PRESBYTERIAN UNIVERSITY COLLEGE, GHANA

FACULTY OF DEVELOPMENT STUDIES

DEPARTMENT OF ENVIRONMENTAL AND NATURAL RESOURCES MANAGEMENT

AN ASSESSMENT OF EFFECTS OF ILLEGAL ACTIVITIES ON TIMBER PRODUCTION IN SOUTHERN SCARP FOREST RESERVE

BY

ROSELENE BOAMAH

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A Dissertation submitted to the Department of Environment and Natural Resources of the Faculty of Development Studies, Presbyterian University College, Ghana in partial fulfilment of the requirements for the award of Master of Science degree in Environmental and Natural Resources Management

BY

ROSELENE BOAMAH

SEPTEMBER 2020

DECLARATION

Candidate's Declaration

I hereby declare that this Dissertation is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Name: ……..…...

Candidate's Signature…… Date……..…

Supervisor's Declaration

I hereby declare that the preparation and presentation of the Dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the Presbyterian University College, Ghana.

Name:……

Supervisor's Signature…… Date……

ABSTRACT

Timber plays an essential role in the economy of the country. Forest reserves houses a lot of flora and fauna that are of great importance. However, poverty, increasing human population and expansion of farms towards forest reserves has led to the over-exploitation and increased number of illegalities in forest reserves. The study was conducted to identify the effects of illegal activities on timber production in Southern Scarp Forest Reserve (SSCP). Ten communities were selected using random sampling technique. A total of hundred respondents were selected with ten from each of the ten communities. Both questionnaires and interviews were used in the data collection exercise. Purposive sampling was used in selecting a total sample of 100 participants from the study population. Illegal farming was noted as the main contributing factor to the destruction of forest reserves. There is the believe that, illegalities on timber production in the reserve have led to the destruction of water bodies and degradation of lands. The results also indicated that there was a decline in fauna and NTFPs e.g. (snail) in the reserve due to illegalities in the reserve. As a means of ensuring effective ways of managing the forest reserve, forest guards should be well equipped and motivated to work to their full ability. Also, frequent monitoring and patrols by responsible stakeholders should be done. Moreover, communities in forest fringe areas should be educated on the importance of forest and effect of illegalities. Areas affected by such illegalities should be planted up by offenders when apprehended. There is also the need to advice timber contractors who work in timber concessions to employ sustainable logging to reduce the impact of logging on the forest.

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DEDICATION

I dedicate this research to Almighty God who gave me the wisdom and in-depth knowledge

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CBD - Convention on Biological Diversity

FAO - Food and Agriculture Organization

GDP - Gross Domestic Product

GNP - Gross National Product

IFA - Illegal Forest Activities

ITTO - International Tropical Timber Organization

LPG - Liquefied Petroleum Gas

NTFPs - Non-Timber Forest Products

SFM - Sustainable Forest Management

SSCP - Southern Scarp Forest Reserve

UNCCD - United Nations Convention to Combat Desertification

UNFCCC - United Nations Framework Convention on Climate Change

VFF - Volunteer Task Team

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Ghana's Timber Production Industry for some decades was one of the largest boosters of the country's economy while also offering several employment opportunities to the citizenry. But the performance of the industry has seen a dramatic decline in relation to both volume and value of product over the years (Bank of Ghana, 2004). According to same report, the timber industry which used to contribute about 6 per cent to the country's Gross Domestic Product (GDP) is now dwindling significantly due to various forms of illegal activities. However, because of the country's high level indebted due to frequent borrowing from its developed counterparts, it compels Ghana to promote unsustainable exploitation and exportation of timber product in order to settle those debts (Stuart *et al.* 1990, cited in Chapman, 2006a). As a result, Ghana has lost roughly 80% of its forest lands since the 1920s to date arising from all forms of illegalities across the country's forested areas with about one-third of its forests disappearing during the last two decades (Hall *et al.* 2013). Land degradation across the tropical forests globally, are as result of illegal activities and timber trade without serious reforestation practices resulting in the dwindling of the world's economic species, despite covering only 7 % of the world's surface (WRI, 1992). The situation is not alien to Ghana, as land degradation was first witnessed in the country as early as 1908 (Thompson *et al.,* 1910).

