

Elephant Crop Raiding in the Dzanga-Sangha Reserve, Central African Republic

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Abstract

Located in southwestern Central Republic, the Dzanga-Sangha Reserve, an area of lowland rainforest, has always sustained high densities of forest wildlife, notably the forest elephant, *Loxodonta africana cyclotis*. A nine month study was initiated in March of 1999 to assess crop damage by wildlife, in particular, elephant crop raiding. The survey was done using a standardized questionnaire formulated by IUCN with slight adaptations as well as a French translation for this area. The villages in the reserve were made aware of the survey and the interest in collecting information about crop damage. Response to the survey was low indicating either low animal damage on crops or a lack of compensation for crop damage. Most of the damage reported was to mature cassava (*Manihot esculens*). Cassava is the most widely cultivated food crop in the area as well as the main subsistence and cash crop. All damage reported was done by elephants. To a lesser extent rodents and monkeys also damage crops but elephants because of their size and high densities are perceived as the major crop raider. As the human population increases in this area driven by economic possibilities such as logging, mining, and conservation projects, the conflict between humans and elephants and other animals will undoubtedly increase. Methods of assessing and compensating this issue of crop damage must be formulated to insure protection of one of the most important elephant populations in the Central African Republic.

Introduction

Situated in southwestern Central African Republic, the area of the Dzanga-Ndoki National Park and Special Forest Reserve has long been known as a region abundant in forest wildlife. Forest elephant (*Loxodonta africana cyclotis*) and other mammal species such as bongo (*Tragelaphus euryceros*), sitatunga (*Tragelaphus spekei*), giant forest hog (*Hylochoerus meinertzhageni*), red river hog (*Potamochoerus porcus*), forest buffalo (*Syncerus caffer nanus*), western lowland gorilla (*Gorilla gorilla gorilla*) as well as monkey and duikers species occur in high densities. In 1981 the Central African government initiated protection of this faunal and floral diversity by creating a forest elephant and bongo sanctuary and by formally ending hunting in the area.

In 1988 further protection was provided when the government designated two areas of the sanctuary as national parks: the Dzanga Ndoki National Park consisting of a Dzanga sector in the north (495 km²) and the Ndoki sector in the south (725 km²). Serving as a buffer zone to these two national park sectors, the Dzanga-Sangha Special Dense Forest Reserve comprises 3359 km². (Fig.1.) The national park and reserve are administered collaboratively by the Central African Ministry of Environment, Water, Forests, Hunting and Fishing and the World Wildlife Fund. This collaborative project includes conservation, rural development, as well as an ecotourism and environmental education divisions.

Forest elephant densities have always been high in this area of the Central African Republic and estimated to be amongst the highest in the Central Africa region: >1/km². (Carroll 1989., Blom et al. (Pers. com.)) The Dzanga Bai, located in the heart of the Dzanga sector of the Dzanga-Ndoki National Park, continually monitored for the last ten years estimates 3000+ elephants frequent the clearing with an additional 1000+ present in the area which is contiguous with Republic of the Congo to the south and the Republic of Cameroon to the west. (Turkalo 1995, 1996.)

This area of the extreme southwestern Central African Republic was originally inhabited by three ethnic groups: the Aka Pygmies, whose survival depended on hunting-gathering, and the Ngoundi and Sangha-Sangha, both Bantu groups, whose livelihood focused upon fishing. Before the 1970's these three ethnic groups dominated this sparsely populated area, with access to the area being limited by river navigation, the

Sangha river. Beginning in the early 1970's this situation changed dramatically with the establishment of large scale logging in the area by the company, Slovenia Bois. The logging opened up the region by establishing road access to the area to the north and served as an economic magnet attracting a mixture of ethnic groups from other parts of the country. This resulted not only in a population increase but now enabled easy access to a previously isolated area changing drastically the lifestyles of its original inhabitants. People were drawn to the area not only by the economic possibilities offered by employment at the sawmill but other activities such as diamond mining, agriculture, and hunting.

