Title: Mitigating Elephant Crop-raiding: The Red Volta Valley Experience, Ghana

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Introduction

The purpose of this document is to share Nature Conservation Research Centre's (NCRC) experience in addressing human elephant conflict in the Red Volta Valley in the Upper East Region of Ghana. Human-elephant interactions in the Red Volta include crop damage by elephants and the killing of elephants by humans. NCRC has been involved in mitigating elephant crop raiding in the Red Volta River Valley since 1998. The effort has involved collaboration with traditional leaders and their communities, the Wildlife Division of the Forestry Commission of Ghana, the Bolgatanga and Bawku West District Assemblies. In this report we share the lessons, successes and on-going challenges of the Red Volta experience in mitigating elephant crop-raiding for the mutual benefit of humans and wildlife.

Background

The Red Volta elephant range, which includes the Red Volta, White Volta, and Morago River valleys in the Upper East Region of Ghana, harbors the third largest population of African elephant (*Loxodonta africana africana*) in Ghana. The Red Volta elephant population is considered one of the few viable populations of the savanna elephant in Ghana and requires priority conservation attention (Wildlife Division, 2000). Sam (1994) gave an estimate of between 120 – 150 elephants within the Red Volta range. Gallery forest reserves along the above-mentioned rivers and bordering savanna woodland/ grassland are the major vegetation types within the elephant range. The forest reserves and bordering savanna vegetation also form an internationally important elephant migratory corridor linking the Red Volta range to elephant ranges in the Republic of Togo and the Republic of Burkina Faso (Sam et. al., 1996), and thereby allowing cross-border movement of elephants among the three countries. The IUCN/AfESG has proposed the development of a corridor linking the Red Volta Range to the Kabore Tambi National Park and the Nazinga Ranch in southern Burkina Faso, and to the Fosse Aux Lion National Park in northern Togo (IUCN/AfESG, 2003). The Red Volta range is also being considered by the IUCN as a pilot site for the Monitoring of Illegal Killing of Elephants (MIKE). Since 2000, NCRC has collaborated with the Human-Elephant Conflict Taskforce/Working Group of the AfESG in testing the IUCN Data Collection and Analysis Protocol for Managing Human Elephant Conflict Situations in Africa (AfESG/IUCN 1999) in elephant conflict areas in the Red Volta.

Furthermore, the Red Volta elephant range is also the subject of an IUCN/AfESG funded thesis research on elephants in the Red Volta. The research objectives include assessing crop raiding by elephants in 6 localities during the study period. In addition, the Red Volta River Valley has been selected as one of 14 sites in Ghana to benefit from the Community-Based Ecotourism project being implemented by NCRC with funding from the United States Agency for International Development (USAID). NCRC has started to develop basic eco-tourism activities in the Red Volta River Valley as a source of alternative income for farmers in the valley. In support of this objective, NCRC has submitted a proposal to the EarthWatch Institute to initiate a long-term research project in the valley. The project will generate much needed biological data on the Red Volta ecosystem and also expose the valley to international volunteers over the course of an initial three-year period.

Baseline situation

NCRC's intervention in the Red Volta Elephant conflict began with the implementation of the Micro-Best Practices project (MBP), a USAID funded initiative in 1998. The MBP was a collaborative project involving TechnoServe, Ghana (an Enterprise Development NGO), NCRC, communities in the Red Volta Valley affected by elephant crop-raiding, and the Bawku West and Bolgatanga District Assemblies. The

MBP project sought to link environmental conservation to small enterprise development, and TechnoServe invited NCRC to work on the environmental aspects of the project. One of the main issues that the project sought to address was elephant farm raids during harvest periods and the resulting economic burden on local families. As an intervention, the MBP aimed to diversify the income-generating activities of local families so that the economic impact of crop raiding was reduced.

In December 1998, NCRC carried out the ecological survey of the project area to document baseline conditions against which ecological changes resulting from the project activities would be measured. The surveys also involved community meetings and key informant interviews. Following a participatory approach, the project team was able to gather input from farmers and successfully outlined the root causes of the elephant crop-raiding problem described below.

