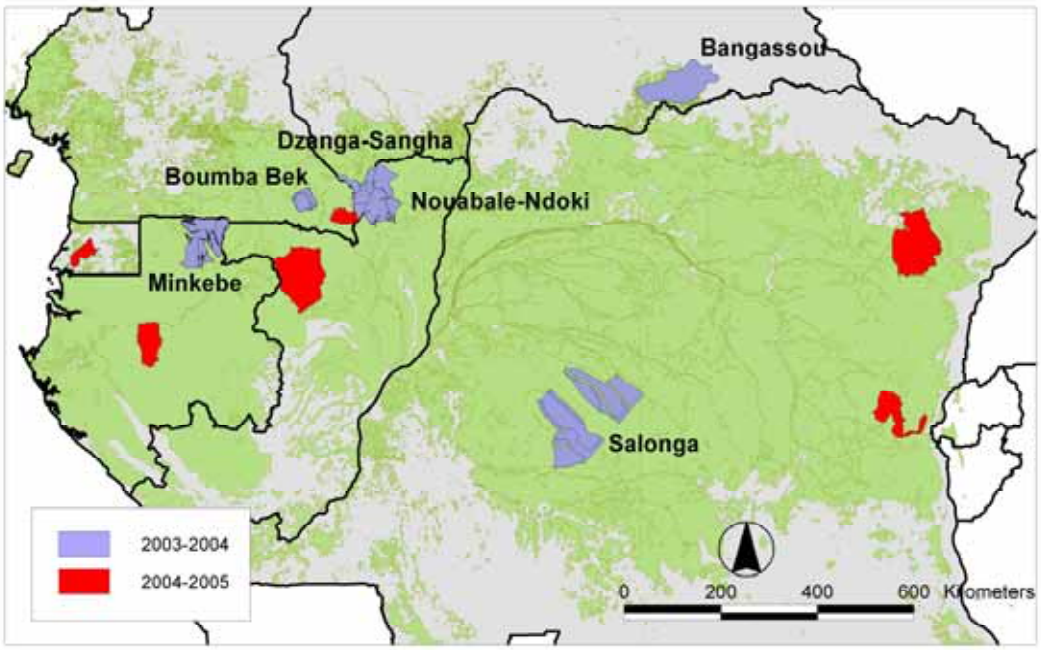
Preliminary Information on elephant poaching in regard to the MIKE Central Africa Forest Surveys

Further evidence that this Sub-region is facing poaching difficulties is provided by the MIKE forest surveys in Central Africa that have recently been completed on behalf of the range states concerned under the co-ordination and leadership of the Wildlife Conservation Society and supported by WWF International. Full site-level and regional reports are under preparation, but for the benefit of the parties at the 13th CoP, a summary of both the distribution of elephants in relation to human activities and national park boundaries and the level of signs of illegal killing observed during fieldwork are informative.

Figure 1. MIKE sites in the range of central African forest elephants



The suite of MIKE sites in the equatorial forests of central Africa contains arguably the largest known forest elephant populations remaining on the continent. Information on the conservation status of forest elephants in these sites is critical to the local, national, regional and global mandate of MIKE by providing managers and decision makers with the data they need to identify the threats facing elephants, assess their impact, and measure the effectiveness of management interventions.

In central Africa in 2003-04, systematic, stratified, un-biased surveys of elephant populations based on dung counts along line-transects were implemented within each of 5 MIKE site. In one site, Bangassou in Central African Republic, a low intensity pilot survey was carried out to obtain preliminary data from which a more exhaustive population survey could be planned. Reconnaissance surveys connected transects and efficiently provided supplementary information on incidence of poaching and other human impacts, and backup ecological data. At each site, an attempt was made to sample elephant abundance across the gradient of human impact. Stratification of each site was based on elephant sign encounter rate from MIKE pilot studies, or on expected levels of human impact as a proxy for elephant abundance. Data analysis provided robust estimates of dung density, relative elephant density, and spatial distribution within each site. However, caution should be used with the estimation of elephant density due to assumptions made in regard to dung decay and defecation rate estimates.

a) Forest elephant abundance estimated from dung counts on line transects

Forest elephant abundance varied widely within and between sites. Important points to note from Table 1 are that: a) elephant dung density was over 3 times more abundant in Minkébé than in any other site, b) Salonga National Park and Bangassou contained an extremely low elephant density

compared to other sites, c) elephant density is significantly lower outside national park boundaries at the Dzanga-Sangha and Nouabalé-Ndoki sites.

