	0	2	0	2	5	2	1	0
TUBERCULOSIS	0	0	0	0	0	0	2	0	0
FILARIAS	0	2	2	2	3	5	3	0	0
TOTALS	254	292	282	322	348	300	211	233	177

**NAGERO DISPENSARY  
CASES PER MONTH FOR 1992 (APR - DEC)**



**Figure 4**

**THE STATUS OF NORTHERN WHITE RHINOS  
(Ceratotherium simum cottoni) IN ZAIRE, 1992**

**DISTRIBUTION**

The only known viable wild population of the northern sub-species of white rhinoceros (Ceratotherium simum cottoni) is at Garamba National Park in north eastern Zaire. There are 31 in 1992. Their total range is approximately 1,300 km<sup>2</sup> in the south central part of the park, which is the most secure from poaching.

These are also the only Rhinocerotidae extant in Zaire. Black rhinos (Diceros bicornis) have not been seen, in their previous range, the region of L'Upembe National park, since the 1940s.

A few northern white rhinos may still exist in Sudan. In all other parts of their previous range they are probably extinct (Edroma 1982, Hillman and Smith 1983, Hillman et al 1985, Froment J.M.pers.comm.)

**STATUS**

The rhinos at Garamba National Park are increasing. Since 1984 an aid project funded largely by World Wide Fund for Nature (WWF), Frankfurt Zoological Society (FZS) and United Nations Educational and Scientific Organisation (UNESCO) and co-ordinated by the World Conservation Union (IUCN) has been working with the Institut Zairois pour la Conservation de la Nature (IZCN) to rehabilitate the park and conserve the ecosystem. During this time the anti-poaching capabilities have been vastly improved. The rhino population has doubled and the elephant population has increased.

In 1992 there are 31 known individuals at Garamba. The present population structure is given in Table 1. The sex ratio is 1:0.94. The adult to combined juvenile and sub-adult ratio is 1:1.4. The average annual rate of increase between 1984 and the present has been 9.7% (Fig.1). Mean inter-calf interval has been 2.5 years, with one female averaging less than 2 year intervals. Age of first parturition was 7 years for the first known age female to reproduce.

**SECURITY SITUATION**

There are two main threats to the population:

1. Poaching, which is by far the most important, and had decimated the population twice between 1960 and 1983.
2. Assuming poaching can be controlled there exists the potential for future in-breeding problems. The population passed through a bottleneck of 15 individuals, with a maximum N<sub>e</sub> of 11 in 1983. This question is considered under research and monitoring.

The park is about 100 km long north/south and less than 50 km wide. The head-quarters is on the southern boundary, while the northern boundary abuts Sudan. Security is therefore far better in the south. The rhinos and most of the elephants are concentrated there.

The combination of the aid project and the IZCN staff has been largely successful in controlling the poaching since 1984. One factor contributing to the success has been the fact that poaching immediately prior to the project had largely been internal. Minor poaching has continued to occur for meat in the north of the park, but this has not affected the south or the rhinos.

Patrolling consists of sequential 15 day foot patrols of 4-6 men each in the south and 8-10 men each in the north, giving a continual patrolling presence in the park. Placement is by vehicle or aircraft and patrols are backed up by aerial support, observation posts and radio communication. In the south, this is complemented and guided by aerial monitoring of the rhinos, other aerial reconnaissance flights and by a presence in the area, particularly in the short grass period for research and monitoring. These activities make a vital contribution to the rhino conservation. 85% (N=150) of all rhino observations in 1991 were made during our monitoring and research activities. 18% (N=32) were made by guards.

But since mid 1991 poaching pressure has increased following a major influx of arms and ammunition with refugees from Sudan. Over 300 arms and 10,000 rounds of ammunition were recovered by parks staff. 20,000 refugees settled in the town of Dingu on the western border of Domaine de Chasse Azande. Inevitably arms and ammunition are more readily available than previously. This, exacerbated by the plunging economy of Zaire has led to an increase in poaching in the park in 1992. So far this has not, to our knowledge directly affected the rhinos. The poaching is still mainly for meat, and so far confined to the north and the Reserves, but the incidences of elephant poaching have increased. 28 elephant tusks were recovered in the first half of 1992, compared with 16 in the whole of 1991, 14 in 1990 and 23 in 1989.