The interventions/Approach

Findings of the baseline survey and NCRC's local knowledge of the elephant crop damage problem in the Red Volta gave a strong suggestion that the following factors were contributing to the perceived worsening of the human-elephant conflict in the Red Volta Valley:

- Insufficient understanding among farmers of the raiding movement of elephants in the range;
- Inadequate deterrent measures and efforts, and a lack of cooperation and coordination in the use of existing traditional deterrent measures deployed by farmers. This was in part due to lack of technical and material inputs for the extension of additional deterrent measures and the coordination of activities by farming communities along the elephant corridor;
- The proximity of farm plots to the forest reserve boundary which forms the core habitat of elephants;
- Cropping and harvesting systems that were incompatible with elephant habitation. Simple measures such as the harvesting of crops before the peak raiding period (which usually falls within the last month of harvest) could independently reduce the chance of elephant raid by 50%. Because farms were distant from the villages, farmers were in the habit allowing crops to dry on the farm, mostly due to the lack of available labour to harvest bush farms quickly. Farmers often harvested their farms around their houses before their bush farms in fear of damage caused by pigs that were released for free-range feeding at the end of the rainy season.
- The need for alternative sources of income to mitigate the economic impact of crop loss to elephants;
- The need to conserve the elephant habitat by reducing ecological issues such as bushfires, small-scale mining, charcoal production, commercial fuel wood production, and hunting was also realized during the baseline surveys.

Based on the above, a set of activities were designed, planned and implemented in a participatory approach with the affected farmers. The interventions were aimed at reducing damage levels, frequency of incidents, the economic impact of crop damage, and also to eliminate the use of the crop-raiding situations as a pretext for elephant poaching by specialist elephant hunters.

<u>Deployment of an early warning system</u>

Through a series of meetings and sensitization in the affected communities, farmers were organized into associations called "farm monitoring groups'. Registration was on a voluntary basis but a total of 1000 farmers forming 33 farmer groups in 7 communities signed-up in the first year of the project. Each community elected two representatives: a group leader and a registrar/secretary. Because farmers belonging to common group may have their cultivated farms at separate locations, members of each main group were further grouped into smaller associations based on location of farms. This was done so that group members farming in one locality could belong to the same sub group. Each of the sub groups

appointed a leader who reports to the main group leader. Members of the farm groups/associations registered their farms with their respective registrar. The following farm variables were recorded: Name of farmers, sex of farmer, location of farm, size of farm, crops sown and date of sowing. The main focus of the groups was to work as a team with the project to address their common problem. They shared information on elephant damage and movement among themselves and between groups. They also worked together for timely harvesting of crops, and avoiding storage of harvest overnight in the field.

The leaders of the farm groups were trained on how to received and pass on the information to the nearest farming community or "chiefdom" promptly. The group leaders were provided with bicycles to enable them to move quickly to the nearest farm registrar or leader and deliver elephant movement information. In the situation were a farm was raided, the owner of the farm was required to report the incident to his or her group leader, who in turn informed an NCRC monitoring field assistant based in the project area. This system allowed NCRC to visit raided farms to assess damage using the IUCN data protocol on crop-damage on a demand basis by the individual farmers. Information documented included: farm location, size of farm, area damaged, and crop type.

Deterrent measures

NCRC, in collaboration with Wildlife Division elephant deterrent teams, organized elephant deterrent demonstrations for the farm monitoring groups. The project provided training to farmers on quick response to information on elephant movement towards their area and the uses of a traditional blaster to deter invading elephants. A blaster is a local device traditionally used at funerals that creates a loud booming sound when packed with sand and gunpowder. The blaster carries no missile, and is not harmful to elephants. Farmers were taught how to respond to elephant raids using the blasters and to coordinate pre-emptive blasts in the early mornings and evening when elephants were believed to be in the vicinity.

Making use of information coming through the early warning system, farmers who had cultivated bush farms in the crop-raiding zone took greater protection of their farms than previously. The farmers stayed overnight in farming zones, often accompanied by Wildlife Division staff stationed in the area for the crop-raiding season, and applied the blasters when elephants were approaching their area. The sound effect from the blast (which could be heard 4-km away) provided an interim measure effective at scaring elephants from farms. Each of the communities was provided with two blasters to augment their existing supply.

Improved agricultural practices

Adding to the HEC problem were traditional agricultural practices that increased the risk of crop raiding. These practices include stockpiling of harvest on bush farms for multiple nights. Due to the long distances of farms from the villages, most farmers were not able to harvest and cart their produce to the house in one working day and had to temporarily store their harvest on the field until their family could bring the produce back to the house, often head-basin by head-basin. Prior to the project interventions, many farmers lost their harvests to elephants as a result of prolonged stockpiling of harvest on farms.

