CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

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Interpretation and implementation of the Convention

Species trade and conservation issues

Elephants

MONITORING OF ILLEGAL HUNTING IN ELEPHANT RANGE STATES

Executive summary

In compliance with Resolution Conf. 10.10 (Rev. CoP12), this report will indicate the progress that has been made in implementing the MIKE Programme since CoP12.

It is still too early to provide trend analyses as the current emphasis is on establishing the baseline. Once in place, then further data collection will allow measurements against the baseline. At its 49th meeting, the Standing Committee agreed a definition of the MIKE baseline in terms of geographical scope and the nature of the data.

Baseline progress

For Asia, the Standing Committee agreed that the geographical scope could be improved using a sub-regional approach (as was done in Africa) rather than a regional one. Accordingly Asia now has 18 sites compared to the original 15.

A brief summary accompanied by a table (see Tables 1-6 below) is provided for each of the 6 Sub-regions in terms of presenting the current status in acquiring the data required by the baseline definition. Because of a delay in recruiting the Sub-regional Support Officer for South East Asia, thereby putting that Sub-region somewhat behind the progress being made in the other Sub-regions, the baseline will not be ready for verification until sometime in 2005.

The baseline definition also requires a preliminary baseline analysis. The statistical approach undertaken and the demonstration that a feasible approach to the analysis of MIKE data has been tested is provided in Annex 3

The methods described in Annex 3 illustrate how with appropriately collected data, it should be possible to investigate and explore relationships between number of carcasses found, site level variables, and time having adjusted for effort. However, given appropriate data, further work is still required to refine the analysis and some important improvements are referred to at the end of section 3.

The MIKE Technical Advisory Group (TAG) are currently and will continue to address these improvement needs in order to guide the way forward

MIKE mortality data analysis

MIKE data collection started in 2000 for Southern Africa but only in 2002 for the other 3 African Sub-regions and in 2004 for Asia. To illustrate the data available from each of three sub-regions in Africa, a summary of the cause of death for carcasses found within 12 months of death (i.e. the fresh and recent categories) is given by year. West Africa has not been included, because the data set is too small as yet. In addition, for that sub-region, there is no data from Cote d'Ivoire and Liberia, due to the civil strife those

countries have been experiencing. However a similar presentation for South Asia is possible due to there being good mortality data prior to the start up of MIKE in late 2003.

These data provide an initial overview of the carcass records collected to date. No attempt has been made to make any comparisons or draw any conclusions among the Sub-regions. The data however, in conjunction with corroborative evidence from TRAFFIC's work on domestic ivory markets in West Africa (Courouble *et al.* 2003), Martin and Stiles (2000) and Hunter *et al*. (2004), do draw attention to recent and ongoing poaching in Central Africa. These reports provide sufficient cause for concern and highlight the need for urgent attention to be given to helping the relevant range States curb such activities.

Unregulated Ivory trade patterns as an influencing factor in illegal killing

A prime objective of the site-based MIKE programme is the provision of information on levels and causes of illegal killing of elephants presently occurring in elephant range States in Africa and Asia. A start has been made on this as demonstrated in this report. The evidence on where and why elephants are being poached will improve as MIKE continues to obtain more and better data over time, but already MIKE is indicating poaching concerns in Central Africa, and it is possible to link this to the unregulated ivory trade patterns that are currently operating.

In a recent paper, Hunter et al. 2004 have published as work in progress an approach which allows the estimation of the annual ivory requirements of the ivory carvers based in major unregulated ivory markets in Africa and Asia. A surprising result is that unregulated ivory markets in Africa appear to consume a higher volume of ivory than those in Asia. The study also suggests that 4000 elephants or more are required each year to meet the estimated unregulated demand from both continents. The paper goes on to look at which geographical regions these elephants might be coming from. The provisional assessment provided in the paper, based on non MIKE information and preliminary MIKE indications, is that the key area under pressure is Central Africa.

The MIKE data as presented in this report, strengthens the MIKE part of that assessment. The understanding of the unregulated ivory trade pattern suggested by the approach followed in Hunter et al. 2004 and the growing evidence that this pattern can not be ignored as an important influencing factor in encouraging the illegal killing of elephants in Central Africa in particular is therefore reflected in figure 8.

MIKE/ETIS links

Linking MIKE and ETIS is important in terms of providing a coherent picture of where elephant products are coming from and where they are going to. There are several levels through which this can occur, including data collection, the sharing of database components and data analysis. Examples of such links are provided in the report.

Some operational aspects of MIKE

The report concludes by providing the progress made in terms of developing range state capacity, referring to the work undertaken and being undertaken by the TAG and highlighting the current funding situation. Essentially the MIKE programme needs some US$300,000 if it is to continue functioning in Africa without loss of momentum and continuity until the end of March 2005, when further EC funding is likely to become available.

Main report on the monitoring of the illegal killing of elephants (MIKE)

1. Introduction

This report is provided to the Conference of Parties in compliance with Resolution Conf. 10.10 (Rev. CoP12), annex 2. This resolution sets out the following 4 objectives:

– Measuring and recording levels and trends and changes in levels and trends of illegal hunting in elephant range States;

– Assessing whether and to what extent observed trends are related to changes in the listing of elephant populations in the CITES Appendices and/or the resumption of legal international trade in ivory;

– Establishing an information base to support the making of decisions on appropriate management, protection and enforcement needs; and

– Building capacity in range States

The report will indicate the progress that has been made since CoP12 towards meeting these objectives. It is still too early for MIKE to provide trend analyses as the first requirement is the establishment of a baseline. Once the baseline is in place then another period of data collection will allow measurements against the baseline. Therefore the emphasis of this report will be on the status of establishing the MIKE baseline, but the report will go on to provide information in regard to the mortality data that MIKE has captured up to the end of June 2004. The report will also indicate the analytical potential of MIKE using real data from 10 sites drawn from 3 Sub-regions in Africa. Fourthly the report will highlight the growing concern that the unregulated ivory markets are a real influencing factor on current elephant poaching. Fifthly the report will discuss progress in regard to MIKE/ETIS links. Lastly the report will provide updates on some operational aspects of the programme, including capacity building and funding

2. Establishing the MIKE baseline

Following the decision at CoP12 that the MIKE baseline must be in place as a precondition for the one off sale being allowed to occur, the Standing Committee at its 49th meeting agreed upon the definition of that baseline in terms of its geographical scope and the nature of the data.

2.1 Geographical scope

The Standing Committee adopted the following definition in regard to geographical scope:

a) For Africa, the geographical scope will cover the scenario 3 option of 45 sites as agreed by the Parties (see document SC41 Doc. 6.3 Annex 1). In the circumstances that MIKE data can not be collected at some sites in countries such as Côte D'Ivoire or the eastern part of the Democratic Republic of the Congo, owing to civil strife, the situation will be inferred from ETIS data and other expert sources.

b) For Asia, the geographical scope will meet the original scenario 3 criteria as agreed by the Parties (see document SC41 Doc. 6.3 Annex 1). Recent discussions with the Asia range States have opened the prospect for improving the sample of the MIKE sites for Asia in a sub-regional context, whilst guaranteeing at least the precision required under scenario 3.

The Standing Committee therefore agreed that a revisit should be undertaken in terms of the sample of the MIKE sites for Asia. Using updated information from the Asian range States, this cluster analysis was done with the assistance of the Statistical Services Centre of the University of Reading. As a result there are now 8 sites representing the sample for South East Asia and 10 sites for South Asia. This is a gain of 3 sites compared to the original site identification. These sites are listed in tables 5 and 6. It is important to clarify that the sites included in the baseline ensure as little bias as possible when undertaking intra site analysis. This does not imply that the other sites where MIKE is operational are unimportant to the MIKE process, given that it is a

MIKE objective to help decision-making in regard to appropriate management, protection and enforcement needs at the site, national, sub-regional and global levels. This latter category of sites has been listed as 'alternate sites' in the baseline status tables provided below.

2.2 <u>Nature of the data</u>

The Standing Committee adopted the following definition in regard to nature of the data:

For each reporting site, the following information would be presented:

a)   at least one population survey (which must not predate 2000);

b)   levels of illegal killing derived from a minimum of 12months' (Africa)/6 months' (Asia) data obtained from patrol forms and carcass forms and summarized in monthly reports;

c)   a descriptive report on the patterns of influencing factors;

d)   an assessment of the effort made in providing the illegal killing information; and

e)   a preliminary baseline analysis of paragraphs a) to d) above.

2.3 <u>Baseline progress</u>

Progress in terms of getting the data required by the baseline for paragraphs a) to d) is reflected in Tables 1–4 for Africa and Tables 5-6 for Asia (see Annex 1). Progress in regard to paragraph e) of the baseline requirement is covered in the next section (Section 3)

*Summary re Southern Africa*

The baseline in regard to paragraphs a) to d) is therefore established for Southern Africa, with the exception of some uncertainty in regard to Niassa. Niassa is struggling with a lack of site staff capacity and thus monthly data flow is patchy. A site visit is planned for August/September to assist with an update.

*Summary re West Africa*

For West Africa, Côte D'Ivoire and Liberia are affected by civil strife, though population surveys for Marahoue and Tai were done just prior to the start of the troubles. The forest survey for Ziama is now underway. Both Yankari and Sambissa need aerial surveys to be done, but lack of funds is a constraint and so it is not certain whether these surveys will be achieved in 2004 or 2005. Babah Rafi is a small group of elephants that would be best surveyed by a total ground count. The need is to identify when the elephants will be suitably located to undertake this count as these elephants move about in the cross border area of Niger and Nigeria. The emphasis in Niokolo Koba is to see if any elephants continue to be present in that site, given that there are probably less than 10 elephants. Two good achievements were the population surveys of the Mali desert elephants and the 'cross border' elephants of Burkina Faso/Niger/Benin/Togo.

In terms of illegal killing and effort data, then the production and flow of data and monthly reports remains patchy from Ziama and Niokolo Koba. The data for Ghana sites are not readily available at the National Office and the Sub-regional Support Unit and the status indicated needs confirming

*Summary re East Africa*

In East Africa, the establishment of the baseline is on course to be completed during 2004. Funds need to be found to undertake the cross border survey in Mount Elgon, which may push back this survey being completed to 2005.