The increase in poaching is not so far on a large scale, revisions to the strategy have been planned and moves are underway to improve anti-poaching efficiency, but at the same time certain factors threaten to decrease anti-poaching capability:

1. Anti-poaching and monitoring vehicles are at the stage where more time is spent on rescue and repair than on use.

2. Numbers of effective guards have been reduced in recent years by retirements, deaths and desertions and have not been replaced. This leads to a ratio of 8,750 ha. per guard in the south, compared with the 5,000 recommended by the IUCN AERSG and only 8.8 patrol days/ 5x5 km/year in the core rhino area and 2.5 patrol days/5x5km/year in the perimeter.

3. Project budgets have had to be cut due to the world recession and concern about political instability in Zaire, but to combat the current threats, more rather than less money is needed.

#### MANAGEMENT/RESEARCH/MONITORING PROGRAMMES

The population has been monitored since 1984, with data also from 1983. The monitoring is both aerial and ground based. In addition more detailed specific studies are underway. Both monitoring and research are orientated towards conservation and management questions, with the following objectives:

##### Monitoring:

1. Feed-back on anti-poaching success, population dynamics, movements, habitat use, inter-individual relationships.

##### Research:

2. Investigation of the genetic variability of the population and inter-individual relationships to assess the potential for in-breeding problems.

3. Communication in this low density population

4. Feeding ecology in relation to the seasonal habitat limitations

5. Juvenile/sub-adult/adult behaviour relative to inter-individual relationships.

Genetic variability (2. above) is being investigated using the technique of remote biopsy sampling developed by Karesh et al (1987). Thirteen different individuals have so far been sampled using this technique and the analysis is being carried out at the Dept. of Molecular Genetics, National Museums of Kenya. The rhinos have shown no sign of infection or other ill-effects from the darting. (Smith et al 1992a & Mbayma et al 1992).

In June 1992 three of the rhinos were radio-collared. The broad objectives were

a) To improve their protection by facilitating their monitoring and follow up by the guards, (1. above)

b) To facilitate the detailed studies 3 to 5 above.

c) To profit from the immobilisations by sampling for genetic and disease analysis and by marking sub-adults for long term identification. (2 and 1 above). (Smith et al 1992b)

Radio-collaring and follow-up will be continued in the 1993 dry season. The collars used originated from Telonics but were modified with elastic inserts to ensure safety for the rhinos. Immobilisations were carried out by Dr Pete Morkel of International Wildlife Veterinary Services. (Smith et al 1992b).

## NEEDS

In order to be able to respond to the current threats, the following support, complementary to the existing project is required:

1. New vehicles and equipment.
2. Financial support towards research.
3. Back up in the IZCN negotiations to employ more guards.

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Parc National de la Garamba

November 1992

Parc National de la Garamba

NORTHERN WHITE RHINOCEROS (Ceratotherium simum cottoni)

POPULATION STRUCTURE, APRIL 1992

ADULT MALES

		STATUS
M2	'Eletl'	dominant, territory changed in 09.88.
M3	'Kondo akatani'	prior to 09.88 classed as old sub-adult, took over territory of M2 probably dominant.
M4	'Bac'	dominant
M5	'Bawesi'	dominant
M6	'Longuecorne'	dominant
M7	'Moitier'	young male
M9	'Notch'	dominant

ADULT FEMALES

F1	'Mama Moke'	with JF
F3	'Kunalina'	with JM
F4	'Boletina'	with IF
F5	'Mama Giningamba'	with JM
F6	'Pacque'	with JM and SF
3aF	'Kuni'	born c.9-10/83, with JM

SUB-ADULTS

1aM	'Moke'	S2, male, born mid 1983
4aM	'Bolete moke'	S2, male, born c. 08-09.1983
5aM	'Giningamba'	S2, male, born 02.85
4bF	'Mai'	S2, female, born 05.85
3bF	'Juillet'	S2, female, born 07.85,
6aF	'Oeuf de Pacque'	S1, female, born 03.86
4cF	'Noel'	S1, female, born 10-11.87 (M2 sire?)
5bF	'Grizmek'	S1, female, born 10.87 (M4 sire?)
6bM	'Elikya'	S1, male, born 06.88
1bM	'Mpiko'	S1, male, born 03-04.89
4dF	'Minzoto'	S1, female, born 08-09.89
5cM	'Molende'	S1, male, born 08.89 (M3 sire?)
3cM	'Solo'	J3, male, born 12.89, partially independent