Table 1

Site	Stratum	n/L (piles km^{-1})	Dung (km^{-2})	% CV	Crude estimate of elephant density (individuals km^{-1})	Crude estimate of elephant abundance	95% CI min.	95% CI max.
Salonga NP[1]	Low	0.3	92	38.7	0.054	794	377	1672
	High	0.3	90	33.2	0.053	392	206	746
Nouabalé-Ndoki	Nouabalé-Ndoki NP	8.3	1071	13.3	0.66	2652	1999	3517
	Logging concession	1.8	229	22.9	0.14	380	239	603
Dzanga-Sangha	Special Reserve	1.4	163	30.8	0.095	125	67	232
	Dzanga NP	9.9	1114	14.6	0.651	325	241	438
	Ndoki NP	8.5	960	21.5	0.561	419	271	649
Minkebe	Low (park)	19.1	6498	11.6	3.8	9556	7510	12160
	Moderate (park)	12.3	4981	16.3	2.9	13122	9372	18371
	High	15.9	4808	21.5	2.8	6469	4188	9991
Boumba Bek		2.4	-	-	-	-	-	-
Bangassou		0.5	-	-	-	-	-	-

[1.] National Park

b) Impact of human activities on forest elephant distribution

In 1989 Richard Barnes established that humans were a major factor influencing the large scale distribution of forest elephants across the equatorial forests of central Africa (Barnes et al. 1991, Barnes et al. 1995). Preliminary analysis of the MIKE datasets show that within the suite of MIKE sites the same is true at the landscape level. Even where the MIKE site is considered a well protected national park, forest elephants are being constricted to those locations furthest from human activity and from permanent human settlement. The full extent of this effect will become clear after a spatial modelling exercise being undertaken by the Wildlife Conservation Society, however simple interpolation maps of encounter rates of elephant dung on transects is compelling (see examples provided for Dzanga-Sangha, Nouabalé-Ndoki, and Minkebe, Figure 2) and signals a major management issue for the future well-being of the hitherto free-ranging elephant populations of the forests of Central Africa. The data clearly demonstrate that elephant distribution and human activity are all but mirror images of each other, and as human development through logging, immigration, and both legal and illegal activities continues to expand, the likelihood is that the range of forest elephants will be compressed into ever-smaller areas within and around the national park areas of these sites[1]. The reduction in elephant abundance in

[1] *The key influencing factor here is hunting pressure. If elephants are left undisturbed, there is evidence that secondary vegetation can support high elephant density, at least in the short term*

affected areas is probably caused by two principal factors; movement of elephants away from human settlement, infrastructure, and areas of high human activity, and high mortality in those areas leading to population reduction. The long-term viability of elephant populations, and their ability to move between centres of population will become increasingly threatened if this trend continues.

c) Illegal killing in MIKE sites

Evidence of illegal killing of elephants from the forest elephant inventory programme was widespread, with carcasses of poached elephants found in 5 of 6 sites in which fieldwork was conducted. The only site in which carcasses were not found was Boumba Bek, in south eastern Cameroon. A difference in reconnaissance survey methods between this site and the other is suggested as a possible explanation, since other sources of evidence suggest poaching is common in this part of southeast Cameroon.