*Summary re Central Africa*

Thanks to the forest population survey work being undertaken under the co-ordination of the Wildlife Conservation Society, with the support of WWF International and the agreement of the relevant range States, the five 2004 labeled sites will have their reports available this year. Sangba needs an aerial survey, but lack of funds means this is unlikely to take place until early 2005. Okapi (DRC) was interrupted by civil strife, but data flow has resumed. The status for Kahuzi-Biega refers to the sections not affected by civil strife but the area being covered by ICCN is gradually increasing.

*Summary re South Asia*

The LEM training has been delivered in the early part of 2004, and the 6 months requirement for levels of illegal killing and the assessment of effort should be available by the end of 2004. On mortality data then for India, Sri Lanka and Nepal, good mortality data exists that predates MIKE implementation. This emphasises the point that in some countries MIKE is enhancing existing monitoring systems rather than starting from scratch. Unless any unforeseen problems occur then the South Asia baseline should be in place end of 2004 or early 2005. The exception will be in regard to the forest survey needed for Yala and Samchi, which is unlikely to be undertaken until 2005, as appropriate methodology and funds still need to be finalised

*Summary re South East Asia*

There was a delay in starting the MIKE programme in South East Asia. The difficulty arose in finding a suitable person to be offered the Sub-regional Support Officer's post. This was finally achieved in February 2004. Since then a real effort has been and is being made to get the MIKE LEM work and population surveys started and to get the necessary equipment positioned in that Sub-region. 7 countries have been or will be visited shortly by the SSO as part of regenerating the momentum, but no response has yet been forthcoming in terms of visiting Lao PDR. But the reality is that it will be not possible to establish the baseline in South East Asia until sometime in 2005.

*Overall Summary of baseline progress*

The condition in regard to having the MIKE baseline established before the single sale can occur will not be fulfilled therefore until 2005.

*Influencing factors*

The 2004 status for Influencing factors is shown, not because the data is not there, but continuous effort is being made to improve the data. This is the same for all 6 sub-regions. Figure 1 demonstrates the type of data currently available in the sites dossiers. It is worth emphasising that the fact that this information is not yet captured in a GIS does not invalidate its use as part of the baseline information. There are advantages to having such data in a GIS, which is why that remains an objective of the MIKE database. Accordingly digitized maps for all sites in Africa are now available and will be so before end of 2004 for all Asia sites. The latest version of the MIKE database includes a GIS linkage.

It can be seen from Figure 1 (see Annex 1) that much of this influencing factor information represents site based co-variates which can be geo-referenced and updated annually and will be important in any analysis. It is also worth making the point that population surveys are not just about providing estimates of numbers. They can make an useful contribution towards understanding densities, distribution patterns and the factors that may be influencing changes in these parameters.

An example from an aerial survey of encroachment (i.e. a change in land use) being the main factor in explaining the absence of elephants from a particular area is provided in Figures 2A and 2B (see Annex 2). The circled area includes a MIKE site, which clearly shows no elephants, but numerous cattle present during the survey

3.  Analysis of MIKE data from a sample of sites in Africa

    MIKE is designed to use a statistical approach to look at the relationship between the illegal killing of elephants and various possible explanatory factors. The TAG approved strategy for achieving this has been described in the document 'MIKE Data Analysis Strategy' by Burn et al. 2004 , which is available on the MIKE part of the CITES website (www.cites.org). The most immediate need however is to work on developing a preliminary baseline analysis as required by part (e) of the baseline definition. The statistical approach undertaken and the demonstration that a feasible approach to the analysis of MIKE data has been tested is provided in Annex 3

    Thus the methods described in Annex 3 illustrate how with appropriately collected data, it may be possible to investigate and explore relationships between number of carcasses found, site level variables, and time having adjusted for effort. However care is needed in interpreting the findings in Annex 3, especially given the rather small amount of data. Given appropriate data, further work is still required to refine the analysis. In particular the following improvements are important:

    a)  Rather than using a single variable to distinguish between sites, each site needs information on a set of variables that can explain site differences. The next step would be to take the influencing factors listed in figure 1 and attribute values to them

    b)  Using a total number of kilometres traveled on patrol as a proxy for effort is crude. It ignores differences in the mode and speed of the patrol, the visibility factor, etc. More work is needed to look at measuring effort in regard to % area covered and detection probabilities.

    c)  Because patrol routes are not chosen according to any statistical sampling plan, information on how patrol routes are determined and followed need to be accounted for in the analysis. Spatial data recorded by the patrols are likely to be useful for indicating patrol pattern biases in particular as well as helping to understand patrol strategies in general.

    d)  It is becoming increasingly understood that the more methods MIKE can use, the stronger MIKE becomes. Patrols will not necessarily be the best method for getting carcass information in many sites, either because no patrols are available or conversely because patrols are effective as a deterrent, thus influencing the carcass detection rate. Alternative non-patrol methods (such as local information networks) need to continue to be developed, including determining how best to measure effort when using these alternative methods.

    These are all issues that the MIKE Technical Advisory Group (TAG) are currently and will continue to address in order to guide the way forward.

4.  Current information in regard to the MIKE mortality data

    MIKE data collection started in 2000 for Southern Africa but only in 2002 for the other 3 African Sub-regions and in 2004 for Asia. The African mortality data are a set of records (drawn from MIKE carcass forms) on elephant carcasses found either by patrols or other means that records cause of death, age of carcass and other information about carcasses (using data protocols for guiding consistency and reliability). To illustrate the data available from each of three sub-regions in Africa, a summary of the cause of death for carcasses found within 12 months of death (i.e. the fresh and recent categories) is given by year. West Africa has not been included, because the data set is too small as yet. In addition, for that sub-region, there are no data from Cote d'Ivoire and Liberia, due to the civil strife those countries have been experiencing. However a similar presentation for South Asia is possible due to there being good mortality data prior to the start up of MIKE in late 2003.

    The data are therefore provided for the 3 Africa Sub-regions and South Asia as pie charts in figures 5-7 (see Annexes 4, 5 and 6). Figure 5 shows the cause of death information for Southern Africa from 2000 to mid 2004. Figure 6 shows the cause of death information for East and Central Africa for 2003 and the first half of 2004. Figure 7 shows similar information for South Asia for 2002/3 and 2003/4.

    In regard to these figures, Legal killing refers to regulated and lawful removal of an elephant under problem animal control operations. This removal is usually undertaken directly by the appropriate

wildlife agency or, in a few countries, by a hunting operation under a legal trophy quota. Because the emphasis of MIKE is on illegal killing, the lawfully removed animals have been grouped with 'natural' for convenience in every Sub-region. Human/Elephant Conflict (HEC) refers to those elephants killed illegally in response to crop or property damage and Accident refers to those killed by train impact, electrocution, etc. The ivory/bushmeat category consists of those killed solely for their ivory and those killed only for bushmeat, but for some carcasses, there is the situation where both products have been removed. The database does therefore have all three categories, but for convenience they have been grouped under one category in figures 5 and 6.

These data provide an initial overview of the carcass records collected to date. No attempt has been made to make any comparisons or draw any conclusions among the Sub-regions. A meaningful comparative analysis would depend in the first instance on the assumption that carcass detection and reporting rates are independent of cause of death. These assumptions need to be tested. Biases could include differences in habitat and visibility, variation in forest access, differences in the quality of data collection and data interpretation, proximity and degree of human activities. In addition, it is still too early to determine what relative levels of population loss these percentages represent, particularly in Central Africa. The analysis and interpretation of the carcass data collected requires more work by the MIKE TAG in future.

The data however, in conjunction with corroborative evidence from TRAFFIC's work on domestic ivory markets in West Africa (Courouble *et al.* 2003), Martin and Stiles (2000) and Hunter *et al*. (2004), do draw attention to recent and ongoing poaching in Central Africa. These reports provide sufficient cause for concern and highlight the need for urgent attention to be given to helping the relevant range States curb such activities. Hotspots for such poaching as indicated by the database include the MIKE sites in Eastern DR Congo, the Tri-national area of Cameroon, CAR and Congo Brazzaville plus Northern Gabon and Southern Tchad.

(Analysis of the Central African forest surveys on behalf of the range States concerned under the co-ordination and leadership of the Wildlife Conservation Society and supported by WWF International is nearing completion. Presentation of the results to the range States is planned for September. It may be possible therefore to present some findings of these surveys at the CoP)

In regard to the data from South Asia, then an illegal killing percentage of less than 10% may not seem, at first glance, to be a major threat. But for one particular site, the poaching of tuskers in the 2-year data set represents 28% of the estimated tusker population, in a population where tuskers form only 2% of that elephant population. For comparative purposes, then for the whole 2-year data set containing that information, poached tuskers represent 1% of the estimated tusker population and tuskers form 11% of the population. The male/female ratio is not entirely dependant on tuskers, as there will be males without tusks, but these figures emphasize the need in Asia to monitor adult male/ female ratios, as a relatively low poaching of tuskers could still impact the reproductive rates of any given population. This is particularly true in some regions such as southern India, where tusker/tuskless male ratios are high. The tusker/tuskless ratios are also monitored in other regions e.g. Northeast India. Here, where the ratios are lower, the impact of poaching tuskers, while indicating the depletion of the tusk trait from the adult male populations, has less consequence as a reproductive issue.

5.  Unregulated Ivory trade patterns as an influencing factor in illegal killing

The Elephant Trade Information System (ETIS) analysis presented to the 12th meeting of the Conference of the Parties to CITES (CoP12) clearly demonstrated a highly significant statistical correlation between the illicit trade in ivory and the presence of unregulated domestic ivory markets in Africa and Asia (Milliken *et al.* 2002a, 2002b, 2002c).

A prime objective of the site-based MIKE programme is the provision of information on levels and causes of illegal killing of elephants presently occurring in elephant range States in Africa and Asia. A start has been made on this as demonstrated earlier in this report. The evidence on where and why elephants are being poached will improve as MIKE continues to obtain more and better data over time, but already MIKE is indicating poaching concerns in Central Africa, and it is possible to link this to the unregulated ivory trade patterns that are currently operating.

In a recent paper, Hunter *et al.* 2004 have published as work in progress an approach which allows the estimation of the annual ivory requirements of the ivory carvers based in major unregulated ivory markets in Africa and Asia. A surprising result is that unregulated ivory markets in Africa appear to consume a higher volume of ivory than those in Asia. In sum, African countries require between two and possibly up to eleven times as much raw ivory to support domestic ivory carvers than is the case for Asia, a finding which is contrary to conventional notions about contemporary ivory trade dynamics. Having determined the annual ivory requirements it is then possible to estimate the number of elephants required to supply the unregulated industry. The study suggests that 4000[1] elephants or more are required each year to meet the estimated unregulated demand from both continents. A detailed explanation of the methods used and the outlining of what is required to improve the approach can be found in Hunter *et al.* 2004.