By its recognized characteristics, estimation of illegal forest activities is often difficult to ascertain due to its complexity. Globally, illegal forest activities are said to result in the decline of both GDP and GNP ranging between $10-15 billion a year (World Bank 2002). In a significant number of countries, illegal logging is a major problem that poses serious threats to forest reserves, communities and wildlife. Illegal logging trade is said to be around 15% of the total trade in the mid 1990's (Brack & Hayman, 2001). Data on revenue losses from illegal logging and marketing is available particularly in relation to losses arising from export tax evasion and timber smuggling (SGS Trade Assurance Services 2002). In a significant number of countries, illegal logging is a major problem that poses a serious threat to forests, communities and wildlife. Moreover, the problem has become so critical that without serious policy and institutional changes, the World Bank and other foreign donors will consider withdrawing entirely from forestry sector projects due to the mass reduction in the quality of timber product exported lately (McCarthy, 2000).

1.2 Statement of the Problem

Forest is one of the important resources to every country, hence one of the catalyst of most countries economy except those in the arid regions though help in the local economy, yet despite their importance for local economies and for the people, are still largely neglected in natural resource management policy and decision-making processes (Malagnoux & Atzmon, 2008). This is clearly witnessed in the amount of per capita income contribution to a country's economy upon every export, employment creation, and immeasurable environmental benefits. For instance, the various ecosystem services derived from the forest such as; provisional, social/recreational or aesthetic, regulatory,

cultural services. Healthy and an intact forest reserve also protect water bodies and aquatic life, wildlife habitats, and economic benefits for fringe communities through the harvesting of NTFP. Unfortunately, over the years several forms and level of land degradation have resulted in the reduction of the overall quality of our forest reserves. These are seen in various indiscriminate activities including illegal logging, charcoal production, encroachment, mismanagement, etc. across the entire country.

The levels of degradation have warranted and diverted the importance of the reserve into grazing field with regular bush fire orchestrated by Fulani herdsmen along the Pimpimso-Akrumso range in the southern scarp forest reserve. Notwithstanding, some citizens from the surrounding communities also intrude and cultivate all forms of crops and vegetables with particular emphasizes on; plantain, cocoyam, yam, banana, pepper, tomatoes, garden eggs, cassava, etc. a situation which is further and faster degrading the forest, rendering the reserve void of economic tree species. It is with this background that the study would be crucial in determining the extent of degradation by the various illegal activities in the Southern Scarp Reserve and to compare with documents on the previous status if there are any while providing strategic options that can help curb the illegalities to benefit tomorrow's generation.

1.3 Research Objective

The objective of this study is to investigate into the various illegal activities within the reserve that are compromising the integrity and the economic gains that could be derived from the reserve.

Specific Objectives

- To identify the various illegal activities in the reserve that is contributing to the continuous decline of timber production that supports the country's economy.
- To examine the level of impacts of the various illegalities on timber production within the reserve.
- To identify some strategic decisions for the effective management of the forest reserve.

1.4 Research Questions

- What are the major contributing factors as far as illegal activities within the reserve is concern?
- In what ways are these illegalities influencing the various economic species and wildlife therein the reserve?
- What strategic options that could be used in the effective management of the forest reserve for the benefit of the unborn generation?

1.5 Scope of the Study

The focus of the study will be driven on the assessment of the true state of the reserve in relation to the level of illegal activities and the associated destruction issues in the Southern Scarp Forest Reserve and the impact to the immediate surrounding communities and the country at large. Therefore, only degraded areas of the reserve will be monitored, investigated, and analysed.

1.6 Significance of the Study

The study will provide updated information to complement the existing literature on the true state of the Southern Scarp Forest Reserve in relation to illegal activities therein and findings of the study would be a great source of

information to environmental experts, the Forestry Commission and other stakeholders, policy makers as well as educational institutions.

1.7 Justification of the Study

Maintaining and ensuring a productive forest reserve at all times must be a concern to all because a degraded forest for instance, is a challenge to any country which economy is supported by timber export. Forest is indispensable resources which is embedded with several life forms; thus, not only for wood or timber product but also for harbouring wild animals, producing NTFP, protecting water bodies, regulation of weather pattern, among many others. The value of every forest reserve comes in varying importance to the "owner" and therefore has its own requirement and composition with a prime objective, hence the need for regular study in ensuring its sustainability. A forest reserve is never a permanent recreational resource and therefore bound to be exploited of its premium product (i.e.; timber), but need to be done legally to ensure sustainable production, hence the need for periodic research to uncover all illegalities therein to benefit the unborn generation.