Table 2 below shows the overall carcass counts from inventory fieldwork (i.e. figure DO NOT include Mike LEM data), including a basic analysis of the "carcass count to survey effort" recorded at each site. During all inventory fieldwork, 39 carcasses were found across all sites, of which 22 were found from 4477.5km of reconnaissance surveys (walks connecting the transects during which systematic data are collected), which gives an encounter rate of 4.9 per 1000km walked. On line transects only one carcass was found (in Nouabalé-Ndoki) from a total of 329.5km of survey effort, which reinforces the belief that line transects, using correct distance sampling technique, cannot be used to obtain valid estimates of carcass density in forest conditions, but reconnaissance walks as done in five of these surveys has great potential (See Figure 5 for an illustration of reconnaissance walks and line transects).

Table 2. Carcass encounter rates from elephant inventory surveys in central African forests

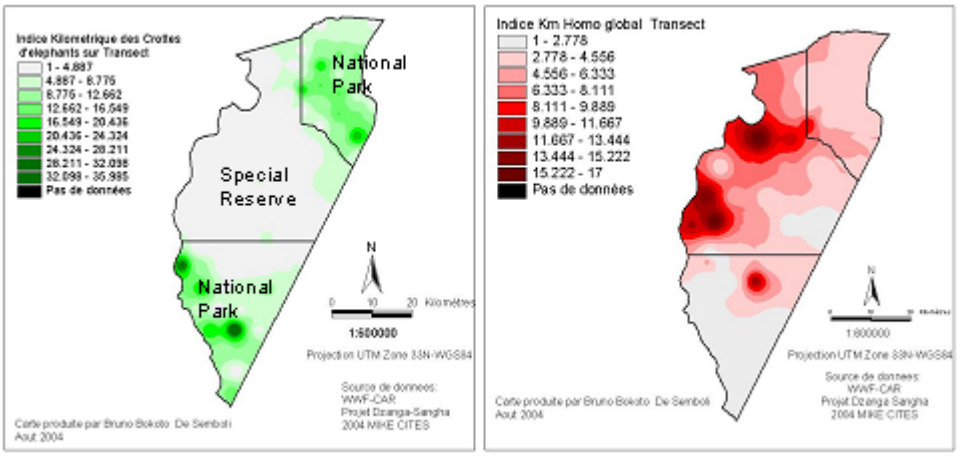
	Reconnaissance surveys			**Transects**			
Site	**Survey effort (km)**	**N poached carcasses**	**Carcass encounter rate[1]**	**Survey effort (km)**	**N poached Carcasses**	**Encounter rate (1000km)**	**All carcasses found during inventory work**
Boumba Bek[2]	473	0	0.0	47	0	0.0	0
Bangassou	504	2	4.0	14	0	0.0	2
Nouabale-Ndoki	732	2	2.7	71	1	14.1	3
Salonga	1727	3	1.7	130	0	0.0	5
Dzanga Sangha	383	6	15.7	67.5	0	0.0	11
Minkebe	658.5	9	13.7	61	0	0.0	19
Total/mean	**4477.5**	**22**	**4.9**	**329.5**	**1**	3.0	**40**