The paper goes on to look at which geographical regions these elephants might be coming from. The provisional assessment provided in the paper, based on non-MIKE information and preliminary MIKE indications, is that the key area under pressure is Central Africa. The MIKE data as presented under section 4 of this report, supports the MIKE part of that assessment. The understanding of the unregulated ivory trade pattern suggested by the approach followed in Hunter et al. 2004 and the growing evidence that this pattern can not be ignored as an important influencing factor in encouraging the illegal killing of elephants in Central Africa in particular is therefore reflected in figure 8 (see Annex 7).

6.  MIKE/ETIS links

Linking MIKE and ETIS is important in terms of providing a coherent picture of where elephant products are coming from and where they are going. There are several levels through which this can occur, including data collection, the sharing of database components and data analysis. In regard to data collection, a mechanism has been put in place to isolate ivory and elephant product seizures within the MIKE data collection process to ensure that all such records are reported to ETIS as well. Such occurrences are actually rare, but a crosschecking system is now in place.

As part of the comprehensive information system, MIKE will use key components of ETIS as appropriate. For example subsidiary databases that hold background economic variables and information on domestic ivory markets are a jointly shared resource. Data analysis is another area of direct collaboration. At CoP12, while ETIS produced a full analysis, MIKE had not developed to the extent that it could issue an equivalent analytical report. This report demonstrates progress in the MIKE analytical process, but an integrated analysis is unlikely to be possible until CoP14. Nevertheless some thought has been given to other tangible ways that MIKE and ETIS links can evolve. For example, it is important to understand ivory trade patterns as one of the influencing factors to be considered by MIKE as well as having some sense of the magnitude of this factor in terms of how many elephants are potentially being killed to service any existing ivory trade patterns.

7.  Some operational aspects of MIKE

    7.1 Capacity building

    The capacity building of Wildlife personnel such that MIKE can be continued on a long term sustainable basis in the range States is clearly identified in Res. Conf. 10.10 (Rev CoP12).

    a)  LEM

        The initial emphasis on training was given to the law enforcement monitoring (LEM) part of the work. This training comprised the familiarization of the MIKE field forms (including incorporating appropriate adaptation and harmonization of the forms with existing monitoring procedures where these occurred), the use of GPSs, and the processing of the monthly forms. The training in Africa was provided by an introductory Sub-regional

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[1]   This number amounts to an annual off-take of 1% if considering the total African elephant population as stated for the definite category in Blanc et al. 2003, but would amount to a higher annual off-take rate if the 4000 elephants are taken from a particular Sub-region

workshop, followed by site visits. Where National and Site officers have been posted away and new officers brought in, then the Sub-regional Support officer has visited the site and re-delivered the training. In South Asia, the approach was modified to have small sub-groups within the Sub-region receive the training, which proved for that Sub-region, practical and cost effective. In South East Asia, it will be necessary to follow a country-by-country approach, as the training will have to be delivered in 6 local languages.

Staff turnover in Africa has been a problem (its too soon to know if this will be the case in Asia). The impact of high staff turnover does have budgetary implications. It can cost as much as US$ 5000 per person per annum to deliver the training. Staff turnover is a reality, but the impact can be reduced if proper handovers are built into the process. Secondly a MIKE training manual is being developed based on the training modules that are delivered, with the vision that these modules can be incorporated in local wildlife training curriculums, thus equipping a wider cadre of personnel with the appropriate skills.

b)   Population surveys

For MIKE related aerial surveys, local staff are trained and used as observers, particularly where such skills are not already in house. Use has been made of skilled persons in one Sub-region to help with the training in another Sub-region. For example, a Kenya Wildlife Service officer helped with training and co-ordinating a total count aerial survey in the Park W ecosystem survey undertaken in West Africa in 2003.

For forest surveys, then the Wildlife Conservation Society has put considerable effort on behalf of the MIKE programme to provide training to the teams that have undertaken the forest surveys in Central Africa. In West Africa, the Ghana Wildlife Department/Conservation International training initiative has allowed MIKE forest surveys to benefit from using trained personnel. In addition Ghana facilitated the training of officers from Uganda in forest survey skills.

Whilst this training has helped to get surveys undertaken and provide skilled people in the relevant Sub-regions, there is an institutional issue. Apart from Ghana, there are no current 'in house' forest population survey skills, for example in West and Central Africa. How best to have this capability and to sustain it on limited recurrent budget resources is a challenge, which the Sub-regional Steering Committees are aware of and will be giving some attention over the next year or so. One option is to consider developing survey units on Sub-regional basis rather than on a national one. The long-term institutional problem is not restricted to forest surveys. Aerial surveys will need similar consideration. These institutional issues also need to be related to the Sub-regional elephant conservation strategies that each African Sub-region is engaged in evolving.

For Asia, then training plans are being developed that will assist those countries in undertaking the methods recommended by the TAG.

c)   Database management

Considerable effort has been made to provide the training during 2003 and 2004 to the African Sub-regions on using and managing the MIKE database. A specialist team, led by a co-ordinator provided by University Of California, Davis, delivered this training in conjunction with the Sub-regional Support Officers. This enabled the training to be delivered simultaneously to all four sub-regions through a workshop approach. The training was complicated by having to test the database for problems and faults while delivering the training at the same time. The first round of training was provided between May and July 2003. Considerable emphasis was placed on managing the computers for viruses, etc as well as on learning how to use the database. Between January and May 2004, a second round of workshops were held to show how data inputting had progressed at the sites and to reinforce the training on computer and database management needs.

The opportunities provided by feedback from these workshops have allowed the database to be improved. Secondly the training has resulted in many sites being able to input their data

into the computers and forward the data plus monthly reports to National Officers and SSOs. One challenge that has emerged is the problems that some computers have experienced with virus invasions, computer start up failure, loading incompatible software, etc. such that the computers have had to come from the field for reformatting. Maintaining and managing, across 55 sites, computers in good operational order is proving a bigger headache than could be envisaged when planning for the purchase and provision of the computers. However the problems have created a greater awareness of the importance of good computer management and further training should continue to reduce these set backs.

For Asia, training on the database in South Asia is planned for September. For South East Asia the training is likely to occur after CoP13.

## 7.2 The MIKE TAG

In compliance with the revision to Resolution Conference 10.10 (Rev. CoP12), the Technical Advisory Group (TAG) for ETIS has been established. Essentially the TAG now consists of two working groups, one for MIKE and one for ETIS. In addition the MIKE part of the TAG has been expanded to include 2 experts with good Asia experience under the global category. Details of the current TAG can be found in the minutes of the Sub-group meeting held on 26th November 2003, which are available on the CITES website.

TAG assistance to MIKE has been ongoing through 2 further meetings held since CoP12 and work undertaken between meetings. A further meeting was intended for August 2004, but the current shortage of funds prevented this.

Nevertheless TAG work has seen the following improvements:

−   An aerial survey standards document is now available on the CITES website. With the assistance of the EC small fund programme of the IUCN SSC African Elephant Specialist Group, French and Portuguese versions will soon be available.

−   A MIKE database has been developed, provided and trained on. The latest version includes a GIS linkage to Arcview 8.3. It will now be important to develop the query and analytical components that the database still needs.

−   A MIKE dung count task force has evolved the forest survey methods so that they are relevant to Asia as well as Africa. A new standardized approach to measuring dung disappearance rates should be especially noted. A forest survey standards document is currently being developed and should be available for TAG consideration by September

−   A MIKE data analytical strategy has been approved and is available on the CITES website.

Other work that is being addressed by the TAG include:

−   Consideration of how best to measure effort with the help of spatial analysis for patrols

−   Consideration of alternative carcass detection methods that can be used in non patrol situations or biased patrol situations

−   Use of early warning mechanisms

−   Use of DNA mark/recapture methods in low elephant density/low elephant number situations, particularly in forest situations.

## 7.3 Funding

For Africa, the initial funding support, which was provided by the European Community but with important matching funds, finished on April 30th 2004. The European Community is wanting to continue its support in terms of a main phase project, worth some €10 million for a 5 year period. The process for applying for this funding is well underway and the CITES Secretariat will

be submitting the project proposal in the next month, but it is likely to still be early 2005, before the funds are finally approved and released.

This leaves a precarious period of some 11 months. So far the CITES Secretariat and the United States Fish and Wildlife Service have provided funds that keep the MIKE programme operational until the end of September, albeit on a reduced activity basis. At this moment, there are 2-3 donors considering helping out with the bridging need, but no commitment has yet been made. Essentially the MIKE programme needs some US$300,000 if it is to continue functioning until the end of March 2005. If such funding is not found, then there will be a loss of continuity and momentum.

For Asia, the situation is different. Funds are largely available to assist the programme through until the end of 2005. Some extra funds will be needed to help population work and core costs n particular. The core costs are directly linked to the work the SSOs do in regard to training, capacity building and generally facilitating the programme.

8.  Acknowledgements

Preparing this report would not have been possible without the direct inputs and help provided by Bob Burn, Fiona Underwood and Flip Stander. This report is possible because of the support provided by the European Community, the United States Fish and Wildlife Service, the Government of Belgium, the Government of Japan, the Critical Ecosystem Partnership Fund, the Japan Ivory Traders Association, the Wildlife Conservation Society, WWF International and the CITES Secretariat. Nothing would have been possible without the commitment and enthusiasm of the MIKE range states from Steering Committee level down to Site level. Thanks are due to the MIKE TAG for all their help and inputs. Last but not least, a big thank you is due to all the MIKE CCU and SSU staff, who have worked tirelessly and loyally to help get MIKE up and running, with welcome support provided by the Deputy Secretary General (CITES Secretariat) and the IUCN regional offices.