The environmental consequences of illegal activities within any forest reserve is enormous with varying degree; ranging from species extinction of both flora and fauna, climate change and its impacts, drying up of streams and rivers, wild fire, etc. therefore the need to identify such issues and analyse the situation for appropriate interventions. There is therefore the need for this independent and comparative scientific study to ascertain the levels of illegalities within the reserve. It is against this background that the present study seeks to unveil.

1.8 Organization of the Study

The entire work after completion shall be made of six chapters arranged in order of arithmetical or numerical order. The first chapter shall give an introduction to the study with emphasizes on the background of the study, statement of the problem, research objectives, research questions, scope of the study, significance of the study, and the justification of the study. Chapter Two will offer a review to the work from related studies to the topic. Chapter Three focused on the methodology which will outline the study area, method of data collection procedure, sources of data, sample size, data collection instruments, and data analysis. The fourth chapter will present the results or findings and discussion of the study. Chapter Five shall preview the summary, conclusions and a recommendation for further study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 World Forest Resources

Forests are essential for human survival and well-being that harbour two thirds of all terrestrial animal and plant species. They provide us with shelter, food, recreation, oxygen, spiritual sustenance and are also the source for over 5,000 commercially traded products, ranging from pharmaceuticals to timber and clothing. The biodiversity of forests, species, forest ecosystems and the variety of genes supports these goods and services which is the basis for long-term forest health and stability (SCBD, 2009). According to Ahmed (2008), about one half of the forests that covered the Earth are gone. Each year, another 16 million hectares disappear. The World Resources Institute estimates that only about 22% of the world's (old growth) original forest cover remains "intact" and this can be found in three large areas: The Canadian and Alaskan boreal forest, the boreal forest of Russia, and the tropical forest of the north-western Amazon Basin and the Guyana Shield (Guyana, Suriname, Venezuela, Columbia, etc.)

2.2 Forest Resources in Ghana

The forests in Ghana, which are part of the Guinea-Congolean phytogeographical region, cover about 24.2 % of the total land area of the country (FAO, 2010). Ecologically, the country is divided into a high forest zone to the southwest, accounting for about a third of the land area (about 7.5 million hectares), a savannah zone (14.7 million hectares) mostly in the north and a transition zone (1.1 million hectares) (ITTO, 2006). Ghana's natural landscape comprises two major ecological zones. The south-western part of the

country is the high forest zone, which represents about a third of its land area (approx. 7.5 million ha.), while the savannah dominates the north and the east. Forests are categorized into reserved and unreserved forest. The reserved areas account for 1.77 million ha of forest lands, of which 1.634 million ha is under the management and control of the Forest Services Division (FSD), whiles the Wildlife Division (WD) manages 0.136 million ha. (Kotey *et al.*,1998). The FSD of the Forestry Commission (FC) categorized the forest reserves under their jurisdiction into different management areas. These systems are based on the forest protection strategy designed in 1993 to replace the old system based on production, protection and conversion working circles ‘, which had been ignored in practice for years (Kotey *et al.*, 1998). These are the timber production areas 742,600ha (47%), where the forest area is designated primarily for the production of wood, fibre, bio-energy and non-timber forest products (NTFP’s). The permanent protection areas [(352,000 ha (21%)] comprise mostly of hill sanctuaries, including shelterbelts, fire protection and special biological area as well as swamp sanctuaries. Logging is not possible in 69% of this area and 16% is degraded. 15% of this area is protected due to genetic diversity and remains well stocked and accessible. The poorly stocked areas resulting from fire, overexploitation and poor management are the convalescence areas which cover 122,000 ha (70%). These areas are considered for rehabilitation within one felling cycle (40 years). This category includes the conversion areas [27,200 ha (8%)] that require planting and the areas that were not inventoried [2700, 000 ha (17%)] (Kotey *et al.*, 1998). The high forest zone comprises seven forest types based on their ecological zones (Hall and Swaine, 2013). The wet evergreen (WE) rainforest experiences the

highest amount of rainfall throughout the year while the dry semi – deciduous (DSD) type experiences amount of rainfall distributed only at certain times of the year in a well-defined dry season. The wet evergreen forest type is found in the south-western part of the country. Annual rainfall ranges between 1700 to 2030mm. Some usual tree species include Cynometra anants, Heretiera utilis and Tieghemelia heckellii. In terms of precipitation, the upland evergreen (UE) forest is similar to the (WE) but the two differ in their floristic composition and structure. The (UE) forests are on hills and mountainous areas and therefore referred to as mount forests. They receive up to 1700mm of rainfall and are wet throughout the year. One example is the Tano – Offin Globally Significant Biodiversity Area (GSBA) (Fig. 1).

