TRENDS AND LEVELS OF POACHING IN WILDLIFE PROTECTED AREAS OF GHANA: A CASE STUDY OF THE KAKUM NATIONAL PARK

BY

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DECLARATION

I, Abigail Frimpong, hereby declare that this thesis is the result of my own original research carried out under the supervision of Prof. Erasmus H. Owusu and Dr. Jones K. Quartey all of the Department of Animal Biology and Conservation Science as principal supervisor and co-supervisor respectively. No part of this thesis has been presented for another degree in the University of Ghana or elsewhere. All references cited have been fully acknowledged.

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DEDICATION

This work is dedicated to my husband, mother and son through whose unflinching support I earned my education.

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It truly takes a whole village to raise a child, and this has been a core part of my reality in this life. Firstly, I express my profound gratitude to the Most High God for His unwavering love, faithfulness, protection and wisdom given me throughout my stay in this University. Unto Him alone be all the glory and honour. Secondly, I wish to extend my sincerest gratitude to my Principal Supervisor, Prof. Erasmus H. Owusu and my Co-supervisor, Dr. Jones K. Quartey for their guidance, constructive criticisms and suggestions that led to the successful completion of this work. I equally appreciate the inputs of Prof. Edward Debrah Wiafe in this work. My warmest gratitude goes to my family (especially my dear husband; Solomon Nana Tachie and our son; David Nana Kofi Tachie), through whose unwavering love and support I earned my education. I specially want to express my heartfelt appreciation to my wonderful colleagues Michael Ayeh and Dorcas Acheampong Apau, for their great support towards the successful completion of my work. To Emma Adom and Patrick Enning Frempong who tirelessly assisted with my data analyses and proof-reading, I say God richly bless you. To all others who impacted me in diverse ways in the course of my program, I say thank you.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CITES:	Convention on International Trade in Endangered Species
EPMD:	Effective Patrol Man-days
FGD:	Focused Group Discussion
IUCN:	International Union for Conservation of Nature
KNP:	Kakum National Park
LI:	Legislative Instrument
PA:	Protected Area
SES:	Socio-Ecological Systems
UCT:	Unmatched Count Technique

ABSTRACT

Poaching has been an age-old challenge faced by park managers who are tasked to maintain and improve the ecological health of protected areas. Although poaching is a major challenge facing the Kakum National Park (KNP), a holistic research on how this menace has evolved since the gazette of the park 30 years ago is still lacking. This research therefore, was to investigate the key drivers of poaching as well as the law enforcement efforts and poaching trends of the KNP in the last 10 years (2011 to 2021). Data for the study was obtained from primary sources including key informant interviews with park staff and focus group discussions with 141 persons from 10 fringe communities. In addition to this secondary data from desktop reviews and quarterly reports of the park (2011 to 2021) were obtained to augment data needed. Analysis of data on poaching legislation was done through a comparative analysis of Ghana's poaching laws and that of Nepal (the country with the least poaching in the world) to ascertain the effectiveness of Ghana's laws. Socio-Ecological Systems (SES) framework was also adapted to analyze the drivers of poaching whereas semi-log linear regression was used to deduce the trends of poaching activities in the last 10 years. The model for catch per unit effort was used to measure law enforcement performance of the park (using Stata and MS Excel). The results show that laws used in prosecuting poaching cases are less punitive with very low fines and jail terms hence ineffective in controlling poaching. Economic hardship was identified as the main driver of poaching in the KNP. The trend analysis shows a significant reduction in the number of poachers arrested in the park suggesting that the poaching activities are gradually reducing which may be attributed to effective law enforcement or the poachers resorting to other ways of poaching without being noticed.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Forests, the abode of wild animals is also an important resource for local communities in developing countries (Glover, 2020). They provide a range of ecological and environmental services as well as have cultural and religious significance. Amongst the various functions and services provided by the forest ecosystem include; provision of support for local livelihoods, protection of soil cover, provision of foods, goods and income from the sale of forest products, as well as inputs for agriculture and employment. Forests also serve as important sinks for carbon emissions and hold huge stocks of carbon which contributes to global warming (Le Noë *et al*., 2021).

Pre-historic research reports that before the arrival of colonial rule, forests with their wildlife in Sub-Saharan Africa including that of Ghana were under the management of indigenous communities. Communities had their own measures and systems for regulating access to and use of forest and wildlife resources (Glover, 2020). The systems for protecting the forests comprised sacred groves and religious taboos and totems. These actions were possibly driven by a need to ensure a continual supply of resources (Anderson, 1987).

The arrival of colonial masters however, brought a change in how forests and wildlife should be managed through the introduction of Protected Area management regimes (Barrow *et al*., 2016). In Ghana, many forests were placed under protection from degradation by what colonial masters

perceived as overexploitation by locals who lived close to these resources (Ayivor *et al*., 2013). This new regime meant community members could no longer enter and extract or make use of forest and wildlife resources as they used to unless with the requisite permissions and licenses from forest and wildlife management bodies including the Forestry Commission and its mandated Agencies (Ayivor *et al*., 2013; Bassett, 2005).

Against this background, in 1992 Kakum Conservation Area (KCA) got legally gazetted as a National Park and Resource Reserve under the Wildlife Reserves Regulations (LI 1525) (UICN/PACO, 2010). Before this, the Kakum National Park had a Forest Reserve status which accorded it some protection from unlawful entry and use. However, upgrading it to the current status meant higher restriction on its utilization by local communities. As expected, preventing local communities from freely using resources they had lived on all their life, was met with some opposition hence, requiring law enforcement by the Wildlife Division mandated to ensure the strict protection of wildlife in the park. This is increasingly necessary since wild animals are vulnerable because they easily move out of their 'protection zone' into places where they may be easily targeted and killed (Amoah & Wiafe, 2012).

1.2 Problem Statement and justification of the study

The introduction of the Protected Area management regime like many reforms has faced keen opposition from local communities who were directly impacted by such regimes. The situation is considered to be a sharp deviation from the normal way where locals could easily enter a forest and hunt animals of their choice, provided they were not under local protection as totems or other 'taboo' protected animals (Obour *et al*., 2016). Until the early 2000s, when the collaborative resource management approach of the Wildlife Division included communities in the protection

of animal resources in and around protected areas, protecting wildlife was the sole responsibility of park managers (Owusu, 2001 & 2010).

Although this community-led protection may yield some results, there is still a lot needed to keep recalcitrant poachers at bay (Obour *et al*., 2016). Law enforcement therefore remains a critical strategy of wildlife managers who are required to protect the remnant populations of the overly exploited animal population in even protected areas including the Kakum National Park. Since 1992 when the Kakum National Park was gazette and given such strict protection against poaching, a lot of effort has been invested in enforcing the law against poaching (Amoah & Wiafe, 2012). While there are pockets of research that attempted to investigate and document the trends and levels of poaching in the park, holistic research in this area is still lacking.

1.3 General Objective

This research seeks to investigate the key drivers of poaching and how law enforcement efforts of the Kakum National Park impact trends in poaching. This is expected to be achieved through the specific objectives listed below.

1.4 Specific Objective

The specific objectives of this study are to:

1. Determine the effectiveness of existing wildlife legislations in Ghana in reducing poaching.
2. Examine the drivers of poaching in the Kakum National Park in the last decade (2011 to 2021).
3. Determine the poaching trends in the Kakum National Park.
4. Examine the law enforcement efforts of the park and their impacts.

1.5 Research Questions

1. How effective are the existing legislation against poaching in Ghana?
2. What are the drivers of poaching in Kakum National Park within the last ten years?
3. What are the trends of poaching in Kakum National Park within the last 10 years?
4. How effective are the efforts made by the park management to curb poaching in the park?

1.6 Scope and Limitations

The Kakum National Park was gazette 30 years ago, hence a holistic study would have been to examine the trends of poaching as well as the law enforcement efforts of the park and its impacts over the three decades, however, unavailability of some park records covering the entire period caused this study to examine records for the last 10 years (2011-2021) where consistent data was available. Furthermore, there was also no data for some quarters (3rd and 4th Quarters for 2011 (July, August and September) and (October, November and December) and 2nd Quarter for 2020 (April, May, and June). For this reason, some presentations did not include 2011 and 2020.

1.7 Thesis Organization

Chapter one of this thesis covers the general background to the study, the problem statement, the objectives of the study as well as the associated research questions, the scope and the limitation of the study. Chapter two reviews literature relevant to the objectives of the research as well as other information relevant to the general theme of this work. Chapter three covers the methodology of the study encompassing the research design, data type and source, sample and sampling technique, data analysis, and presentation of the study. Chapter four presents the results of the study. The

major results from the analyses are discussed in Chapter five. This is followed by the conclusion and recommendations for the study in chapter six.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature that relates to poaching at the global, regional and national levels with a focus on existing legislation, drivers, peculiar trends and dynamics, law enforcement efforts, anti-poaching strategies, and their impacts. The section is in four parts, the first part looks at poaching as a park management challenge at global, regional, and national levels. The second part looks at existing legislation on poaching in Ghana. The third part focuses on empirical works on drivers, key dynamics including trends and levels of poaching, law enforcement efforts, and their impacts at the regional and national levels. The fourth part talks about some gaps in the literature on poaching.

2.2 Poaching as a Park Management Challenge

This section covers the challenges wildlife-protected areas such as national parks face with regards to poaching. In all, this theme is discussed under three different levels essential to the study undertaken. These levels are poaching at the global, regional, and national levels.

2.2.1 Poaching at the Global Level

As defined by the International Union for Conservation of Nature (IUCN), "a protected area (PA) as a clearly defined geographical space, 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" (Dudley, 2008, p. 8). The IUCN further places protected areas into

six categories, based on management objectives. National Parks are one of the PA categories defined by the IUCN under the IUCN Category II as "large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational opportunities" (Dudley, 2008, p. 16). Like all the other PA categories, National Parks are confronted with many challenges including encroachment, invasive species, human-wildlife conflict, limited funding and logistical inadequacies, and poaching among others.

According to Hoffman and Cawthorn (2012) wild animals are massively poached, with millions of individual animals of diverse species worldwide killed or captured from their natural habitats. Poaching poses a growing threat to elephants, rhinos, and other charismatic animals, as well as to smaller and more obscure creatures, like certain lizards and monkeys. Hoffman and Cawthorn (2012) further asserts that poachers sometimes kill or capture animals to sell them locally or to the global trade in wildlife. Wildlife trading is a major black market that has increased alongside rising wealth in Asia and the introduction of e-commerce and social media. In many cases, animals such as birds, reptiles, and primates, are captured alive so that they can be kept or sold as exotic pets while slaughtered animals, on the other hand, have commercial value as food, jewelry, decor, or traditional medicine. The ivory tusks of African elephants, for example, are carved into trinkets or display pieces (Gorobets, 2020; IUCN, 2020). The scales of pangolins are consumed in a powdered form for their purported healing powers in many parts of Asia. The meat of apes, snakes, and other bush animals is considered a delicacy in parts of Africa (Hoffman & Cawthorn, 2012). Rhino horn, elephant ivory, and tiger products are sold at high prices among consumers, especially those in Asia.

This unrelenting poaching crisis at the global scale has been underway for many years due to the lucrative nature of global illegal wildlife trade and consumption, as well as widespread corruption and less punitive laws that makes illegal wildlife trade a low-risk business with high returns. The poachers which comprise mainly of poor locals are the ones caught in many cases while the real masterminds and their networks are left to operate for as long as they want. (Gorobets, 2020; Jaclin, 2016).

2.2.2 Poaching in Africa

Serious challenges including land use change, invasion of alien species and over-exploitation of wild animals is causing national parks in Africa to rapidly lose biodiversity. (IPBES, 2019). A major concern of national parks is to safeguard the perpetual existence of viable populations of its wildlife; hence poaching directly undermines all efforts in this regard. Several studies focused on how national parks in Africa are impacted by poaching with others identifying poverty and high population density around parks as the major causes of the menace in the parks (Abukari & Mwalyosi, 2018). Abukari and Mwalyosi (2018) assert that the wildlife resources demand is high in Tanzania and this is due to the prevalence of a lucrative wildlife trade run by wildlife traffickers. Park officials allege the presence of an international cartel in Tanzania that engages in poaching and illegal trafficking of wildlife products, especially ivory. Similarly, Abebe and Bekele (2018) attribute the loss of biodiversity in key National Parks including, Bale Mountains National Park, Awash National Park, Gambella National Park, and Simien National Park in Ethiopia to several causes including poaching.

Blanc *et al*. (2007) and Roe (2008) have indicated that the taking of 'bush meat' from game parks still supplements the diet of many people in the developing world but in recent times, poaching

consists of a much more diverse set of behaviors than simply hunting for food. Lubbe *et al*. (2019) have equally indicated that iconic animals, such as the rhino, are major attractions for tourists to South Africa (South Africa holds approximately 80% of the world's rhino population). However, the rapid increase in rhino poaching activities has reached a crisis point but should the rate of poaching continue to increase, Africa's remaining rhino population will become extinct in the wild within 20 years.

In another study, Hillman and Martin (2009) shared that poaching for the commercial use of horns has reduced the populations of black rhinoceros *Diceros bicornis* in East Africa to between one fifth and one-tenth of what they were five years ago, while the northern white rhinoceros *Ceratotherium simum cottoni* has for some number of years been reduced to a handful of relict populations in a fraction of their former ranges in Sudan, Uganda, Zaire, and the Central African Republic. The situation of poaching leading to the decline in wildlife populations is equally devastating in West Africa, since Cote d'Ivoire, Burkina Faso, Liberia, Ghana, and many others continue to battle this challenge (Compaore *et al*., 2020; Clement, 2017; Niamien *et al*., 2015).

2.2.3 Poaching in Ghana

Ghana is considered one of the world's 34 "Biodiversity Hotspots" –the Earth's highest priority areas for biodiversity conservation due to rich concentrations of globally significant species coinciding with very high threats to their survival. Most of the forests in Ghana have been lost over the past 50 years. The remaining Guinea forests are restricted to several isolated patches that contain exceptionally diverse ecological communities, distinctive flora and fauna, and a mosaic of forest types that provide refuge to numerous endemic species. There are seven national parks in Ghana and these include; Bia National Park, Bui National Park, Digya National Park,

Kyabobo National Park, Mole National Park, Nini-Suhien National Park, and Kakum National Park.

According to Abukari and Mwalyosi (2018) the population of megafauna in national parks and other protected areas in Ghana is in decline mainly due to poaching and human population increase. Ghana is reported to have high rates of extinction which is attributed to pressures from intensive commercial bushmeat hunting (Harcourt *et al*., 2001; Newmark, 2008). According to Martin (2010) Ghanaians have a long history in ivory, both for export and for carving. From the 1970s to the early 1990s, however, most of Ghana's elephants were killed either by local farmers in retribution for human-elephant conflict or by poachers for the ivory trade. Ghanaian ivory craftsmen used the tusks primarily to make jewelry and figurines over this time. These curios were mostly sold in Accra, the capital, but due to a lack of market surveys, very little data are available. Concern over the devastating consequence of poaching has resulted in several interventions, notably starting in 2004; a system to monitor patrol staff performance, illegal wildlife use, and trends in large-mammal populations was established in nine protected areas in Ghana. As a result, poaching is perceived to have reduced in some protected areas in the savannah areas whereas occurrences in forested areas remain high and concerning (Abukari & Mwalyosi, 2018; Martin, 2010). Animals poached in national parks range from mammals predominantly duikers, pangolins and primates, reptiles, birds, and mollusks (Dery *et al*., 2022; Wiafe, 2018).

2.3 Existing legislation on poaching in Ghana

This section attempts to give a detailed review of three major legislations on poaching in Ghana, and give an objective critique of these laws, as well as some amendments and proper enforcement.

2.3.1 Definitions of Poaching

Although there are several legislations concerning poaching in Ghana, this review focuses on three of such in defining and examining the illegality in accordance with the laws of the land. These are the Wildlife Animals Preservations Act 1961 (Act 43), the Wildlife Conservation Regulations 1971 (L.I 685), and the Wildlife Reserves Regulations 1971 (L.I 710).

2.3.2 The Wildlife Animals Preservations Act, 1961 (Act 43)

Passed by the first post-independence parliament, the Wildlife Animals Preservations Act, 1961 (Act 43) contains 13 provisions, apart from its schedules, which regulate wildlife in Ghana. Although the word "poaching" has not been expressly mentioned in any provision of the statute, it is clear from a thorough reading, that acts that promote poaching have been prohibited in the statute. The long title of the Act states as follows **"AN ACT to consolidate and amend the laws relating to animals, birds, and fish and to continue the observance of the Convention signed on the nineteenth Day of May 1960".** This depicts that the purpose of the Act is to protect wild animals, from all forms of violation, which include poaching.

A careful reading of the Act, reveals that the laws on poaching begin from Section 6. Section 6(1), demands that persons are not allowed to use a motor vehicle or aircraft for hunting, killing or capturing wild animals. This is to say that, one cannot use a vehicle or aircraft to disperse or in the wording of the Act, disturb animals, if the purpose is for hunting, killing, or capturing them. Section 6(2) also further states that the rule in Section 6(1) does not apply to an occupier of a land. In law, an occupier of a land is one who has the right to use a land and bear exclusive possession of the land, to the exclusion of others ***(animus posendi).*** Section 6(3) provides the punishment for the contravention of Section 6(1) which amounts to summary conviction to a fine not exceeding

two hundred penalty units or a term not exceeding 12 months or both the fine and the imprisonment. Section 7 of the statute borders around the killing of animals by fire, which is also another form of poaching. Section 7(1) states that a person shall not surround an animal with fire for hunting. Section 7(2) further states that it is an offence to do so, and anyone who commits such an offence is liable to a prison term of twelve months or a fine of twelve penalty units or both. Section 11 of Act 43 empowers the President of the Republic, to enact legislation by legislative instrument, to prevent acts of poaching.