9.  References (see Annex 8)

**ANNEX 1**

Tables 1-6: Baseline status as at 30/06/04

In reading tables 1-6, please note the following:

−   (BW) is the ISO country code (ISO 1366)
−   ✓ means that the data are available
−   MM/YY indicates the month and year when the data should be available
−   2004 indicates the data will be available during 2004
−   2005 indicates the data will be available during 2005
−   Civil strife indicates data not available due to that reason
−   ? indicates waiting for an update from the site
−   NC indicates that the 12 months data has still to be confirmed
−   * indicates budgetary constraint

**Table 1: Southern Africa – Baseline status as at 30/06/04**

| Geographical scope | Population survey available 2000 onwards | Levels of Illegal killing (12 months) | Influencing factor site dossier | Effort assessment | Remarks |
|---|---|---|---|---|---|
| Chobe (BW) | ✓ | ✓ | 2004 | ✓ | |
| Cahora Bassa (MZ) | ✓ | ✓ | 2004 | ✓ | |
| Niassa (MZ) | ✓ | ✓ | 2004 | ? | Lack of capacity |
| Etosha (NA) | ✓ | ✓ | 2004 | ✓ | |
| Caprivi (NA) | ✓ | ✓ | 2004 | ✓ | |
| Kruger (ZA) | ✓ | ✓ | 2004 | ✓ | |
| S. Luangwa (ZM) | ✓ | ✓ | 2004 | ✓ | |
| Chewore (ZW) | ✓ | ✓ | 2004 | ✓ | |
| Nyami N. (ZW) | ✓ | ✓ | 2004 | ✓ | |

**Table 2: West Africa – Baseline status as at 30/06/04**

| Geographical scope | Population survey available 2000 onwards | Levels of Illegal killing (12 months) | Influencing factor site dossier | Effort assessment | Remarks |
|---|---|---|---|---|---|
| Pendjari (BJ) | ✓ | ✓ | 2004 | ✓ | |
| Parc W (BF) | ✓ | Sep. 2004 | 2004 | Sep. 2004 | |
| Nazinga (BF) | ✓ | Sep. 2004 | 2004 | Sep. 2004 | |
| Comoe (CI) | Civil strife | Civil strife | 2004 | Civil strife | |
| Marahoue (CI) | ✓ | Civil strife | 2004 | Civil strife | |
| Tai (CI) | ✓ | Civil strife | 2004 | Civil strife | |
| Kakum (GH) | ✓ | ✓ | 2004 | ✓ | NC |

| Geographical scope | Population survey available 2000 onwards | Levels of Illegal killing (12 months) | Influencing factor site dossier | Effort assessment | Remarks |
|---|---|---|---|---|---|
| Mole (GH) | ✓ | ✓ | 2004 | ✓ | NC |
| Ziama (GN) | Dec. 2004 | ? | 2004 | ? | |
| Sapo (LR) | Civil strife | Civil strife | 2004 | Civil strife | |
| Gourma (ML) | ✓ | ✓ | 2004 | ✓ | |
| Babah Rafi (NE) | 2004* | ✓ | 2004 | ✓ | Ground count |
| Sambissa (NG) | 2004* | ✓ | 2004 | ✓ | Aerial survey |
| Yankari (NG) | 2004* | ✓ | 2004 | ✓ | Aerial survey |
| Niokolo Koba (SN) | ✓ | ? | 2004 | ? | Less than 10 eles |
| Keran (TG) | ✓ | ✓ | 2004 | ✓ | |
| *Alternate sites* | | | | | |
| Park W (BJ) | ✓ | ✓ | 2004 | ✓ | |
| Red Volta (GH) | 2005 | 2005 | 2005 | 2005 | Only recently a site |
| Park W (NE) | ✓ | ✓ | 2004 | ✓ | |
| Fazao (TG) | 2005* | Dec. 2004 | 2004 | Dec. 2004 | |

**Table 3: East Africa – Baseline status as at 30/06/04**

| Geographical scope | Population survey available 2000 onwards | Levels of Illegal killing (12 months) | Influencing factor site dossier | Effort assessment | Remarks |
|---|---|---|---|---|---|
| Gash Setit (ER) | ✓ | ✓ | 2004 | ✓ | |
| Elgon (KE) | 2004* | ✓ | 2004 | ✓ | Forest survey |
| Samburu/L. (KE) | ✓ | ✓ | 2004 | ✓ | |
| Akagera (RW) | ✓ | ✓ | 2004 | ✓ | |
| Ruaha (TZ) | ✓ | ✓ | 2004 | Sep. 2004 | |
| Selous (TZ) | ✓ | ✓ | 2004 | ✓ | |
| Murchison F. (UG) | ✓ | ✓ | 2004 | ✓ | |
| Q.Elizabeth (UG) | ✓ | ✓ | 2004 | ✓ | |
| *Alternate sites* | | | | | |
| Meru (KE) | ✓ | ✓ | 2004 | ✓ | |
| Tsavo (KE) | ✓ | ✓ | 2004 | ✓ | |
| Katavi (TZ) | ✓ | ✓ | 2004 | ✓ | |
| Tarangire (TZ) | ✓ | ✓ | 2004 | ✓ | |
| Elgon (UG) | 2004* | ✓ | 2004 | ✓ | Forest survey |

## Table 4: Central Africa – Baseline status as at 30/06/04

| Geographical scope | Population survey available 2000 onwards | Levels of Illegal killing (12 months) | Influencing factor site dossier | Effort assessment | Remarks |
|---|---|---|---|---|---|
| Bangassou (CF) | 2004 | ? | 2004 | ? | Lack of staff |
| Dzanga-S. (CF) | 2004 | ✓ | 2004 | ✓ | |
| Sangba (CF) | 2005* | Dec. 2004 | 2004 | Dec. 2004 | |
| Boumba Bek (CM) | 2004 | ✓ | 2004 | ✓ | |
| Waza (CM) | ✓ | ✓ | 2004 | ✓ | |
| Nouabale.N (CG) | 2004 | ✓ | 2004 | ✓ | |
| Odzala (CG) | ✓ | ✓ | 2004 | ✓ | |
| Garamba (CD) | ✓ | ✓ | 2004 | ✓ | |
| Kahuzi-B (CD) | Civil strife | ✓ | 2004 | ✓ | Area cover increasing |
| Okapi (CD) | ✓ | ✓ | 2004 | ✓ | |
| Minkebe (GA) | 2004 | ✓ | 2004 | ✓ | |
| Lope (GA) | ✓ | ✓ | 2004 | ✓ | |
| Zakouma (TD) | ✓ | ✓ | 2004 | ✓ | |
| *Alternate sites* | | | | | |
| Salonga (CD) | 2004 | ✓ | 2004 | ✓ | |
| Virunga (CD) | 2004 | ? | 2004 | ? | |
| Mont Alen (GQ) | 2005* | 2005 | 2004 | 2005 | Lack of staff |

## Table 5: South Asia – Baseline status as at 30/06/04

| Geographical scope | Population survey available 2000 onwards | Levels of Illegal killing (6 months) | Influencing factor site dossier | Effort assessment | Remarks |
|---|---|---|---|---|---|
| Garo Hills (IN) | ✓ | ✓ | 2004 | 2004 | |
| Chirang-R. (IN) | March 05 | ✓ | 2004 | 2004 | Prev. surv. unreliable |
| Eastern Dooers (IN) | ✓ | ✓ | 2004 | 2004 | |
| Shivallik (IN) | ✓ | ✓ | 2004 | 2004 | |
| Mysore (IN) | ✓ | ✓ | 2004 | 2004 | |
| Yala (LK) | 2005 | ✓ | 2004 | 2004 | |
| Wilpattu (LK) | 2004 | ✓ | 2004 | 2004 | |
| Suklaphanta (NP) | ✓ | ✓ | 2004 | ✓ | |
| Samchi (BT) | 2005 | 2004 | 2004 | 2004 | |
| Chunauti (BD) | ✓ | ✓ | 2004 | ✓ | |

| Geographical scope | Population survey available 2000 onwards | Levels of Illegal killing (6 months) | Influencing factor site dossier | Effort assessment | Remarks |
|---|---|---|---|---|---|
| *Alternate sites* | | | | | |
| Deomali (IN) | March 05 | Sept 04 | 2004 | 2004 | |
| Dehang P. (IN) | ✓ | ✓ | 2004 | 2004 | |
| Mayurbhanj (IN) | ✓ | ✓ | 2004 | 2004 | |
| Niligiris (IN) | ✓ | ✓ | 2004 | 2004 | |
| Wyanad (IN) | ✓ | ✓ | 2004 | 2004 | |
| *Note: The levels of illegal killing are based on good quality pre-MIKE data.* | | | | | |

**Table 6: South East Asia – Baseline status as at 30/06/04**

| Geographical scope | Population survey available 2000 onwards | Levels of Illegal killing (6 months) | Influencing factor site dossier | Effort assessment | Remarks |
|---|---|---|---|---|---|
| Mondulkire (KH) | 2005 | 2005 | 2004 | 2005 | |
| Bukit Barisan (ID) | ✓ | 2005 | 2004 | 2005 | |
| Way Kambas (ID) | ✓ | 2005 | 2004 | 2005 | |
| Nam Phui (LA) | 2005 | 2005 | 2004 | 2005 | |
| Gua Musang (MY) | 2005 | 2005 | 2004 | 2005 | |
| Alaungdaw K (MM) | 2005 | 2005 | 2004 | 2005 | |
| Salakphra WS (TH) | 2005 | 2005 | 2004 | 2005 | |
| Cat Tien NP (VN) | ✓ | 2005 | 2004 | 2005 | |
| *Alternate sites* | | | | | |
| Cardomom (KH) | 2005 | 2005 | 2004 | 2005 | |
| Xishuangbanna (CN) | ✓ | 2005 | 2004 | 2005 | |
| Teso Nilo (ID) | 2005 | 2005 | 2005 | 2005 | |
| Kluang District (MY) | 2005 | 2005 | 2004 | 2005 | |
| She U Daung (MM) | 2005 | 2005 | 2004 | 2005 | |
| Kuibiri NP (TH) | 2005 | 2005 | 2004 | 2005 | |