The moist evergreen (ME) forests experiences a lower amount of rainfall of between 1500mm to 1700mm per annum. They do 9 not differ in structure from the WE forest except in floristic composition. The moist semi – deciduous (MSD) forest receives lower amounts of rainfall between 1200mm to 1500mm annually compared to the evergreen sub – types. The MSD forest type has upper and middle strata in terms of species composition and exhibits the deciduous habit during the dry season. This forest type can be conveniently divided into the north-western (NW) and south eastern (SE) sub – types (ie. MSD – NW and MSD – SE) (MES, 2002). The dry semi – deciduous (DSD) forest type bordering the Guinea Savannah has a low level of rainfall (1100mm to 1200mm annually) and pronounced dry season often associated with high temperature. This forest type is also known as transitional zone. According to the MES (2002), the DSD forest sub – type is also recognized as forest containing savannah with clumps of forest trees. Just like the MSD, this forest

type has an inner zone (IZ) sub – type and fire zone (FZ) sub – type. For instance, Odum (Milicia excelsa) which is highly important timber species reaches its maximum abundance in the DSD / IZ sub – type but is currently endangered. The DSD / FZ sub – type is associated with the occurrence of periodic fires, especially during the dry season. The southeast outliners on the other hand represent the driest of forest types with an annual rainfall of about 750 – 1275mm. it is the least extensive forest area, occupying an area of approximately 20km2 in small scattered patches. An example is the Shai Hills Game Production Reserve in the Accra Plains. This forest type also has a low floral diversity coupled with sparse tree canopies. Within this forest types, there are several rare tree species such as Talbotiella gentii and few commercial timber species (MES, 2002). The characteristics of these zones greatly influence the type of tree species and agricultural crops growing across the forest area. The biological diversity of the high forest zone is high and of global significance and rich in endemic species (Hall & Swaine, 2013, 1981: Hawthorne & AbuJuam, 1995; MES, 2002).

2.3 Forests and Wildlife Contributions to Ghana's Economy

In terms of economic contribution, forestry and logging accounted for 3 per cent GDP in 2009 and contributed US$240.9 million (representing 7.6 per cent) to total export value. It is estimated that about 120,000 people are formally employed by the forest and wildlife sector, and it serves as a source of livelihood for about 2 million people. There are 84 sawmills and 12 companies with plywood capacity in the formal sector, directly employing about 120,000 people. (Country Environmental Analysis, 2007 as cited in MLNR, 2011). In the informal sector, however, a wide mix of actors and rural households depend

on forest resources for their livelihoods, ranging from small scale carpentry, hunting, illegal chain-saw operations, and wood fuel collection to the gathering and commercialization of diverse non-timber forest products (NTFPs). About 11 million people live in forest areas of which about 67 per cent of their livelihoods are supported by 11 forest activities. It is estimated that there are about 6,000 people engaged in regular hunting, with an average income from hunting of around $1,000 per year. Even though they are of very high importance to the national economy, the extent of the contribution of non-timber forest products (NTFPs) are not formally recorded, and remains inadequately represented in policy analysis. Wild animal and wild plant exports were valued at US$18.0 million in 2003 (World Bank, 2006 as cited in MLNR, 2011). Bush-meat is of high dietary importance as a protein source in Ghana, but there is no consistency in national statistics on the annual trade in bush meat. The primary indigenous energy sources in Ghana are from the forestry sector comprising of 94.5 per cent wood fuel (Strategic National Energy Plan, 2006). Biomass in the form of firewood and charcoal dominates the total energy consumed in the country (averaging 67 per cent in 2008; MLNR, 2011).

2.4 Importance of Ghana's Forest

Forests play a major role in the socioeconomic development of humankind and are essential source of harvestable products and variety of other services (Roy *et al.*, 2002). Forests are important source of timber, raw material for pulp and paper, fuel wood, and energy, and other essential harvestable products like food, medicines, oil and resins. The forests also play vital role in maintaining the ecological balance and environmental make-up of our world (Roy *et al.*, 2002). They do not only help maintain biological

diversity, but also mitigate climate change, control hydrology, mineral cycling and soil erosion, improve air quality, create wildlife habitats and alleviate poverty (FAO, 2006; Roy *et al.*, 2002).

