Number and Migration Patterns of Savanna Elephants *(Loxodonta africana africana)* in Nothern Cameroon

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Abstract

The Sudanian region of Cameroon covers about 198,000 km^2 and comprises two major domains: the sahelian and the sudanian. The Waza-Logone floodplain lies in the sahelian domain and contains one of the largest elephant populations of the soudano-sahelian region of West and Central Africa (1,100 elephants). In the dry season elephants stay in Waza and KalamalouÈ National Parks because of water availability, and move out during the rains when there is also less perennial grass available inside the parks. A sub-population of elephants migrates between Waza and KalamalouÈ. In the dry season they are in KalamalouÈ and in the wet season they move back towards Waza. The prolonged stay of an increasing number of elephants is having deleterious effects on the vegetation in KalamalouÈ Park.

There is another major population of elephants located in the band of sudanian vegetation which lies north of the Adamawa Plateau and south of the sahelian domain (1,620 elephants). The three national parks of Faro, BÈnouÈ and Boubandjidah lie in this zone. Seasonnal movements again appear to be correlated with water and food availability, but are limited.

Recently a herd of more than 320 elephants has entered the KaÈlÈ region (70 km south of Maroua) near the Chadian border. Their origin is unknown, but it appears that they have crossed into Cameroon from Chad. The origin of these elephants and the causes of their migrations need to be urgently determined if measures have to be taken to prevent further crop damages (estimated at more than $ 200,000) and humans lost (3 dead) from immigrants.

Elephant migrations in northern Cameroon are cause for concern to farmers, local authorities and conservationists. Elephants are killed, farms are damaged and crops lost. Elephants might loose the battle unless the sources of conflict are removed.

Introduction

The vast majority of Cameroon's elephant live in the dense forest zone, and most of them stay outside of the country's protected area system. There are populations, particularly of the savanna elephants, living inside the protected area system, most notably the Waza-Logone flood-plain, but their seasonal migration has become a serious concern to farmers, economists and project designers.

The situation in Northern Cameroon is different from that in Southern Cameroon, Central, Eastern and Southern Africa, in that the elephants in the north are under far greater pressure from human populations competing for space and altering natural habitat.

Northern Cameroon comprises two major domains: the sahel domain and the sudanian domain. Historically, elephants were rare in the sudanian domain in 1933 (Flizot, 1948). There were small numbers (20) in Boubandjidah and the Vina valley, south of NgaoundÈrÈ, but they were not known to occur in the BenouÈ and Faro Reserves until 1946 and 1947. Since then the number of elephants in the region has continued to increase. Flizot (1968) believed that many of the elephants moving into the Benoue region came from Nigeria, where the British Authorities were less interested in game conservation.

The sahel domain in which the Waza - Logone floodplain is located was devoid of elephants until 1947 when the first ones crossed the Logone near Kousseri and took up residence in the KalamalouÈ Reserve. Since then their numbers have grown steadily as shown by Flizot's estimates: *250* in 1961,400 in 1964, and over 600 in 1969(Flizot, 1969).

Most of this increase was due to immigration from Chad.

A first attempt to assemble all existing information on elephants in northern Cameroon and to determine their conservation status was made within the framework of the National Plan for Elephant Conservation (Tchamba *et al,* 1991). The present investigation is based on this plan, but it is adding much historical and more detailed local information collected since 1990 by the elephant project of the Center for Environmental Studies and Development in Cameroon.

Study Area

The sahel domain of northern Cameroon extends from lake Chad southwards as far as 10^0 and covers 36,000 km^2. It includes two distinct vegetational communities: thorny grasslands with *Acacia spp., Balanites aegyptiaca, Tamarindus indica, Calotropis procera, Ziziphus spp.,* and periodically flooded grasslands of the Logone-Chari and lake Chad floodplains with *Echinochloa pryamidalis, Hyparrhenia rufa, Oryza longistaminata and Pennisetum ramosum.* Waza and KalamalouÈ National Parks are located in this domain (Figure 1). The rainfall is about 1,000 mm per year in the south diminishing to less than 350mm in the north. The dry season lasts 6-8 months. The expansion of agricultural farm lands and wood cutting activities in the Waza-Logone floodplain have led to human-elephant conflicts and to changes in migration patterns.