2.3.2.1 Criticism of Act 43

The interpretation section of the statute is not wide enough. It does not give enough interpretation to many controversial words in the statute. It is essential per the principles of legality, particularly the *nullem poena sine lege* (no person shall be punished for an act unless it is prohibited by a statute, defined and its punishment attached to it) rule, carried in Article 19(11) of the Constitution, 1992, which requires a statute to create a provision to define an offence to make certain ambiguous words clear to ensure certainty. For instance, in Section 6(1) of the Act, a word like "disturb" could give rise to hot legal arguments, but could have been settled, had it been included in the interpretation section. A word like "occupier" in section 6(3), must have also been included in the interpretation section of the Act. Although this review has defined who an occupier is under law, it is the contention that, it should have been included, to settle all controversies.

It is true, that the courts have held in cases like *Tsatsu Tsikata v. The Republic*[1], that an offence-creating section does not necessarily have to define all words, to meet the constitutional

[1] Tsatsu Tsikata v. The Republic: Criminal Appeal No. J3/4/2004

requirement, but where any of the rules of interpretation are enough or will suffice to interpret them, then the courts will rule as such. This review however contends that such a trend is likely to create ambiguity for judges to legislate from the bench.

2.3.3 The Wildlife Conservation Regulations, 1971 (L.I 685)

The Wildlife Conservation Regulations, 1971 (L.I 685) was enacted under the powers given to the President of the Republic under Section 11 of Act 43. The laws on poaching are scattered all over the legislation, although not expressly stated.

2.3.3.1 Part I- Restrictions on Hunting, etc.

Regulation 1 of the L.I states that shall not hunt capture or destroy any of the species mentioned in the First Schedule. Some of these animals include chimpanzees, black and white rhinos, Diana monkeys, and red colobus.

Regulation 2 states that no person shall at any time hunt, capture, or destroy young animals or animals accompanied by their young if they are mentioned in the Second Schedule. Some of these include mona monkey, green monkey, and spot-nosed monkey.

Regulation 3 states that no person shall between the 1st Day of August and 1st Day of December hunt or capture any of the animals in the Third Schedule. Some of these animals are baboons, hedgehogs, and tree squirrels.

Regulation 4 states that no person shall hunt, capture or destroy any wild animal using pitfalls, snares effective only in conjunction with pitfalls, poisons, or poisoned weapons.

Regulation 5 gives the punishment for contravention of regulations 1 to 4. It states that any person who does so is guilty of an offence and is liable to summary conviction to a fine not exceeding two hundred new Cedis or to imprisonment not exceeding six months or to both.

2.3.3.2 Part II- Game Licenses

Regulation 6(1) of the L.I states that no person shall capture or destroy any adult animal of the species mentioned in the Second Schedule when unaccompanied by its young or any of the species mentioned in the Second and Third to the regulations outside the close mentioned in Regulation 3 unless he is the holder of a valid license to do so. This license is known as a "Game License". Regulation 6(2) goes on to state that any person who contravenes this 6(1) shall be guilty of an offence and reliable on summary conviction to a fine not exceeding two hundred new media or to imprisonment not exceeding six months or both.

The other regulations that govern game licenses are given below:

7. (1) Application for a game license shall be in writing made to the Chief Game and Wildlife Officer accompanied by a fee of ten new Cedis and by the particulars specified in the Fourth Schedule to these Regulations.

(2) The Chief Game and Wildlife Officer shall not grant a game license to hunt, capture or destroy any of the aforesaid animals with firearms unless the applicant satisfies him that he is lawfully in possession of a license granted under regulation 59 or 60 of the Arms and Ammunition Regulations, 1962 (L.I. 200), authorizing him to use a firearm for the period during which he requires a hunting license under these Regulations.

2.3.3.3 Criticism of L.I 685

The fee paid for game licenses is too low and will pave way for more people to apply. An increase in the fee will discourage application, which will go a long way, to aid in the conservation of the population of wild animals.

2.3.4 Wildlife Reserves Regulations, 1971 (L.I 710)

This was also enacted in pursuance of the powers conferred on the President under Section 11 of Act 43. Here the laws on poaching can be found in Regulations 3 and 4, and they are stated as follows:

3. (1) no person shall at any time –

(a) hunt, capture or destroy any animal or collect or destroy any plant within a reserve, except with the written consent of the Chief Game and Wildlife Officer which shall only be given for Conservation and Management purposes;

(b) bring into a reserve any equipment or any apparent which may be used to hunt, capture or destroy any animal;

(c) take any animal or plant out of a reserve without the written consent of the Chief Game and Wildlife Officer.

(2) A Game Officer may seize and confiscate any apparatus brought into a reserve that is in the opinion of the Game Officer capable of being used to hunt, capture or destroy any animal and such equipment or apparatus may be disposed of in such manner as the Chief Game and Wildlife Officer thinks fit.

4. No person shall at any time- (a)

light any fire within a Reserve

(b) pollute any water within a Reserve

(c) abandon any litter or unwanted articles within a reserve

(d) without the written consent of the Chief Game and Wildlife Officer, clear or cultivate any area within a reserve

5. Any person who contravenes any provision of regulations 2 to 4 shall be guilty of an offence and liable on summary conviction to a fine not exceeding 200,000 or to imprisonment not exceeding six months or both.

The state has over the years prosecuted several people who have flouted the various legislations given above.

2.4 Key dynamics of poaching; drivers, trends and levels, law enforcement efforts, and their impacts

This section presents some works that focus on major drivers of poaching in Africa and also share some information on its trends and levels in different African countries. Additionally, this section looks at law enforcement efforts and their impact in the African sub-region.

2.4.1 Drivers of Poaching in Africa

Until the 20th century, most poaching incidents were mostly for subsistence purposes, however, in recent years, poaching is conducted for commercial purposes and in some cases for sports (Obour et al., 2016). The scale at which poaching is conducted is a major concern for conservationists since the larger the scale the greater the destructive impact of these illegalities.

In Africa, the challenge of poaching is complex since several factors drive these illegal activities. Lunstrum and Givá (2020) found that economic factors including poverty are the most central drivers of poaching on the ground-level in Africa. This is particularly concerning since most African households are estimated to have a consumption level below the 1.90$/day (Malpezzi, 2022).

Although Malpezzi (2022) prompts that poverty levels are on the decline in most African countries and on average the proportion of African households with a consumption level below the 1.90$/day poverty line declined from 40% in 2010 to 34% in 2019, poverty still remains a critical driver of poaching in the sub-region. This is because while in 2019, 478 million people lived in extreme poverty, it is estimated that in 2021, 490 million people in Africa live under the poverty line of 1.90$/day, and this is 37 million people more than what was projected without COVID-19 pandemic. In many cases, poverty is most prevalent among the rural poor who fringe protected areas and predominantly depend on natural resources for their livelihoods. Lack of basic needs including food serves as a major motivation for such fringe communities to engage in illegal wildlife trade in places where bushmeat markets exist (Challender & MacMillan, 2014). Tensions between park managers and communities living near protected areas where locals perceive conservation initiatives to yield few local benefits or threaten traditional livelihoods worsen the situation when poverty is also in the picture. This significantly impedes the park's efforts to fight wildlife crime since locals may connive and support poachers or even disregard regulations. (Lunstrum & Givá, 2020).

The availability of markets for wild animals, their products and parts is also a key driver of poaching in Africa. Poachers operating on a small scale may hunt for consumption or local sale to other households, market women and food vendors. Local persons who mediate the transport of

wildlife products for onward trafficking also mostly engage on a relatively smaller scale whereas organized commercial poachers and businesses in destination markets may engage in larger-scale, higher-return operations. China and countries in Southeast Asia are top destinations for trafficked African wildlife products although several other countries are involved. (Kurland & Pires, 2017). Although seizures of illegally obtained ivory take place, much of the smuggled ivory still gets through. Less than 1 percent of the shipping containers unloaded in the Port of Hong Kong are inspected for smuggled ivory (Xia *et al*., 2021). Ivory traders who do get caught are seldom arrested and if they are, they face meagre penalties (Challender & MacMillan, 2014). The combination of improved international trade links coupled with weak enforcement proves a powerful and extremely lucrative incentive for the criminal networks leading to the poaching of African elephants. All great apes are protected by national and international legislation, so it is illegal to kill or capture them and to trade live animals or their body parts in all great ape range states (UNEP-WCMC, IUCN, 2018). Despite this international regulation, great apes from Rwanda, Nigeria, Uganda, Senegal, DR Congo, and Tanzania face illegal killing and trade for their meat which serves as a delicacy or high-status food at traditional or political functions.

Human-wildlife conflict (HWC) over crops, livestock grazing land, or human safety is also a major driver of poaching in Africa (Massé, 2016, Woodroffe *et al*., 2005).Human-wildlife conflict represents a serious threat to both the survival of wild animals and human economic activities at the local level in many African regions (Hockings *et al*., 2013). Kahler and Gore (2015) deduced that in human-wildlife conflict cases in Namibia, species perceived to be at greatest risk from poaching were characterized as posing high ecological risks (e.g., disease vectors) and livelihood risks (e.g., crop damage) and were economically valuable for local subsistence and trade.

According to Nicole (2019) in Africa, HWC primarily occurs in regions where rural communities live close to protected areas. Nicole (2019) further states that human encroachment into national reserves and buffers is documented to occur in Nigeria, Uganda, Ghana, Congo, Kenya, Tanzania, Zanzibar, and South Africa to name a few countries. The lack or limited span of buffers around protected areas aggravates the occurrence and extent of crop damage from wild animals and this poses a strong provocation for people to poach the animals at the centre of the damage. Some research done in Samburu, Trans-Mara, and Kwale in Kenya illuminates the interlinkages between intensified conflict, land conversion, and the development of small-scale farming in and around protected areas (Nicole, 2019).

Low capacity and/or corruption within customs and law enforcement services reportedly enable poaching to occur in national parks in Africa. Wyatt *et al*. (2018) proposed that not only do individual corrupt acts enable wildlife trafficking and poaching to happen, but also that corrupted structures (the criminal justice system, and economic and political foundations) in some societies in Africa enable trafficking and poaching to happen and also increase the resilience of trafficking to reduction measures. Wyatt *et al*. (2018) further state that Asia, particularly China and Southeast Asia, are the focal points for the supply and demand of certain species of wildlife enabled by weak law enforcement and corruption by African and Asian institutions. Williams *et al*. (2016) propose that the wildlife trafficking process consists of planning, poaching/breeding, distribution, transportation, processing, selling, and laundering and these are well facilitated by weak institutions with low logistical capacity for law enforcement.

2.4.2 Trends and levels of Poaching in Africa

For mandated institutions to ascertain the impact of their law enforcement and conservation efforts, knowledge and information on the occurring trends and levels of poaching support accurate assessment of their situation and help in the development of essential strategies for improved conservation. Several wild animals are victims of indiscriminate poaching in Africa yet some animals are worst hit by the phenomena (WWF, 2020). Key among animals suffering from poaching in Africa includes mammals such as elephants, rhinos, primates, duikers, and pangolins. Although there is not much data on the trends and levels of poaching of some key wild animals, elephants, rhinos, and pangolins have received some attention from research.

According to Save the Rhino International (SRI, 2021) the current rhino poaching crisis began in 2008, with an increasing number of rhinos killed for their horn throughout Africa until 2015. Thankfully, poaching numbers have decreased across the continent since the peak of 1,349 in 2015. Yet, at least one rhino is still killed every day hence there is a lot more that must be done. South Africa holds the majority of the world's rhinos and has been the country hit hardest by poaching criminals, with more than 1,000 rhinos killed each year between 2013 and 2017. Pangolins on the other hand are the most trafficked mammal in the world; poachers kill as many as 2.7 million African pangolins every year. Although pangolins are a protected species in China, there is a thriving black market for pangolin meat and especially for scales, which account for 20 percent of body weight. The scales are in high demand for use in traditional Chinese medicine (Conciatore, 2019). In a recent study, Emogor *et al*. (2021) cited Nigeria which is home to three of the four African pangolins as a major transit country for trafficking wildlife products (especially pangolin scales and ivory) obtained from Central and other West African countries to Asia.

2.4.3 Trends and Significance of poaching in West Africa

One of the most important perceived threats to wildlife in the tropics is the trade in wild animals for their meat well known as "bushmeat" trade (Cowlishaw *et al.,* 2005). Robinson and Bodmer (1999) describes the bushmeat trade in West Africa as a big business which directly benefit diverse groups of people including poachers, local and foreign merchants. Wild animals that are mostly involved in this illegal trade according to Robinson and Bodmer (1999) include ungulates, primates, and rodents. In the study conducted by Cowlishaw *et al.* (2005) the most predominant species caught in the bushmeat trade in West Africa include; *Anomalurus spp* (Flying squirrels), *Neotragus pygmaeus* (Royal antelope), *Artherurus africanus* (Brush-tailed porcupine), *Cephalophus maxwelli* (Maxwell's duiker), *Cephalophus niger* (Black duiker), *Tragelaphus scriptus* (Bushbuck), *Potamochoerus porcus* (Red river hog), *Hylochoerus meinertzhagene* (Giant hog), *Cercopithecus petaurista* (Lesser spot-nosed monkey), *Cercopithecus mona* (Mona monkey), pangolins and several others. According to Wright *et al*. (2000) the bushmeat trade does not only threaten the populations of target species but also significantly affect plant and animal species that depend on the traded wildlife. The unregulated trade leads to the illegal killing of vulnerable species and loss of millions of dollars which could have been obtained from sustainable use of wildlife including ecotourism development in West Africa. Over the years a major concern of the bushmeat trade is the issue of its sustainability. Although some researches including that of Cowlishaw *et al*. (2005) found no evidence to suggest this illegal trade is unsustainable, some others like Robinson and Bodmer (1999) have shown that the trade is indeed unsustainable. Further, alarming statistics shared by Raxter (2020) estimates that as much as 5 million tons of bushmeat is consumed each year across Central and West Africa. With such quantities of wildlife involved in the unregulated bushmeat trade, issues on the survival of wild animals in other parts of the world including West Africa remain a critical biodiversity conservation concern.

2.4.4 Law enforcement efforts on poaching in Africa

Effective law enforcement in protected areas leads to reductions in the number of illegal activities (Moore *et al*., 2017). Conservation areas exist to protect plant and animal species from harvesting as a means of protecting biodiversity. With the increase in human population, efforts are put in place to achieve this goal of conserving biodiversity (Afriyie *et al*., 2021). Some approaches necessary to protect areas include having a clear vision, management plan, awareness campaigns, effective law enforcement, training, and capacity building for staff (Afriyie *et al*., 2021).The illegal wildlife trade is reported to be a multibillion-dollar industry (UNEP INTERPOL, 2016). Organized crime groups take undue advantage of gaps in legislation with its associated weak law enforcement which is prevalent in Africa to make huge profits with a relatively low risk of punishment (Robertson, 2017).

According to Sehmi (2019) in many countries in Africa, environmental crimes are only regulatory and therefore quasi-criminal; they are similar to traffic offences which comes with no moral stigma when a person is convicted of such crimes. Such a situation only gives offenders the courage to continue committing such offences. Sehmi (2019) further adds that weak legislation hinders adequate enforcement in Africa. This in many cases is as a result of poor legislative drafting or minimal enforcement powers in the law. Unfortunately, well-qualified and experienced judicial officers, prosecutors, investigators and even rangers on the ground in many instances lack the required knowledge of the laws they are supposed to be enforcing. At the same time, decision makers and community members have limited awareness of the contents of wildlife legislation (Holden *et al*., 2019; N'Goran *et al*., 2012).

2.5 Research Gap

A review of the literature clearly showed many empirical works have been conducted on various issues of poaching in other parts of the world yet not so much has been conducted in Africa. There is limited data on how much of Africa's wildlife is being poached annually and how this is impacting the continent's conservation efforts. This gap is especially wide for species not considered as keystone or flagship species such as duikers that feature in the bushmeat trade (Ofori *et al*., 2015).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

The Kakum National Park (KNP) and Assin Attandanso Resource Reserve forms the Kakum Conservation Area and in 1992 they were legally gazzetted as a National Park and Resource Reserve respectively under the Wildlife Reserves Regulations (LI 1525) (Hawthorne & Musah, 1993; Kpelle, 1993). The Kakum National Park has an area of 210 square kilometres and lies in latitude 5°25′N and longitude 1°19′W in the Central Region of Ghana. Vegetation of the park is a moist semi-deciduous rainforest characterized by a high annual average rainfall of about 1380 mm (Amoah & Wiafe, 2012). The Park is home to a number of protected mammals and birds. The mammals include the African Elephant *Loxodonta cyclotis*, Maxwell's Duiker *Philantomba maxwellii*, Black Duiker *Cephalophus niger*, Bongo *Tragelaphus eurycerus*, Lowe's Monkey *Cercopithecus lowei*, Olive Colobus *Procolobus verus*, Black and White Colobus *Colobus vellerosus*. Conspicuous bird species include seven hornbill species, the turacos (Yellow-billed Turaco *Tauraco macrorhynchus,* Green Turaco, the Great Blue Turaco) and many other bird species. The park is surrounded by 53 communities, including Aboabo, Antwikwaa, Ahomaho, Adiembra, Mfuom, Abrafo, and Kuruwa among others. Most of the people are cocoa farmers (Monney *et al*., 2010; Figure 1). The occurrence of large of populations of species of importance, coupled with the socio economic importance of the KNP for the many fringing communities and the perceived prevalence of poaching in the biodiversity hotspot informed the selection of this site for the study.

