

EARTHWATCH INSTITUTE FIELD REPORT

SECTION I

- Project Title:** Elephants of the Red Volta
- Principal Investigators:** (1) Mr. Patrick Adjewodah (2) Dr. Alex Asase
(3) Mr. Moses Kofi Sam
- Principal Advisor:** (4) Prof. Paul Beier
- Position/Affiliations:** (1) Nature Conservation Research Centre. P. O. Box KN 925, Kaneshie-Accra (2) Department of Botany, University P. O. Box LG 55 Legon, (3) Forestry Commission, Wildlife Division, Kumasi (4) Northern Arizona, University, USA

Research Site

The project was carried out within the Red Volta River Valley in the Upper East Region of Ghana. This area is located within latitude 10° 30' - 11°00' North and longitude 0°45' - 0°15' West. The Red Volta River and its adjacent forests reserves is a significant feature of the area. On either side of the river are 10 chiefdoms (Traditional Councils) from three tribes: the Kusasi, Nabdam and Gurune.

Local Management Status of the Research Site

Much of the research area is located within forest reserves that are managed by the Forestry Services Division of the Forestry Commission. The local communities are currently seeking collaborative management of these forests with the Forestry Commission. The other part of the research site was located on community lands that are managed by individuals for crop farming.

Scientific names of primary species being studied: *Loxodonta africana*

Key Research Objectives

Objective 1: Evaluate the distribution, habitat use, and seasonal movement of elephants in the Red Volta Valley.

Objective 2: Evaluate the presence, distribution, and habitat available for 8 large hoofed mammals and 2 small carnivores in the Red Volta River Valley.

Objective 3: Assess Human Elephant conflicts (elephant crop raiding) in six (6) localities within the Red Volta Valley.

Date this report was completed: February 2006

Data Collection and Results

We conducted activities relating to objectives 1 and 3 during the first year of this project. In this effort we were assisted by Earthwatch research assistants/volunteers and a team of local staff in completing the research activities. Objective 2 of the project was not conducted because of logistical difficulties in simultaneously implementing the three research objectives.

(a) Data collection methods

(1) Evaluation of the distribution, seasonal movement and habitat use of elephants in the Red Volta Valley

Sampling strategy

For sampling purposes, the project area was divided into six locales. We randomly selected ten habitat cells each of size 1.8 x 1.8 km (one minute of latitude and longitude) within five of the six locales. In each of the habitat cells, we laid a 1 km transect consisting of 20 segments of 50 m length and 20 m wide (10 m on each side of the centre line).

Elephant population, distribution and movement

We followed the elephant dung count method of Barnes and Jensen (1987) with modifications to estimate elephant population and distribution within the project area. We selected 1 km transects randomly from a sample of ten cells in each locale. However, during Team 3, we subjectively identified the location of the 1 km transects within the locales due to practical difficulties in reaching randomly selected transects. We chose cells where high elephant prevalence was recorded in previous research efforts, and which were accessible by the project vehicle. This adjustment to the methods allowed us to cut down on time and effort spent hiking to and from the transect terminals. On each 1 km transect, we searched for and recorded the number of elephant and cattle dung piles.

We conducted hunter interviews to gather qualitative information on elephant migration in and out of the project area.

Habitat availability and use

In order to describe the habitat available and used by elephants and other animals, we recorded parameters of the vegetation within plots of 50 x 10 m size in 5 of the 20 segments along a transect (i.e., in every 4th segment along the 1000 m transect). A total number of ten transects were studied. In each of the 50 x 10 m plots (extending 5 m on each side of the centre line), we tallied trees and shrubs over 30 cm tall by species, and recorded the diameter at breast height (dbh) of the trees (dbh at 1.3 m above ground level) larger than 5cm.

We assessed browsing and damage by elephants on the tree and shrub species within each plot by recording the specific parts of the plants browsed and / or damaged by elephants.

In each plot, we also recorded disturbance to the vegetation by noting clearing, fire damage, and area of the segment covered by informal mine pits.