The sudanian domain extends south from 10^0 N as far as the 800m contour on the southern slopes. of the Adamawa plateau and covers about 162,000 km^2. Faro, BÈnouÈ and Boubanjidah National Parks are the only protected areas of this domain (Figure 1). This domain is covered with savanna woodland in which *Terminalia laxiflora, Isoberlinia doka, Monotes kestingii and Anogneissus leiocarpus'*are the common species interspersed with fire resistant trees like *Daniella olivieri, Lophira lancoelata, Borassus aethiopium.* The rainfall is between 1,000 and 1,500mm per year with a dry season of 3 to 6 months. This ecological domain is very important for savanna elephants.

Methods

There are few recent accurate counts of elephants in Northern Cameroon. The most accurate are for the Waza-Logone floodplain (including the parks of KalamalouÈ and Waza). Data on elephant numbers were obtained by reviewing several reports: Esser and Van Lavieren (1979), Van Lavieren and Esser (1979), Eijs and Ekobo (1987), Steehouwer and Kouahou (1988), Mahamat (1991). Because no elephant surveys have been conducted in BÈnouÈ and Boubandjidah National Parks since 1979, the present estimates are basically guesses. An aerial census of elephants of the Waza-Logone floodplain was carried out in September 1991 and May 1992 (Tchamba and Elkam, 1992).

Figure 1: Location of the study area (1-Kalamaloue National Park,2-Waza, 3-Boubandjidah, 4-BÈnouÈ, 5-Faro)

Elephant movements were studied by recording footprints left in the mud and examining the perimeter roads for sign of elephants crossing to areas outside the parks. Observations on elephant movements were also made during aeriel surveys. Eight trips were made to areas surrounding the protected areas of the Waza-Logone floodplain to inquire about recent or former movements of elephants. Two trips were made to villages north of KalamalouÈ park, three to villages north of Waza park, and three others to villages south of Waza. Arrangements were made with game wardens and local agricultural officers for systematic keeping of records of elephants movements in the area (date of arrival, number of elephants, sex and age structure of the group, date of departure, direction of travel).

Results*umbers*

Van Lavieren and Esser (1979) estimated the elephant population of Boubandjidah National Park at 232 and 150-300 by aerial and ground sample counts respectively. Tchamba *et al.* (1991) gave an estimate of 660 and 540 elephants for Boubandjidah and BÈnouÈ National Parks respectively. These estimates were based on an educated guess of 0.3 elephant per km^2 in the region. The same authors estimated the elephant population outside of the protected areas in the sudanian domain at 360. The elephant population of Faro National Park is evaluated at 60 individuals (Tia Esaie, conservator, personnal communication) which gives a total of about 1,620 elephants in the sudanian domain of northern Cameroon.

The Waza - Logone floodplain of the sahel domain is one of the last elephant refuges of the soudano-sahelian region. Esser and Van Lavieren (1979) estimated the elephant population in Waza National Park at 465 individuals. Dry season counts at permanent waterponds inside the park mentioned figures of about 750 elephants (Eijs and Ekobo, 1987 ; Steehouwer and Kouahou, 1988). Mahamat (1991) made a total count in KalamalouÈ during the dry season (the only time when elephants are found in KalamalouÈ) and found 384 elephants. Aerial census conducted in the Waza - Logone gave an estimate of 1,100 elephants (Tchamba and Elkam, 1992). The total elephant population of northern Cameroon could be estimated at 2,720 individuals. In July 1992, a herd of more than 320 elephants entered the KaÈlÈ region near the Chadian border and increased the number of elephants in the region.

Migration patterns

There has been no recent observations of elephant migrations in the sudanian domain. Elephants reside permanently in Faro, BÈnouÈ and Boubandjidah National Parks. The elephant populations of these parks occasionally forage outside the protected areas. These short distance movements are done at night in the beginning of the dry season when crops are ripe.

Waza National Park is the core area for elephant migrations in the sahel domain of northern Cameroon. Elephants spill out of this protected area and disperse throughout the region on a seasonal basis.

Three elephant sub-populations have been identified in Waza Park. The first sub-population resides in the northern part of the park. At the beginning of the dry season (December-January), this sub-population moves north to KalamalouÈ Park (Figure *2)* traveling about 120 km. Because the floodplain is still flooded these elephants migrate along the eastern part of the floodplain 5 to 10km from the paved road "Waza"-"Kousseri", following a corridor dominated by *Acacia seyal.* They stay *5* to 6 months in KalamalouÈ with frequent night incursions into farms as far as Goulfey (6 km from the park. At the beginning of the wet season (May - June) this sub-population moves back to Waza following a corridor on the western part of the floodplain, 10 km from the Logone river. This corridor goes through the villages of Kalakafra, Oulouf, logone Birni, Khalkoussam, HinalÈ, Kaoussen and BÈlÈ (Figure 2).