At present the human population of the DSSFR (Dzanga-Sangha Special Forest Reserve) is estimated to be about 4500 or 2.5 inhabitants/ km². The biggest village in area being Bayanga with an estimated population of 3000 and the smaller villages being Lindjombo, Babongo, Moussapoula, Kunda Papaye, and Yobe. (Fig. 1.)

Given the high elephant densities and low human population density crop raiding had never been a major problem in the area. In the past before the establishment of a conservation project when people and elephants did come into conflict hunting was usually the solution in discouraging continued crop losses by large mammals.

With the establishment of the Dzanga-Sangha Project in 1989, the fauna, particularly the elephant population was actively protected in the hope of developing an ecotourism industry thus enhancing the economic situation of the local people. With this increased protection, elephants, which had previously been hunted, began to feel no fear of human settlements, particularly in the area of Bayanga where the conservation project was based. It is not uncommon to observe elephants during day light hours around the village of Bayanga. Within the last ten years with an increase in human population leading to increased agriculture elephants are slowly becoming a liability in the minds of the local inhabitants.

Since the inception of a conservation project in the area the situation of human-elephant conflict was never formally addressed. In the past local inhabitants have complained about elephant crop damage in hope of receiving compensation but very little was forthcoming. In the past the project made some effort to address the problem by trying to discourage elephants from the fields by firing blanks but this action had a limited and temporary effect as the elephants soon realized that the noise posed no danger to them. In 1992 the first administrative order was issued for the culling of two elephants. This action failed when the assigned hunter attempted to kill an elephant near the village of Moussapoula. The elephant escaped and the project was accused of using blanks. Others believed that the elephant was a transformed Bangombe pygmy who are reputed to possess such supernatural powers. (Fay 1993)

During the period of March-November of 1999 a survey of crop damage was initiated in the Dzanga-Sangha Reserve by Amis Kamiss. Kamiss, a Central African sociologist, working for the WWF conservation project, is responsible for socio-economic surveys in villages located in the reserve. A questionnaire developed by IUCN was translated into French and modified for use in this area.

Agricultural Background

Due to dense forest vegetation most agricultural activity in the Dzanga Sangha Dense Forest Reserve occurs naturally along the main north-south axis road connecting Lidjombo in the far south to villages north of Bayanga. (Fig. 1) Cultivation is found on the road edge in the vicinity of villages with the areas between villages left mostly uncultivated. The only exception is the road between the villages of Bayanga and Moussapoula which is cultivated along approximately 4 kilometers of road edge, consisting mostly cassava and coffee fields. The management plan of the Dzanga-Sangha project stipulates the limitation of agriculture to within 100 meters of the road. In a few areas this rule has not been observed, i.e. the village of Yandoumbe, but in most areas it has occurred naturally without enforcement because of the difficulty in clearing thick forest vegetation. The estimated surface area cultivated of the reserve area is less than 2% of the total land surface area. The same fields are cultivated on the average for a period of several years and then abandoned due to soil infertility for a few years before cultivation is resumed.

Agricultural activity in the area consists mostly of subsistence farming. Crops cultivated include cassava (*Manihot esculens*), both sweet and bitter varieties. The bitter variety is the more cultivated of the two varieties being the main carbohydrate source in local diets and whose leaves also serve as a food substance. Ground cassava tuber (bitter variety) is the one crop which is sold commercially by village women throughout the area. Corn is also cultivated for food consumption but is also used in the fabrication of an indigenous alcoholic drink, mbako. Peanuts are cultivated to a lesser extent than cassava and corn but are also imported from other areas of the country to meet local consumption needs.

This area, once one of the largest robusta (lowland) coffee producing areas of the Central African Republic, still retains an impressive acreage of coffee trees. Due to the vagaries in the world price for robusta coffee, the groves often go neglected for several seasons because of poor prices. Most cultivation of coffee is practiced mostly around the village of Lindjombo and along the road edge between the villages of Bayanga and Moussapoula.