Some developing countries virtually depend on forests and their resources to support socioeconomic and national developments (Dadebo & Shinohara, 1999). Ghana's forests make significant contribution to the national economy. Timber, which is the major market-based forest product is currently the fourth largest contributor to Ghana's foreign exchange earnings aside minerals, cocoa and tourism (Marfo, 2010). The formal timber industry accounts for 11 % of foreign exchange earnings and contributes about 6 % to Gross Domestic Product (GDP) and directly employs about 100, 000 people (Marfo, 2010). Between 2002 and 2007, Ghana earned an average of € 193.048 million annually from the export of wood products such as sawn wood, veneer and plywood (Marfo, 2010). In 2009 alone, Ghana earned an amount of € 128, 226, 984 from the export of 426, 221 m3 wood products. Aside timber, the role of forests providing non-timber forest products and other services has been noted and appreciated. Forests contribute to livelihoods by providing food, fodder, fuel, building materials and supplement their incomes in addition to other non-quantifiable benefits such as cultural symbols, and ritual artifacts. Over 2100 plant species have been recorded in the High forest zone of Ghana, of which 23 are considered to be endemic (Hall & Swaine, 2013).

2.5 State of Ghana's Forest Cover

Ghana, like many tropical countries, continues to lose its remaining closed forests at an alarming rate. At the beginning of the last century, about one-third

(i.e. 8.2 million hectares) of the total land area was covered by high forest while the remaining two-third (15.7 million hectares) was savannah woodland (Owusu *et al.,* 1999). The area of high forest (off reserve) has drastically reduced and the only remaining portions today are mainly in remnant or sacred grooves. Records show that at the turn of the last century, Ghana had about 8.2 million ha of primary forest. By 1950, the area had been reduced to 4.2 million hectares and further to about 1.5 million ha by 1999 (Owusu *et al.,* 1999). This implies that from 1900 to 1950, the nation lost 50 % of its primary forest cover and also lost about 60 % of the remaining forest cover between 1950 and 1999. 12 From (1900 to 2000), the nation lost over 80 % of the closed forest (a reduction from 8.2 million ha to 1.5 million hectares). Farrhead and Leach (1998) estimated the deforestation rate to be a massive 22,000 hectares per year around the late 90's. From some more recent trends, Mongabay.com reported that, between 1990 and 2000, the average annual deforestation rate was 1.82 %. Also, between 2000 and 2005, the rate of forest change increased from 1.89 % to 4.2 % per annum. The recent FAO (2010) Country report on Ghana's forest has estimated Ghana's deforestation at 135,395 ha per year. According to Tropenbos (2005), the crisis in the forestry sector is rapidly increasing. Satellite imagery suggests that the forest resource is depleting faster than at any time in our history and that, state managed forest reserves are now also under siege. As forest resources dwindle and industry competes fiercely for what remains, the vicious cycle of state capture, over-logging, rural stakeholder marginalization and conflict has sped up considerably.

2.6 Concept of Illegal Forest Activities (IFA)

High levels of deforestation due to illegal logging coupled with other

related illegal forest activities are detected globally and are of concerns to biologists (Reboredo, 2013); hence the need to define and expatiates the concept under study. The concept illegal forest activities (IFA) which grammatically is a phrase, comes from three distinct English words. This study therefore seeks to vividly explain each word in order to clear doubt about the origination of the concept for understanding of the study as a whole. A dictionary definition of the term illegal tells us that it means something "not allowed by the law". According to the same dictionary, a law is "the system of rules of a particular country, group or area of activity". To further clarify the meaning of illegal, it is also useful to consider its synonyms, which include "criminal", "illegitimate" and "irregular". However, activities also mean something that is done as work or for a particular purpose. Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 per cent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.

Illegal forest activities (IFA) is therefore defined to include "all illegal acts that relate to forest ecosystems, forest-related industries, and timber and non-timber forest products. (Tacconi, Boscolo, & Brack, 2003).

Also according to Odoom, 2005***;*** *illegal forest activities include: occupation of forestlands, logging, woodland arson, timber transport, trade and timber smuggling, transfer pricing and other accounting practices, and illegal forest processing.*

The forest resources in Ghana are being destroyed at an alarming rate. From the country's original forest cover of 8.2 million hectares at the

beginning of the 20th Century only an estimated 1.6 million hectares remain intact due to various forms and degree of illegal activities within the reserves in the country (Ministry of Lands and Natural Resources, 2012). This, therefore calls for reconsideration into the status of some forest reserves in the country of which the Southern Scarp Forest Reserve, Akim portion is not an exception.