**Figure 1: Example of Site Dossier for Boumba Bek (Cameroon)**

| Influencing factors | Spatial data themes | Description | Source of information |
|---|---|---|---|
| Ecosystem/habitat | Vegetation | Dense moist forest | Existing maps&Site visit |
| | Baies | Present | WWF reports |
| | Topography | Lowland with some outcrops | Wildlife Department Notes |
| Adjacent land use | Land cover | Logging concessions and hunting zones | MINEF map, CA parks map |
| Human access | Roads | No roads inside the site | MINEF map, CA parks map |
| | Rivers, water bodies | Only at the borders of the site | MINEF map, CA parks map |
| | Human trails | Yes, many | Local information |
| | Airstrips | Absent | |
| | Railways | Absent | |
| Human population pre | Permanent settlements | Very poor near northern&eastern borders | MINEF map, CA parks map |
| Availability of water | Hydrography | Many permanent rivers | Existing maps&Site visit |
| Land tenure systems | Land ownership | State property | Law |
| | Traditional land | No | |
| | Forest&Mining concessions | Logging concessions around the site | MINEF map, CA parks map |
| | Protected areas | Yes | |
| | Projects and schemes | Future National Park | MINEF |
| | Development infrastructure | No | |
| Tourism activities | Tourist sites | No | |
| Research activities | Research stations&sites | Bio-monitoring at the baies/raised hide | WWF reports |
| Wildlife management | Park infrastructure | 2 offices, 3 work stations | MINEF, WWF reports |
| International borders | Proximity | No | |
| Civil/military conflict | Conflict zones | No | |
| Elephant population le | Surveys | Yes by MIKE | Blake report |
| Elephant/Human confl | Incident reports | Yes, but not documented | SO reports |
| | Topography | Lowland | SO reports |
| | Temporary settlements | Permanent villages outside | SO reports |
| | Population density | Small | SO reports |
| | Migration | Yes between Lobeke and Boumba Bek | Local information |
| Development activities | Livestock pressure | No | |
| | Informal resource use | Hunting | |
| History of illegal killing | Incident reports | Not documented | |
| Cross-border incursion | Incident reports | No | |
| LEM levels | Patrol effort | Several patrols per month | WWF reports |
| | Site-level LEM | Several patrols per month | WWF reports |
| | Carcass returns | Not documented before MIKE | |
| Ivory trade patterns | Traffic routes | Not documented | |

An example from an aerial survey of encroachment (i.e. a change in land use) being the main factor in explaining the absence of elephants
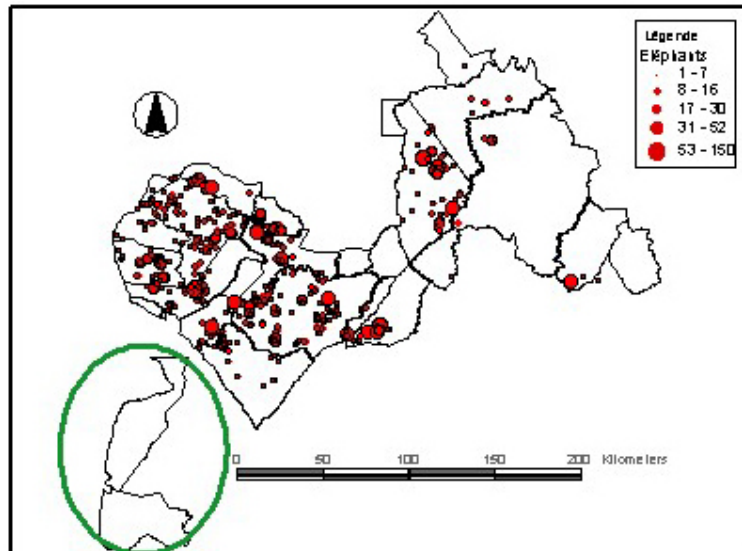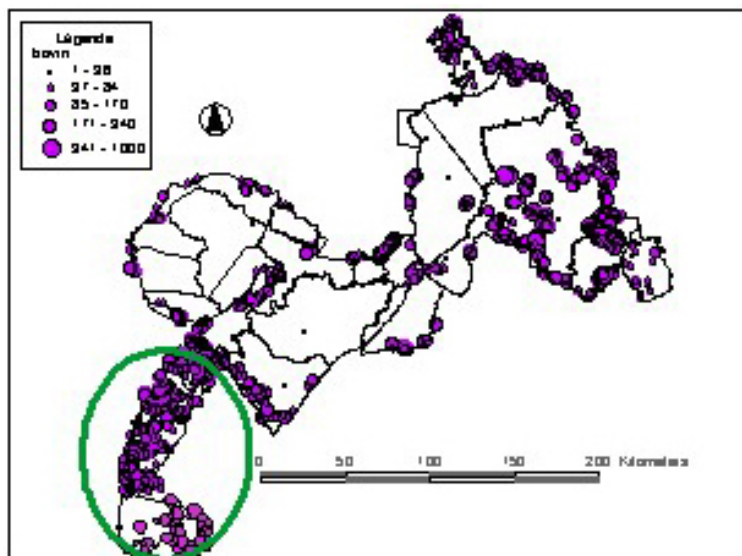
**Figure 2A: Elephant distribution (2003)**



**Figure 2B: Cattle distribution (2003)**

**ANNEX 3**

Analysis of MIKE data as a baseline requirement

Summaries of monthly patrol data by year from 10 sites drawn from a 2000 - 2003 period have been used to test the appropriateness of using a generalised linear model (McCullagh and Nelder 1989). Data available included the number of carcasses found, the number of illegally killed carcasses found and total kilometers covered by the patrol (used as a simple measure of search effort). Two analyses were carried out, one exploring the change in the number of carcasses found through time, per unit search effort, and the second exploring the change in the proportion of carcasses that were illegally killed through time. Statistical analysis was carried out using the statistical software R, available from www.r-project.org

Regression models were used to explore the dependence of carcass counts on time and site differences. Since the response variable, number of carcasses, was a discrete count, Poisson regression models (McCullagh & Nelder, 1989) were appropriate. The log of total number of kilometers covered on patrol was used as an offset (to account for variable effort). Elephant population density, site and effort[1] were included in the model, so that the assessment of change in the number of carcasses through time can be made on a comparative basis as it is expected that the number of carcasses found would

–   increase with patrol effort
–   increase with elephant population density
–   vary in accordance with different site characteristics, e.g. habitat.

For the moment, it was only possible to use total number of kilometers covered by patrol as a basic proxy for patrol effort and to incorporate differences between sites by using site as a single "catch-all" variable[2]. Population density was derived from the most recent population surveys for the sites in question.

After adjusting for these three variables, the change in the number of carcasses found through time was explored both averaged over all ten sites and for individual sites. Figure 3 (see below) illustrates the changes at those sites that have at least two years of data, after adjusting for effort and population density. This figure demonstrates that by using this method of analysis, it is possible to extract the change in the number of carcasses found through time for each site. In this case some sites show a decrease in the number of carcasses found through time, whilst others show an increase.

The number of carcasses resulting from illegal killing was regarded as a binomial variable (conditional on the total number of carcasses found), so the proportion of carcasses found that were illegally killed was analysed using binomial logistic regression (McCullagh & Nelder, 1989). In the event that no carcasses were found in a particular year at a site, that year was excluded from this analysis for that site. Again adjustment for site differences was made using site as a single explanatory variable. However no adjustment for effort was made on the basis that the number of illegally killed elephants and the total number of carcasses would increase with effort in the same manner, albeit that this is based on the assumption that the probability of detecting an illegally killed elephant is the same as the probability of detecting an elephant that died by another cause. Elephant population density turned out to be not significantly associated with the proportion illegally killed, and was therefore dropped from the model. After adjusting for site effects, the way that the proportion of illegally killed carcasses changed through time was explored. For this purpose a generalized additive model (Hastie and Tibshirani, 1990) was fitted with a smooth for time. This indicated that a linear trend adequately described the change over time. The result in Figure 4 (see below) of fitting a linear logistic regression model with Site and a linear Year effect resulted in a significant downward trend. This trend was estimated after excluding sites for which only one year of data was available; the sites remaining were CHE, CNP, ENP and NN.

---

[1]   *The log of total patrol distance was included as an offset (McCullagh & Nelder, 1989) to account for variable effort. Elephant population density and site were included as explanatory variables.*

[2]   *Differences between sites that are likely to affect carcass counts will be best expressed as a variety of site characteristics as illustrated in Figure 1. This will eventually allow the separate effects of these characteristics to be estimated or tested. These variables are not yet available, however, so for the time being "site" was accounted for in statistical models by including it as a categorical variable. Thus, if a site effect is found, it will not be possible to distinguish which of the site characteristics are responsible.*

**Figure 3: Adjusted number of carcasses for each site through time**

The horizontal line at zero represents the hypothetical situation where there are no differences between sites or between years. The graph shows the deviation from this situation after adjusting for effort and elephant population density.
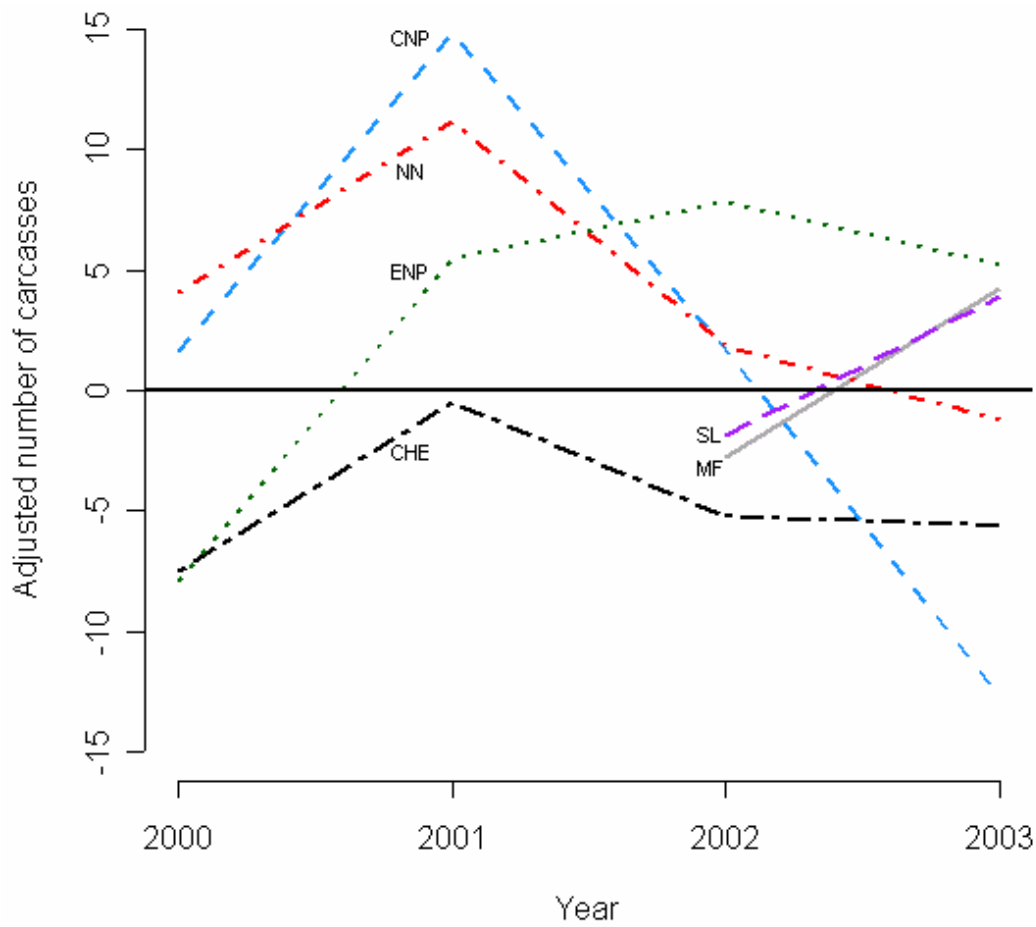