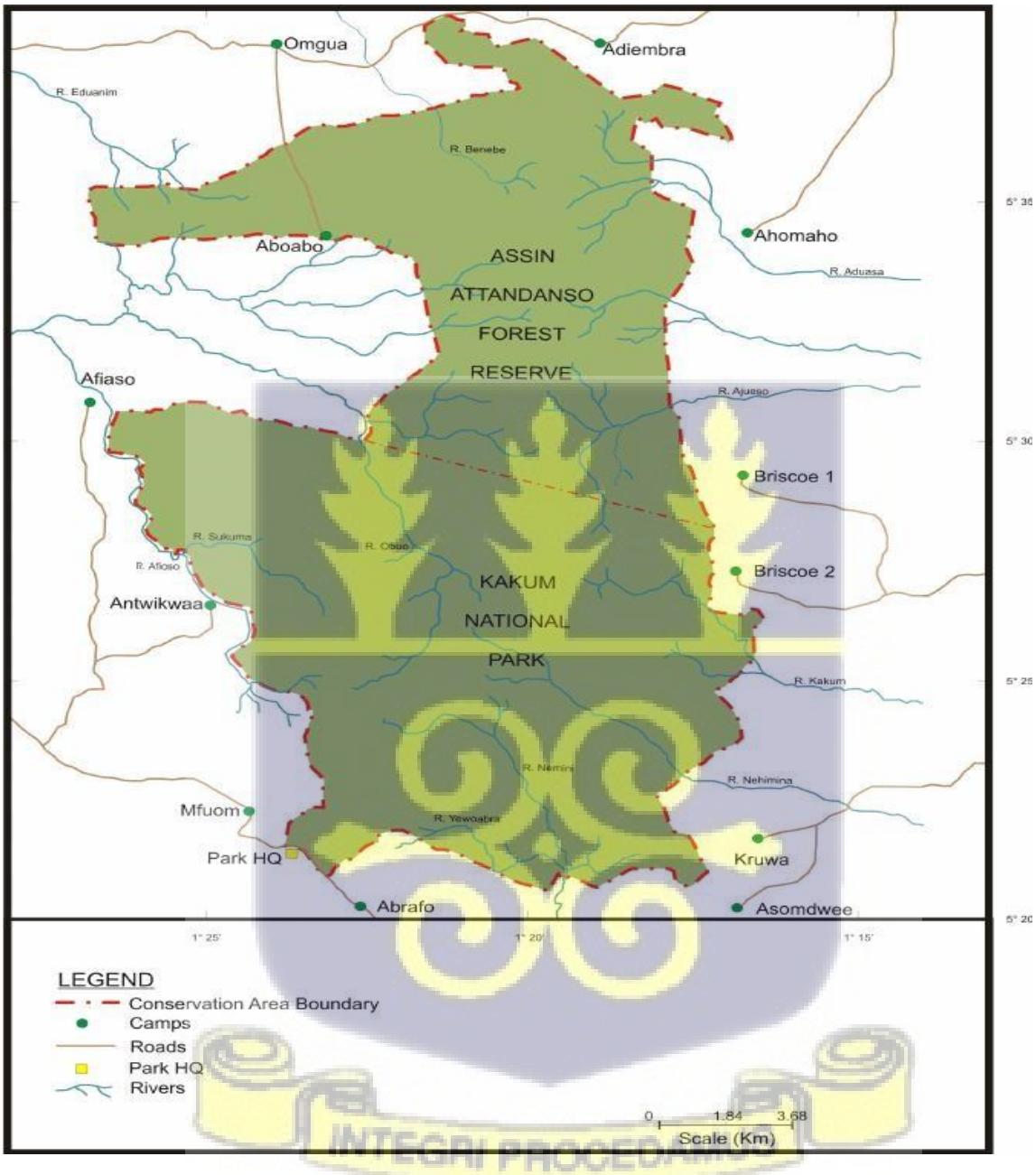

Figure 1: Map showing Kakum National Park (Monney *et al*., 2010)

3.2 Data Collection

Data for the study was obtained from both primary and secondary sources. The primary sources were key informant interviews (Interview guide provided in the Appendix) with four key park staff, including the Park Manager, Law Enforcement Officer, Range Supervisor and Forest Guard.

These key persons were selected due to their indebt knowledge and experience with the poaching situation in the KNP as a result of their roles as day-to-day managers of the park. Additionally, some primary data were collected from Focused Group Discussions (FGD) (FGD guide provided in the Appendix) conducted in 10 fringe communities namely; Abrafo, Kruwa, Tomfokro, Bobi, Antwikwaa, Abodweseso, Aduanom, Aboabo-Nyamebekyere, Ahomaho and Briscoe 2. The selection of the 10 communities was based on communities with high records of poacher arrests in the last 10 years (2011-2021) (Ntuli, *et al*., 2021; Wiafe & Amoah, 2012). On the average each focus group had between 9 to 15 persons including men and women. Secondary data were obtained from Quarterly Reports of the KNP (2011 to 2021) which were collected from the Law Enforcement Unit (sample attached as an Appendix) of the KNP. The reports were screened and sections relevant to the study were sampled and the data provided were inputted into MS Excel for analysis. Also online published literature from authentic sites including ResearchGate, JSTOR, ScienceDirect and Google Scholar were sourced. Data were collected using keywords such as 'poaching', 'poaching impact in Africa' and 'poaching laws in Ghana'. Articles obtained from the online search were assessed by examining the title, abstract, and keywords to determine suitability and relevance to specific areas of the study. In all about 70 articles were reviewed for the study.

3.2.1 Determine the effectiveness of existing wildlife legislations in Ghana in reducing poaching.

A review of relevant literature on wildlife legislations in Ghana was done to help understand what provisions are available to protect wild animals according to the laws of the country. To further understand how effective these wildlife laws are in reducing poaching in the Kakum National Park, during key informant interviews with park staff, some questions focused on how the laws support arrests, prosecution, and punishment for convicted poachers. Additionally, legislation on poaching

in Ghana was subject to a comparative analysis with poaching legislations of Nepal, the country with the least incidence of poaching in the world (WWF, 2020). This was done to ascertain the strengths and weaknesses of Ghana's legislation on poaching.

3.2.2 Identifying drivers of poaching

Data on drivers of poaching was collected through key informant interviews with park staff and focus group discussions with community members from 10 fringe communities. In order to deal with the potential difficulty to obtain accurate responses from locals due to the sensitivity of the topic, the Unmatched Count Technique (UCT), where respondents are asked a series of non-sensitive questions (e.g. name, favorite meal, source of livelihood) after which a sensitive question (e.g. do you know a poacher?) is chipped in was used in the focused group discussions (Nuno *et al*., 2015; Petroczi *et al*., 2011). This technique help put respondents at ease and encourage honest responses.

3.2.3 Determining poaching trends in KNP

Trends in this study refers to the overall directional change in activities that depict the presence of illegal activities in the wildlife reserves. Finding significant trends (increase or decrease) implies that a particular poaching activity is either increasing or decreasing. The absence of a significant trend implies that there is no change in the poaching activities over the 10-year period. Data used to assess the trends in poaching activities was obtained from the law enforcement unit of the Kakum National Park. According to Wiafe (2018), some of the indicators of poaching activities include the presence of empty cartridges, sound of gunshots, snares, poachers arrested, poacher camps, and human foot prints other than that of patrolling staff. The indicators of poaching used in determining poaching trends over the period (2011 to 2021) in this study were; snares found,

gunshots heard, empty cartridges, poaching camps, and poachers arrested. These were selected based on the availability of data from the Kakum National Park.

3.2.4 Examining law enforcement efforts of the park

The relationships between the law-enforcement effort and encounters with illegal activity and wildlife assume that patrol reports are reliable accounts of the activities of the patrol staff, both in terms of technical precision and in terms of being a true account of events (Jachmann, 1998). In evaluating the law enforcement effort of the park in the last 10 years, taking into consideration the assumption above, the catch per effort index (C/E) as developed by Jachmann (1998) was applied. This method was used to measure the level of encounter rates with indicators of illegal activities per year. Catch here refers to the total number of monthly encounters with indicators of illegal activity, and the effort is the total number of effective patrol man-days per month.

Data on the patrol team, hours spent in the field, waypoints of all the observations made during patrols were accessed from quarterly reports of the park.

3.3 Data Analyses

The method of analyzing data for the study objectives are provided in this subsection.

A comparative analysis of Ghana's legislation on poaching with that of Nepal was conducted. This allowed identification of the strengths and weaknesses of Ghana's legislation in addressing poaching in protected areas.

Data on drivers of poaching were analyzed using a modified version of the Social-Ecological System (SES) framework developed by Ostrom (2009). In the framework, poaching was viewed as occurring within a nested, multi-level SES (Figure 2).

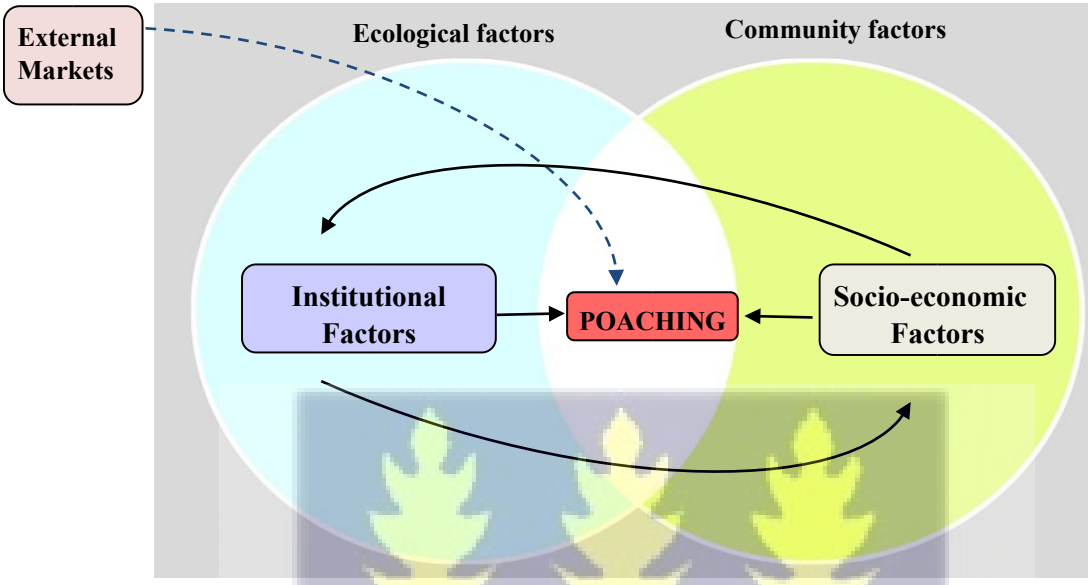

Figure 2: Analysis of poaching drivers with SES Framework

The factors in the innermost levels (socio-economic and institutional factors) are the closest to the actual act of poaching and reflect the characteristics (e.g., lack of patrols) immediately affecting the opportunity for poaching to take place at a given site and time (Clarke, 2008; Carter, 2017). Factors in the intermediate levels (ecological and community factors) reflect the individual characteristics that can directly influence a person to poach or increase an animal's vulnerability to poaching. The outer-most level (external markets) include more distal factors influencing poaching and reflect aspects of the broader trade contexts in which human societies and wildlife populations interact (Clarke, 2008; Carter, 2017). The outcome of this analysis was presented as a graphical framework, which instead of trying to capture all possible root drivers of poaching in the KNP, focuses on the factors that might enable conservation professionals further analyze and reduce poaching at spatio-temporal scales most relevant to them (Carter, 2017).

To determine the trends in poaching activities, the occurrence of illegal activities (snares found, gunshots heard, empty cartridges, poaching camps, and poachers arrested) were used. There are

several indicators of illegal activities recorded in the Kakum National Park patrol data, however only the five (snares found, gunshots heard, empty cartridges, poaching camps, and poachers arrested) were used because the other indicators had missing data for some years. The illegal activities in the park are dependent on the patrol efforts. This is to mean when the patrol efforts increase it is likely for more illegal activities to be identified compared to when there are less patrol efforts. Following Gray and Kalper (2005), the number of illegal activities identified for each month from 2012 to 2021 was divided by the effective patrol man-days to standardize the observations for each year. This gives an index of the monthly encounter rate of each type of observation. Descriptive statistics was used to describe the trends in poaching occurrences over 10 years using the index developed. Monthly data were used to compute the growth rates because a larger data set is required to run this analysis. The monthly growth rates in each illegal activity related to poaching were computed using log linear regression following the growth rate formula used by Shadmehri (2008). The equation used to compute the growth rate of illegal activities in the park is given as:

Log (illegal activity) = $\alpha_{0iA} + \alpha_{1iA} T_t$

Where, illegal activity is the time series data of index of the monthly encounter rate of each type of observation and T_t is the time in month. The coefficients α_{1iA} measure the monthly growth rates in illegal activities and α_{0iA} the constant terms for illegal activities at $T_t = 0$. One (1) was added to the frequency of occurrence of each variable to ensure that there were no undefined terms after taking the log of the frequency of occurrence (hence the frequency of occurrence used for each year was (n+1). The annual observations were also presented on graphs.

Law enforcement of the park involves patrolling the park in search of illegal activities or poacher activities. The main law enforcement strategies used in this study are obtained from the park's

quarterly reports. The methodology for this section follows Afriyie *et al*. (2021) and Jachmann (2008). Catch per unit effort which measures the level of encounter rates of illegal activities was used in this study as a measure of performance. The monthly change in catch per unit efforts was determined. An increase in this variable indicates the effectiveness of the staff as it implies there are more efforts to control poachers. Linear regression was models were used to examine the increase in patrolling was related to an increase in encounter rates with catch per unit effort as the dependent variable (Afriyie *et al*., 2021; Jachmann, 2008). Results obtained from the analyses were supported with information obtained from the key informant interview and focus group discussion. Responses from the Focus Group Discussions and key informant interviews were used to explain or validate the findings obtained from the regression. Stata and Microsoft Excel were used to perform statistical analysis of the study.

CHAPTER FOUR

4.0 RESULTS

4.1 Characteristics of respondents of the study

The respondents of the FGDs were made up of 118 males (83.7%) and 23 females (16.3%) (Figure 3). Majority of the respondents made up of 62 persons (43.9%) said they had primary education while 24 persons (17.0%) said they had secondary school education. Although six persons (4.3%) said they had tertiary education, 49 persons (34.8%) said they had no formal education.

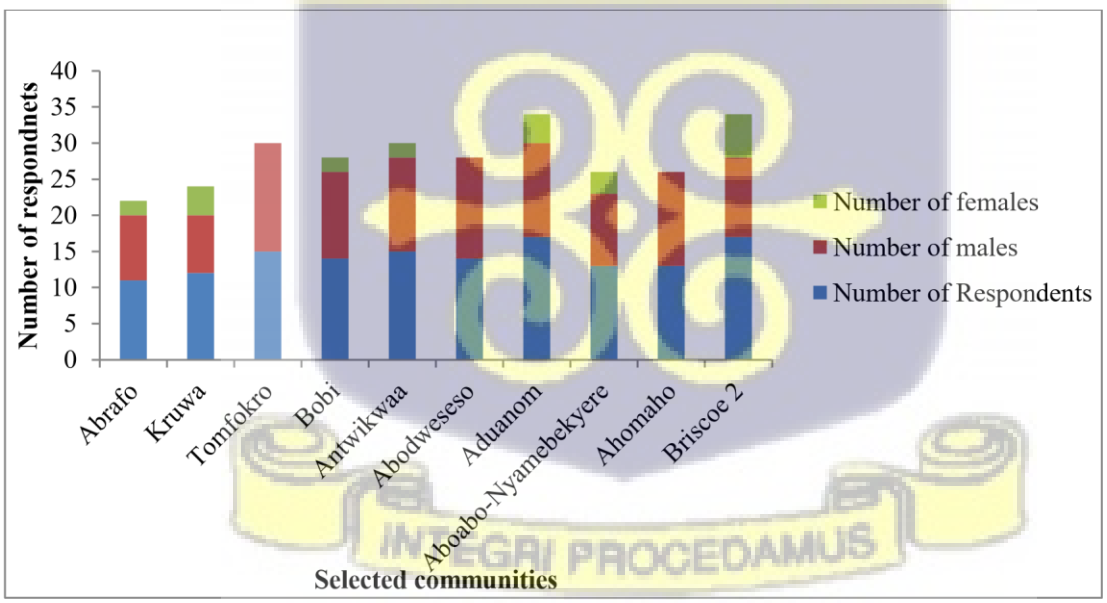

Figure 3: Profile of respondents in the Focus Group Discussions

Among the respondents were opinion leaders including Assemblymen, Unit Committee members, religious leaders and some community Elders. While a small fraction of the respondents (3%) said they were unemployed, cocoa farming was the major occupation (84%) and the main source of

livelihood for majority of the men and women although some women engaged in petty trading to support their homes (Figure 4).

