

EFFECTS OF ENCROACHMENT ON GHANA'S WILDLIFE AND PROTECTED AREAS: A CASE STUDY OF KORLOR FOREST RESERVE IN VOLTA REGION

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Abstract: One of the greatest environmental problems is rural Ghana is encroachment on wildlife and protected areas and the Korlor forest reserve in the Volta Region of Ghana is of no exception. The study seeks to provide information on Korlor forest reserve for sustainable development including plant and animal species, plant and animal species that are threatened or scarce in the Korlor forest reserve, the causes of encroachment on Korlor forest reserve, the extent of encroachment on Korlor forest reserve area and the importance of Korlor forest reserve to the inhabitants. The study was carried out in two established forest blocks with three forest stands with varying encroachment disturbances. Thus Heavily Disturbed Forest (HDF), Moderately Disturbed Forest (MDF) and Partially Disturbed Forest (PDF), within each blocks, three plots were demarcated (one plot in each forest stand). A total of 47 and 32 plant and animal species were identified in the three forest stands respectively by using transverse walk, questionnaire administration and different sampling methods such as pitfall trap and Sherman live trap.

Survey method was used to administer 60 questionnaire to Dorfor Gborkpo resident. Also, a total of 4 chiefs and 26 opinion leaders were interviewed. The study showed that, grazing of cattle (12.2%), hunting (13.5%), farming (40.5%), bush burning (8.1%) and fuel wood exploitation (25.7%) were the main encroachment activities in Korlor forest reserves. A transverse walk and measurement carried out in and around indicated the Korlor forest reserve indicated that the reserve has been reduced from 1,350,000 m² to 1125000 m³ translated into 16.7%

In all the life forms, species richness decreased from the PDF through MDF to HDF. Tree diversity declined significantly with increasing disturbance fuel wood exploitation. Liana diversity also differed significantly between the forest stand. For shrubs, the PDF was significantly more diverse than the HDF while diversity between the other forest pairs did not vary significantly. Canopy cover of trees was high in the PDF than the other forest stands. The disparity in the forest areas under studied is due to frequent human disturbances going on in the forest, thus compromising the 'health' of the KFR.

Keywords: Korlor Forest Reserve, Encroachment, Ghana, Wildlife, Protected Area.

Introduction

Wildlife refers to animals, plants and other living things that live in natural surroundings that have not been domesticated or tamed and are usually living in their natural environment. Also

according to IUCN, (1994), protected area is defined as “A clearly defined geographical space or area, recognized dedicated and managed through legal or other effective means to achieve the long term conservation of nature with associated ecosystem services and cultural values”. Wildlife and protected areas would be a move towards sustainable development in Ghana. A well protected area would be economic value to Ghanaians with merits and demerits of protecting wildlife and protected area; it would serve as sustainable use of resources and equitable sharing of it component in efficient manner.

Grundly and Wynberg, (2001) defined forest as a closed canopy plant communities comprising mainly of woody plants more than 5m tall. Tropical forest ecosystems host at least two-thirds of the Earths terrestrial biodiversity and provide significant local, regional and global human benefits through the provision of economic goods and ecosystem services. Yet the future of tropical forest species is not sustained, few areas of the tropics have escaped some form of human impact (Gardner et al., 2009).

According to Boon, et al, (2009). Originally, Ghana’s forests covered about 36 percent (84,000 km²) of the total land area of the country. Records do indicate the existence of relatively undisturbed forests which harbored abundant biodiversity which protected fragile soils regulated the supply of scarce water resources. Deforestation and global climate change impacts are significantly causing a rapid loss of biodiversity in the country. The degradation of forests and the loss of biodiversity in Ghana have increased sharply in recent decades. Deforestation leads to a reduction in the water and soil nutrient that sustain agriculture productivity, which is the main activity of these nearby communities (Opoku, 2006; Binlinla, et al., 2014). Forest reserves are areas designated by state governments for the protection of timber and other forest resources (Usman and Adefalu, 2010).