*CHE = Chewore, CNP = Chobe National Park, ENP = Etosha National Park, MF = Murchison Falls, NN = Nyami Nyami, SL = South Luangwa National Park*

**Figure 4: Estimated proportion of illegally killed elephants, 2000-2003**

The estimates are the result of fitting a logistic regression model with Site and Year as explanatory variables. Error bars are approximate 95% confidence intervals.
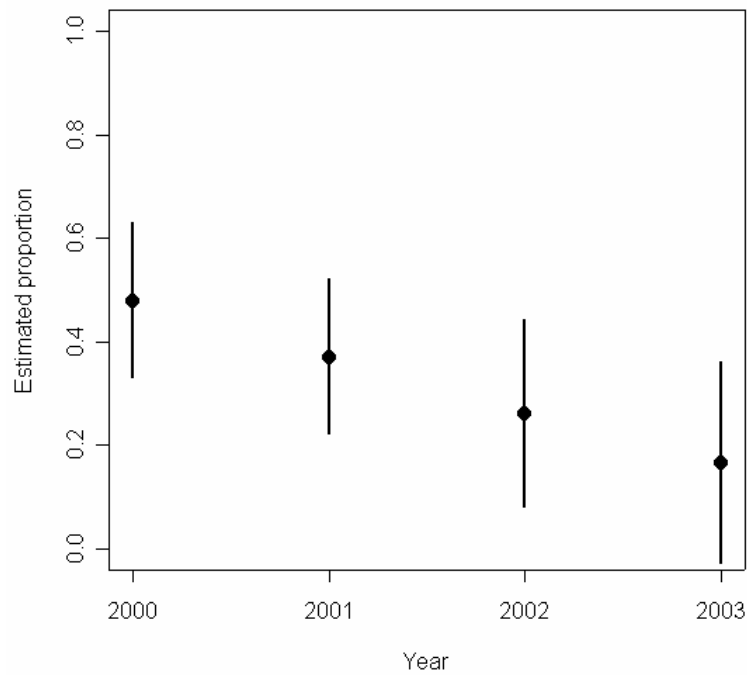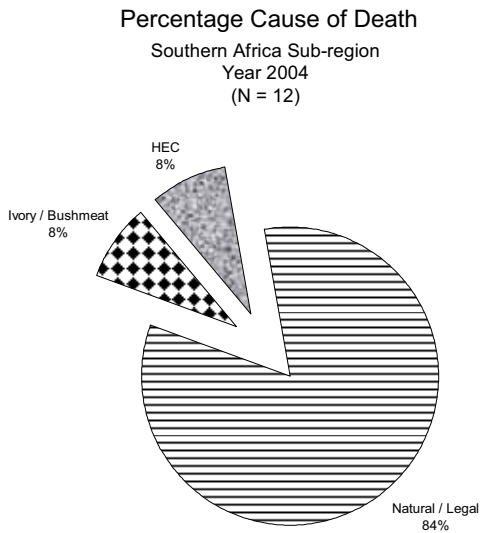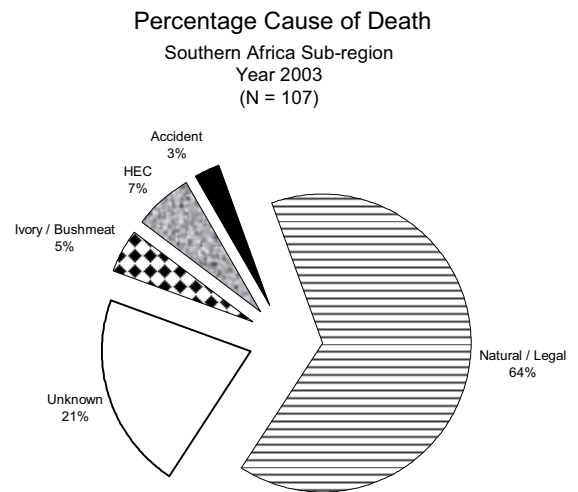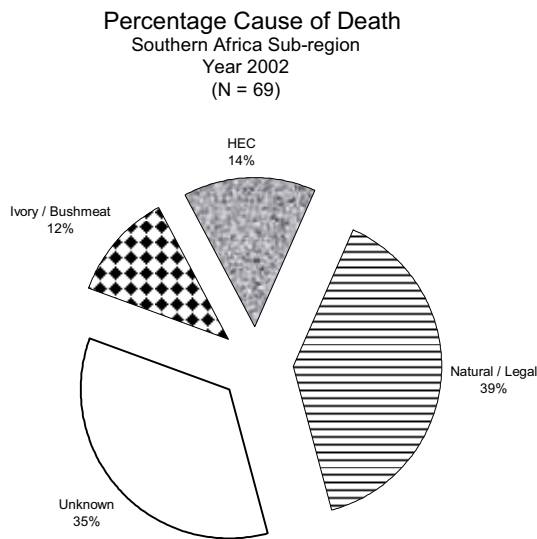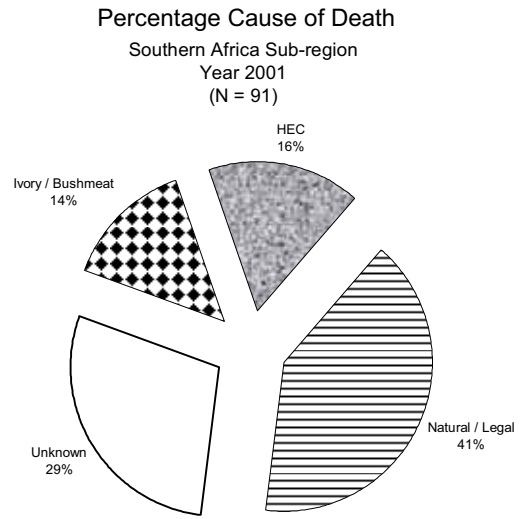


The estimates are given in the table below:

| Year | Estimated proportion illegally killed | 95% confidence interval |
|------|---------------------------------------|-------------------------|
| 2000 | 0.48 | 0.33, 0.63 |
| 2001 | 0.37 | 0.22, 0.52 |
| 2002 | 0.26 | 0.08, 0.44 |
| 2003 | 0.17 | 0.00, 0.36 |

Note:    This figure relates only to data from Chewore (Zimbabwe), Chobe (Botswana), Etosha (Namibia) and Nyami Nyami (Zimbabwe)
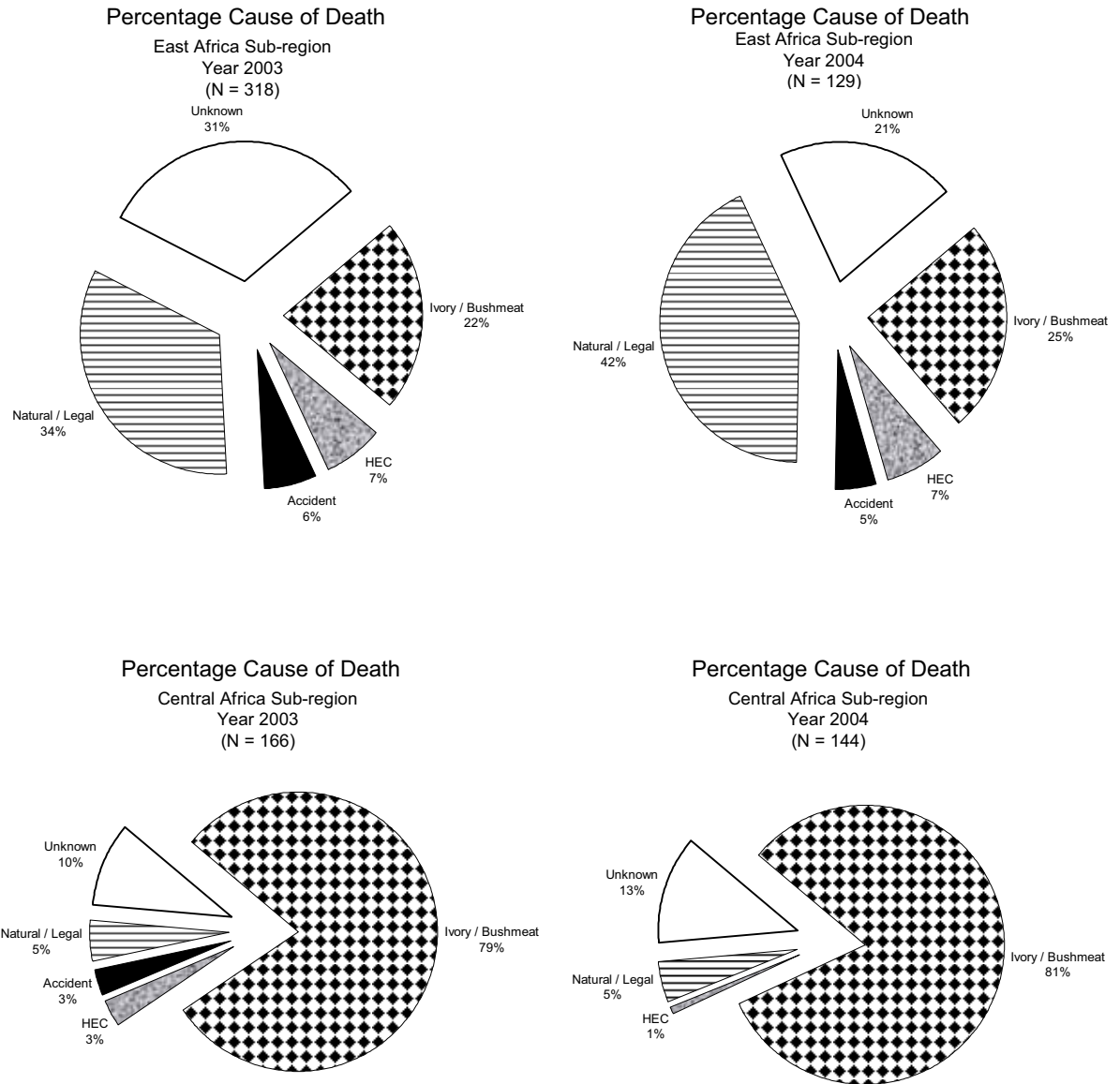
**Figure 5. Percentage cause of death in Southern Africa 2000 to 2004 (June)**