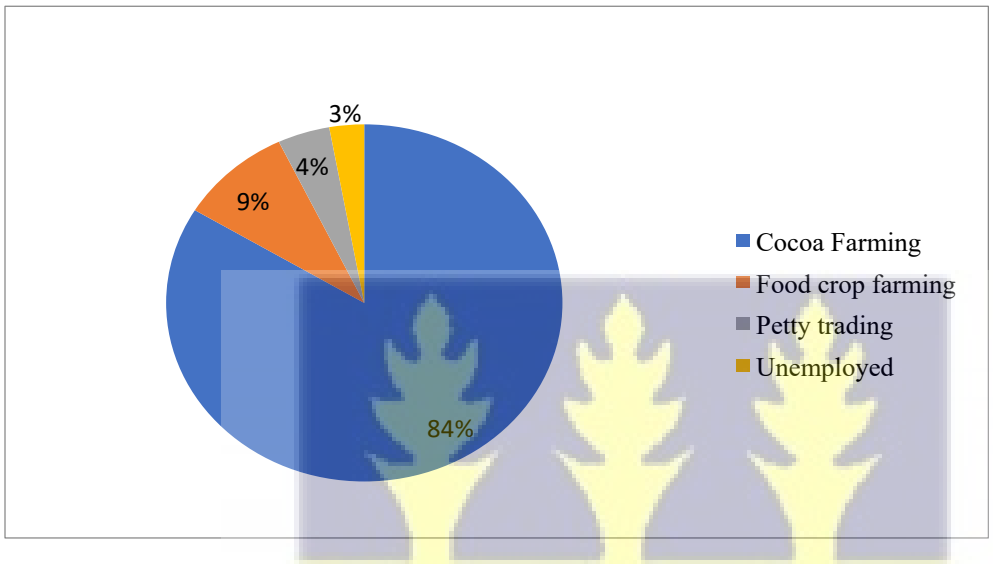

Figure 4: Livelihood Sources of Respondents

4.2 Determine the effectiveness of existing wildlife legislations in Ghana in reducing poaching.

Just like Ghana, other countries, have taken steps in curbing poaching, through legislation. A comparative analysis of the laws on poaching in Ghana, as compared to other nations, by identifying some similarities as well as drawing some differences, between these legislations was undertaken. For the purpose of this study, the legislation used for the comparison was the National Parks and Wildlife Conservation Act, 2029 (1973) of Nepal and Wildlife Animals Preservations Act, 1961 (Act 43) of Ghana (Table 1).

Table 1: Comparative Analysis of Ghana's poaching legislation against that of Nepal

Parameter	Ghana	Nepal
Parties to CITES	+	+
Structured Institutions	+	+
Sensitive Areas under Protection	+	+
Protected species listed	+	+
Entry and Hunting Prohibited	+	+
Permits and Licenses Required	+	+
Compensation	-	+
Rewards	-	+
Fines and Prison terms	+	+
Revenue to fringe communities	-	+

Table 1 shows the various parameters that were compared for the laws of the two nations. The positive sign (+) denotes that the assigned parameter is present in the wildlife laws of the respective nation and the (-) denotes the absence of a parameter in the wildlife laws of the respective nation. For instance both countries have (+) for 'Protected species listed' which means in the laws of both countries a list of protected species is provided. Whereas for 'Rewards' it is (-) for Ghana while (+) for Nepal, which means the laws of Ghana does not provide rewards for whistleblowers while the laws of Nepal clearly state the rewards due whistleblowers.

4.3 Identifying the drivers of poaching

Efforts to analyze the interaction between the varying drivers of poaching in the KNP were made from graphical mental maps based on responses and feedback from the key informant interviews

with park staff, as well as information obtained from the focused group discussion with 10 communities, with the worst history of poaching. Figure 5 indicates how respondents ranked the key drivers of poaching. Socio-economic and Institutional factors ranked the first and second highest perceived factors with 37% and 28% respectively, followed by Ecological and Community factors as third and fourth with 18% and 16% respectively. External Markets was ranked the fifth factor that drives poaching in the KNP. Subsequently, a Socio-Ecological Systems framework for this ranking was used (adapted from Ostrom, 2009) to discuss the key dimensional factors that drive poaching in the KNP.

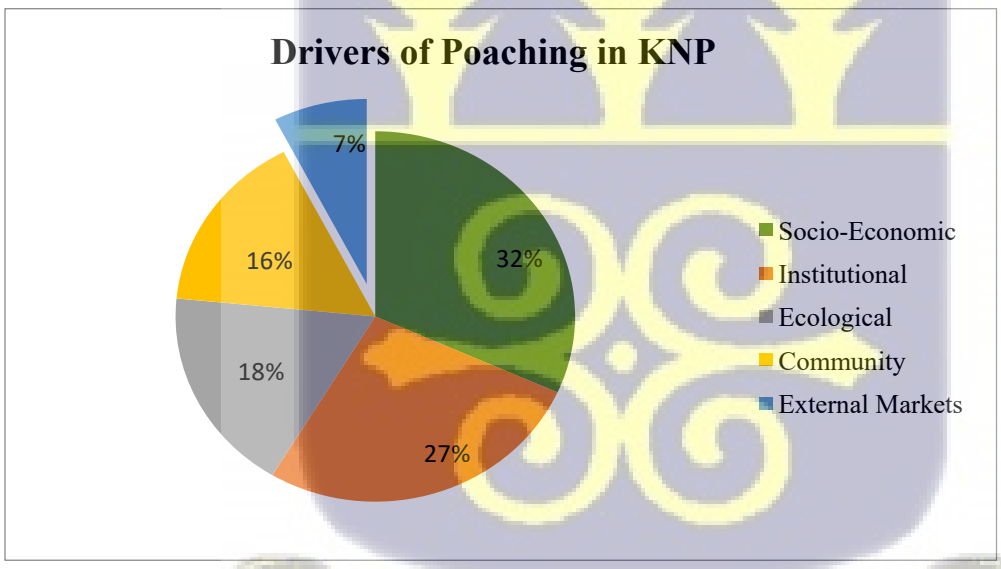

Figure 5: Perceived drivers of Poaching in Kakum National Park

4.4 Poaching trends in Kakum National Park

Tables containing linear regressions and figures are presented in this section. The coefficients of the trends portray the monthly growth rate in the illegal activities. The monthly growth rates of the indices of the activities listed above from 2012 to 2021 are used as an indication of poaching. The annual indices of the illegal practices in the park were also described using graphs. The illegal

activities include snares found in the park, gunshots heard, empty cartridges, poaching camps, and poachers arrested.

Snares found in the park

Table 2 presents a linear regression of the monthly snares recorded over time. One hundred and eleven data points were used in the regression. The coefficient of the time trend gives the growth rate in the indices of number of snares per effective patrol man-days for each month. From the results, the coefficient of time trend (-1.2E-05) is negative implying a decrease in the indices of the snares found. Nonetheless, this is not statistically significant at 10% (0.10) because the P-value is 0.29. This implies there was no change in the indices of snares found.

Table 2 Regression results for monthly snares found

Log snares	Coefficient	Std. Err.	T	P-value
Time trend	-1.2E-05	1.09E-05	-1.06	**0.29**
Constant	0.004434	0.00072	6.16	0.00
Number of observations				114
F(1, 112)				1.12
Prob > F				0.29

Source: KNP data (2022)

Figure 6 gives the annual trends in the indices of snares found in the pack. The years 2013 and 2017 recorded the highest indices with 2021 recording the least value. After 2017, there was a reduction in the indices of snares found.

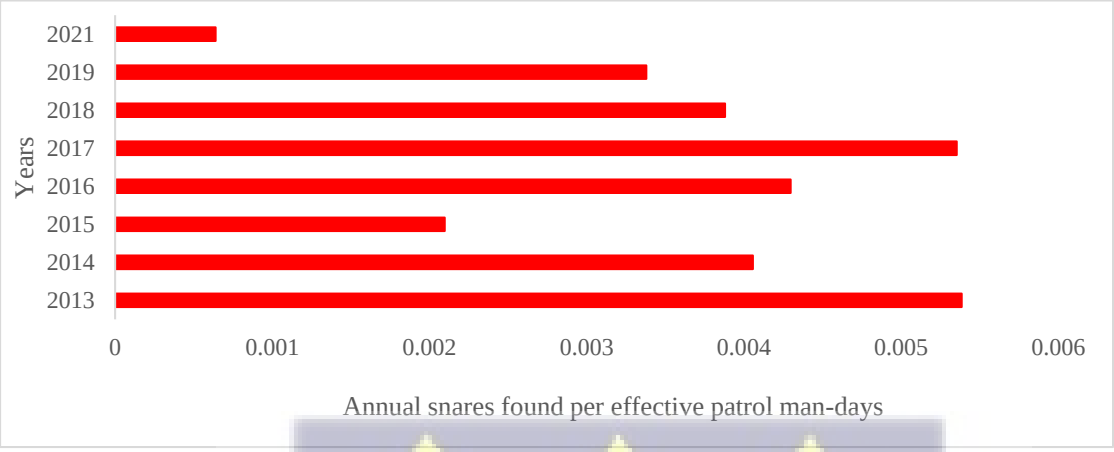

Figure 6: Annual trends in snares found in Kakum National Park

Source: KNP data, 2022

Gunshots heard in the park

Table 3 and Figure 7 give the trend in gunshot heard and the annual trend in the indices of gunshots heard respectively. The coefficient of time trend (1.88E-05) is positive which imply an increase in the number of gunshots heard in the park. This monthly trend increase is significant at 10% (it has a p-value of 0.087). The values recorded for gunshots heard do not include those shot by the patrol team.

Table 3 Regression results for monthly gunshots heard

Variables	Coefficient	Std. Err.	t	P-value
Time trend	1.88E-05	1.09E-05	1.73	**0.087**
Constant	0.004225	0.00072	5.87	0.000
Number of observations				114
F(1, 112)				2.98
Prob > F				0.087

Source: KNP data, 2022

Figure 7 shows that 2019 recorded more gunshots compared to the other years. From 2013 the number of gunshots heard were high but this value fell gradually till 2015 and begun to increase again in 2016 till 2019 then it fell in 2021.

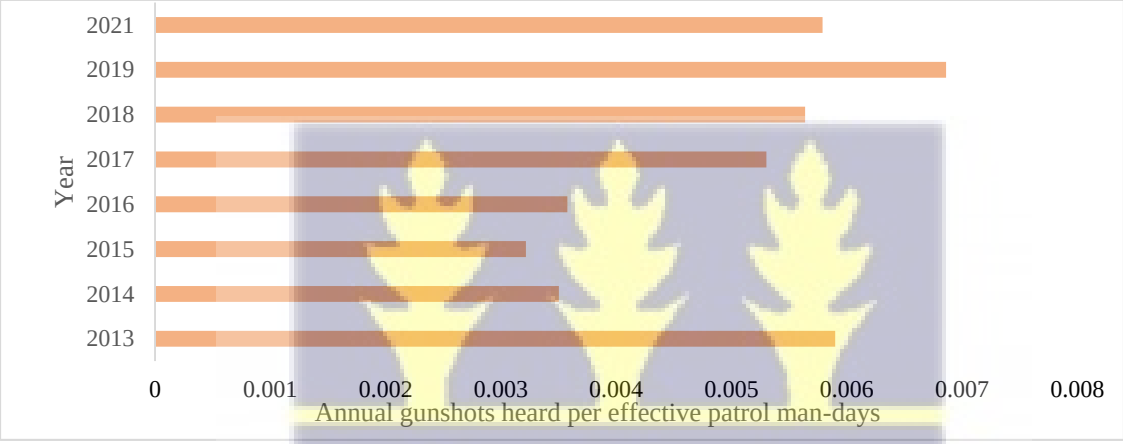

Figure 7: Annual trends in gunshots heard in Kakum National Park

Source: KNP data, 2022

Empty cartridges found in the park

The regression results (Table 4) show that the coefficient of the time trend is negative. However, this is not statistically significant at 10% as the P-value is 0.237.

Table 4 Regression results for monthly cartridges found in the park

Variables	Coefficient	Std. Err.	t	P-value
Time trend	-8.10E-06	6.81E-06	-1.19	**0.237**
Constant	0.003315	0.000451	7.35	0.000
Number of observations				114
F (1, 112)				1.41

Prob > F	0.237

(Source: KNP data, 2022)

The findings from the annual trends of empty cartridges depict a decreasing trend till 2016 and then the movement become irregular (Figure 8). More cartridges were found in 2013 and the least were found in 2016.

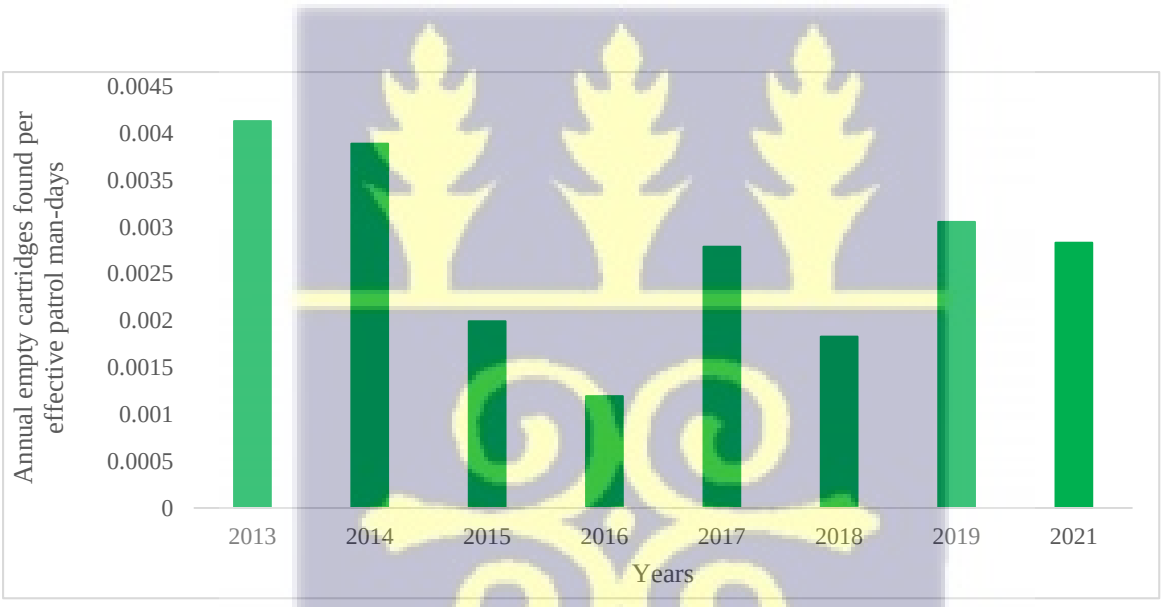

Figure 8: Annual trends in empty cartridges found in Kakum National Park

Source: KNP data, 2022

Poaching camps found in the park

The indices of poaching camps found per effective patrol man-days for each month and year are presented in Table 5 and Figure 9. Although the coefficient of the monthly trend in poaching camp has a negative sign which signifies a decrease, this is not statistically significant as the level of significance is greater than 10% (p-value is 0.149, that is 14.9%).

Table 5: Regression results for monthly poaching camps found in the park

Variables	Coefficient	Std. Err.	t	P>t
Time trend	-4.70E-06	3.23E-06	-1.45	**0.149**
Constant	0.001036	0.000214	4.84	0.000
Number of observations				114
F(1, 112)				2.12
Prob > F				0.149

Source: KNP data, 2022

The annual trend in poaching camps found shows an irregular pattern (increases one year then decrease two years). More poaching camps were found in 2014 followed by 2013. Again 2016 and 2015 recorded the least poaching camps.

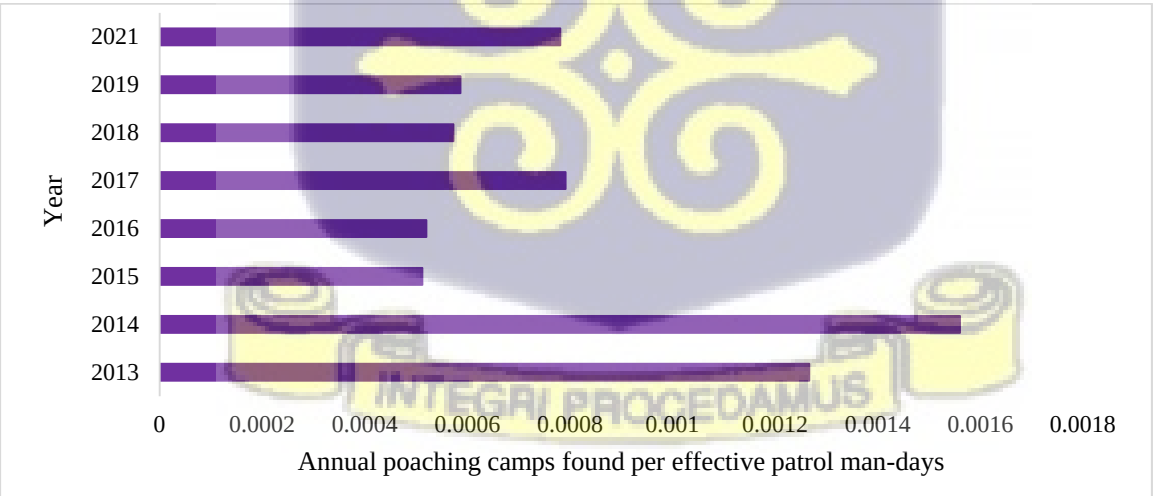

Figure 9: Annual Trends in poaching camps found in Kakum National Park

Source: KNP data, 2022

Poachers arrested in the park

The monthly and annual indices of the number of poachers arrested per effective patrol man-days are presented in Table 6 and Figure 10. The monthly time trend has a negative coefficient which is significant at 10%. This portrays a decrease in the poachers arrested per effective patrol.

Table 6 Regression results for monthly poachers arrested

Variable	Coefficient	Std. Err.	t	P-value
Time trend	-6.51E-06	3.88E-06	-1.67	**0.097**
Constant	0.001398	0.000257	5.43	0.000
Number of observations				114
F(1, 112)				2.80
Prob > F				0.097

Source: KNP data, 2022

The indices recorded shows that the year with the least arrests was in 2018. The greatest number of arrests were in 2013 and 2015. This is followed by the arrests in 2019. The least number of arrests occurred in 2018.

