WWF Project ZR0009.02

GARAMBA NATIONAL PARK, RESEARCH AND MONITORING

Annual Report 1992

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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 up-date 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 esosystem.
6. To test and develop a simple method of monitoring poaching and anti-poaching activites.

7. To continue vegetation monitoring in the fire experimental blocks and to set up exclosure plots.

8. To continue and develop vegetation measuremens 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 Veterinery 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.

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 apparentely 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 Harly, 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 rhinocerinus 5 males
Rhipicephalus senegalensis 1 male

Amblyoma 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 sucessful 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 Mugenthaller 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 mades 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 Mugenthaller 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 mtres. 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 probems 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 elswhere. 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 kilomtre 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.

2.5 .<u>Ecosystem monitoring</u>

2.6.1 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 compatable with a GIS system.

2.6.2 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 preceeding 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 Hartebeeste (Alcelaphus buselaphus lelweli), Kob (Kobus kob thomasi), Waterbuck (Kobus defassa harneri) and Warthog (Phacocoerus aethiopicus).

2.7 .Vegetation

2.7.1 Fire experiment

Most of the southern section of the park burned in January, with fires that escaped. With a combination of lack of old combustable 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.

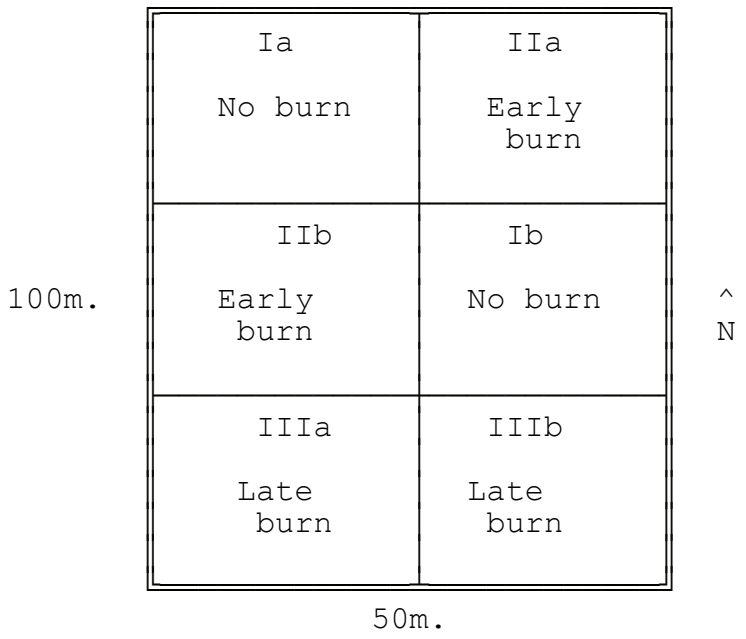

Fig.2 Plan of Source Nambira Exclosure Plot

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.

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

2.7.3 **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.

2.7.4 **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.

2.8 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.

2.9 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 addd 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.

2.10 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.

2.11 Personnel

2.11.1 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 availablity 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.

2.12 Training

2.13.1 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.

2.13.3 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.

2.14 Medical support for IZCN staff

Support for medical expenses is an important motivating factor for the guards and their famillies. 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.

2.15 Meetings

2.15.1 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.

2.15.2 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.

2.15.3 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 Delegue 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 TechnicalAdvisor, 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.

2.15.4 **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.

2.16 General

2.17.1 **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.

2.17.2 **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.

2.17.3 **Equipment**
The aircraft 5Y-KEZ had to be re-fabriced in order to obtain it's 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.

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