Coco yams, bananas, and papayas are also cultivated but are rarely found being sold in the market, being consumed in the cultivators households. Other food products consist of wild foods derived from the forest. These forest foods are generally collected by the Aka Pygmies in the forest and sold to the Bantus who either consume them or sell them in the market. The main forest product is the koko leaf (*Gnetum africana*), a forest vine which is available year round forming a staple food product in the local diet. *Gnetum* generates income for both the Aka and Bantu women in the area.

Precipitation in this area of CAR is averages 1200 millimeters per year. The yearly weather pattern consists of two dry seasons: an extended dry season from December to March and a shorter one occurring in July-August. Interspersed between these two dry seasons are two wet seasons: a long wet season occurring in September through November with the shorter wet season taking place in April through June. With such a favorable climatic condition of abundant rainfall agricultural activity is a year-round occupation. Cassava is planted all year around and takes approximately two years to produce mature tubers. Corn and peanuts are planted up to three times a year: May and September (with another possibility in December). Coffee beans are harvested between the months of November and December. (Table 1.)

Table 1: Principal Crops Cultivated in the Dzanga-Sangha Reserve

Crop	Cultivation Period	Harvest
Cassava	All year	All year
Corn	May, September, December	3 months after planting
Peanuts	May, September, December	3 months after planting
Coffee	Non-seasonal	November-December

Methods

In March of 1999 Amis Kamisse, a sociologist, working in the rural development sector of the GTZ portion of the WWF project, started collecting information on crop damage and raiding. The information was collecting using a modified questionnaire developed by IUCN. The original form was in English with a translation into French developed for use in the Dzanga-Sangha Reserve.

During this period Kamiss informed villagers in the Reserve to inform him of any crop damage incurred at which time he would try to visit the area to inspect the damage and complete a questionnaire.

Results

A total of five questionnaires were completed during the period covering March 1- November 30, 1999. Four of these questionnaires were collected during the month of March and one questionnaire was collected in July.

In all cases mature cassava (bitter) was damaged by elephant. Included in two of the surveys were coffee trees. In only one of the questionnaires were other crop items damaged: corn and peanuts in an area of cassava damaged. (Table 2.)

In the case of cassava damage, the elephants uproot the entire plant but generally do not eat the tuber. They prefer the sweet variety of cassava when they do find it. Coffee trees are not consumed but usually pushed over by the elephants as they travel through the coffee plantations. In the case of corn the entire plant: stalk, leaves and ears, are consumed. Peanuts are uprooted and eaten during crop raiding.

Because no direct observations were made while the crop was being raided, due to either nocturnal activity or no human presence, the number of individual elephants causing the damage was estimated based on the measurements of rear foot prints found in the field after the incident. In all cases inventoried the raiding was thought to be done by a group based on the different size prints measured. The minimum group size was two with the maximum group size being four.

Table 2: Elephant Crop Damage

Crop	Location	Date	Maturity Stage ¹	Degree of Damage ²	Size of Elephant Group
Cassava	Moussapoula	March 12	3	2	3
Coffee	Moussapoula	March 12	1	4	3
Cassava	Moussapoula	March 12	3	2	2
Cassava	Moussapoula	March 12	3	2	3
Coffee	Moussapoula	March 12	1	4	3
Cassava	Moussapoula	March 16	3	2	3
Corn	Bayanga	July 27	1	2	4 (approx.)
Cassava	Bayanga	July 27	1	2	4 (approx.)
Peanuts	Bayanga	July 27	1	2	4 (approx.)

¹Maturity Stages: 1= immature, 2= intermediate, 3= mature

²Degree of Damage: 1= very high, 2= high, 3= medium, 4= low, 5= very low

Discussion

Current Sample Size

Low response to the questionnaire was due to several reasons. The first may be low crop damage by elephants. Elephants occur in high densities in this region but this combined with low human density may account for low crop raiding.