The total land area of Ghana is about 23.85 million hectares with forest areas confined to two vegetation zones, each with different forest types: the high forest zone (HFZ) constitutes 34% and the savannah zone (SZ) forms the remaining 66% (Ankomah, 2012). Forests designated for the production of timber are mainly concentrated in the southwestern part of the country; forest types range from wet evergreen to semi-deciduous. Forest lands are owned by local communities and stools (chiefs and families). However, timber resources, whether inside forest reserves or outside them, are managed by the Forestry Commission. Thus, even though traditional authorities are recognized as land owners and receive benefits as such, they do not have any management rights over their forests. Approximately, 20% of the HFZ is gazette as forest reserves (Marfo, 2010; Ankomah, 2012). These areas are to be managed for timber

production, biodiversity and environmental conservation. About 0.39 million hectares of forest reserves have been categorized as degraded while 0.35 million hectares have protected status (including hill and swamp sanctuaries, areas of high biodiversity and fire protection sites) and the remainder is suitable for timber production (Marfo, 2010). According to Marfo, (2010) and Ankomah, (2012), Forests provide numerous goods and services to support human life timber and materials, firewood, food, medicines, fodder for livestock, and a variety of sources of income. Many forests are rich stores of valuable biodiversity stocks. They protect the fertility and stability of soils, play a key role in watershed management, and are the habitats of countless species of wildlife, and homes for many cultures and communities. However, the problem of encroachment of public forest through physical development poses problems to sustainable resource utilization. There are limited human resources of these wildlife and protected area conservation in Ghana. It has been found that, these natural features have been destroyed everyday as a result of encroachment (Kpontsu, 2011; Binlinla, et al., 2014).

The problem of encroachment of public forest through physical development poses problems to sustainable resource utilization. Encroachment on public property is defined as: "the existence of any structure or item of any kind under, upon, in, or over the project lands or waters and/or the destruction, injury, defacement, removal or any alteration of public property including natural formations, historical and archaeological features, and vegetative growth (Agyen-Brefo, 2012). It also "denotes an illegal activity as one where the person who encroaches is not deemed to have any legal right to do so" (Shitima, 2005). The above two definitions suggest that encroachment results when there is an unlawful activity/entry on forest (gradually and without permission).

Korlor forest reserve runs from Zondon through Anyloryetsi to Dorfor Gborkpo and ends at Bator Kpekpo. In the 17th and early 18th century, the reserve was the gods/deity to the inhabitants and sacrificial ground to their ancestors until 19th century to 20th century (1970 - 2008) where private companies (Hedge and Diurnal Lime Companies) and individuals used chainsaw to cut trees from KF to burn lime. The word "Korlor" means "agreed taboo" that is when the people drink the water on a taboo day and they are able to survive and they name it that the taboo agreed for us to drink, so the forest is named after the water that flows through it "Korlor". This reserve was effectively managed by the local people (traditional authorities) until 19th century (1970) by natural spirits. It is the home of dwarf spirits in the olden days (Torgodzi Traditional Council, 2012).

The Korlor Forest Reserve Area (KFRA) had seen encroachment over the years and it is still on-going, and this pose a challenge to the reserve due to massive encroachment in the form of illegal activities including farming, bush burning, hunting, and grazing of cattle which do not conform to the zoning of the area and general disregard of rules and regulations of bush burning by hunters and Fulani/cowboys found very close to the problem. Hence, there is a need for this study.

Materials and Methods

Preliminary study was carried out through literature review as well as exploratory field survey to have a full grasp of the research. Data was collected by the use of survey method such as questionnaire administration, field observation and interviews. Also, sampling techniques was used in sampling and identifying some animal and plant species as well as measurement taken. These included pitfall trap, Sherman live trap, box trap, rope and tape measure and transverse walk. Below are brief description of the methods and techniques employed.

Questionnaire Administration: From equation 1 (Krejcie & Morgan, 1970; Fox *et al.*, 2009), at 95% confidence level or $p = 0.05$ and a population size of 71a total of 60 questionnaires were administered in the three closest settlements/ Community to the KFR, whose inhabitants are expected to use the resources in the area more often. Dorfor Gborkpo Community (DGC) (45 questionnaires), Dorfor Korsive Community (DKC) (10 questionnaires) and Dorfor Afaode Community (DAC) (5 questionnaires).

$$n = \frac{N}{1 + N(e)^2} \quad \text{Equation 1}$$

Where n = the sample size

N = the population size

e = the level of precision

Interview

Chiefs and Opinion Leaders: A total of 4 chiefs and 26 opinion leaders were interviewed based on their experience and their longer period of staying in the nearby settlements alongside the questionnaires. They were interviewed based on questions that are not included in the questionnaire administration.