The project encouraged the farm monitoring groups to provide labour for communal harvest of peer farms. This enabled farmers who were hitherto not able to harvest and cart produce the same day to avoid stockpiling and reduce the risk of elephant crop raiding. In addition to the above, the farm groups were educated on the risk of keeping mature crops on farms any longer than necessary. Growers of maize and finger millet were advised to harvest before the crops had dried, and rather dry them at home instead of leaving them on the farms and increasing their risk of elephant raids.

Farmers were also encouraged to adopt early maturing varieties of crops. Two maize farmers in the community of Kusanaba were the first farms raided in 1999 and 2000. However, after the local extension agent of the Ministry of Food and Agriculture (MoFA) introduced a variety of maize that matures prior to

elephant arrivals each year; these farms have been free from raids the last three seasons. The monitoring of the crop damage also revealed that the closer a cultivated field is to the forest boundary the greater the chances that it would be raided. This result was used to educate and encourage farmers to locate their farms at least 1-km from the forest boundary, though lack of available land has made this a difficult object to realize.

Conservation education and incentive system

Elephant crop-raiding can also be linked to ecological factors that impact negatively on the elephant habitat. In the Red Volta, these factors include: the effects of bushfires, small-scale mining in the reserves, commercial fuelwood extraction and charcoal production, farming in the reserves, and grazing of cattle by alien herdsmen in the forest reserves. NCRC worked through the traditional leadership of the project area by providing sensitization on the issues and encouraging the various traditional leaders and their communities to take responsibility over the above issues. Traditional leaders and communities that demonstrated exemplary leadership and responsibility were presented with incentive awards by NCRC. The incentive system encouraged the chiefs and their communities to be more proactive on issues of environmental concerns in their chiefdoms.

Focus on traditional leadership and indigenous knowledge.

NCRC believes the mechanisms to control many of the environmental challenges in rural Ghanaian communities already exist locally in the form of traditional leaders such as chiefs, land priests or tindam, and magazias, or women's leaders. The influence of the leaders has been eroded over the years due to a variety of factors. NCRC's approach was to tap into and encourage initiative on the part of traditional leaders. This approach included staging a series of meetings with the traditional leaders that were the first-ever meetings of all the chiefs in the Red Volta River Valley. The meetings resulted in a greater collaboration amongst chiefs, a discussion of common issues, and the launching of the first-ever environmental education campaign designed by and led by the chiefs themselves. In addition, much of NCRC success has been based on establishing and maintaining the trust of resource users, such as hunters. NCRC's main field assistant in the Red Volta Valley grew up as a hunter, and being native to the area, was able to easily gather information and gain the trust of community members. In addition, as much of the rationale behind environmental destruction is the economic survival of the resource users, NCRC has sought, whenever possible, to find employment for hunters from the valley as a means of reducing hunting pressure in the valley.

Impact of the interventions

Reduction in crop damage

Indicator: No of farmers per chiefdom that experienced crop raiding

The incidence of elephant crop-raiding was reduced by 95% during the 1999 farming/harvest season. In all, a total of 30 farmers out of the 996 registered farmers experienced elephant crop damage (which is 3% of registered farmers). The number of actual farmers is higher than those registered, and thus the percentage of farmers actually experiencing elephant crop raiding is actually smaller than 3%. These results have been repeated in the years that followed. Since 2000, the number of registered farmers reached 1,500 farmers, the total number of communities, or chiefdoms, has varied (8 in 2000, 9 in 2001, and back to 8 in 2001 and 2002. The number of communities varies based on either adding new communities, or certain communities not participating in a certain year, for example Datuku on 2001. In 2002, 32 out of 1500 farmers were raided or 2.1% of registered farmers, and in 2001, 24 out of 1500 farmers were raided or 1.6% of registered farmers. Similar results were obtained in 2002, though this data has not yet fully been analyzed. No raids were reported in 2003, presumably due to the unusually

heavy level of rainfall and the lack of any elephant sightings in the Red Volta River Valley during the 2003 crop-raiding season.

Hunting pressure
Indicator: Number of elephants/roan antelopes killed in the project area each year, and trend of group hunting in the project area.

One elephant was killed in the project area in August 1999. The incident occurred near a village called Dagari in Datuku. No roan antelope was reported killed in the project area. Hunting pressure in the project area during the period was much lower compared to the first period and the baseline survey period in December 1998. One elephant was also killed in the project area in 2001. It is worth noting that the two elephants killed in the area since 1998 were both killed by professional elephant hunters from outside the Upper East Region, rather than by local hunters.

There was neither group hunting nor revenge hunting in the project area during the review period. At Zongoiri the chief has placed a taboo on hunting in his area, and has sent notices to the chiefdoms surrounding Zongoiri to that effect.