1. Carcass encounter rate is carcasses per 1000km

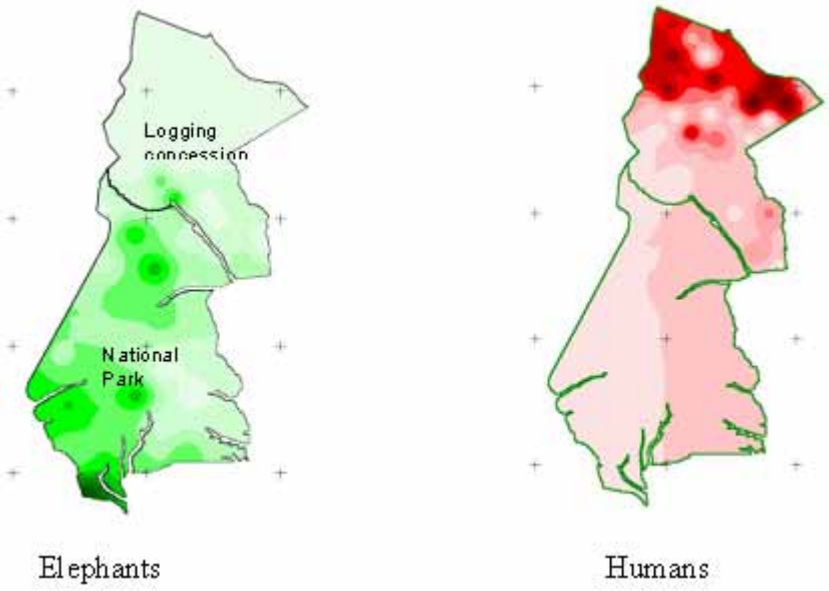
2. Boumba Bek followed straight line recces with only minor deviations – in other sites recces involved deviations from the desired travel route, and survey teams were encouraged to follow up on fresh and recent human signs (see figure 5).

Figure 2 Interpolation map examples of elephant dung and human sign encounter rates on line transects in selected central African MIKE sites

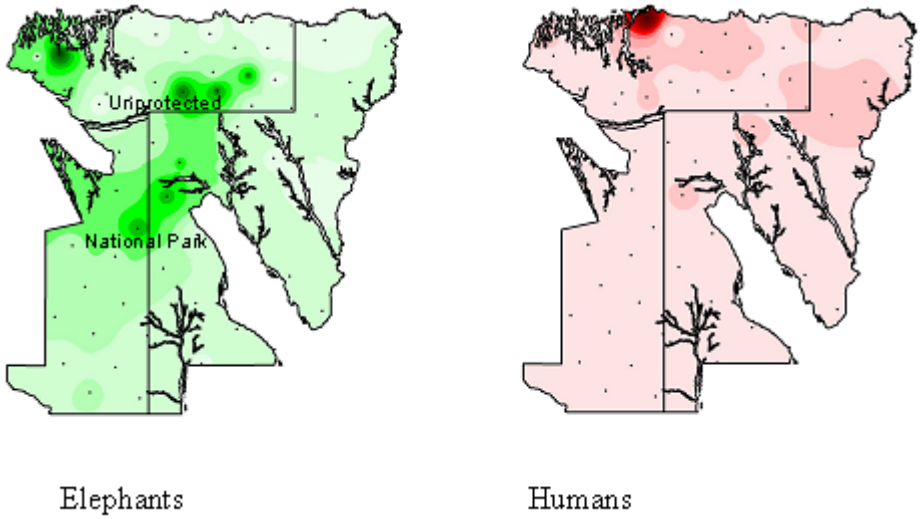
a) Dzanga Sangha



b) Nouabalé-Ndoki



c) Minkebe



In Minkebe, a total of 19 carcasses were found, the highest for any site. Of these 19 carcasses, 16 were positively identified as having been poached. The cause of death for the other 3 remained undetermined. Of the total of 19 carcasses, only 3 were found inside the national park, with most found in the northwest sector of the Minkebe massif, in close proximity to the known poaching centres of Minvoul and S. E. Cameroon. The relatively high human population of S. E. Cameroon leading to high rates of cross border incursions into Gabon, and the limited access to this northwestern forest block from Gabon make anti-poaching logistically difficult and expensive. Limited management funds have been spent most heavily in the south and southwest of the 32000km^2 Minkebe massif, which may account for the relatively low carcass count in these areas. By contrast in Dzanga-Sangha, of 8 confirmed poached elephants, 5 were found in the Dzanga National Park, and the remaining 3 were found within 2km of national park boundaries (Figure 3).