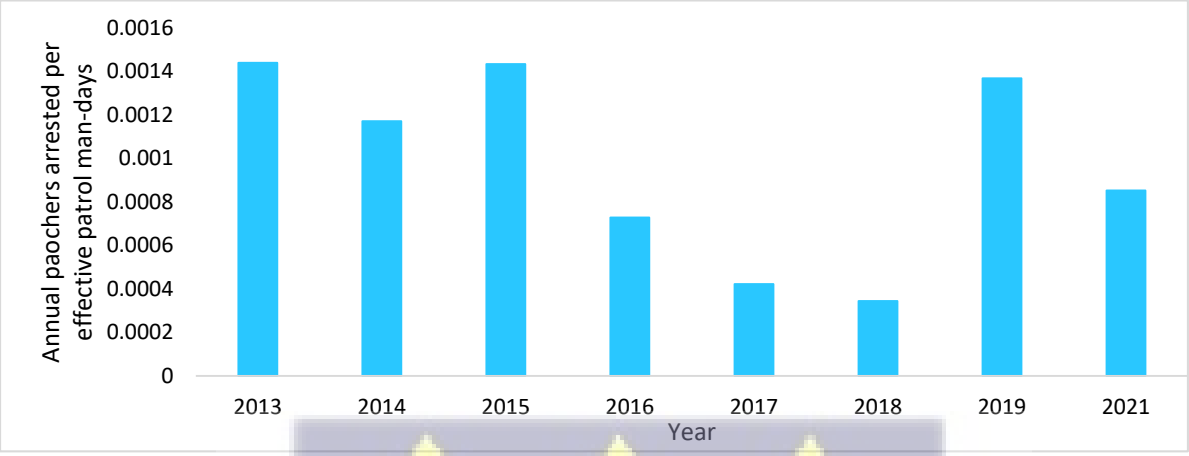

Figure 10: Annual trends in poachers arrested in Kakum National Park

Source: KNP data, 2022

4.5 Effectiveness of law enforcement

Law enforcement in the park is undertaken by patrol staff to arrest or scare off poachers. This was done by describing the changes in the effective patrol man-days, effective patrol staff and effective patrol.

Effective patrol man-days

The annual effective patrol man-days from 2012 to 2021 are provided in Figure 11. From the figure, effective patrol man-days increased from about 7500 Effective patrol man-days in 2013 to about 8500 effective patrol man-days in 2015. After 2015, the value reduced to about 6100 effective patrol man-days in 2021.

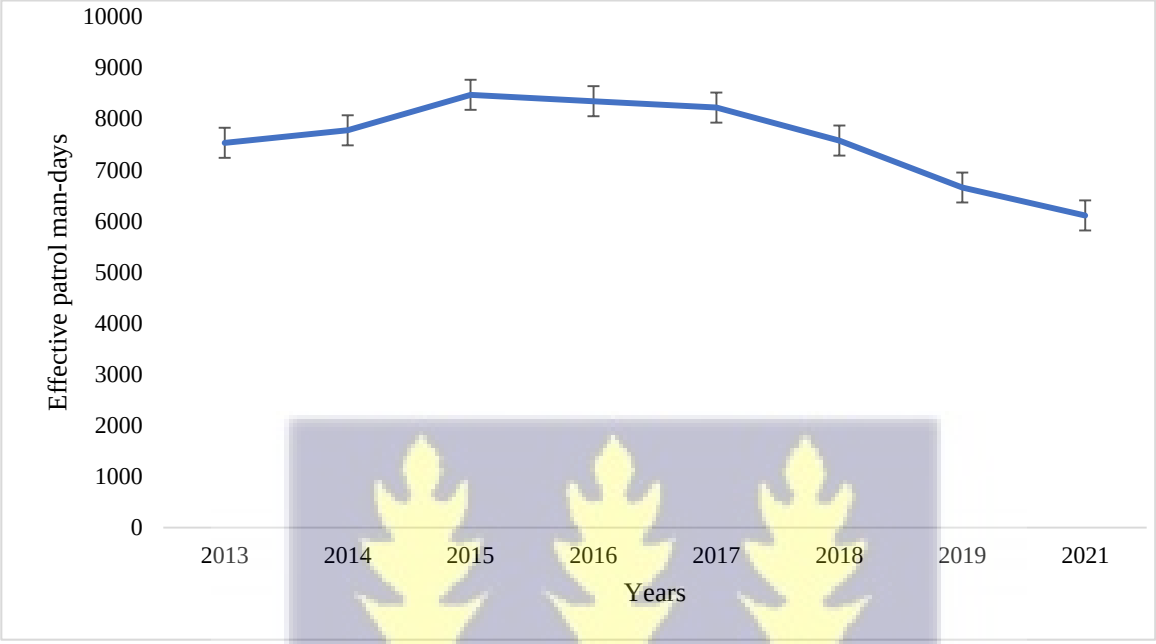

Figure 11: Effective Patrol Man-days at Kakum National Park (2013-2021)

Source: KNP, 2022

Effective patrol staff and effective patrol

Figure 12 shows the monthly effective patrol staff and effective patrol over the period (2012-2021). The figure shows that the effective patrol staff had an equation of **y = -0.0499x + 37.931; P> |t| = 0.003.** This indicates a significant decrease in the effective patrol staff at 1% with time. However, the effective patrol had an equation of **y = -0.0047x + 18.471; P> |t| = 0.596** which is not significant.

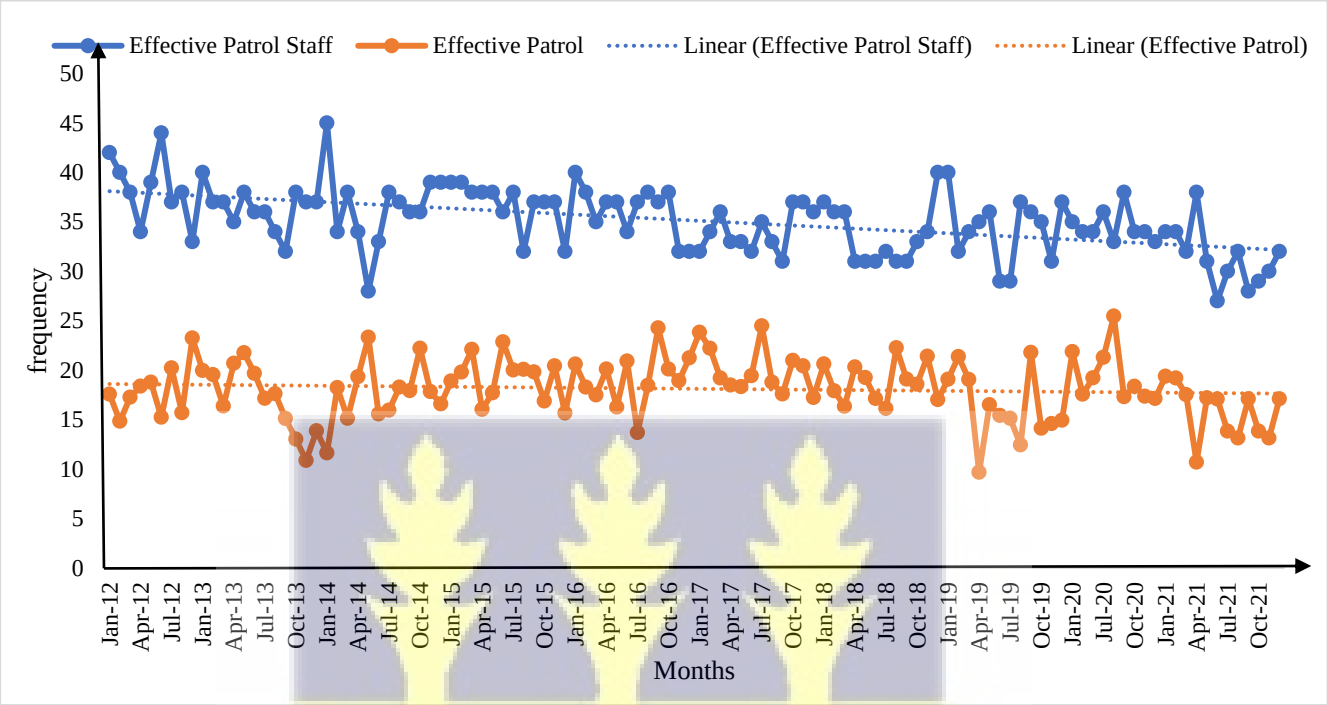

Figure 12: Effective Patrol Staff and Effective staff on the park (2012- 2021)

Source KNP, 2022

Association between Effective patrol staff and catch per unit effort

Figure 13 presents the catch per unit efforts and the effective patrol in months. The diagram shows that both the effective patrol staff and the catch have been fluctuating over the months for 2012 to 2021. Again, a negative relationship between the number of effective patrol staff and the catch per unit effect indices from a simple linear regression ($Y= -0.0018X + 0.1255$, $P>|t| = 0.044$) was obtained. It is observed from the results that as the numbers of effective staff increase, the catch per unit effort indices reduces.

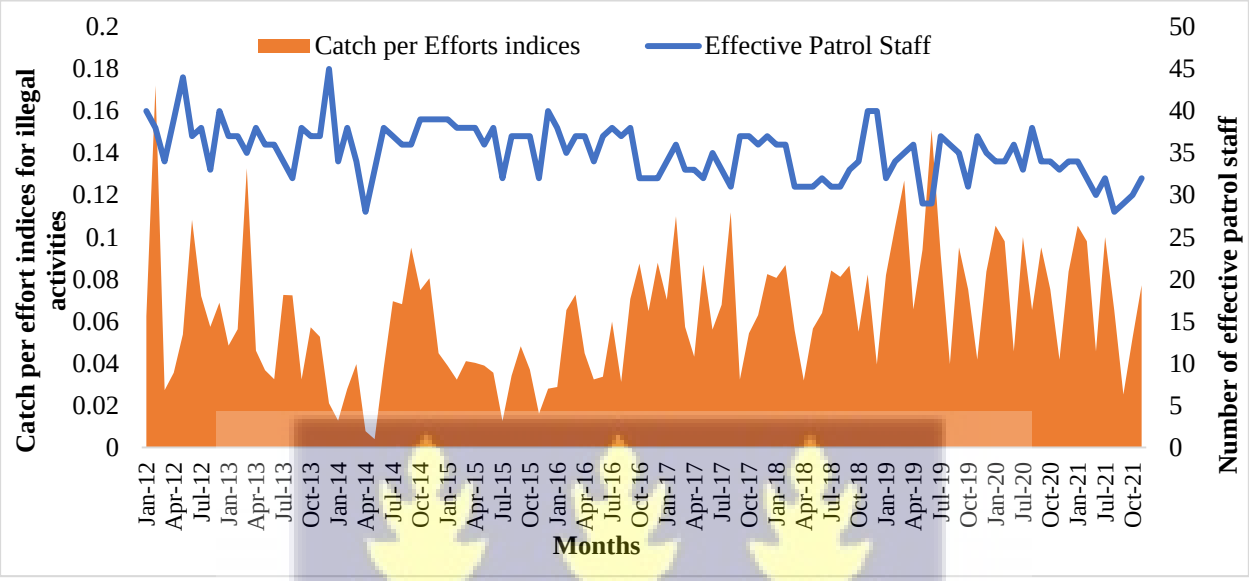

Figure 13: Relationship between the catch per effort indices and number of effective patrol staff (2012-2021)

Source: (KNP, 2022)

CHAPTER FIVE

5.0 DISCUSSIONS

5.1 Review of existing legislation

Based on available data on global poaching, the National Parks and Wildlife Conservation Act, 2029 (1973) of Nepal as against the Ghanaian Law though passed in 1973, has proved very useful, to the nation of Nepal, on the subject of poaching (WWF, 2020). This section details some similarities, as well as some differences, between this legislation and Ghana's Wildlife Animals Preservations Act, 1961 (Act 43).

The wildlife conservation laws of Ghana and Nepal share some similarities as well as some significant differences. Whiles the effectiveness, community support and buy-in may be the reason behind Nepal performing very well with their control of poaching, Ghana still has some significant challenge with its poaching control. Using the wildlife conservation laws of Nepal as a measure of potent legislation is due to its ability to contribute to zero poaching occurrences; as they recorded a whole year of zero poaching of rhinos in 2011.This trend was maintained for two consecutive years (2015 and 2016) and also earned a reputation in 2014 as the first country in the world to achieve zero poaching of its three flagship species: tigers, rhinos and elephants (WWF, 2020).

Ghana and Nepal are both Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), a global agreement among governments to regulate or ban international trade in species under threat (Wijnstekers, 2003). The legislation of the two countries allows them to partake in such a global move that makes them better placed to improve their anti-

poaching efforts and enhance species conservation (Geijzendorffer, 2017). By ratifying the Convention, the two countries join the global efforts purposed to address overexploitation of many vulnerable species as a result of unregulated international trade. This is so because CITES leads creation of awareness on surges in illegal wildlife trade and takes an organized approach to the fight against the illegal trade (Azizi *et al*., 2019). This they do through the formation of the International Consortium on Combating Wildlife Crime (ICCWC), which is a collaborative effort of five inter-governmental organizations (CITES, INTERPOL, the United Nations Office on Drugs and Crime, the World Bank and the World Customs Organization). This consortium works to bring coordinated support to law enforcement agencies responsible for wildlife at the national level and to the sub-regional and regional networks that protect natural resources on a daily basis (Azizi *et al*., 2019).

Also, the Government of Nepal, per Section 16b of its law, just like that of Ghana per Section 1 of the Wildlife Animals Preservations Act, 1961 (Act 43), has the power to establish structures to carry out all purposes of the laws. These provisions of the two laws meaningfully establish the necessary institutions like the Ministry of Lands and Natural Resources and its Agencies in Ghana and the Ministry of Forests and Environment and its Departments in Nepal. These Institutions have helped to manage poaching through several interventions and strategies including monitoring, patrolling and law enforcement in protected areas of both countries (Ayling, 2013).

Other similarities Ghana shares with Nepal include the declaration of sensitive areas as protected areas exempted from exploitation of any kind especially those gazzetted as National Parks. Both laws list species under protection and rightly makes it illegal to hunt these wild animals. There is also the provision for no entry and no hunting in National Parks by both laws of Ghana and Nepal. These sound provisions in the laws are significantly helpful in reducing poaching. Such provisions

have clearly contributed to minimal incidence of poaching in Nepal and to a considerable extent in recent times in Ghana and this is consistent with WWF (2020); Martin (2010).

Although, the laws of both countries have key provisions that control poaching, the laws of Nepal have peculiar provisions that enhance and sustain poaching control than the laws of Ghana. As indicated by several works including that of Bajracharya *et al*. (2006) providing fringe communities with adequate incentives go a long way to improve conservation and keep poaching to the minimum. The laws of Nepal in its provisions in Sections 3a, 3b and 3c clearly recognize buffer zones that fringe national parks that belong to local communities and as such make provision for compensations to be paid to persons who suffer any loss of property as a result of the operations of the park in the buffer.

Additionally, provisions in Sections 25 and 25a clearly provides rewards for persons that support anti-poaching activities by reporting poachers to authorities and also return to 50% of all earnings of National Parks to the development of local communities respectively. According to Bajracharya *et al*. (2006) such provisions in the laws of Nepal have direct impact on local communities' commitment towards conservation since they receive direct benefits for their efforts. Such provisions are clearly absent in the laws of Ghana and may be a major contributing factor to Ghana's difficulty in achieving zero poaching. Communities many times lament the limited monetary benefits they receive from activities of the KNP including its ecotourism and this serves as a direct motivation for the locals to look on unconcerned when poachers go about their deeds unlike the locals of Nepal who will voluntarily report poachers knowing they will be duly rewarded or compensated if they suffer any loss (Bajracharya *et al*., 2006; Martin, 2010).

As shared by Gandiwa (2013) law enforcement plays a critical role in significantly reducing poaching at all levels. Wilson and Boratto (2020) equally emphasis the need for poaching laws to

be punitive enough in order to deter poachers other than that the laws may themselves become motivation for persons to engage in poaching. Such is seen in the study of Kassa *et al*. (2021) where in Uganda when poachers are arrested poachers some demand that they be taken to court with the good chances of only paying a small fine after pleading guilty to the charges. It is therefore not surprising for Nepal to record zero poaching since Section 26 of its law imposes high fines and severe sentences up to 15 years or both whereas that of Ghana is a small fine with short sentences up to 2 years. It is therefore, clear that the punitive nature of Nepal's laws is having a significant impact on poachers by keeping their activities to the minimum while Ghana still struggles to achieve this fate.

5.2 Drivers of poaching in the Kakum National Park

According to Partelow (2018) the Social-Ecological Systems (SES) framework is arguably the most comprehensive conceptual framework for diagnosing interactions and outcomes in social-ecological systems. As shown in Figure 6, diverse factors drive poaching in the KNP and these have been categorized under five main themes namely; Socio-economic, Institutional, Ecological, Community and External Market factors and Review of existing literature reveals a fifth factor that lies beyond the control of a single country although it has a direct influence on poaching in protected areas.