Sampling: A total of two main Forest Block zones (FBZ) was established in the KFR for the collection of data. The study was carried out in three forest types based on different levels of disturbance intensity. These were Partially Disturbed Forest (PDF), Moderately Disturbed

Forest (MDF) and The Heavily Disturbed Forest (HDF). It was selected in areas with approximately equal topography and one plot ($5\text{ m} \times 5\text{ m}$) was randomly demarcated and randomly sampled in each forest types based in the two FBZ (six plots in all).

Sampling Techniques

Pitfall trap: This equipment is made up of glass bottle or plastic bottles with wider brim which is buried into the ground openly with bait inside to attract migrating organisms. This was used to identify the fauna species such as insects, grasshoppers', millipedes, and Ants in each plot in the KF for one week.

Sherman live trap (Glue board): This equipment is made up of an adhesive glue and small board. It was used to identify small animals that were not sampled by the pitfall trap for a week.

Box trap: This is a locally manufactured wire mesh trap used together with a bait to attract small mammals such as Glasscutters, Rats, Squirrels for a week

Rope and Tape Measure: Tape Measure was used to measure the plots ($5\text{ m} \times 5\text{ m}$) before sampling and the Rope was also used for the demarcation with two (2) feet pegs in the four edges in each demarcation. Again, the tape measure was also used to measure the initial and the current size of the forest.

Transverse walk: A transverse walk was also carried out in and around the KFR to observe the biodiversity of the reserve.

Findings and Discussion

1. Causes of encroachment on Korlor forest reserve

Figure 1 showed that, grazing of cattle, hunting, farming, bush burning and fuel wood exploitation were the main encroachment activities in KFRA. Farming (40.54%) being the dominant encroacher and bush burning (8.1%) being least encroachment activity in KFRA.