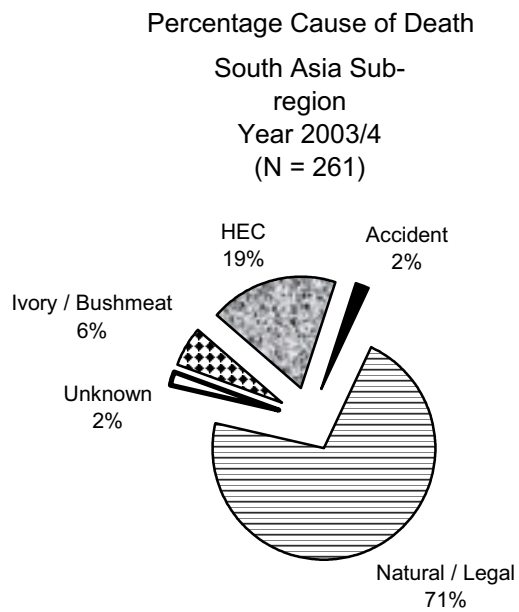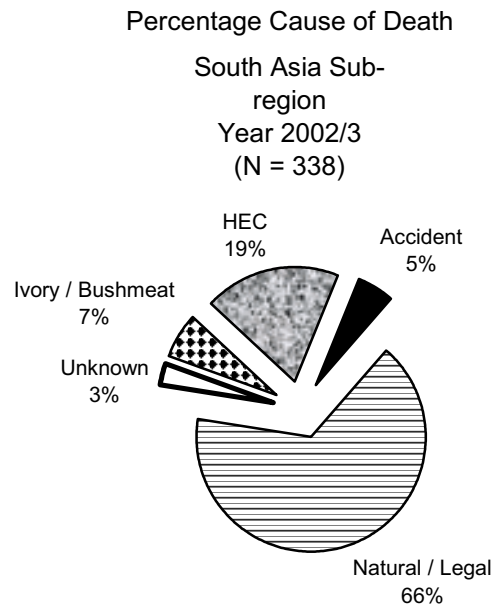Percentage Cause of Death
Southern Africa Sub-region
Year 2000
(N = 41)



HEC
20%

Ivory / Bushmeat
12%

Unknown
15%

Natural / Legal
53%

Percentage Cause of Death
Southern Africa Sub-region
Year 2001
(N = 91)



HEC
16%

Ivory / Bushmeat
14%

Unknown
29%

Natural / Legal
41%

Percentage Cause of Death
Southern Africa Sub-region
Year 2002
(N = 69)



HEC
14%

Ivory / Bushmeat
12%

Natural / Legal
39%

Unknown
35%

Percentage Cause of Death
Southern Africa Sub-region
Year 2003
(N = 107)



Accident
3%

HEC
7%

Ivory / Bushmeat
5%

Natural / Legal
64%

Unknown
21%

Percentage Cause of Death
Southern Africa Sub-region
Year 2004
(N = 12)



HEC
8%

Ivory / Bushmeat
8%

Natural / Legal
84%

**Figure 6. Percentage cause of death for East and Central Africa Sub-regions 2003 & 2004 (June)**



Percentage Cause of Death
East Africa Sub-region
Year 2003
(N = 318)

Unknown
31%

Ivory / Bushmeat
22%

Natural / Legal
34%

HEC
7%

Accident
6%

Percentage Cause of Death
East Africa Sub-region
Year 2004
(N = 129)

Unknown
21%

Ivory / Bushmeat
25%

Natural / Legal
42%

HEC
7%

Accident
5%

Percentage Cause of Death
Central Africa Sub-region
Year 2003
(N = 166)

Unknown
10%

Natural / Legal
5%

Accident
3%

HEC
3%

Ivory / Bushmeat
79%

Percentage Cause of Death
Central Africa Sub-region
Year 2004
(N = 144)

Unknown
13%

Natural / Legal
5%

HEC
1%

Ivory / Bushmeat
81%

**Figure 7. Percentage cause of death for 1 Asia Sub-region 2002/3 & 2003/4**

Percentage Cause of Death

South Asia Sub-
region
Year 2002/3
(N = 338)



HEC
19%

Accident
5%

Ivory / Bushmeat
7%

Unknown
3%

Natural / Legal
66%

Percentage Cause of Death

South Asia Sub-
region
Year 2003/4
(N = 261)



HEC
19%

Accident
2%

Ivory / Bushmeat
6%

Unknown
2%

Natural / Legal
71%

**Figure 8: Current understanding of Ivory Trade Patterns**
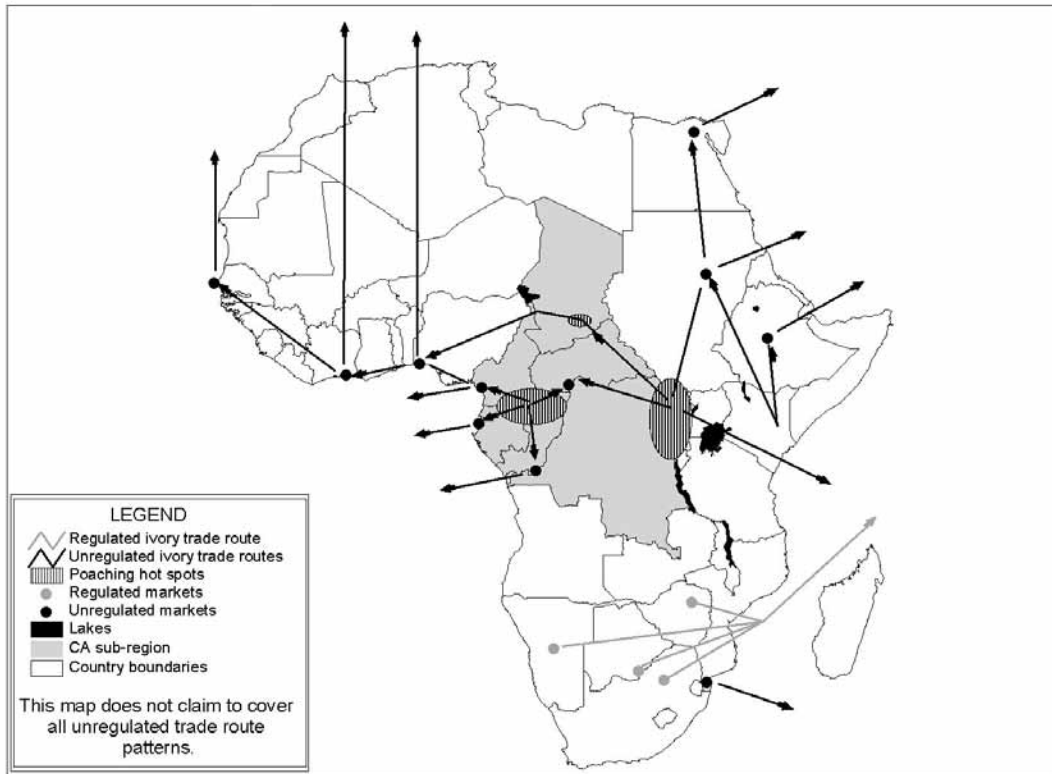
**ANNEX 8**

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<u>Preliminary Information on elephant poaching in regard to the MIKE Central Africa Forest Surveys</u>

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
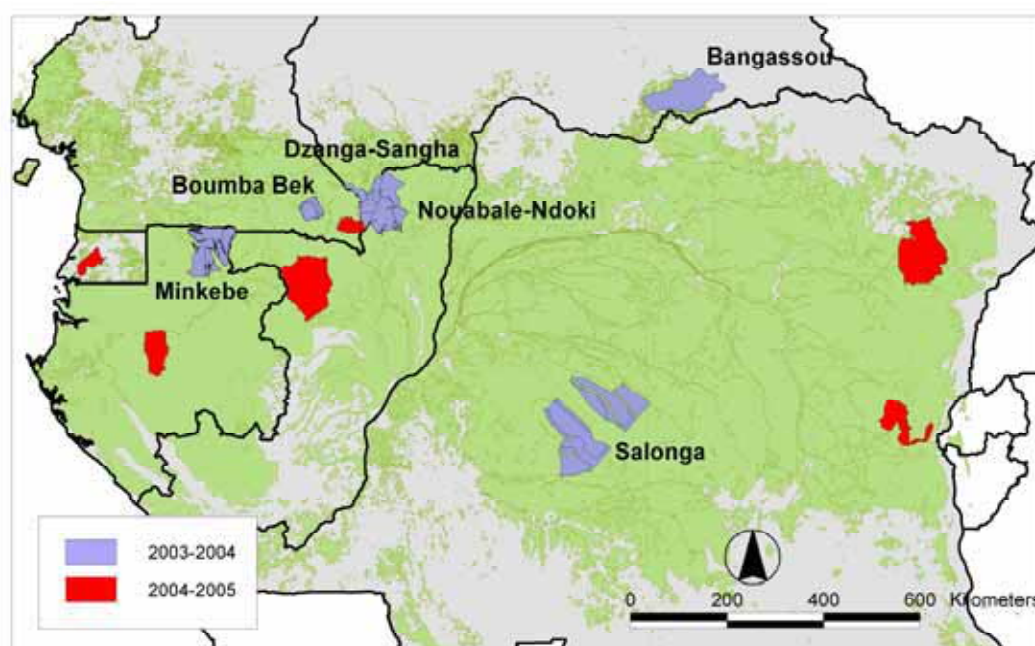


The suite of MIKE sites in the equatorial forests of central Africa contains arguably the largest known forest elephant populations remaining on the continent. Information on the conservation status of forest elephants in these sites is critical to the local, national, regional and global mandate of 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 elephant abundance | of 95% CI min. | 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