2.7 Deforestation

Change is happening at a very fast rate all over the world, with some implications for sustainable human development. The bio-physical environment which contains the basic human life-support systems has always been characterized by change (Gyasi *et al.,* 1995). Though tropical forests have always had a long history of human interferences, and also characterized by change, the rate at which the changes are occurring have raised a lot of concerns (Gupta *et al.,* 2004; Gyasi *et al.,* 1995; Hawthorne and Abu-Juam, 1993; Myers, 1992). The concerns over the rapid disappearance of tropical forests (Myers, 1992), are as a result of the degree of disturbance and the imbalance between disintegration and recovery rates (Hawthorne and Abu-Juam, 1993). Forests in the tropics are particularly under threat from human-induced disturbances (Gupta *et al.,* 2004; Kozlowski, 12 2000), and approximately 13 million ha of tropical forests are felled, burned or converted to other land uses each year (FAO, 2006). The forests in Ghana, like other tropical forests is seen to have been very much influenced by human disturbances. There has been a considerable loss of forests in the country in the last 100 years and over, with serious local, national, regional and global implications (Appiah *et al.,* 2009; Foli *et al.,* 2009; Gupta *et al.,* 2004; Palo and Yirdaw, 1996). Siry *et al.,* (2005), argued that forests loss has a far-reaching

significance which goes beyond loss of forest land but also affect the decline in the quality of existing forests. Though there are uncertainties about the actual rate of deforestation, the rate of change in Ghana has been rapid and increasing (Appiah *et al.*, 2009; FAO, 2006; Benhin and Barbier, 2004; Sandler, 1993).

The present rate of deforestation is among the highest in Africa (FAO, 2010). The average estimated annual rate of deforestation between 1990 and 2000 was 2% (135, 000 ha), which is higher than the average annual rate for both Central and Western Africa which stands at 0.6 % (FAO, 2010; FAO, 2006). Forest resources in Ghana have reduced from 7 million ha in 1990 to approximately 6 million in 2000 (FAO, 2006). Almost all the forests are depleted and 0.39 million ha of forests reserves are considered as degraded (Marfo, 2010). Over harvesting has led to the downward revision of the national Annual Allowable Cut (AAC) in forest reserves from 1.2 million m3 in 1990 to 500, 000 m 3 in 2005 (ITTO, 2006). The off-reserve component of the total national AAC (2 million m3) was set as high as 1.5 million m3 mainly due to extensive illegal logging and the assumption that with time those areas are likely to be converted to 13 other land uses (Marfo, 2010). However, some have argued that some of the causes of deforestation in the past were legal, purposeful and arguably necessary for development of the country (Grainger, 1993; Hawthorne & Abu-Juam, 1993). The cause of deforestation in Ghana vary and are by no means easy to change, but they have resulted from a complex interaction of different social, cultural, economic, management and political factors (Teye, 2005; Benhin & Barbier, 2004; Gupta *et al.*, 2004; Capistrano and Kiker, 1995; Grainger, 1993). Though, there are several causes for forest loss in Ghana, they can be broadly divided into internal (country

specific issues such as unsustainable agriculture, conversion to agriculture, unsustainable logging, wildfires, firewood collection and charcoal production, mining, plantation strategies and taungya, population pressure, poorly defined land and resource tenure, poverty and unemployment, weak government policies, corruption and weak institutional governance) and external (influences from outside Ghana such as foreign investments, international trade and market failures) factors (Appiah *et al.*, 2009; Codjoe & Dzanku, 2009; Awung, 1998).

The internal factors can further be categorized into proximate and underlying causes. The proximate causes include, unsustainable agriculture, conversion to agriculture, unsustainable logging, wildfires, firewood collection and charcoal production, mining, and plantation strategies and taungya, whilst the underlying causes also include but not limited to population pressure, poorly defined land and resource tenure, poverty and unemployment, weak government policies, corruption and weak institutional governance (Codjoe & Dzanku, 2009; Teye, 2005; Benhin and Barbier, 2004; Palo & Yirdaw, 1996; Grainger, 1993; Hawthorn and Abu-Juam, 1993). However, these distinctions are merely 14 conceptual since none of the causes is mutually exclusive but all are interdependent and interactive (Codjoe & Dzanku, 2009; Dadebo & Shinohara, 1999).