(2) Assessment of human elephant conflicts (elephant crop raiding)

Farm registration and crop damage

With the assistance of farm monitors from the project communities, we conducted a registration of vulnerable farms in the elephant crop-raiding enclave of the study area. The farm registration exercise provided baseline data for determining the proportion of farmers affected by elephant crop-raiding within the project area. This exercise was carried out starting in May just before the rainy season, and it covered six chiefdoms. The registration for each farm provided records including the name and sex of the farmer, locality of farm, size of farm, crops on farm, date of sowing, and the deterrent methods adopted by farmer. This activity was conducted by the project communities (with supervision from PIs) before and after Earthwatch teams, and did not involve Earthwatch team members.

During the harvest season, we visited farms raided and recorded the size of farm, crops raided, location, and area affected etc.

Household interviews

We conducted 49 household interviews within Widnaba area in order to determine the proportion of farmers in that chiefdom registered with the programme. This exercise will be repeated in the other chiefdoms in subsequent teams. The Widnaba area consists of three sections, namely, Widnaba Natinga (49 households), Waere (41 households) and Gogo (62 households) each overseen by a headman appointed by the chief of Widnaba. We expected that farmers who perceived their farms to be at risk of elephant damage were most likely to register, and by visiting 20 randomly selected households each in the three sections, we were able to deduce the proportion of farms in the Widnaba area at risk of elephant crop damage.

Farm Data

In order to assess the geographical variation of elephant crop raiding as well as variation with farm size and crop type, we selected a random sample of 127 farms in three chiefdoms, namely, Widnaba, Kusanaba and Sakote. On each farm we recorded the location (using a hand held GPS), size of farms and the crops raised. We obtained the random sample 'n' farms for each chiefdom by calculating the total number of registered farms in the chiefdom divided by 50 (n is the integer part of the quotient).

(3) Other

Avifauna

During Team 3 only, we used walking transects (informal transects) for an inventory of birds in the study area. We also took note of birds along the 1 km transects during the dung pile and habitat surveys described earlier. Team 3 included an exceptionally skilled birder, Mr Fred Hodgson, who was especially interested in this activity and skilled at identifying birds. We conducted regular observations on a community dam in Widnaba which was popular with waterfowl.

(b) Preliminary Results

(1) Distribution, seasonal movement and habitat use of elephants in the Red Volta Valley

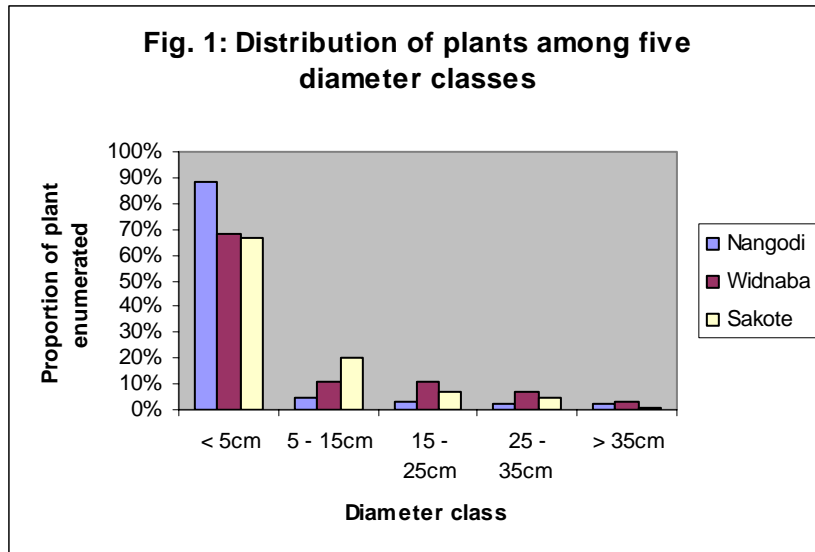
There were no elephant dung piles recorded on the twenty transects surveyed during the first year of the research. This information indicates absence or very low occurrence of elephants in the Red Volta area during the first year of the project. Hunter interviews conducted during the period also confirmed that elephants have not been found in the area for several months prior to the study. There were, however, cattle dung piles on all transects in the five locales studied suggesting that cattle share the same habitat with elephants within the project area (Table 1). The generally low density of cattle dung piles recorded on most of the transects points to a corresponding low grazing intensity in the research area.