The SES framework in Figure 6 describes poaching as the central issue of concern bearing direct influence from two key factors thus socio-economic and institutional factors. Based on the results, socio-economic factors are ranked the first driver that causes people to engage in poaching although they are well aware of its illegality. The challenge of youth unemployment in the study area coupled with dwindling yields of cocoa farms serves as a motivation for the men to enter and

poach in the KNP. Additionally, respondents acknowledge that many people dare enter the park to poach during the lean cocoa season when the majority of the people have no other source of income (84% of respondents had cocoa farming as the only source of income as shown in Figure 5). The findings are similar to that obtained in studies undertaken by Lunstrum and Givá (2020). who found that economic factors including poverty are the most central drivers of poaching on the ground-level in Africa. Similarly, Challender and MacMillan (2014) asserts that poverty is most prevalent among the rural poor who fringe protected areas and predominantly depend on natural resources for their livelihoods. Lack of basic needs including food, serves as a major motivation for such fringe communities to engage in illegal wildlife trade in places where bushmeat markets exist (Harich *et al*., 2013).

Although socio-economic factors appear to be the central driver of poaching in the KNP, the study revealed that the ability of anyone who intends to poach even for economic reasons is able to do so due to the enabling environment created by Institutional challenges including weak law enforcement and the less punitive nature of the wildlife laws in Ghana. Major challenges with low staff numbers as well as limited logistical strength limit the park's ability to conduct effective patrols which could deter poachers from plying their illegal trade. This places Institutional challenges as the second most important factor at par with socio-economic influences when it comes to the motivation for poaching in the KNP as illustrated in the SES framework (Figure 6). The results obtained corroborates with that obtained by Kassa *et al*. (2021) in Uganda where arrested poachers would even demand to be taken to court with the prospect of only paying a small fine, after having pleaded guilty to the charges. The remaining money the poachers will have from the sale of their catch in many cases exceed the penalties they may be made to pay when caught. This serves as a direct motivation to engage in poaching when one has financial difficulties.

The intermediate level of drivers that influence poaching in the KNP are the Ecological ranked third and Community factors ranked fourth. Ecological factors in this case refer to occurrences including Human Wildlife conflict which affect both wild animals and livelihoods when their needs overlap. The study observed that many farms are established right within the buffer zones of the park and this serves as bait for animals including elephants to enter and raid crops leading to conflicts between the animals and farmers. Such situations fuel the provocation of locals to poach. Danquah (2014) and Osei-Owusu (2018) equally asserts that in Africa, HWC primarily occurs in regions where rural communities live in close proximity to protected areas. The lack or limited span of buffers around protected areas aggravates the occurrence and extent of crop damage from wild animals and this poses a strong provocation for people to poach the animals at the center of the damage (Danquah, 2014). Although the respondents of this study were reluctant to accept that the location of their farms in the buffer zones contributes significantly to crop raids, they were quick to suggest that elephants that damage their crops need to be killed.

Community factors, on the other hand, refer to enshrined beliefs, cultural practices, and entrenched positions of people who believe that they are the rightful owners of the forest resource (Osei-Owusu, 2018). The study observed that, although the communities accept the position of the law to protect the park from any form of encroachment, they believe that their forefathers were the owners of the forest before it was seized from them. Such beliefs cause people to be hesitant in desisting from poaching or even reporting poachers they know. During the FGDs, one old man, expressed this belief when he emphatically stated that:

"*the government needs to understand that those that live by the sea eat from the sea so those that live by the forest must be left to eat from the forest*".

Such a belief system has the potential to influence people to poach without much consideration. Similar observations were made by Kassa *et al*. (2021) where majority of their research participants in northern Uganda felt infuriated whenever wildlife trafficking awareness campaigns were brought to their door step. For them, the bigger crime is the creation of the wildlife habitat itself which they believe has led to the destruction of their traditional heritage, loss of access to ancestral lands and sources of livelihood as well as the human consequences for the arrest and prosecution of persons engaged in wildlife crimes (Kassa *et al*., 2021).

A distal driver of poaching as shown in the framework is External markets ranked as the fifth and the least most important factor that influence the decision of poachers at the local level and in this case the KNP. In cases where poachers do not find markets for their catch, this might serve as a disincentive to engage in this trade hence the availability of markets may encourage it. Within the study area, poached animals are speculated to end up in homes, 'chop bars', and the bushmeat markets dotted across the country. Notable outlets where poachers are believed to sell their catch include Assin Fosu market, Jukwa market, and a newly discovered wholesale outlet at Nfuom all around the Kakum Conservation Area. These are the local markets that support poaching in the area. However, the influence of bigger markets outside of the country is perceived to hold a stronger influence on a large scale and organized poaching incidences where people hire recalcitrant poachers that live outside protected areas to poach large mammals like the elephant for its tusk (Newmark & Hough, 2000).

5.3 Poaching trends in Kakum National Park (2011-2021)

The study analyzed the monthly and annual trends in snares found, gunshots heard in the park, empty cartridges found, poachers' camp found and poachers arrested in the park. The findings of

this study revealed that there were no changes in the monthly snares, empty cartridges, and the poaching camps found in the park over the study period (Tables 2, 4, and 5). This means that with the given patrol efforts the number of snares, empty cartridges, and poaching camps found have neither increased nor decreased over the period. However, an increase in the number of gunshots heard per month and a decrease in the number of arrests were observed from the findings (Tables 3 and 6). These trends (reduction in arrests and increase in gunshots heard) may imply that the poaching activities are gradually reducing which may be attributed to law enforcement efforts or the poachers have resorted to improved ways of poaching without being noticed. An increase in the number of gunshots heard per month may also imply poachers may have resorted to using guns which may be a better way to get target prey. Similar to findings of Wiafe (2018) who observed that the main hunting equipment found on arrested poachers were shotguns and wire snares and this may explain why there were increases in the gunshots heard in the Park.

Weapons and tools poachers use for hunting include short guns and wire snares (Oates, 1993). Apart from poacher arrests, law enforcement officials use the presence of other poaching indicators such as gunshots heard, poaching camps, empty cartridges and the presence of snares to monitor the activities of poachers in the KNP (Wiafe, 2016).

5.4 Law Enforcement effectiveness of the park

Effective patrol man days (EPMD) is the time spent actively pursuing illegal activities in the park. This is equivalent to the monthly effective patrol time of all the active patrol staff. The linear model over time shows a decrease in the EPMD value (Figure 11). The effective patrol man-days per month recorded on the field have been fluctuating over the period under study. These fluctuations

according to the park staff is due to the practice where Rangers make their movements unpredictable and also as a result of inadequate staff numbers and logistics for field patrols.

The effective patrol staff per month that is- the total number of active patrol staff on duty/ involved in the patrolling for a given month was also found to be reducing with time (Figure 12). These indicate a reduction in the efforts put into controlling illegal activities on the field. The main law enforcement strategy of the park is patrolling hence reduction in the patrolling effort of staff and the EPMD over the years implies reduction in the law enforcement in the park.

During the key informant interviews with the park staff, it was revealed that the park has low number of staff and limited logistical strength. This may have contributed to the reductions in the law enforcement efforts of the park. This could have resulted in the fluctuations in both the catch per unit effort indices and the effective patrol staff (Figure 13).

This indicates that as patrolling efforts increase, this could deter poachers from undertaking illegal activities in the park hence, the catch per unit efforts will reduce. This result is similar to findings from Wiafe (2016) who found fluctuations in the trends of encounter rates in his study and he attributed that to the flexibility of patrol staff in their implementation plans (that is, they use lessons learned from previous months to adjust their patrolling strategies), although it is equally likely less staff and limited logistics challenge of the park could be a contributing factor for the declining encounter rate (Afriyie *et al*., 2021).

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Through desktop reviews, key informant interviews with park staff and local communities as well as analysis of data on poaching from the KNP, the study concludes that;

1. The laws that park managers employ in prosecuting poaching are less punitive with very low fines and jail terms for convicted offenders. This serve as an incentive for poachers to keep plying their trade because when caught, the fines they will be made to pay are much lesser compared to the money they make from their poaching activities.
2. It was evident that the central driver of poaching is the economic hardships of locals who are mostly poor and depend heavily on the Park for sustenance. Challenges such as weak law enforcement in the park due to low staff numbers, limited logistics and low use of technology allows for poachers to hunt without fear of punishment.
3. Factors that indicate poaching activities in the park have gradually reduced over the last 10 years which indicates that poaching in the KNP may be declining.
4. The Effective Patrol Man-Days (EPMD) per month fluctuated over the 10 years as the Effective Patrol Staff per month were found to be reducing with time. This indicates a reduction in the efforts put into controlling illegal activities in the KNP.

6.2 Recommendation

The following recommendations are made for consideration and further studies;

1. Forest management strategies should consider tangible ways of supporting local communities to adequately improve their livelihoods to discourage poaching in the long term.
2. Law enforcement teams need to be provided with the requisite number of staff, logistics, and technology to adequately deal with poaching in the medium to long term.
3. Further study to ascertain whether the decline in poacher arrests in the KNP is as a result of effective law enforcement or that poachers have found new way of outwitting arrest.

REFERENCES

Abebe, F. B., & Bekele, S. E. (2018). Challenges to national park conservation and management in Ethiopia. *Journal of Agricultural Science*, *10*(5), 52.

Abukari, H., & Mwalyosi, R. B. (2018). *Comparing pressures on national parks in Ghana and Tanzania: The case of Mole and Tarangire National Parks.* Global Ecology and Conservation, 15, e00405.

Afriyie, O. J., Asare, J., Osei Mensah, J., & Hejcmanova, J. (2021). Evaluation of long-term law enforcement monitoring in a West African protected area. Cambridge University Press. Available via https://doi.org/10.1017/S0030605320000228

Amoah, M., & Wiafe, E. D. (2012). Livelihoods of fringe communities and the impacts on the management of conservation area: the case of Kakum National Park in Ghana. International Forestry Review, 14(2), 131-144.

Anderson, D. (1987). Managing the forest: The conservation history of the Lembus, Kenya, 1904- 1963. In: Anderson, D. and Grove, R. (Eds). Conservation in Africa: People, policies and practice. Cambridge University Press.

Ayivor, J. S., Gordon, C., & Ntiamoa-Baidu, Y. (2013). Protected area management and livelihood conflicts in Ghana: a case study of Digya National Park. Parks, 19(1), 37-50.

Ayling, J. (2013). What sustains wildlife crime? Rhino horn trading and the resilience of criminal networks. Journal of International Wildlife Law & Policy, 16(1), 57-80.

Azizi, D., Biermann, F., & Kim, R. E. (2019). Policy integration for sustainable development through multilateral environmental agreements: An empirical analysis, 2007–2016.

Global Governance: A Review of Multilateralism and International Organizations, 25(3), 445-475.

Bajracharya, S. B., Furley, P. A., & Newton, A. C. (2006). Impacts of community-based conservation on local communities in the Annapurna Conservation Area, Nepal. Biodiversity & Conservation, 15(8), 27652786.

Barrow, E., Kamugisha-Ruhombe, J., Nhantumbo, I., Oyono, R., & Savadogo, M. (2016). Who owns Africa's forests? Exploring the impacts of forest tenure reform on forest ecosystems and livelihoods. *Forests, trees and livelihoods*, *25*(2), 132-156.

Bassett, T.J. (2005), "Card-carrying Hunters, Rural Poverty, and Wildlife Decline in northern Cote d'Ivoire", *The Geographical Journal*, Vol. 171 No. 1, pp. 24-35.

Blanc, J. J., Barnes R. F. W., Craig G. C., Dublin H. T., Thouless C. R., DouglasHamilton I. & Hart J.A., (2007). *African Elephant Status Report 2007: An Update from the African Elephant Database, 2007 occasional paper of the IUCN Species Survival Commission*. No. 33. Gland, Switzerland: IUCN.

Challender, D. W., & MacMillan, D. C. (2014). Poaching is more than an enforcement problem. *Conservation Letters*, *7*(5), 484-494.

Clement, T. G. (2017). *Population Estimate and Distribution of the Western Chimpanzee (Pan Troglodytes Verus) in Sapo National Park, Liberia* (Doctoral dissertation, University of Nairobi).

Compaore, A., Sirima, D., Hema, E. M., Doamba, B., Ajong, S. N., Di Vittorio, M., & Luiselli, L. (2020). Correlation between increased human-elephant conflict and poaching of elephants in Burkina Faso (West Africa). *European journal of wildlife research*, *66*(1), 1-9.

Conciatore, J. (2019). Up to 2.7 million pangolins are poached every year for scales and meat. Online Article available via https://www.awf.org/blog/27-million-pangolins-are-poached-every-yearscales-and-meat.

Cowlishaw, G. U. Y., Mendelson, S., & Rowcliffe, J. M. (2005). Evidence for post-depletion sustainability in a mature bushmeat market. Journal of applied ecology, 42(3), 460-468.

Danquah, E. (2014). *Human-Wildlife Conflicts*. Nature & Faune. FAO Regional Office for Africa. Vol. 21, Issue 2. Available via https://www.researchgate.net/publication/267208898

Dery, G., Imoro, A. Z., & Dzitse, S. (2022). A survey on trade in wildlife parts in the Northern Region of Ghana. *Global Ecology and Conservation*, *38*, e02208.

Dudley, N. (Editor) (2008). Guidelines for Applying Protected Area Management Categories. Gland, Switzerland: IUCN. x + 86pp.

Emogor, C. A., Ingram, D. J., Coad, L., Worthington, T. A., Dunn, A., Imong, I., & Balmford, A. (2021). The scale of Nigeria's involvement in the transnational illegal pangolin trade: Temporal and spatial patterns and the effectiveness of wildlife trade regulations. *Biological Conservation*, *264*, 109365.

Epanda, M. A., Fotsing, A. J. M., Bacha, T., Frynta, D., Lens, L., Tchouamo, I. R., & Jef, D. (2019). Linking local people's perception of wildlife and conservation to livelihood and poaching alleviation: A case study of the Dja biosphere reserve, Cameroon. *Acta Oecologica*, *97*, 42-48.

Geijzendorffer, I. R., Van Teeffelen, A. J., Allison, H., Braun, D., Horgan, K., Iturrate-Garcia, M., & Zuppinger-Dingley, D. (2017). How can global conventions for biodiversity and

ecosystem services guide local conservation actions? Current opinion in environmental sustainability, 29, 145-150.

Glover K. E. (2020). Pre-Colonial, Colonial and Postcolonial Forest Legislation, Forest Policies and Practices: Forest Law, Forest Policy and Enforcement Mechanisms for Protection of Forest Resources in the Sudan. Academic dissertation for the Doctor of Laws (LL. D.) Degree. ISBN 978-951-51-6793-4. Faculty of Law, University of Helsinki. Retrieved on 21 st February, 2022 via https://helda.helsinki.fi/bitstream/handle/10138/321267/glover_edinam_dissertation_2020.pdf?sequence=3&isAllowed=y

Gorobets, A. (2020). Wild fauna conservation: IUCN-CITES match is required. *Ecological Indicators*, *112*, 106091.

Harcourt, A.H., Parks, S.A & Woodroffe, R. (2001). *Human density as an influence on species' area relationships: double jeopardy for small African reserves?* Biodivers. Conserv, 10 pp. 1011-1026.

Harich, F. K., Treydte, A. C., Sauerborn, J., & Owusu, E. H. (2013). People and wildlife: Conflicts arising around the Bia Conservation Area in Ghana. Journal for nature conservation, 21(5), 342-349.

Hawthorne, W., & Musah, A. J. (1993). *Forest protection in Ghana*. Forestry Department, Ghana.

Hillman, K., & Martin, E. (2009). Will poaching exterminate Kenya's rhinos? *ryx*, *15*(2), 131-132.

Hockings, M., Adams, W. M., Brooks, T. M., Dudley, N., Jonas, H., Lotter, W., & Woodley, S. (2013). A draft code of practice for research and monitoring in protected areas. *Parks*, *19*(2), 85-94.

Hoffman, L. C., & Cawthorn, D. M. (2012). What is the role and contribution of meat from wildlife in providing high quality protein for consumption?. *Animal frontiers*, *2*(4), 40-53.

Holden, M. H., Biggs, D., Brink, H., Bal, P., Rhodes, J., & McDonald-Madden, E. (2019). Increase anti-poaching law-enforcement or reduce demand for wildlife products? A framework to guide strategic conservation investments. *Conservation Letters*, *12*(3), e12618.

IPBES, (2019). Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental SciencePolicy Platform on Biodiversity and Ecosystem Services.

IUCN, (2018): The IUCN Red List of Threatened Species. Version 2018-2.

IUCN, S. (2020). *Regional action plan for the conservation of western chimpanzees (Pan troglodytes verus) 2020, 2030.*

Jaclin, D. (2016). Poached lives, traded forms: Engaging with animal trafficking around the globe. *Social Science Information*, *55*(3), 400-425.

Kahler, J. S., & Gore, M. L. (2015). Local perceptions of risk associated with poaching of wildlife implicated in human-wildlife conflicts in Namibia. Biological Conservation, 189, 49-58.

Kpelle, D. (1993). Evaluation of past management and resource use of Kakum and Assin Attandanso Forest Reserves. Unpublished report.

Kurland, J., & Pires, S. F. (2017). Assessing US wildlife trafficking patterns: How criminology and conservation science can guide strategies to reduce the illegal wildlife trade. Deviant Behavior, 38(4), 375-391.

Le Noë, J., Erb, K. H., Matej, S., Magerl, A., Bhan, M., & Gingrich, S. (2021). Altered growth conditions more than reforestation counteracted forest biomass carbon emissions 1990–2020. *Nature Communications*, *12*(1), 1-10.

Lubbe, B. A., Du Preez, E. A., Douglas, A., & Fairer-Wessels, F. (2019). The impact of rhino poaching on tourist experiences and future visitation to National Parks in South Africa. *Current Issues in Tourism*, 22(1), 8-15.