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[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

| Site | Reconnaissance surveys | | | Transects | | | All carcasses found during inventory work |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | Survey effort (km) | N poached carcasses | Carcass encounter rate[1] | Survey effort (km) | N poached Carcasses | Encounter rate (1000km) | |
| 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
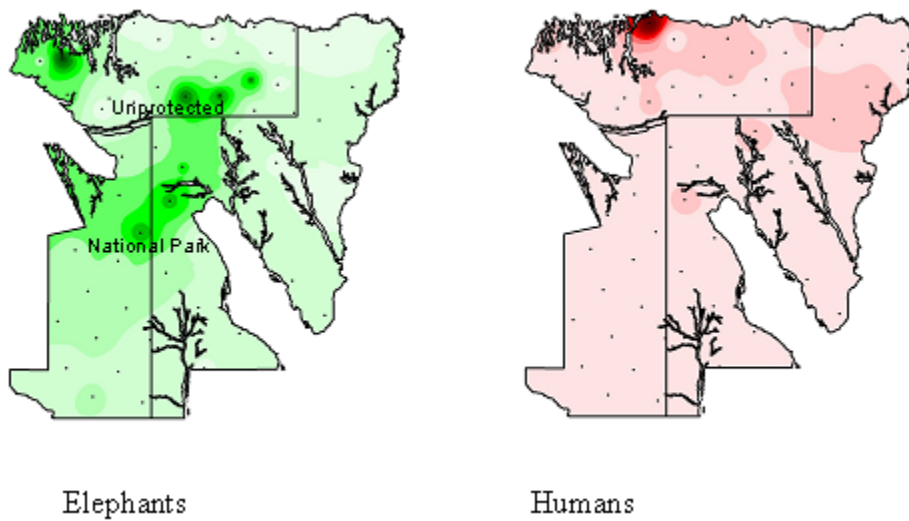
a) Dzanga Sangha



b) Nouabalé-Ndoki



Elephants                    Humans

c) Minkebe



Elephants                    Humans
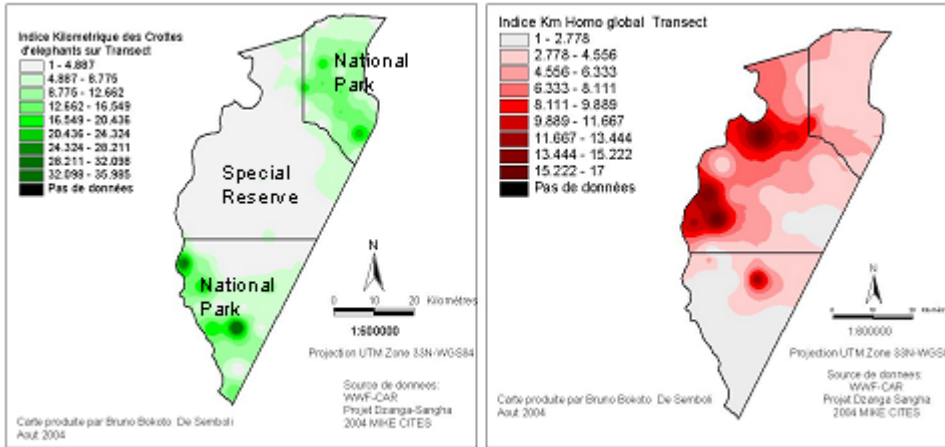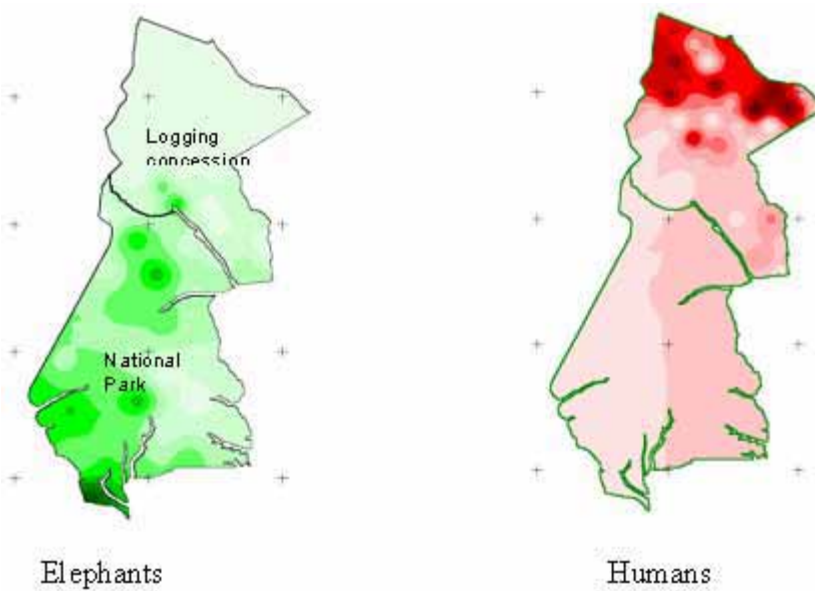
In Minkebe, a total of 19 carcasses were found, the highest for any site. Of these 19 carcasses, 16 were positively identified as having been poached.  The cause of death for the other 3 remained undetermined. Of the total of 19 carcasses, only 3 were found inside the national park, with most found in 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
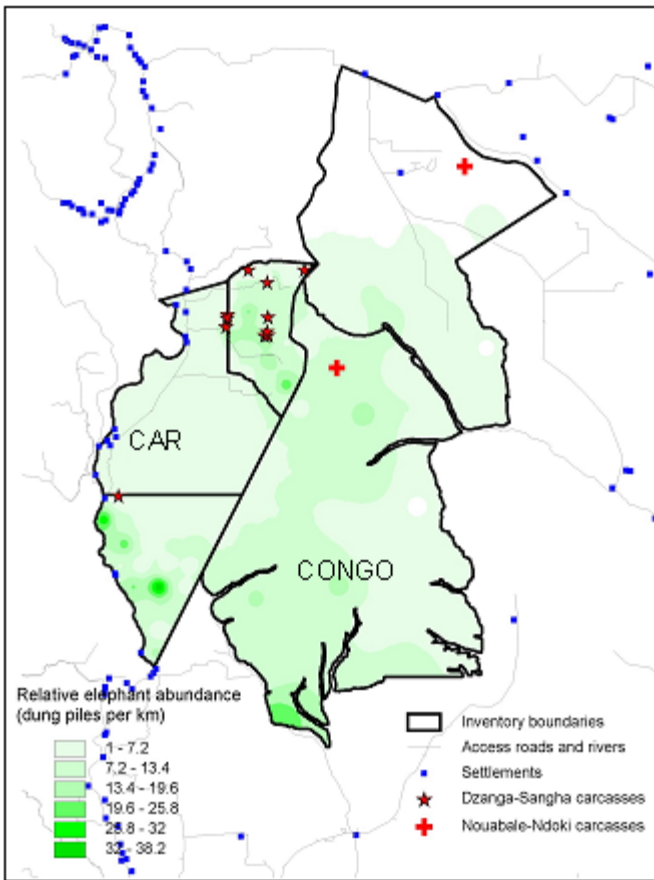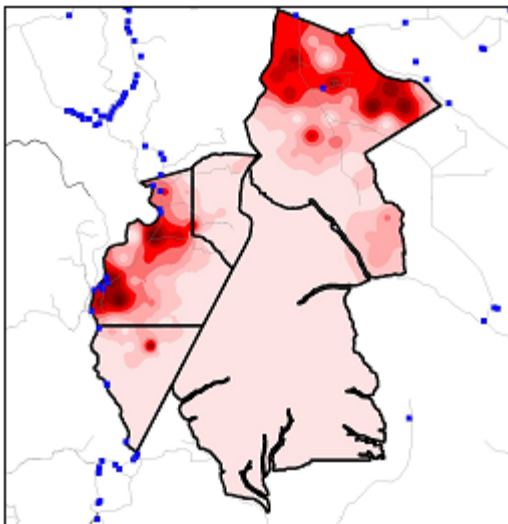


Figure 3(b)    Interpolation map of relative level of human activity as identified from sign counted on transects



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

| Site | Camp encounter rate[1] | | Carcass encounter rate | |
|------|-------------|--------------|-------------|--------------|
|      | 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)



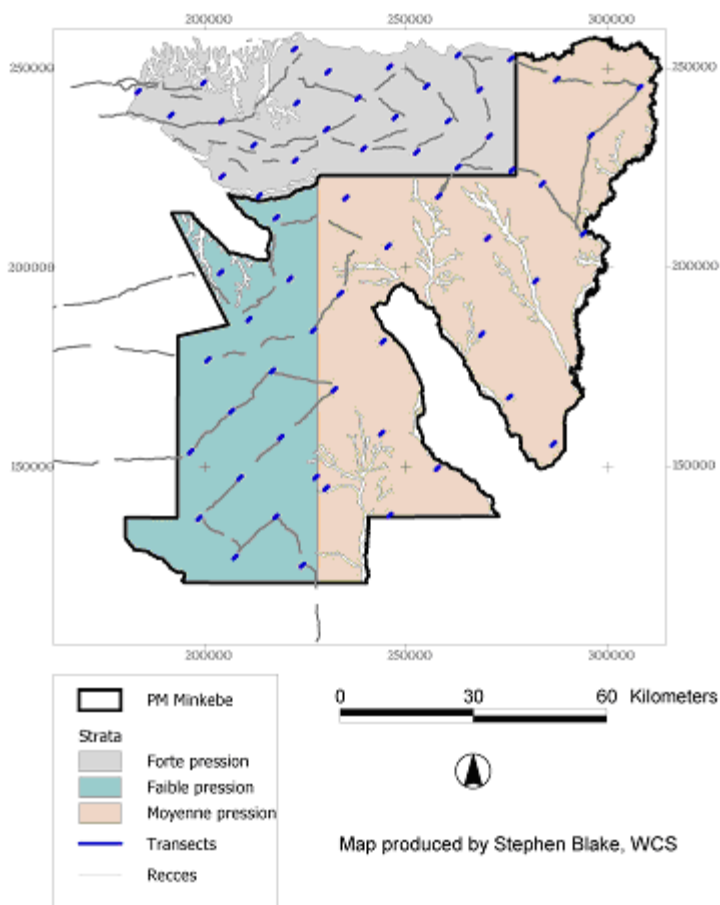a)                                                                           b)

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.

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