Table 1: Mean number of cattle dung pile in five locales in the Red Volta area of Ghana

Locale	Transect Number	Cattle dung \pm S.D
Nangodi	1	0.3 \pm 0.4
	2	0.05 \pm 0.2
	21	0.1 \pm 0.4
Tilli	3	0.6 \pm 1.3
	4	9.5 \pm 12.5
	5	0.0 \pm 0
	6	3.0 \pm 4.8
	9	0.05 \pm 0.2
	10	3.1 \pm 4.6
Datuku	11	5.6 \pm 9.8
	12	3.2 \pm 3.6
Widnaba	13	22.3 \pm 13.5
	14	16.9 \pm 18.8
	15	19.6 \pm 15.7
	16	13.0 \pm 10.8
	17	19.5 \pm 15.1
	18	2.1 \pm 2.2
	20	0.2 \pm 0.37
Sakote	7	0.90 \pm 1.7
	8	0.25 \pm 1.1

From the study on habitat available and used by elephants in the Red Volta area, 39 species of trees and shrubs were recorded. Of these species, the most common with more than 200 individuals per transect, included *Combretum* sp. (15.39 %), *Acacia nilotica* (14.2 %), *Acacia hockii* (8.4 %), and *Terminalia macroptera* (9.8 %), N=2127. Information on the frequencies of occurrence and densities of these species are provided in Appendix 1.

A majority (74.3%) of the specimens enumerated belong to a recruitment class of less than 5cm (dbh) and only a few (3%) were large trees of diameter reaching 30cm and above (Table 2 and Fig. 1). Fig 1 depicts the negative effects of human and fire damage on successful succession of the vegetation in the study area.



None of the plants showed signs of browsing on them, and none were damaged by elephants. No mining activity was observed within the vegetation quadrats, and only four out of the 50 of the quadrats were cleared through either cultivation or harvest of poles. In the dry season (Team 3), all the two transects surveyed were completely burned by wild fire. There were no signs of elephant browsing and / or elephant damage on the plants. This observation also supports the absence or low occurrence of elephants in the area during the period of study.

Mining activity was not observed within the plots studied, and only four out of the 50 plots studied were cleared through either cultivation or harvesting of building poles. In the dry season (Team 3), the two transects surveyed were completely burned by wildfire which suggested some amount of anthropogenic activities within the habitat area of elephants in the project area.

(2) Human- elephant conflicts (elephant crop raiding)

A total of 1016 farmers in six chiefdoms registered their farms in 2005 (Table 3) with the anti-crop raiding programme. Of this number only one of the farms in Sakote was found raided by elephants during the 2005 harvest season. About 55% of the 0.75 ha Guinea corn farm was raided by a single elephant. This was encouraging for the 2005 year and could be due to the low occurrence of elephants in the area during the harvest period.

Of the 49 households (number of persons per household ranged from 4 to 27, mean= 12) interviewed in the Widnaba area about half (49%) had registered their farms with the anti-crop raiding programme. Our findings indicate that a high proportion of the farming population in Widnaba were included in the study.

Table 2: Number of registered farmers and crop raised in six chiefdoms in the Red Volta area of Ghana

Locale	# of farmers	Millet (ha)	Maize (ha)	Gcorn (ha)	Gnut (ha)	Rice (ha)	Beans (ha)	Yam (ha)
Tilli	120	1	54	14	1	0	0	25
Widnaba	195	74	4	8	22	1	7	0
Kusanaba	105	21	70	105	8	0	0	0
Sakote	246	1	14	17	106	20	5	0
Zongoiri	250	468	125	0	27	0	0	0
Degare	100	202	202	8	48	23	89	0
Total	1016	767	469	152	212	44	101	25

The farms studied in the area have shown that farming in the Red Volta area was on small scale, seasonal, and rain fed. The area of land cultivated for each farm was about 1 hectare (Table 3). The farms sampled for this study were within the traditional elephant crop-raiding enclaves where previous incidents of crop damage by elephants were recorded. Many of the farms in the area were situated outside the forest reserve. Only a few farms in Widnaba (4%, N=71), and Sakote (6%, N= 49) were found located within a forest reserve.