The second sub-population is made of resident elephants of Waza National Park. They stay in the park year-round. In the wet and early dry seasons (May to November) they use the southern and eastern parts of the park. This region is covered with woodland savanna dominated by *Sclerocarya birrea, Anogeissus leiocarpus and Lannea lumilis.* In December, January and February (mid-dry season) they move to the floodplain and *Acacia seyal* woodland. At the end of the dry season (March - April), the resident elephants concentrate in the *Acacia seyal* zone.

The third sub-population of Waza uses the southern and central part of park (forest *and Aca-cia* zone) in the dry season (December-January to May - June). At the onset of the rains the elephants spill out of the park, enter and eat the rich patches of food that

constitute plantations of millet, corn, peanuts and beans. These elephants could be divided into two groups. The first group goes out of the park through Andirni, then passes Alagarno, Fadare and Doubbel. The second group crosses the park boundary towards BandalarÈ, then goes to PettÈ and Doubbel. The village of Doubbel seems to be the elephants' meeting point during their departure and return to Waza.

A few individuals stay around'Doubbel with trips to Wolorde. Most of the elephants continue their journey southward, going through Balaza alcali, Djoulgouf, YoldÈo, Ourozangui and Mindif. The elephants of this sub-population migrate up to 100 km from Waza. They return to the park only in December.

A new elephant population has appeared in the KaÈlÈ region since July 1992. Investigations made along the Maroun-Bogo-Maga road (mandatory crossing for elephants moving south from Waza) indicate that such a number of elephants (more than 320) have not passed through that area. These elephants have probably migrated northward either from south west of Chad or from Boubandjidah National Park located only about 150 km south of the region. At the time of this study it was not possible to visit these two areas because of inaccessibility (wet season) and lack of authorization from Chadian authorities.