JUVENILES

3aaM	'Bonne Annee'	J2, male, born 12.90 (M6 sire?)
1cF	'Nawango'	J2, female, born 02.91
5dF	'Jengatu'	J1, female, born 07.91 (M3 sire?)
3dM	'Mamu'	J1, male, born 09.91
4eF	'Sifa'	I2, female, born 01.92

TOTAL KNOWN INDIVIDUALS

Male adults (MA)	7
Female adults (FA)	6
Male sub-adults (SM)	7
Female sub-adults (SF)	6
Male juveniles (JM)	2
Female juveniles (JF)	2
Female infant (IF)	1

TOTAL 31  
 SEX RATIO 16M : 15F  
 ADULT:SUBAD.+ JUV.RATIO 1 : 1.4

Table 2.

## POPULATION DYNAMICS

A comparison between observed demographic parameters in populations of Ceratotherium simum cottoni and C.s.simum.

	C.s.cottoni GARAMBA N.P. 1984-1992	C.s.simum UMPOLOZI G.R. 1969-1973	C.s.cottoni CAPTIVE 1972-1992
Annual rate of increase	9.68%	9.5%	0
Inter-calf interval	2.5 yrs	2.4 yrs	9.2 yrs
Age at first parturition	7 yrs	7 yrs	15yrs
Adult : Sub-adult+juvenile ratio	1 : 1.4	1 : 1.4	1 : 0.8
Sex ratio	1 : 0.94	1 : 1.25	1 : 1.5
REFERENCES	Own data	Owen-Smith 73	Foose in CBSG 92

**THE STATUS OF RHINOS  
IN SOUTHERN SUDAN, 1992**

**DISTRIBUTION**

Northern White Rhinos. (Ceratotherium simum cottoni)

There have been reports of sightings or signs of white rhinos in two areas west of the Nile in Southern Sudan recently. While anecdotal, these are from relatively reliable sources and indicate a strong possibility that some rhinos remain in Sudan.

The two areas are Southern National Park and a swamp/delta area to the north west of the Shambe Reserve.

Black Rhino (Diceros bicornis)

I know of no direct sightings of black rhinos, but there are reports from pilots who fly regularly over southern Sudan that pockets of wildlife have been sighted in un-populated areas and that they strongly suspect the existence of black rhinos in certain bush areas well marked with trails.

These areas are all east of the Nile.

**STATUS**

If any rhinos do still exist in Sudan they are likely to be in extremely small numbers of scattered individuals. Reports of their occurrence are from un-populated areas and their survival is probably due to relative inaccessibility. Nothing concrete can be done at present to aid their conservation and it is therefore considered best by the sources of the reports not to draw attention to them.

Kes Hillman Smith

**THE STATUS OF ELEPHANTS (Loxodonta africana)  
AT GARAMBA NATIONAL PARK, ZAIRE, 1992**

**BACKGROUND**

Garamba National Park covers 4,920 km<sup>2</sup> and is surrounded on three sides by Hunting Reserves totalling 7,527 km<sup>2</sup>. The habitat within the park is predominantly long grass savanna and outside it is predominantly mixed deciduous woodland.

Since 1984 a project funded by the World Wide Fund for Nature (WWF), Frankfurt Zoological Society (FZS) and United Nations Educational, Scientific and Cultural Organisation (UNESCO) has been working with the Institut Zairois pour la Conservation de la Nature (IZCN) to rehabilitate the park and conserve the ecosystem.

**CONSERVATION STATUS OF ELEPHANTS**

The elephant population currently numbers about 7,400 and is increasing. Table 1 gives figures from all species aerial sample counts carried out over the park and reserves since 1976. Even after the start of the project during 1984 elephant numbers continued to fall somewhat, but the dead:live ratios indicate the reduction in poaching resulting from the effects of the combined project. The figures from December are from a period of poor visibility and the aim of the count was to examine seasonal distribution not numbers. The time lag before the increase was probably due to the continued loss of juveniles whose mothers had been killed and the period necessary to re-establish a good birth rate after the disturbance of heavy poaching.