Crops cultivated on sampled farms included millet (*Pennisetum americanum*), maize (*Zea mays*), guinea corn (*Sorghum bicolor*), groundnut (*Arachis hypogaea*, and beans. However, the most preferred crops were Guinea corn, millet, maize, groundnut and rice (*Oryza sativa*). Most of the farmers (73% out of the 113 sampled farms) cultivated Guinea corn as the most dominant crop, in association with other crops. Other farms were found dominated by Millet (10%), Rice (7%), Maize (6%), Groundnut (3%), and beans (1%) in that order.

Table 3: Mean area (ha) per farm in three chiefdoms in the Red Volta Area of Ghana

Chiefdom	Number of farms	Mean size (ha)
Widnaba	71	0.65±0.58
Kusanaba	7	1.48±1.41
Sakote	49	1.05±0.79

Other (Avifauna)

We detected a total of 89 bird species (appendix 2) within the study area. None of the species recorded was listed as Rare, Threatened, or Vulnerable by IUCN, and most appear to be year-round residents. These initial results seemed to point to significant avifauna diversity for the area, and when a full list of species is compiled the birds of the Red Volta River Valley could be useful in promoting ecotourism at Widnaba and the surrounding villages.

Significance/Benefits of Research

Local

Data from the research is providing biological information necessary for making management strategies towards the creation of a community collaborative protected area in the Red Volta Valley. This is unique in that the project will assist to bring together different chiefdoms and ethnic groups for the purpose of management, conservation, and sustainable use of biological diversity.

The involvement of local people as support staff is resulting in five young men developing into excellent natural history guides who will provide tourists with reliable information on the plants, birds, and culture of the Kusasi people. Interactions with Earthwatch teams have also assisted them in improving their confidence levels as service providers in the Ecotourism Enterprise at Widnaba.

Team observations, comments and recommendations are bringing about improved management and effective marketing of ecotourism products within the project area leading to increased income for the local community members especially through the sale of souvenirs.

National

The creation of the Red Volta Community Protected Area will be a successful replication of the Wechiau Community Hippopotamus Sanctuary initiative pioneered by the Nature Conservation Research Centre (NCRC) and supported by Earthwatch Institute. Experiences from the Wechiau and the Red Volta initiatives will increase the demands from local communities for this model to be replicated in their areas. NCRC has already started moves to create similar reserves to protect the West African manatee (*Trichechus senegalensis*), the white-necked rockfowl (*Picathartes gymnocephalus*) and the western sitatunga (*Tragelaphus spekei gratus*) as prime species in three other localities in Ghana. The tourism potentials of these sites will create direct employment opportunities to community members leading to increased family incomes.

The project has provided field practical learning opportunities for two Ghanaian university students in the year 2005. The students participated in our field expeditions and took the opportunity to learn our field methods.

International

The Red Volta Elephant project is an attempt to understand and protect an internationally significant elephant migratory corridor between Ghana, Burkina Faso and Togo. The findings from this project will provide important information on the seasonal migration of the elephants that will assist in making strategic management policies for the conservation and protection of the threatened species.

The project has provided practical field training to seven African fellows who were awarded a fellowship position on the project by Earthwatch Institute. These fellows gained experience in the use of field equipment and methodologies, and new insights to biodiversity conservation that will enhance their work as conservation scientists.

Dissemination of Results

The result from the project is being used in planning a Community Reserve in the Red Volta Area. The findings from the project will also be incorporated into an implementation plan for the IUCN AfESG led Ghana section of the Ghana-Burkina Faso-Togo elephant migration corridor.