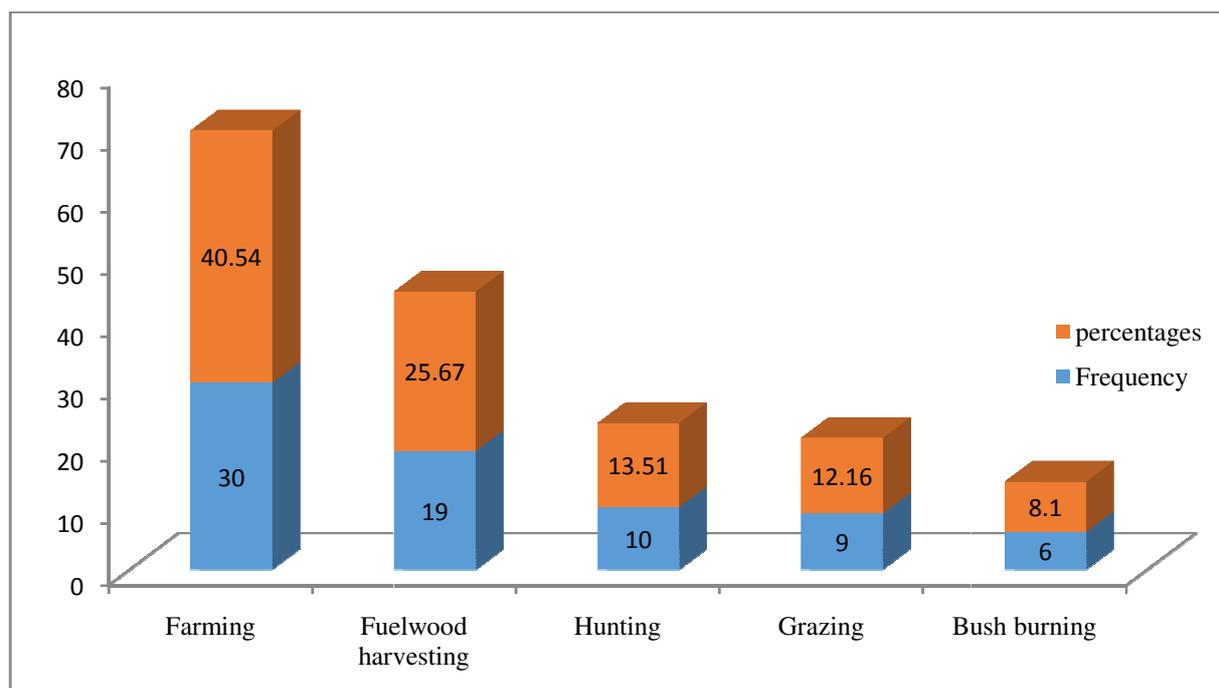


Figure 1: Encroachment activities in and around KFR

2. Extent of Encroachment on Korlor forest reserve

The Korlor forest reserve was about 1,350,000 m² (135ha) but the study showed that the reserve has been decreased in size by 225,000 m²(22.5ha) (16.7%) and is currently 1,125,000 m² (112.5ha).

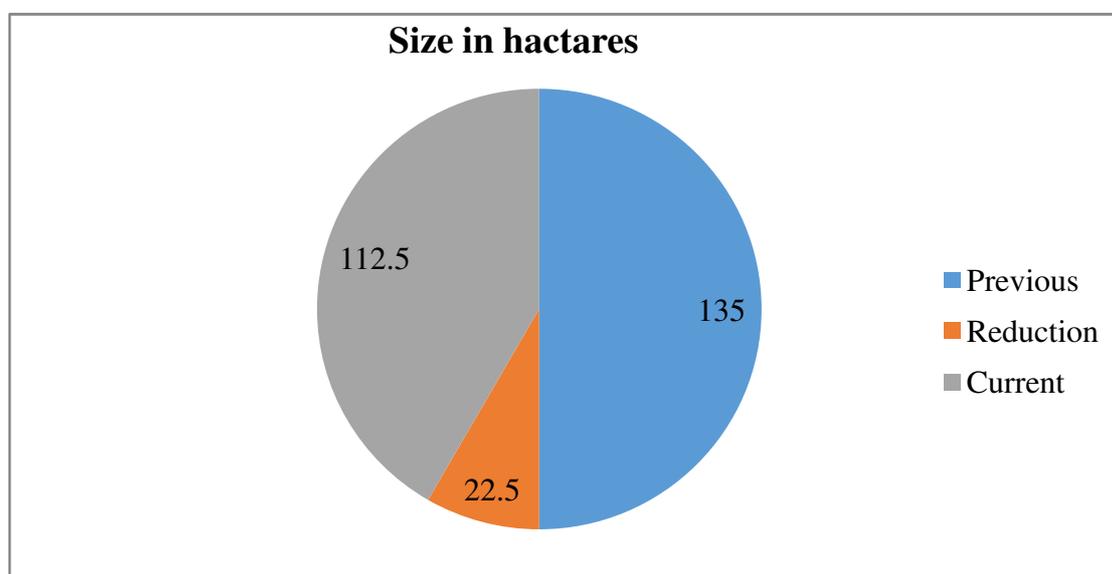


Figure 2: The extent or state of KFR

Residents of Dorfor Gborkpo and the study showed that the following are the causes of Korlor forest reserve encroachment and depletion:



Figure 3: Bush burning



Figure 4: Hunting



Figure 5: Fuel wood exploitation



Figure 6: Cattle grazing species

Plant and Animal species in KFR**Table 1: List of some Plant Species in KFR**

S/N	English name	Scientific name	Family name	Life form
1	False Abura	<i>Mitrigyna inermis</i>	Rubiaceae	Tree
2	Elephant grass	<i>Pennisetum purpureum</i>	Poaceae	Grass
3	Miner's lettuce	<i>Claytonia perfoliata</i>	Montiaceae	Liana
4	Raffia palms	<i>Rephia hookeri</i>	Palmaceae	Tree
5	Climbing Wattle	<i>Acacia pennata</i>	Fabaceae	Liana
6	Red resin	<i>Millettia thonningii</i>	Fabaceae	Tree
7	Mallotus	<i>Mallotus oppositifolius</i>	Euphorbiaceae	Tree
8	Triangle tops	<i>Blighia unijugata</i>	Sapindaceae	Tree
9	Corn plant	<i>Dracaena arbores</i>	Araceae	Shrub
10	Short-pod	<i>Byroscarpus coccineus</i>	Connaraceae	Shrub
11	Siam weed	<i>Chromolaena odorata</i>	Compositae	Shrub
12	Wild custard apple	<i>Annona senegalensis</i>	Annonaceae	Tree
13	Fan palm	<i>Hyphaene petersiana</i>	Arecaceae	Tree
14	Tea bush	<i>Lippia multiflora</i>	Verbenaceae	Tree
15	Water lettuce	<i>Pistia stratiotes</i>	Compositae	Liana

Table 2: List of some Threatened/Scarce Plant Species in KFR

S/N	English name	Scientific name	Family name	Life form
1	Crystal-bark	<i>Crossopteryx febrifuga</i>	Rubiaceae	Tree
2	brimstone tree	<i>Morinda lucida</i>	Rubiaceae	Tree
3	Hog plum(Yellow)	<i>Spondias mombin</i>	Anacardiaceae	Tree
4	WinePalm	<i>Rephia hookeri</i>	Arecaceae	Liana
5	-	<i>Tricalysia Pobeguunii</i>	Rubiaceae	Tree
6	West African plum	<i>Vitex doniana</i>	Labiatae	Tree

Table 3: List of some Threatened/Scarce Animal Species in KFR

S/N	Common Name	Scientific Names
1	African Palm civet	<i>Genetta tigrina pardina</i>
2	Antelope (Roan)	<i>Gippotragus equines</i>
3	Bongo	<i>Tragelaphus euryceros</i>
4	Black Rhinoceros	<i>Diceros bicornis</i>
5	Bison	<i>Bison bison</i>
6	Buffalo	<i>Syncerus nanus</i>
7	Bamboo	<i>Papio</i>
8	Duiker	<i>Cephalophus spp</i>
9	Forest Elephant	<i>Loxodonta africana cyclotis</i>
10	Hog	<i>Cyclotis</i>
11	Hyena	<i>Crocuta crocuta</i>
12	Leopard	<i>Panthera pardus</i>
13	Lion	<i>Pantheraleo</i>
14	Oribi	<i>Ourebia ourebia</i>
15	Tiger	<i>Panthera tigris</i>
16	Warthog	<i>Phacochoerus africanus</i>

Conclusions

The research shows that some wildlife and protected areas such as Korlor forest reserve has been encroached. Anthropogenic activities such farming, hunting, fuel wood, bush burning and grazing by cattle are the main activities responsible for the encroachment. Some plants and animal species have been endangered hence some animal and birds have migrated from KFR to other reserves like Kalakpa forest reserve and Kyabobo National Park.

Lack of jobs in the study area make people engage in illegal logging of trees for wood and charcoal burning.

However, the forest and its components help the inhabitants in many diverse ways but they still continue with their activities. Plants and animal species are growing at a fast diminishing rate than moving forward. The researcher has found out that if measures are not taken, the forest would become a savanna belt with plant species widely sparse.

Recommendations

1. Government and institutions must ensure that policies and regulations concerning wildlife and protected area must be enforced.
2. The chiefs and people of Dorfor Gborkpo should reinforce bye laws for protection of the reserve for sustainable development.
3. Forestry commission together with district Assemblies should periodically check wildlife and protected areas and place them under government legislation.
4. Forest guards should perform routine patrols and enforce policies and laws concerning wildlife and protected areas.
5. Korlor forest reserve should be developed as tourism centre since plant and animal diversity is great in the reserve.
6. There should be alternative jobs for the inhabitants in order to stop dependency on natural resource from the reserve.
7. There should be public education on importance of wildlife and protected areas.
8. There should be alternative source of fuel such as liquefied petroleum gas for the inhabitants.

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