Table 2 shows the population age structure in 1990, with thanks to the work of Cynthia Moss at the park. Over 21% of the population sampled (N= 419) was less than 5 years old and nearly 40% was less than 10 years old. The troughs in the sub-adult and old age classes reflect the heavy poaching in the early 1960s and between 1978 and 1984.. Apart from the lack of animals over 35, this age structure closely resembles that of the increasing Amboseli population, which also shows a trough in the 10-20 year old classes due to the effects of a severe drought.

These elephants are an intergrade between L.a. africana and L.a. cyclotis. This population has the reputation of forming large aggregations of several hundred individuals in the early wet season (April and May). In the past it was thought that this was due to immigration from Sudan (Cornet d'Elzius pers.comm and in Troupin.), but it still happens now within the existing population.

Due to the contrast between the dominant habitats inside and outside the park and to the seasonal attraction of fruiting trees outside the park, there are elephant movements outside the park into the reserves, particularly during the night and in the dry season. Since early 1991 these movements have been numerically larger and longer lasting and the effect of the elephants on the vegetation has become

more marked. Their interactions with humans and agriculture have also increased. This is partly due to better control of the reserves and partly due to the compression effect on the increasing population. Because of poaching pressure on the north of the park since the late 1970s, the elephants have concentrated in the south at densities as high as  $3.1\text{km}^{-2}$  (Fig.3). Fig.4 shows the movements of an adult female elephant with a satellite radio collar since April 1992. This is a project of Dr W.B.Karesh, New York Zoological Society.

The plans for long term conservation development at the park include an integration of activities in the park and reserves, habitat management and an expansion of anti-poaching activities. It is therefore particularly important to management that a study of feeding ecology and movements of the elephants is carried out by a long term IZCN researcher. The previous zoologist researcher who had begun a study, left for family reasons and we have outlined a study for his successor, but require a vehicle and running costs. Details are given elsewhere.

There are 4 adult domestic elephants, of which one is currently loose and two young elephants in training.

#### INCREASE IN POACHING PRESSURE

This year we have noted an increase in poaching both for meat and for elephants in the north of the park and the reserves. 28 elephant tusks were recovered in the first half of 1992 compared with 16 in the whole of 1991. Of these 6 were single tusks. This therefore represents 17 elephants. In addition a further 3 skulls and 2 fresh carcasses were seen from the air. This accounts for a total of 22 dead elephant recorded, of which 7 were freshly dead, 5 of which were killed or wounded by poachers. The frequency of observation of meat poaching camps has also increased.

This is largely due to the increase in availability of arms and ammunition in the area following the influx of refugees from Sudan. In March 1991, when the town of Maridi was taken by SPLA forces, 5,000 people fled through the reserves and the park to the town of Dungu which borders the western reserve Azande. Over 300 arms and 10,000 rounds of ammunition were recovered, but more are inevitably still in the hands of local people and the influx of refugees has not stopped. Coupled with the plunging economy of Zaire and the uncertain political situation this poses a serious threat to the park.

Although revisions to the strategy have been planned and moves are underway to improve the anti-poaching efficiency, these are limited by three factors:

1. A lack of good functioning vehicles. Existing vehicles have reached the stage where more time is spent on maintenance than on use.
2. Budget cuts due both to the world recession and to the political instability in Zaire.
3. Insufficient young, motivated, trainable IZCN personnel. 35 have been lost in recent years due to retirements, deaths and desertions and they have not been replaced, probably due to the

financial problems within the country.

Help is needed to combat this threat and to maintain the successful conservation record.

Dr Kes Hillman Smith  
Technical Advisor (Ecology)  
Garamba National Park Project  
with  
Fraser Smith  
Chief Technical Advisor  
Garamba National Park Project  
and  
Conservateur Principal Muhindo Mesi



Table 1

Estimates of elephant numbers in Garamba National Park

DATE	EST.in PARK	DdeC.GnB *	METHOD	SOURCE
1957	> 3,600 **	>496	Ground transects	Cornet d'Elzius
1976	22,670+-11,790	-	Aerial syst.sample	Savidge et al
1983	7,742+-3,690	0	Aerial syst.sample	Hillman et al
1986	4,339+-1,648	0	Aerial syst.sample	Hillman Smith '89
1989	>4,065	-	Aerial block sample	" "
1991	7,389+-2,922	231	Aerial syst.sample	Unpub.data

\* Domaine de Chasse Gangala na Bodio, to the south of the park.