It is reasonable to consider the Dzanga/Nouablé complex as a single elephant range as the areas are adjacent and elephants are known to move between the two sites. The distribution of carcasses recorded in this complex suggests that most elephant poaching appears to be taking place in the Dzanga National Park in CAR, while immediately across the border in Congo, only a single carcass was found in the entire Nouabalé-Ndoki National Park, despite the fact that density estimates indicate very little difference in elephant abundance between the two sites. Reasons for this are unclear, but may include the following:

1. roximity of Dzanga National Park to the major town of Bayanga, and connectivity with regionally important population centres of Nola and Salo.

2. Ease of access increased by the logging road network

3. The apparent abundance of large-tusked elephants in the region due to the presence of important mineral licks

4. The psychological deterrent of crossing an international border to conduct illegal activities

5. The increasingly efficient actions of the Nouabalé-Ndoki National Park guards

6. Weak law enforcement follow-up at national level for poaching infractions in CAR.

An interpolation of human sign abundance based on transect data suggests that the three national parks within these two sites are relatively free from human incursion. However, this is inconsistent with the concentration of carcasses in Dzanga NP, the encounter rate for which was an order of magnitude higher than any other sector of the complex. It is probable that human incursions are relatively low in the national park, but that the incursions which do occur are dominated by elephant hunters who are particularly careful to avoid leaving obvious sign, which would increase their vulnerability to anti-poaching patrols. In the Dzanga-Sangha special reserve and the Mokabi logging concession people have the legal right to hunt for subsistence and are probably more likely to leave observable signs.

Figure 3(a) Recorded carcass locations and relative elephant abundance in the Dzanga-Sangha-Nouabalé-Ndoki complex

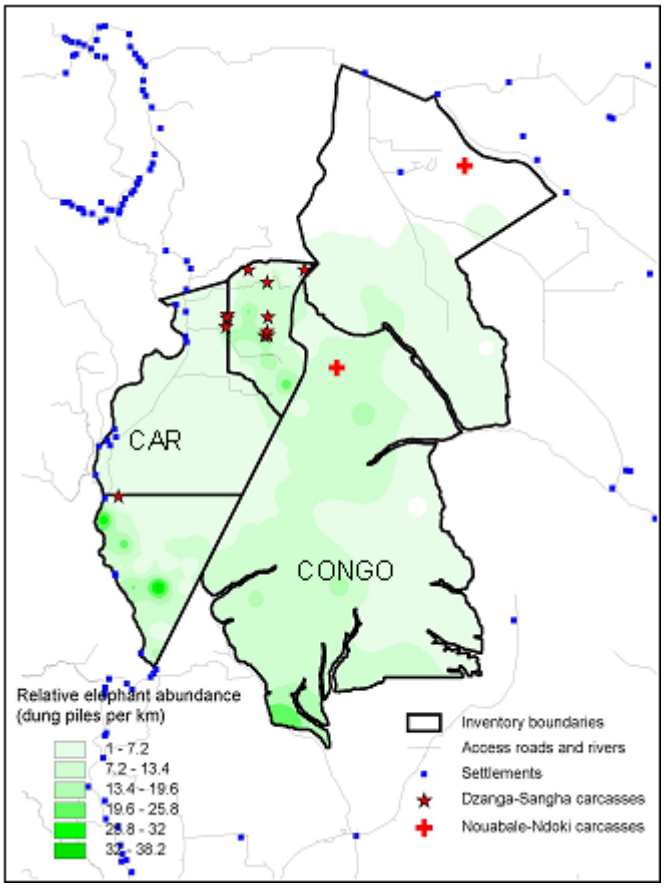
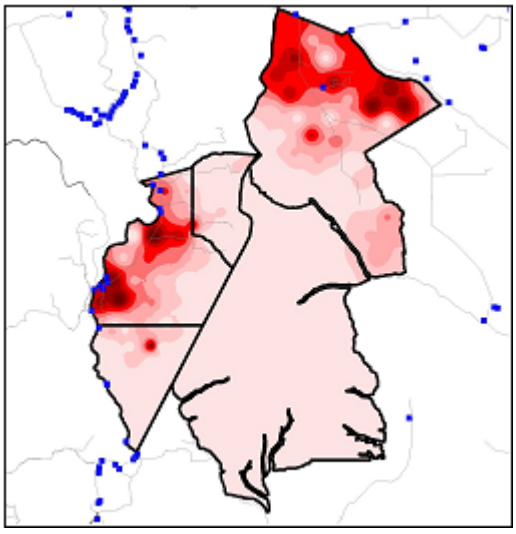