Another reason for low response is the history of compensation for crop damage. Since the inception of the WWF conservation project the problem of crop raiding has never been formerly addressed except in the case of an attempted administrative cull in 1993 which failed. There have also been attempts to discourage elephants by the shooting of blank cartridges in the areas of fields but this activity has never been systematic. Because of this history the local people feel that the project is reluctant to accept complaints about crop damage. When informed that the project was now interested in collecting information without mention of compensation villagers were reluctant to make the effort to inform the project of damage especially in areas far from the project headquarters in Bayanga.

A third reason for not informing the project about crop raiding would be that in certain areas villagers have found their own solutions to elephant damage which include poaching. In several villages this is the case where elephants have been traditionally discouraged by hunting.

In the village of Yandombe, located 2 kilometers south of Bayanga, elephant crop raiding rarely occurs. This village is a fairly new settlement having been established by pygmies who left Bayanga in 1990. Cultivation of mostly cassava have been planted

The project also lacks the resources for responding quickly to complaints because of lack of personnel and vehicles. At present complaints coming from Bayanga and Moussapoula could be easily addressed because of their proximity to the project headquarters but villages farther away such as Babongo and Lindjombo lack communication and are logistically difficult to reach because of a lack of vehicles.

Traditional Deterrence Methods

The most effective deterrence to elephants damage is the grouping of fields along the main road. As mentioned before this is stipulated in the management plan of the park and occurs naturally because of thick forest vegetation and the difficulty in clearing it. Fields in this area are never guarded on a twenty-four hour basis, as observed in some savanna regions where primates are a problem (Turkalo, pers. ob.) They are tended only during the daylight hours when the villagers work

Another traditional elephant deterrence observed is the erection of “fences” around fields. These fences consist of a string mounted around the cultivated area with various objects such as cans, discarded plastic bags, etc. are suspended from the string. The perception being that the motion of the objects frightens the elephants from the area. Some of the objects such as milk tin lids make noise when moved by the wind which is also thought to deter elephants. Whether this is an effective means of deterring elephants from fields is doubtful.

Another deterrence measure is the burning of Chinese bamboo near the fields. Because of their structure: the presence of closed cavities in the stems, the bamboo “explodes” when burned. This noise frightens the elephants away but only for short periods of time.

Modern Deterrence Methods

In 1994 a small electric fence test/demonstration plot was erected by Peace Corps volunteer, John Hansen. The idea behind the creation of this plot was the introduction of this technology to local people with the intention of erecting electric fences in areas of the reserve where crop raiding was a problem. The plot fence was powered by solar energy in the form of a solar panel and battery. After the departure of the volunteer a lack of maintenance as well as interest ended this effort.

The project failed to pursue funding to erect electric fences on the village level. One of the reasons for the end of this endeavor was the difficulty in motivating villagers in maintaining such a high-tech elephant deterrence measure.

Other Pests

As in all areas of Africa elephants are always perceived as the main crop raider where present. In the area of Bayanga primates as well as rodents are also considered pests. Monkey species particularly crested mangabey (*Cercocebus galeritus agilis*) eat bitter cassava in fields pulling up the tuber. They also eat the tubers when they find them in water sources where the villagers leach them to remove poisons before consumption. Other food stocks destroyed by mangabeys in this area include papayas, corn, and peanuts.

Three rodent species also are noted for crop damage. They include cane rat (*Thryonomys sp.*) giant rat (*Cricetomys emini*) and Porcupine (*Hystrix sp.*) All of these species damage cassava fields as well as corn and peanut fields.

Recommendations

With the continuing influx of human population into this area, elephant crop raiding will become a more prominent problem and one that will have to be effectively addressed if elephants are to be effectively protected in this region. Presently the inhabitants of the Reserve perceive the elephants as agricultural pests and not as a natural resource.

In the future funding for a full-time employee whose responsibilities would be monitoring of elephant damage as well as formulating sound local strategies in dealing with this problem.

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