2.8 Effects of Forest Degradation and Deforestation on Species Dominance

Forest degradation refers to any activity that affects the quality of the forest (Guuroh, 2010). According to FAO (2006), forest degradation is the changes within the forest which negatively affect the structure or function of

the stand or site, and thereby lower the capacity to supply products and/or services. Very often degradation does not show up so much in decrease of woody vegetation but rather as a gradual reduction in biomass, changes in species composition and soil degradation (FAO, 2000). 15 According to Fiset (2008), consequences of degradation are; loss of biodiversity, non-suitability of deforested areas for conversion, flooding and soil erosion. Land-use change is thought to have the greatest impact on biodiversity in tropical forests (Sala *et al.,* 2000). Forest clearance destroys the habitat and generally causes a decline in forest species abundance and diversity, particularly for species that are restricted in range. Diverse taxon shows different and often variable responses (Lawton *et al.*, 1998; Barlow *et al.*, 2007).

2.9 Impact of Forest Degradation and Deforestation on VPA and REDD+

Forest depletion constitutes a threat to forest sustainability and loss of potential forestry revenues; the situation possesses a big challenge to implementation of Ghana's Voluntary Partnership Agreement (VPA) with the European Union. Though VPA is primarily concerned with legality of timber being exported to Europe, a component seeks to 17 promote legality of domestic lumber supply. This is because if legality of domestic lumber is not ensured, illegally sourced lumber for the domestic market could find its way as legal lumber for export. Besides, leaving out legality of domestic lumber supply would constitute a threat to forest sustainability, the ultimate goal the VPA seeks to contribute to. Illegal chainsaw lumbering also constitutes a threat to Ghana's REDD plus agenda by which Ghana seeks to reduce the loss and degradation of her forests (Nutakor *et al.,* 2009). The REDD+ concept as defined in the Bali Action Plan (UNFCCC Dec 1/CP.13) and subsequent COP

decisions relates to reducing emissions from deforestation and degradation, the role of conservation, sustainable management of forests and enhancement of forest carbon stocks all within developing countries. REDD+ actions are sustainable development policies and measures to reduce emissions and enhance removals, knowing that these measures may well extend to the agriculture and bio-energy sectors, insofar as they impact forests. A REDD+ strategy can involve market or non-market-based instruments, and be based on performance according to established criteria or based on greenhouse gas quantification (FC, 2012).

2.10 Invasive Species and Its Effect on Forest Structure and Composition

Invasive species are non-native species that have established outside their natural range, while introduced species have been established outside their natural range by human action. Both invasive and introduced species can cause extinctions, alter abiotic environments, become pests, or introduce diseases (Bradshaw *et al.*, 2009), particularly targeting species with a lower reproductive potential or those that are naive to competitors or predators (Purvis *et al.*, 2000). Much of the evidence for the detrimental effects of invasive species is based on correlations between invasive species dominance and native species decline in degraded habitats (Didham *et al.*, 2005). In these cases, invasive species could be driving the native species loss or could simply be taking advantage of habitat modification or another ecosystem change that is itself driving the native species loss (MacDougall & Turkington, 2005). Invasive species may cause biotic homogenization, where species assemblages become dominated by a small number of widespread species that thrive in human-altered environments (McKinney & Lockwood, 1999). Tropical forest

communities that have been substantially altered by 16 invasive or introduced species occur predominantly on heavily disturbed islands (Ghazoul & Sheil, 2010). Intact continental rainforest may be more resistant to invasion because of the high species and functional group richness, high competitive exclusion rates and high pest loads (Denslow & DeWalt, 2008). Invasive species can, however, dominate disturbed or open tropical forest areas, impacting their recovery (Ghazoul & Sheil, 2010).

2.11 Forms of IFA

There are several forms or types of illegal forest activities that takes place at least almost every moment within various protected areas, but for the sake of the of objectives of the study; below are the major among them reviewed in relation to this work.

Illegal Logging

Illegal logging is a permeating and widespread phenomenon, causing enormous damage to forests, forest peoples, and the economies of producer countries (Wijen *et al.,* 2013*)*, however concerns about the extent of illegal logging around the world has grown significantly in past years.