Sustainability of the methods
The most exciting aspect of these results is that since 2001, the communities have managed their deterrent activities on their own accord. NCRC merely provided additional blasters in 2001, and has provided gunpowder every year since the inception of activities. There has been no Wildlife Division presence since 2001. The Wildlife Division placed crop raiding support teams in the Red Volta River Valley from 1995-2000. The lessons learned by community members though these interventions have enabled them to manage the task of farm protection on their own. In the beginning of the monitoring work, most raids were recorded by NCRC staff, now most raids are recorded by community farm leaders. In the future, NCRC would like to provide GPS units and training to selected group leaders to further enable the communities to manage the elephant deterrent efforts on their own accord.

Challenges and Outstanding Questions

Impact of deterrent on elephant movement
One question is whether the use of local blasters has actually impacted elephant movement into the area. There were no elephants cited in the Red Volta River Valley in 2003. This is presumably because of the unusually heavy rainfall during the 2003 rainy season; however it is unclear whether the successive years of blasting may have also impacted elephant movements. In addition, continued dry-season mining in the Red Volta River bed, and the corresponding human influx into the valley as a result, may also impact elephant movement into the area.

Sustainability of the effort
The question of whether elephants will become habituated to the use of the blasters also remains. Though there has been no evidence to show that elephants have become used to the blasts. Our team believes that because the blasters are used for such a relatively short period of time, 2 months from mid-September to mid-November each year, that elephants will be less likely to become habituated to the blasters. Further study is required to bear this out.

Funding challenge
NCRC's ability to maintain a constant presence in the area has been affected by funding. Much more extensive interventions are required to really impact the effects of human activities in the reserves, as previously mentioned. NCRC's funding to work in the valley has been piece-meal. Much of the reason

why 2002 data has not been analyzed was due to the lack of staff and funding. However, in 2003 there have been positive changes with regard to staffing levels, though direct funding to work on elephant crop raiding has been lacking, with the exception of Patrick Adjewoudah's master research on crop raiding during the 2003 season. NCRC expects that the Red Volta's expected designation as a MIKE site will also positively impact NCRC's presence in the valley. NCRC has been able to place a full-time staff officer in the Red Volta Valley as of November 2003 with support from USAID.

Research required on population

Many questions still remain regarding the elephant population in the Red Volta Valley, their distribution, and their movements. All previous population studies conducted in the valley have relied on the dung count method. More detailed surveys are required to better understand the true dynamics of elephant migration in the Red Volta River Valley. The 2003 crop-raiding season has brought this issue into particular focus as the elephants have not migrated into the Ghana-end of the Red Volta prior to the completion of the harvest. We suspect this is as a result of the unusually high rainfall in the area thus affecting the late arrival of elephant to the area from Burkina Faso.

Effect of the Toungua system

In 2002, the Forestry Division implemented a Tounga farming system in the Red Volta Forest Reserves. Tounga farming is a method used to re-forest degraded portion of the reserve. Farmers are given plots in degraded areas, and are allowed to plant food crops in exchange for caring for newly planted tree seedlings on their plot. The idea is that as the trees mature, and the canopy closes, the farming will phase out. The intervention raises many questions. First of all, what impact does this human presence in the reserve have on elephant movement? The reserve is supposed to be the home of the elephants and their main migration corridor. Secondly, what incentive do farmers really have to ensure the success of the growing trees. The longer it takes the area to become reforested, the longer they will be able to farm their plot.

Continued human pressure

Finally, the human population around the Red Volta Reserves continues to grow. This will in turn increase pressure on the reserves, regardless of any environmental education. This rising tide of human presence presents the biggest challenge to protection of the elephant habitat, and the increased likelihood of future raids as competition for resources between humans and wildlife increases.

Conclusion

Though challenges and questions remained, NCRC and Wildlife Division's approach to the crop-raiding problem by working through traditional leadership structures and using locally available methods has proved highly successful. This is evident in the four successive years of successful crop protection from 1999-2002. 2003 is not considered since there was no elephant presence recorded in the valley. The success has been due largely to three factors: 1) better information on elephant movement among farmers, 2) better and more coordinated deterrent measures, and 3) improved agricultural practices, including efficient harvesting techniques and the introduction of early maturing crops. More importantly, these methods are easily implemented by the communities themselves without outside support. The growing human tide in the area will pose challenges, but NCRC's and Wildlife divisions successful track record over the last five years sets the stage for further interventions that will seek to maintain a peaceful and mutually beneficial relationship between humans and elephants.

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