Lunstrum, E., & Givá, N. (2020). What drives commercial poaching? From poverty to economic inequality. *Biological Conservation*, *245*, 108505.

Malpezzi, S. (2022). Housing affordability and responses during times of stress: A preliminary look during the COVID-19 pandemic. Contemporary Economic Policy.

Martin, E. (2010). Effective law enforcement in Ghana reduces elephant poaching and illegal ivory trade. *Pachyderm*, *48*, 24-32. Retrieved from https://pachydermjournal.org/index.php/pachyderm/article/view/233.

Massé, F. (2016). The political ecology of human-wildlife conflict: producing wilderness, insecurity, and displacement in the Limpopo National Park. *Conservation and society*, *14*(2), 100-111.

Monney, K., Dakwa, K. & Wiafe, E. (2010). Assessment of crop raiding situation by elephants (Loxodonta africana cyclotis) in farms around Kakum conservation area, Ghana. *The International Journal of Biodiversity and Conservation*, Volume 2, Pgs 243-249.

Moore, J.F., Mulindahabi, F., Masozera, M.K., Nichols, J.D., Hines, J.E., Turikunkiko, E. *et al*. (2017). Are ranger patrols effective in reducing poaching-related threats within protected areas? *Journal of Applied Ecology*, 55, 99-107.

N'GORAN, P. K., Boesch, C., Mundry, R., N'GORAN, E. K., Herbinger, I., Yapi, F. A., & Kuehl, H. S. (2012). Hunting, law enforcement, and African primate conservation. *Conservation Biology*, *26*(3), 565-571.

Newmark, W. D., & Hough, J. L. (2000). Conserving Wildlife in Africa: Integrated Conservation and Development Projects and Beyond. BioScience, 50(7), 585-592.

Newmark, W.D. (2008). Isolation of African protected areas Front. Ecol. Environ, 6 (6) pp. 321-328, Available via https://doi.org/10.1890/070003

Niamien, C. J. M., Kadjo, B., Dago, N. D., Koné, I., & N'Goran, E. K. (2015). Initial data on poaching of Eidolon helvum (Kerr, 1792) Near-Threatened Species in Côte D'Ivoire, West Africa. *European Journal of Scientific Research*, *135*(2), 219-227.

Nicole, B. F. (2019). An assessment of the human-wildlife conflict across Africa. *Wildlife Population Monitoring*.

Nuno, A., & St. John, F. A. V. (2015). How to ask sensitive questions in conservation: A review of specialized questioning techniques. Biological Conservation, 189, 5– 15.

Oates J. F. (1993). Kakum National Park, Ghana. Wildlife Specialist's Report on visit of 9–29 August 1993. Conservation International Report, unpublished.

Obour, R., Asare, R., Ankomah, P., & Larson, T. (2016). Poaching and its Potential to Impact Wildlife Tourism: An Assessment of Poaching Trends in the Mole National Park in Ghana. *Athens Journal of Tourism*, *3*(3), 169-192.

Ofori, B. Y., Attuquayefio, D. K., Owusu, E. H., Musah, R. K. Y., Quartey, J. K., & Ntiamoa-Baidu, Y. (2015). Seasonal changes in small mammal assemblage in Kogyae Strict Nature Reserve, Ghana. International Journal of Biodiversity and Conservation, 7(4), 238-244.

Osei-Owusu, Y. (2018). *Human-Wildlife Conflict*: Elephants-Technical Manual. Available via http://hdl.handle.net/20.500.11822/26753

Owusu, E. H. (2001). Community-based conservation in Ghana: the potential of the Afadjato and Agumatsa Range for ecotourism. (PhD Thesis.) University of Kent at Canterbury, Kent, UK.

Owusu, E. H. (2010). Community-based conservation in Ghana: a case of local management of the Afadjato and Agumatsa Conservation Area in Ghana. Natural resources in Ghana. New York. Nova Science Publishers Inc.

Partelow, S. (2018). A review of the social-ecological systems framework. Ecology and Society, 23(4).

Petroczi, A., Nepusz, T., Cross, P., Taft, H., Shah, S., Deshmukh, N., Naughton, D. P. (2011). New non-randomised model to assess the prevalence of discrimination behaviours: A pilot study on mephedrone. Substance Abuse Treatment, Prevention, and Policy, 6(20), 1– 18. https://doi.org/10.1186/1747-597X-6-20

Robinson, J. G., & Bodmer, R. E. (1999). Towards wildlife management in tropical forests. The Journal of wildlife management, 1-13.

Roe, D. (2008). *Trading Nature*. CambridgeTRAFFIC International

Save the Rhino International (2021), Poaching Statistics. Online article available via https://www.savetherhino.org/rhino-info/poaching-stats/

Shadmehri, M. T. A. (2008). Estimating growth rates and Decomposition Analysis of Agricultural Production in Iran (1970-2000). *Trends in Agriculure Economics*, 1(1): 14-26.

Stolton, S., P. Shadie and N. Dudley (2013). IUCN WCPA Best Practice Guidance on Recognising Protected Areas and Assigning Management Categories and Governance Types, Best Practice Protected Area Guidelines Series No. 21, Gland, Switzerland: IUCN. pp 8-16. ISBN: 978-2-8317-1636-7.

UICN/PACO (2010). Parks and reserves of Ghana: Management effectiveness assessment of protected areas. Ouagadougou, BF: UICN/PACO. ISBN: 978-2-8317-1277-2.

UNEP, A., & ASSESSMENT, I. R. R. (2016). *The Rise of Environmental Crime*. Nairobi: UNEP.

UNEP-WCMC, I. U. C. N. (2018). NGS (2018). Protected planet report, 70.

Wiafe, E.D. (2016). Wild Life Laws Monitoring as an Adaptive Management Tool in Protected Area Management: A Case of Kakum Conservation Area. *Springerplus*, *5*(1), 1440.

Wiafe, E.D. (2018). Hunted species and hunting equipment used by rainforest poachers in Ghana. *Journal of Threatened Taxa, 10*(2), 11271–11284 Available via https://10.11609/jott.3416.10.2.11285-11289

Wijnstekers, W. (2003). The evolution of CITES. Geneva, Switzerland: Cites Secretariat.

Williams, A., Parry-Jones, R., & Roe, D. (2016). *The resource bites back: entrypoints for addressing corruption in wildlife crime*. U4 Issue Paper, November 2016, No 2. Bergen: Chr. Michelsen Institute.

Woodroffe, R., Thirgood, S., & Rabinowitz, A. (2005). The impact of human wildlife conflict on natural systems. *Conservation Biology SeriesCambridge-*, *9*, 1.

Wright, S.J., Zeballos, H., Domínguez, I., Gallardo, M.M., Moreno, M.C. & Ibáñez, R. (2000) Poachers alter mammal abundance, seed dispersal, and seed predation in a neotropical forest. Conservation Biology, 14, 227–239.

WWF. (2020). How Nepal Achieved Zero Poaching. Online Article available via https://tigers.panda.org/news_and_stories/stories/how_nepal_achieved_zero_poaching/#:~:text=The%20country%20was%20an%20early,the%20effectiveness%20of%20conservation%20management.

Wyatt, T., Johnson, K., Hunter, L., George, R., & Gunter, R. (2018). Corruption and wildlife trafficking: three case studies involving Asia. *Asian Journal of Criminology*, *13*(1), 35-55.

Xia, C., Lam, S. S., & Sonne, C. (2021). Seize China's momentum to protect pangolins. *Science*, *371*(6535), 1214-1214.

APPENDICES

Appendix 1: Interview Guide for Park Manager

1. What are the key challenges of the KNP?
2. If poaching is a key challenge of the Park, how will you rank it on a scale of 1-5 (1=highest and 5=least)?
3. How is the park dealing with poaching as a challenge?
4. What interventions have been in place to help deal with poaching in the Park?
    1. International
    2. National
    3. Park level
5. How effective have these interventions been?
6. How best can poaching be significantly dealt with in the Short, Medium and Long Term?

Appendix 2: Interview Guide for Law Enforcement Officer

1. What are the key challenges of the Park?
2. In a rank of 1-5 (1=highest and 5 is least) where will poaching be?
3. Which animals are mostly poached?
4. List first five of animals mostly poached?

5. Which communities are mostly associated with poaching in the Park?

6. List first 10 communities

7. What are the law enforcement efforts of the park (Arrests, Prosecutions, fines, sentences, confiscation, etc)?

8. How do you measure the effectiveness of law enforcement of the Park?

9. What are the laid down procedures for enforcing poaching laws?

10. Are these procedures effective?

11. What challenges is the unit facing in enforcing anti-poaching laws?

12. What are the key drivers of poaching in the KNP?

13. How are human-wildlife conflicts managed, any challenges?

14. What efforts does the park make to address these drivers?

15. How best can these drivers be dealt with in the short, medium and long term?

16. What is the nature or trend of poaching in the park?

    1. Closed and Open seasons?

    2. Wet and Dry seasons?
    3. Funds available and when funds are lacking?

    4. Local and external demands for poached animals goes high or low?

    5. Etc?

17. Where do poached animals go? Markets at the local, national and international levels?

Additional Data obtained from the Law Enforcement Unit

Documents that give accurate account of poaching incidents in the park (2011 to 2021)

1. Pictures
2. Patrol reports (patrol team, date, poaching signs-gunshots heard, cartridges, snares, etc)
3. Quarterly reports,
4. Annual reports
5. MIST Data (2011 to 2021)
    1. Encounters
    2. Arrests
    3. Prosecutions
    4. Fines
    5. Sentences
    6. Etc…

Appendix 3: Interview Guide for Range Supervisors and Forest Guards

1. What is the nature of field patrol?
2. What key challenges do you face with regards to patrols?

3. What is the nature of poaching in the park?

    1. Those involved?

    2. When does it occur?

    3. What tools and techniques are used by poachers?

    4. What are the signs of poaching?

4. How do you handle poachers?

5. How can poaching be dealt with in the short, medium and long term?

Appendix 4: Focus Group Discussion Guide for Local Communities

1. Demographics
    1. Name of community:

    2. Number of people in the group:

    3. Gender composition of the group:

    4. Age range of respondents:

    5. Educational background of group:

    6. Marital status of respondents:

    7. Position in the community:

    8. Livelihood activities of respondents

2. Awareness on the existence of the KNP?

3. Knowledge on laws protecting the park?

4. Importance of the KNP?

5. Awareness on the occurrence of poaching in the park?

6. Awareness on the illegalities of poaching?

7. Which animals are mostly poached?

8. What is the nature of poaching in the area? When does this usually occur?

9. How often do you hear about poaching?

10. When was the last time you heard of poaching in the area?

11. Where do poached animals go? Markets at the local, national and international levels?

12. What are the drivers/causes of poaching in the park? Poverty, unemployment, arson, HWC, weak law enforcement, etc?

13. Do you encounter HWC?

14. How often does HWC occur?

15. When was the last time such occurred?

16. How does HWC get resolved?

17. How can the drivers of poaching be dealt with in the long, medium and shirt term?

Appendix 5: Kakum Conservation Area Quarterly Reports - Sample

FORESTRY COMMISSION
(WILDLIFE DIVISION)
KAKUM CONSERVATION AREA
O.BOX 427, CAPE-COAST CIR
Your Ref.No: Date: 19 th January 2015

Tel: 0332195402
E-mail:kakumwd@yahoo.com

Our Ref.No: KCA/QTR/Q.I/

THE EXECUTIVE DIRECTOR
FORESTRY COMMISSION
WILDLIFE DIVISION
P.o. BOX M239
ACCRA

KAKUM CONSERVATION AREA QUARTERLY REPORT FOR OCTOBER-DECEMBER 2014 1.0 INTRODUCTION

Activities carried out during the quarter were law enforcement, community outreach, visitor services and maintenance of some facilities and equipment at the park.

2.0 STAFFING

Staff strength as at 31 st December 2014 was 77 and is broken down as follows:

STAFF CATEGORY	PROF	AO	SWR	PTA	STA		WG	DR	TOTAL
NUMBER	6	2	1	2	19	22	24	1	77

2.1 TRANSFER/APPOINTMENTS: Nil
2.2 PROMOTION: Nil
2.3 RESIGNATION/RETIREMENT/ DISMISSAL: Nil.
2.4 TRAINING/ WORKSHOP/MEETINGS:

On 17th December 2014 the Park Manager attended a workshop on Options Assessment Framework for REDD+ benefit sharing and National REDD+ strategy at the Forestry Commission Auditorium. It was organized by IUCN AND Forestry Commission.

2.5 HEALTH:Ni1
2.6 OBITUARY: Nil
2.7 DISCIPLINE:

No.	NAME OF STAFF	RANK	OFFENCE	ACTION TAKEN

	Eric Bukari		Causing discontent or disaffection among staff. Engaging in an ct which tends to brin the commis Ion into disre lite.	Pending

2.8 ANNUAL/PART/CASUAL LEAVE: ANNUAL LEAVE/PART/CASUAL:-

The under listed members of staff were granted their annual/part leave during the quarter.

NO.	NAME OF STAFF	RANK	DATE LEAVE START	DATE LEAVE END	REMARKS
1	DAVID ADONGO	TA	01/12/2014	22/12/2014	Part Leave
2	CYNTHIA AMO-MENSAH	TA	08/12/2014	22/12/2014	Casual Leave
3	VINCENT ASAMOAH	AO	07/12/2014	25/11/2014	"
4	EMMANUEL FORSON	STA	01/12/2014	-	Annual Leave
5	RICHARD OTWEY	STA	28/12/2014	-	"
6	ERNEST APENKWAH	SWR	17/11/2014	30/12/2014	"
7	GAD LAWSON SAGOE	HDD	17/11/2014	30/12/2014	"
8	OFOSU DARKO	STA	07/11/2014	-	"
9	JOHN ACQUAH	TA	10/11/2014	19/12/2014	"
10	SAMUEL APPIAH	STA	17/11/2014	30/12/2014	"
11	EMMANUEL PEASAH	STA	03/11/2014	18/12/2014	"
11	WELLINGTON TACKIE	TA	20/10/2014	27/11/2014	"
12	DANIEL GYIMAH	TA	20/10/2014	27/11/2014	"
13	JIMMY KOFI ABBAN	TA	17/10/2014	26/11/2014	"
14	SAMUEL GYEEDU	STA	15/10/2014	24/11/2014	"
15	EMMANUEL KWAKYE	TA	10/10/2014	16/11/2014	"
16	RICHARD ADONGO	PTA	06/10/2014	17/11/2014	"
17	JAMES BINEY	STA	15/10/2014	24/11/2014	"

2.9 WELFARE:

The welfare fund of the park has been reactivated and staff have started contributing with effect from September 2014. The constitution has also been reviewed to make it relevant to the current circumstance of staff.

3.0 OFFICIAL VISITORS TO THE PARK

5. The following official visitors were received during the quarter.

Date	Name of Visitor	No. in Grou	Institution	Pur ose
5/1 1/2015	Frank Boateng Asomani	6	Ghana National Commission on Small Arms and Li ht Wea ons	Official visit

4.0 LAW ENFORCEMENT PERFORMANCE

All types of law enforcement patrols were undertaken from all camps throughout the quarter.All camps executed at least one extended patrol (cross country patrol) per month to check illegal activities and gather data.

4.1 SUMMARY OF PATROL EFFORT

The table below shows the various patrol efforts during the period under review in terms of effective patrol man-days (EPMD).

ITEM	OCT	NOV	DEC	TOTALS
Effective Patrol Staff	36	39	39	114
Number of Patrols (All T es	66	62	55	183
Effective Patrol Man-Days (Standard at 8 hours	799.96	695.38	647.20	2142.54
Effective Patrol staff/da /officer/month	22.22	17.83	16.59	56.64

4.2 JUDICIAL CASES

Details of persons arrested for the various offences are as shown in the table below.

NO.	NAME	DATE OF ARREST	TYPE OF OFFENCE	SENTENCE
1.	1.Stephen Aidoo 2. Kwame Ayigbe (on the run) -Abenbrom	27/7/2014	1. Conspiracy to commit crime 2. Unauthorised entry into a wildlife protected area. 3. Taking into a forest reserve equipment or apparatus intended to capture, destroy or hunt for animals therein without authority. 4. Harvesting plant species in a WL PA without authorisation.	Cautioned and discharged by court on 4/12/2014.
2.	KwakuAbokyi -Mfuom	18/12/2014	1. Unauthorised entry into a wildlife protected area. 2. Hunting without valid game license. 3. Taking into a forest reserve equipment or apparatus intended to capture, destroy or hunt for animals therein without authority. 4. Hunting with a gin trap	Fined GHS360.00 19/12/2014

4.3 INDICATORS OF ILLEGAL ACTIVITIES

MONTH	OCT	NOV	DEC	TOTAL
SNARES	25	6	23	54
GUNSHOTS	6	6	14	26
EMPTY CARTRIDGES	12	14	8	34
POACHER OBSERVED		3	1	4
POACHING CAMPS	9	4		13
POACHERS ARRESTED	0	1	2	3
HUMAN FOOTPRINTS	13	16	3	32
PLANT HARVESTING	2	O	1	3
TREE CUTTING	0			
GIN TRAP	9	2		11
TOTAL	76	52	52	180

4.4 CATCH PER EFFORT INDICES FOR ILLEGAL ACTIVITIES MONTH	OFFENCE	C/EPMD

OCT	Major	0.0762

	Minor	0.0188
NOV	Major	0.0518
	Minor	0.0230
DEC	Major	0.0742
	Minor	0.0062

4.5 BOUNDARY MAINTENANCE

A total of **18.23** km of the park's boundary was cleaned during the quarter under review. Details are as shown in the table below.