\*\*Extrapolated from counts in Domaine de Chasse; almost certainly under-estimate.

Table 2

Dead to Live Ratios of Elephants

DATE	DEAD	:	LIVE
1983	1	:	8
1984	1	:	23
1986	1	:	86
1991	1	:	576

## GARAMBA NATIONAL PARK

### SUPPLEMENTARY SUPPORT FOR ANTI-POACHING AND INFRASTRUCTURE DEVELOPMENT

In view of the increasing poaching threat a plan has been formulated and is being implemented as far as possible, to up-grade the anti-poaching activities. A large part of this is being funded through the existing project but there are limitations and immediate supplementary support is required for:

- 1 4WD Mercedes 911 lorry
- 1 Toyota Land-Cruiser
- Spares for above
- A construction and maintenance assistant to free up field time for the Chief Technical Advisor and carry out necessary construction and training.

In the second year a road construction and maintenance unit is required to develop the road network for anti-poaching, research and visitor purposes and to be able to maintain it realistically.

35 guards have left the work force in recent years and not replaced. In order to re-establish an effective guard force and support other long term conservation action we should like to explore the possibility of the establishment of a Trust to cover costs.

*Rating:*

**1 PRIORITY**

## GARAMBA NATIONAL PARK

### CONTINUATION AND DEVELOPMENT OF MONITORING AND RESEARCH ACTIVITIES

The monitoring and research activities make a significant contribution to the conservation of the rhinos and the ecosystem, both directly by a presence in the area and indirectly by guidance of the anti-poaching units and provision of information to management. 85% of all rhino observations were in the course of monitoring and research activities and only 15% by Rhino Protection guards. The continuation of this activity and salary for the Technical Advisor is supported by WWF, but funds are currently limited particularly for Zaire. The effectiveness of the operation is curtailed by a lack of vehicles in good condition, and limitations of funds. In view of the increased threat of poaching with the availability of arms and ammunition from Sudan it is important to increase the rhino monitoring activities. We further propose to investigate certain questions relative to the ecology, behaviour and management of these rhinos in this unique habitat and at low density.

#### Activities include:

- Increased aerial surveillance
- More field time possible with functional vehicles
- Radio-telemetry of selected rhinos
- Continued investigation of the genetics of the population
- Study of feeding ecology in relation to termitaria
- Investigation of long distance communication
- Inter-individual and inter-age class behaviour relative to known genetic relationships.

#### Funds are required for:

- Vehicle
- Supplementary flying time
- Costs of radio collaring
- Costs of biopsy darting for genetic samples
- Communication recording equipment for attachment to radio collars.

*Rating:*

**1 PRIORITY**

## GARAMBA NATIONAL PARK

### LONG TERM CONSERVATION DEVELOPMENT THROUGH LOCAL COMMUNITY INVOLVEMENT

The early phases of the Garamba National Park Project concentrated on rectifying the major poaching problem and on rehabilitating the park. But for a long term continuation of the conservation of the park and surrounding reserves and to reduce the dependence on purely defensive, para-military anti-poaching, it is vital to involve the local communities who are the source of poaching pressure. A draft management plan has been drawn up to plan a development strategy for the ecosystem, which include a focus on the buffer zone reserves.

The first phase of this project involves communication, socio-economic and human attitude, faunal and floral surveys and mapping in the reserves, the establishment of local committees and planning. It will also include preliminary small scale activities to benefit the local people and the development of an informer system. Activities in the second phase will be based on the results of the first phase and the recognition of what is feasible in the area, but are likely to involve zonation, sustainable and as far as possible profitable, use of natural resources with demonstrable benefit to local people, help with local development schemes, development of a village game guard system and activities designed to reduce an over-dependence on bushmeat, and a pressure on the park.

Costs are for the salary of a Technical Advisor to co-ordinate activities and support for assistants and consultants, for vehicles, running costs, for surveys and for the development of the planned schemes, over an initial three year period, with a review in the third year.

*Rating:*

*2 IMPORTANT*