Figure 3(b) Interpolation map of relative level of human activity as identified from sign counted on transects



It is important to note that the extremely high carcass encounter rate was in what has traditionally been the epicentre of elephant activity in the region – Dzanga National Park. Elephants appear to have been largely exterminated from the Special Reserve of the Dzanga-Sangha complex, and it appears that the Dzanga National Park itself is under considerable threat.

In Bangassou the Wildlife Conservation Society funded a 3-week study in the main local meat market in Bangassou town aimed at assessing the quantity of elephant meat on sale. During the study meat from a confirmed minimum total of 9 different elephants was sold openly in the market, with elephant meat

offered every single day (Figure 4a). A similar situation was reported by (Fay and Agnagna 1991). The majority of the elephant meat on sale originated in villages to the southeast of Bangassou close to the border with DRC, and it is likely though unconfirmed that the elephants were poached in DRC. The market in which the study took place is less than 500 metres from the regional offices of the wildlife department. A shop selling ammunition, with advertising for "La Grande Chasse" and the purchase of elephant bullets is a similar distance from the office (Figure 4b)

It is also informative to look at the number of hunting camps, both for small game and confirmed elephant poaching camps, found during the inventories in central Africa, and details are provided in Table 3. In many cases elephant poaching camps are indistinguishable from hunting camps where the priority is for small game, therefore the figure in this table should be taken as a minimum estimate of elephant poaching camp locations. In Salonga, an astonishing 39 confirmed elephant poaching camps were found, with 97 camps recorded in total – almost all of which were found within the boundaries of the national park. By contrast in the Nouabale-Ndoki site, which had the second highest number of camps recorded, all 66 camps were found outside the national park in an active logging concession. In Minkebe, where most elephant poaching is done by local residents, elephant poaching camps are particularly difficult to distinguish from small game camps, and it is likely that a large fraction of the camps recorded were used for elephant hunting.

Table 3. Number of hunting camps found by MIKE site during forest inventories

Site	N confirmed elephant hunting camps	N small game/possible elephant hunting camps	Total number of hunting camps	Camp encounter rate (per 1000km effort)
Boumba Bek[1]	0	8	8	17
Bangassou	0	47	47	93
Nouabale-Ndoki	13	53	66	90
Salonga	39	58	97	56
Dzanga Sangha	0	17	17	44
Minkebe	0	45	45	68
Total	52	228	280	63

1. Boumba Bek followed straight line recces with only minor deviations – in other sites recces involved deviations from the desired travel route, and survey teams were encouraged to follow up on fresh and recent human signs. This considerably decreased the chances of finding carcasses at the Boumba Bek site.

It was shown in Table 1 that in two of the three MIKE sites in which inventories were conducted both inside and outside national parks elephant abundance was several times higher within the national nark boundary than beyond. In part this may be due to wise placement of national parks in high-density elephant areas, however it is more likely due to protected status and management regime within parks compared to their peripheries. Both the interpolation maps above, and Table 4 below highlight clearly the consistent, and in some cases enormous differences in signs of illegal killing of elephants and human pressure from hunting camps inside national park boundaries compared to the areas surveyed outside their borders where the legal basis for protection is less stringent, and conservation efforts may be reduced.