MONTH	DISTANCE(KM)	REMARKS
OCT	5.60	No encroachment
NOV	9.48	No encroachment
DEC	3.15	No encroachment
Total	**18.23**	**No encroachment**

Giant Forest Squirrel	3	0.0038	3	0.0043	0	0.0000
Maxwell's Duiker	98	0.1225	68	0.0978	57	0.0881
Mona Monkey	305	0.3813	279	0.4012	286	0.4419
Mongoose	49	0.0613	40	0.0575	23	0.0355
Ogilby's Duiker	0	0.0000	0	0.0000	0	0.0000
Olive Colobus	32	0.0400	35	0.0503	39	0.0603
Potto	0	0.0000	0	0.0000	1	0.0015
Red River Hog	59	0.0738	44	0.0633	1	0.0015
Royal Antelope	6	0.0075	20	0.0288	5	0.0077
Spot-Nose Monkey	37	0.0463	54	0.0777	14	0.0216
Tree Hyrax	86	0.1075	71	0.1021	57	0.0881
Tree Pangolin	0	0.0000	1	0.0014	4	0.0062
Yell.-Backed Duiker	3	0.0038	2	0.0029	1	0.0015
TOTAL	**1263**	**1.5788**	**1040**	**1.4956**	**784**	**1.2114**

5.0 COLLABORATIVE RESOURCE MANAGEMENT Below are the reports of all activities of the Community Resource Management Unit for third quarter they include school education, distribution of posters, licensing, community visits and elephant crop raiding demonstration sites visits.

5.1 SCHOOLS OUTREACH

Nine (9) schools in the following communities Abrafo, AbekaNkwanta, Afiaso,

Bobi, Antwikwaa, Mfoum, Flami,Breman and Mmem were educated on basic WD laws and why it is important to sustain biodiversity. They were also educated on the characteristics of Insects, Mammals and Reptiles.

5.2 DISTRIBUTION OF POSTERS

The wholly protected species posters and basic WD laws were distributed to five (5) schools that were educated on basic WD laws;Mfoum- Roman, Abrafo-Roman, Frami Roman, Breman-Roman and Mmem School.

5.3 LICENSING

Three (3) bushmeat traders along Abrafoto Mmem road were issued with bush meat trade permit as part of ongoing outreach activity to sensitize and improve revenue collection in and around the park

10.0 CIÃLLENGES

Lack of official staff housing at Afiaso, Aboabo, Adiembra and Homaho continue to make effectise lavs enforcement actix ities in these areas quite challenging. Land donated to the park by these communities has not been properly acknowledged and documented to pave way for dex elopment,

Lack of field gear eg. uniforms, boots, etc for field staff to undertake official duties are seriously affecting staff morale. Numerous complaints from staff on poor state of field gear are received and obserxed daily. This is a major source of worry and dent on the image of the Commission and requires attention.

FORESTRY COMMISSION
Forestry Commission DIVISION)
KAKUM CONSERVATION AREA
Tel: 0332195402 P.O.BOX 427, CAPE-COAST, C/R
Emall:kakumwd@yahoo.com Our Ref.No:
KCA/QTR/Q.I/
Your Ref. No: Date: 20th April
2015

THE EXECUTIVE DIRECTOR
FORESTRY COMMISSION
WILDLIFE DIVISION
P.O. BOX M239
ACCRA

KAKUM CONSERVATION AREA OUARTERLY REPORT FOR JAN-MAR 2015 1.0 INTRODUCTION

Activities carried out during the quarter were law enforcement, community outreach, visitor services and maintenance of some facilities and equipment at the park. 2.0 STAFFING

Staff strength as at 31 st March 2015 was 75 and is broken down as follows:

STAFF CATEGORY	PROF	AO	SWR	PTA	STA		WG	DR	TOTAL
NUMBER	6	2	1	2	19	19	25	1	75

2.1 TRANSFER/APPOINTMENTS: Nil

2.2 PROMOTION: Nil

2.3 RESIGNATION/RETIREMENT/ DISMISSAL:

Mr Prince Dickson Amoako (TA) was compulsorily retired on the 22nd February 2015.

2.4 TRAINING/ WORKSHOP/MEETINGS:

Two days (21 st -22nd January 2015) training in tourism management was organized by GHCT for FC and GHCT management staff at Jukwa. In March, two (2) days training in customer care and tour guiding was also held for FC and GHCT supervisors, frontline staff and all tour guides at the park by GHCT.

2.5 HEALTH:

The table below shows summary of staff that reported sick and attended hospital during the quarter.

NO	NAME OF STAFF	RANK	DIAGNOSIS	DATE ATTENDED	EXCUSE DUTY	REMARKS
I	C nthia Amo-	TA	Malaria and cardiac	09/02/2015		Treated and

4.2 JUDICIAL CASES

Details ofthe persons arrested for the various offences are as shown in the table below:

No.	NAME	DATE OF ARREST	TYPE OF OFFENCE	SENTENCE
	Yaw Kani (Wofa Yaw)	09/01/2015	1. Hunting without valid game license. GHOOO.OC 2. Killing animal without valid licence. on 12/01/2015	Fined
	l, Kwabena Musa Kwame Sam Adjei (on the run) -Mfuom	10/01/2015	1. Unauthorised entry into a wildlife protected area. GH060.OO 2. Hunting without valid game license. on 14/01/2015	Al fined
3	Stephen Sackey	25/01/2015	1. Unauthorised entry into a wildlife GHý1200.OO protected area. 2. Bringing into a reserve equipment or months apparatus which may be used to ca ture, destro or hunt an animal.	Fined or in default twelve (12) imprisonment If-IL

Hunting animal within a wildlife protected area.

Bringing into a reserve equipment or apparatus which may be used to capture, destroy or hunt any animal.

Hunting with a gin trap.

Huntin° in a °rou

4.4 BOUNDARY MAINTENANCE

A total of 24.16 km of the park's boundary was cleaned during the quarter under review.

4	l. Kwabena Arhin 2. Yaw Yenu -Adiyaw near Mmanyeaye	13/02/2015	1. Unauthorised entry into a wildlife protected area. 2. Hunting without valid game license. 3. Bringing into a reserve equipment or apparatus which may be used to capture, destroy or hunt any animal. 4. Hunting with artificial light. 5. Huntin ina 011	Fined GHØ2100.OO each fourteen or in default(14) months imprisonment IHL.

TREE TOTAL

Details are as Shown in the table below

MONTH	DISTANCE	REMARKS
JAN	12.16	No encroachment detected
FEB	33	No encroachment detected
MAR	8.7	No encroachment detected
Total	24.16	No encroachment detected

4.5 ANIMAL OBSERVATION INDICES

	JAN		FEB			
SPECIES	NO	CIE (EPMD)	NO	CIE (EPMD)	NO	CIE (EPMD)
African Civet	20	0.0271	54	0.0699	7	0.0083
African Giant Rat		0.0000		0.0000		0.0000
Bay Duiker	19	0.0258	11	0.0142	1 8	0.0214 0.0119
Black Duiker	20	0.0271	26	0.0337	1 0	0.0810
Blk &Wht Colobus	83	0.1126	93	0.1205	6 8 4	0.0048

	10	0.0136	1 1	0.0142		

Bongo		0.0163	6	0.0078	17	0.0202
Brush-Tail Porcupine	12				28	0.0333
	40	0.0543	63	0.0816		
Bush Baby			6	0.0078	8	0.0095
Bushbuck	5	0.0068			44	0.0524
	37	0.0502	74	0.0958		
Cusimance			39	0.0505	30	0.0357
Forest Elephant	50	0.0678			1	0.0012
		0.0000	8	0.0104		
Flying Squirrel	0			0.0000		0.0000
Galago	0	0.0000				

4

5.0 COLLABORATIVE RESOURCE MANAGEMENT

Activities undertaken by the unit were licensing, elephant crop raiding reporting and control, community livelihood, Monkey Sanctuary inspection Licensing

Some bushmeat licenses were issued to traders between along Jukwa to Twifo Prasoro and were licensed in February 2015 and were reminded not to trade in wholly protected species. Three hundred and fifteen Ghana Cedis (GHé315,00) was collected as bush meat trade license.

5.2 Monkey Sanctuary Inspection

The animal sanctuary at Frami was inspected within the quarter, The animals have been moved into new holding areas that were more spacious and improvement over previous holding conditions. Animal species found were Patas Monkey, Spot Nosed Monkey, Nile crocodile, Scorpions, Green Monkey, Civet Cat, Parrots, Mona Monkey, Genet Cat, Maxwell's Duiker, and Tortoise. The owner was prompted about the low water level of the crocodile pond and already provision for installation of a water pump to provide constant and enough water for the crocodile pond is in progress.

5

10.0 CHALLENGES

The lack of official staff housing at Afiaso, Aboabo, Adiembra and Homaho continue to make effective law enforcement activities in these areas quite challenging. Land donated to the park by these communities has not been properly acknowledged and documented to pave way for

Existing official staff camps and quarters at Antwikwaa, Abrafo, Kruwa and Briscoe 11 are deteriorating and need maintenance. The main problems with the facilities are leaking roofs, mosquito netting, door locks and painting. At Antwikwaa the leakage requires replacement of the tile roof with iron sheets. A complete assessment is being made to seek support for the maintenance work.

The station appreciates the release of funds for operations, however, the funds were inadequate to meet operational needs of the station within the reporting period. It is anticipated that there will be an improvement in subsequent fund allocation to sustain park operations.

11.0 CONCLUSION

In spite of the challenges encountered, the quarter ended with modest gains as indicated in the summary of activities.

Enoch A. Ashie
Park Manager
CC: All Stations, WD
All Regional Managers, WD
Hon DCE, Hemang-Lower Denkyira District Assembly

Hon DCE, Assin South District Assembly
Hon DCE, Abura Asebu Kwamankese District Assembly 11

FORESTRY COMMISSION
(WILDLIFE DIVISION)
KAKUM CONSERVATION AREA
Tel: 0332195402 P.O.BOX 427, CAPE-COAST, C/R

Our Ref.No: KCA/QTR/Q.I/
Your Ref. No:

Date: 21 st July 2015

THE EXECUTIVE DIRECTOR FORESTRY COMMISSION suLDLIFE DIVISION
P.O. BOX M239
ACCRA

KAKUM CONSERVATION AREA QUARTERLY REPORT FOR APRIL-JUNE 2015 1.0 INTRODUCTION

Activities carried out during the quarter were law enforcement, community projects, first aid training and provision of visitor services and water facilities for staff and maintenance of equipment at the park.

2.0 STAFFING

Staff strength as at 30th June•2015 was 75 and is broken down as follows:

STAFF CATEGORY	PROF	AO	SWR	PTA	STA		WG	DR	TOTAL
NUMBER	6	2	1	2	19	19	25	1	75

2.1 TRANSFER/APPOINTMENTS: Nil

2.2 PROMOTION: Nil

2.3 RESIGNATION/RETIREMENT/ DISMISSAL: Nil

2.4 TRAINING/ WORKSHOP/MEETINGS:

One day (28th April 2015) training in basic first aid was organized for a cross section of staff of the park to equip staff with requisite skills and tools in the application of first aid.

The resource persons were from the Ghana Red Cross Society, Cape Coast. The training was funded by GHCT.

2.5 HEALTH:

The table below shows summary of staff that reported sick and attended hospital during the quarter.

NO	NAME OF STAFF	RANK	DIAGNOSIS	DATE ATTENDED	EXCUSE DUTY	REMARKS
I	Mary Nkrumah	WG	Pregnancy Term	29/06/15		Maternity Leave

2.6 OBITUARY:

1

			of Diplomatic Practice and Dev. Policies	
04/06/2015	Hon. Samuel Y. Edusie	54	Dep. Minister Water Resources, Work &Housing	Tour with Ministers for Housing from Some African Countries.

4.0 LAW ENFORCEMENT AND GROUND COVERAGE

4.1 SUMMARY OF EFFORT

The table below shows the various efforts used to encounter illegal activities during the period under review in terms of Effective Patrol man-days (EPMD) standardized at 8 hours.

ITEM	APR	MAY	JUN	QUARTERLY TOTALS
EffectiNe Patrol Staff	38	38	36	112
Number of Patrols All T es)	65	59	58	182
Effective Patrol Man-Days (Standard at 8 hours)	609.36	672.79	823.13	2105.28
Effective Patrol staff/dav/officer/month	16.04	17.71	22.86	56.61

4.2 JUDICIAL CASES

Details of the persons arrested for the various offences are as shown in the table below:

NO.	NAME	DATE OF ARREST	TYPE OF OFFENCE	SENTENCE
l.	I. Yaw Nyarko Kwesi Korkor Nana Kwame (on the run) - Assin Edubiase	02/04/2015	l. Felling tree without authorisation in a reserve. *Admitted Farm	Al fined GH<300.OO. A2 reappeared for trial on 29/04/2015. Cautioned and dischar ed.

2.	1 . Kwesi Amoah 2. Abusuapanin Asante Sorbin - Adiembra	08/04/2015	1 . Felling tree without authorisation in a reserve. 2. Taking into a forest reserve equipment or apparatus intended to capture, destroy or hunt for animals therein without authority. *Admitted Farm	Al and A2 fined GHS 300.00 each.
3	I. Akwesi Afum 2. Justice Kofi Donkor - Adiembra	17/04/2015	1 . Unauthorised entry into a wildlife protected area. 2. Bringing into a reserve equipment or apparatus which may be used to capture, destroy or hunt for animals therein without authorit	Al and A2 fined 360.00 each
4	Kofi Buabeng - Kruwa	30/04/2015	1 . Hunting without valid game license. 2. Trading in bushmeat without license.	Convicted, cautioned and asked to obtain a hunting license.

5.			3. Killing a wholly protected s ecies.	
	I . Kwabena Kum 2. Kofi Yesu 3. Abukori Issaka - Krokoso Jakai	21/05/2015	1. Unauthorised entry into a wildlife protected area. 2. Hunting without valid game license. 3. Hunting in a group without written authority. 4. Killing animal in a wildlife protected area without authority. 5. Killing a wholly protected species. 6. Using an artificial light to hunt, capture or destroy a wild animal. 7. Taking into a reserve equipment or apparatus intended to capture, destroy or hunt for animals therein without authori	Al, A 2 and GHse 1080 t each or in de months imprisonmer
6.	l. Akwasi Essuon 1. Daniel Addisson 2. Emmanuel Dzobo	11/06/15	1. Unauthorised entry into a wildlife protected area. 2. Hunting without valid game license. 3. Hunting in a group without written authority. 4. Killing animal in a wildlife protected area without authority. 5. Killing a wholly protected species. 6. Taking into a reserve equipment or apparatus intended to capture, destroy or hunt for animals therein without authori	Al, A2 and A sentenced to months imprisonmer

4.3 INDICATORS OF ILLEGAL ACTIVITIES

MONTH	SNARES	GUNSHOTS	EMPTY CARTRIDGES	POACHING CAMPS	POACHERS	POACHERS	HUMAN	POACHER' S PATH	TREE HARVI TIN

					ARRESTED	OBSERVED	FOOTPRINTS		
APR		6	3		7	1	2	5	1
MAY	2	4	6	1	3	1	9	1	o
JUN		2	8		3		6	13	o
Total	2	12	17		13	2	17	19	1

4.4 CATCH PER EFFORT INDICES FOR ILLEGAL ACTIVITIES

MONTH

APR	OFFENCE Major	C/EPMD
	Minor	0.0279 0.0131
MAY	Major	0.0268

4

5.0 COLLABORATIVE RESOURCE MANAGEMENT

Activities undertaken during the quarter are mainly pepper farming project and tree nursery establishment.

5.1 Pepper farming Project

The Park facilitated the establishment of at least twelve (12) acres pepper farms in six (6) fringe communities namely Ghyahadze, Mpentemoa, Obengkrom, Gyaware, Apokwa and Brahabebome with support from GHCT. The purpose of the project is to provide pepper as input for pepper fencing to control elephant crop raiding. Other varieties of pepper were also cultivated to generate additional income for the farmers. In all thirty (30) farmers from the six communities are engaged in the project, the following inputs and materials were provided to the farmers; seeds, fertilizer, knapsacks and pesticides. In addition cost of land preparation was also covered. One (I) number bore hole was drilled and mechanized at the senior staff quarters to replace the previous unyielding borehole also at the quarters. The mechanized borehole was funded by our panners GHCT as part of support to the park this year. The borehole has since May been in use and providing water to about forty (40) staff and dependents.

9.0 SUMMARY OF ACHIEVEMENTS

OBJECTIVE	OUTPUT	ACTIVITY	ACHIEVEMENT
To effectively manage a system of Pas that is fully representative of Ghana's various ecological community and biodiversity.	Poaching and other illegal activities reduced.	Undertake camp, range, joint and crosscountry antipoaching patrols. Clean park boundary.	-2105.28 EPMDs achieved. -18.87 EPMD/Off/mth -182 patrols embarked. - 13 Poachers arrested court fines. -13.60km of park boundar cleaned

To reduce social conflicts associated with ildlife.	Enhanced wildlife conservation awareness in fringe communities	-Facilitate pepper farming for elephant crop raiding control and income to farmers. - Establish tree nursery for communities and boundary planting	-12 acres pepper farms in six (6) communities with thirty (30) farmers. - 500 trees and ornamentals nursed

To adequately maintain park infrastructure and equipment	Improve park facilities to enhance conditions of service.	Provide potable water for staff and their dependents	-One (l) number mechanized borehole for ark staff at Abrafo.
To increase revenue generation from PA.	Revenue generation improved.	Provide standard visitor services. Improve controls and supervision	-30,360 visitors received. revenue generated.