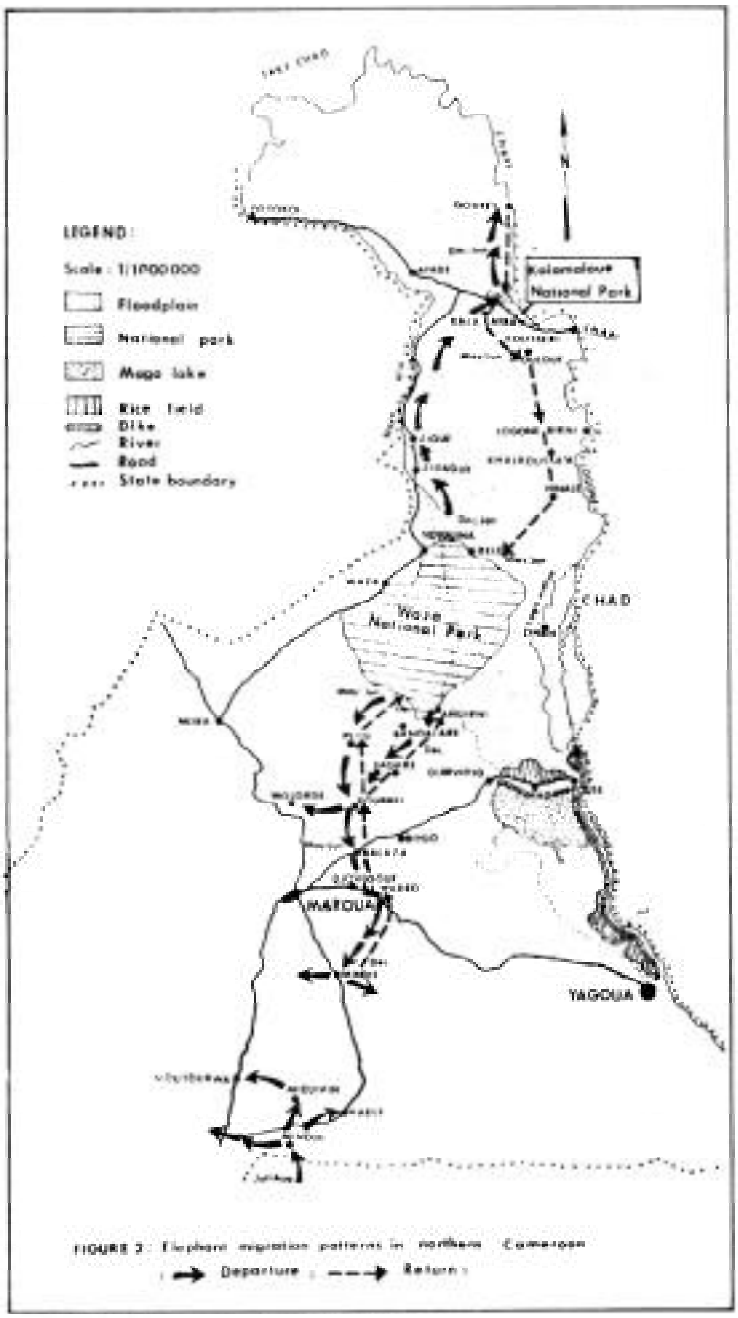

FIgure 2: Elephant migration patterns in northern Cameroon

Discussion

Since about 40 years ago the elephant population has continued to increase in northern Cameroon. Most of this increase is due to immigration from Chad and Nigeria but observations indicate that considerable breeding is taking place. The elephant of northern Cameroon generally carries small tusks rarely exceeding 25 kg each side, a factor which has doubtlessly weighed in their favour. In order to determine the conservation status of elephants in the sudanian domain of northern Cameroon, it is necessary to investigate the population size in each protected area (BÈnouÈ, Faro, Boubandjidah), degree of isolation and possible interchange with neighbouring elephant populations.

In the Waza-Logone floodplain elephants show two distinct migration patterns. When one sub-population leaves Waza Park in December -January and travels north to KalamalouÈ Park, another sub-population returns to Waza after spending the wet season raiding crops south of Waza. The reasons for these migrations are probably similar. Water is available during the dry season only in the two artificial waterholes of Waza and in the Logone river bordering KalamalouÈ Park. To avoid competition for limited food and water in Waza, part of the elephants move to KalamalouÈ where there is more water and more diverse savanna woodland. These elephants are replaced by elephants confining themselves to within 10km foraging radius of the artificial waterholes.

Migration often starts a few hours after the first rains, long before vegetation has responded to it, further supporting the hypothesis that water restricts the movements of migrants during the dry season. Support to this argument is given by the observation that elephants stay longer in the Mindif area where boreholes were sunk in 1985 for livestock.

Seasonal migrations and habitat selection have been reported for many elephant populations (Laws et *al.* 1975, Eltringham, 1977 ; Caughley and Goddard, 1975, Western, 1975 ; Short, 1983; Jachman, 1983 and 1988; Butynski, 1986; Merz, 1986 ; Roth and Douglas - Hamilton, 1991). The movements appear to coincide with changes in food and water availability. Water availability (pull factor) alone cannot fully explain the migration patterns of Waza elephants. Forage requirements (push factor) also contribute to their leaving Waza Park. The reduction of the flooded area of the Waza-Logone floodplain has led to the replacement of perenniel grasses by annual grasses which cannot produce nutritive regrowth for wildlife and cattle (Oijen and Kemdo, 1986).

The expansion of agricultural land and wood cutting activities coupled with the construction of the Maga dyke (Figure *2)* has resulted in an apparent maldistribution of people with respect to elephants, and changes of migration patterns. Farmers continually face the threat of extensive elephant damage on crops and elephants are subsequently killed to protect people and crops. Elephant crop damages in the KaÈlÈ region were estimated at more than 200,000 US dollars between July and October 1992 (Thouless and Tchamba, 1992). Three persons were reported killed by elephants in the same period.

Elephant migrations also have an impact on the natural vegetation. (Tchamba and Mahamat 1992) observed that the "elephant problem" in KalamalouÈ National Park was significant. They noted large scale killing of mature trees and serious damages on the regeneration of vegetation, and concluded that the habitat would not remain in equilibrum with regeneration not balancing the losses.

A good understanding of elephant movement patterns is necessary for a better management of protected areas to the benefit of both elephant and man. A study is currently being conducted to determine the natural factors (vegetation composition, structure productivity, digestibility and succulence, phenology, water availability) and human factors (crop presence, forms of disturbance and distance to them, poaching) which influence movements and the most important ones in time and space. Radio/satellite telemetry is also being conducted to determine elephant home ranges. The ultimate goal of this study is to propose solutions that would allow the coexistence of the presently opposing domains of agricultural development and conservation in northern Cameroon.

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