Table 4. Differences in hunting camp and carcass encounter rates comparing inside and outside of national parks in MIKE sites

	Camp encounter rate[1]		Carcass encounter rate	
Site	Inside park	Outside park	Inside park	Outside park
Nouabalé-Ndoki	2.3	219.1	0.2	0.3
Minkébé	25.4	97.6	3.6	33.8
Dzanga Sangha	36.5	44.4	8.1	14.8

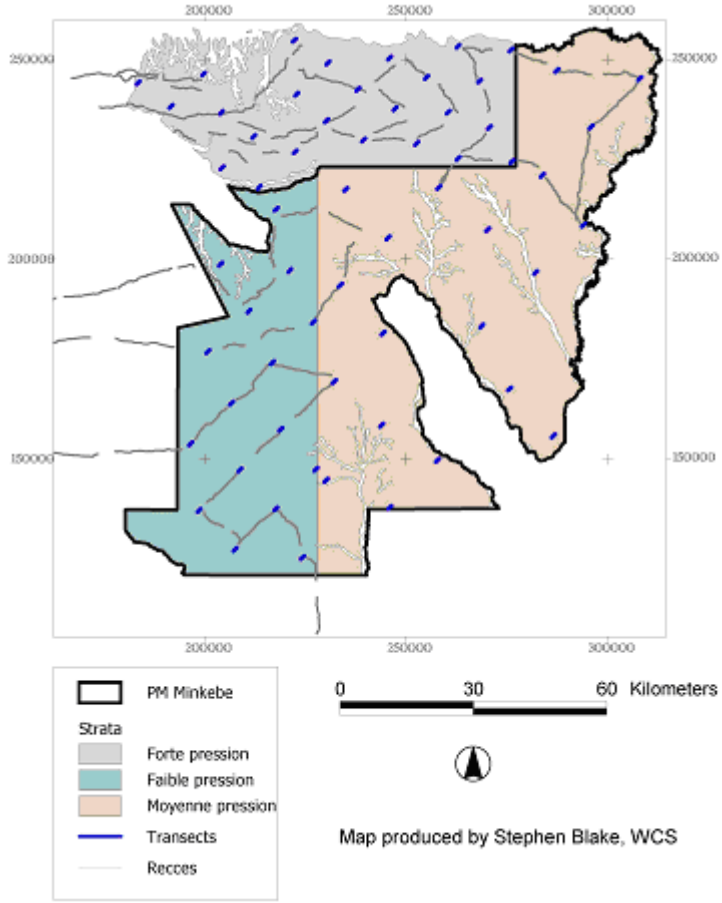
[1.] Encounter rates are shown in units of sign per 1000km

Figure 4. Elephant trunk for sale in Bangassou market (a), local ammunition shop (b)

b)

a)

Figure 5. Illustration of reconnaissance walks and line transects from Minkebe



In conclusion, the MIKE sites represent a relatively small sample of the population of forest elephants of central Africa. The sites are biased towards well-known and important national and international elephant populations, all of which are based in and around National Parks and protected areas, which have received heavy financial and technical support from the international community. Yet even here, in some of the best conservation conditions available, the MIKE survey suggests forest elephant range is shrinking due to human pressure, and that poaching of elephants for ivory and bushmeat is occurring widely. Two of the most important elephant populations, as determined by the survey (in Minkebe and Dzanga National Parks of Gabon and CAR respectively), are experiencing the highest recorded levels of poaching as indicated by the presence of carcasses, compared to the other 4 sites. In Salonga and Bangassou, elephants appear to have been reduced to very small fractions of their former abundance, while poaching still proceeds apace at these sites. Unless poaching and the factors that promote it are reduced, the future of central Africa's remaining elephants remains under real and imminent threat.

Barnes, R. F. W., K. Barnes, M. Alers, and A. Blom. 1991. Man determines the distribution of elephants in the rain forests of northeastern Gabon. African Journal of Ecology **29**:54-63.

Barnes, R. F. W., A. Blom, and M. P. T. Alers. 1995. A review of the status of forest elephants *Loxodonta africana* in central Africa. Biological Conservation **71**:125-132.

Fay, J. M., and M. Agnagna. 1991. Forest elephant populations in the Central African Republic and Congo. Pachyderm **14**:3-19.