Illegal logging is said to include but is not limited to the following kinds of activities:

- *Unauthorized harvesting in national parks or forest reserves;*
- *Harvesting without concession permits or beyond concession permit limits;*
- *Overharvesting on granted lands;*
- *Transporting timber without proper documentation;*

- *Timber smuggled, sold or transported as if produced from foreign, legal concessions;*
- *Purchasing shipments of logs of questionable origin mixed with legal timber harvests;*
- *Failure to properly report harvests to avoid royalty payments; and*
- *False customs papers* (Hansen, 2017).
- *Logging protected species*
- *Duplication of felling licenses*
- *Girdling or ring-barking, to kill trees so that they can be legally logged Contracting with local entrepreneurs to buy logs from protected areas.*
- *Logging in prohibited areas such as steep slopes, riverbanks and water catchments • Removing under-/over-sized trees from public forests*
- *Reporting high volume extracted in forest concessions to mask the fact that part of the volume declared is extracted from non-authorized boundaries.*
- *Setting woodlands on fire to convert them to commercial uses.*

The illegal harvest and trade of timber involves a vast, corrupt network of industry, global supply chains, and imperfectly regulated trade practices. Both supply and demand-side companies contribute to unlawful, inequitable and destructive illegal logging practices. Consumer appetite for lumber for infrastructural development amid urbanization rate across nations and the world at large has fuelled further the exploitation of already depleted forests and the related consequences. Features of illegal logging studies have shown to be negative impacts to the forest industry:

- *Contribute to deforestation and loss of biological diversity;*
- *Result in government revenue losses of billions of dollars;*

- *Foster a vicious cycle of bad governance, i.e. corrupt individuals gain power through illegal revenues, then they may support bad governance to maintain revenues and acquire more power;*
- *Contribute directly to increased poverty when people lose their resources, and indirectly as a result of a reduction in government revenues, that could in turn be made available for poverty reduction programs;*
- *Contribute to funding national and regional conflicts thereby exacerbating them;*
- *Distort forest product markets, thus reducing incentives for sustainable forest management.*(L Tacconi *et al.*, 2003)

Illegal farming

Agriculture is traditionally considered as the "basis" of economic and social structures. However, unsustainable or illegal agricultural practices are recorded throughout the World and are included among the main driving forces for environmental degradation leading to severe impacts on the sustainability of the forestry sector (Ferragina, 2010). Global deforestation is estimated to total nearly 9.4 million hectares annually, very substantial portion takes the form of illegal encroachment into forest areas (Goncalves, Panjer, Greenberg, & Magrath, 2012). Encroachment and forest degradation in the tropical regions; especially, in the Sub-Saharan Africa have continued unabated and are posing serious threats to forests and the revenue countries derived from the forests and other forest resources *(Duguma et al.*, 2019).

Conversion to Agriculture

The continued expansion of agriculture in many parts of the tropics is a major threat to forests, contributing immensely to deforestation (Horne, 1996).

In Ghana, there has been an increase in both legal and illegal farms in most forest reserves (Hawthorne & Abu-Juam, 1993). Forests continue to be converted to croplands especially in areas where lands for cultivation are becoming scarce. Economic reasons have been cited for the persistent conversion of forests to other land uses in the off- reserve areas (Kotey *et al.*, 1998). As incomes decline, rural communities are forced to clear more forests to sustain their livelihoods (FAO, 2001). Forest land clearing has been intensified by the increased emphasis on agricultural production which relies heavily on export 17 commodity crops (Yirdaw, 1996). The quest to diversify the nation ‘s exports with emphasis on non-traditional export commodities have led to an increased expansion of cocoa growing areas (Yiridoe & Nanang, 2001). Large portions of the high forests are therefore cleared annually for cocoa production. Benhin and Barbier (2004) used a four-equation model to show that cocoa land expansion is a significant cause of forest loss in Ghana. However, the cultivation of food crops like cassava, plantain and cocoyam by farmers also lead to the clearing of more forest areas. Palo and Yirdaw (1996) stated that so far as the modernization of the agriculture sector continue to receive little attention the conversion of forests to farmlands is likely to continue.

Illegal Hunting:

Increased illegal hunting (poaching) continues to be a major threat to forest biodiversity in many countries. The depletion of wildlife is intimately linked to the food security and livelihood of numerous tropical forest-region dwellers, as many of these forest-dependent folks have few alternative sources of protein and income. Unsustainable poaching pressures are often linked to

logging activities in most cases across the world (SCBD, 2009). Wildlife attraction forms part of global tourism to most protected areas in countries, especially in the tropical sub-region of Africa; however, the environmental impacts of illegal hunting range from an immediate detrimental effect on the target species and incidental loss of non-target species, to a long-term deterioration in ecosystem services with regional and global consequences (Kaiser & Jennings, 2001), since all species perform a functional role within the ecosystem of which they are components.

Illegal Mining

The activities of illegal small-scale miners across Africa; especially, in Ghana have resulted in land degradation through loss of vegetation and eventual land degradation. Illegal mining strips about 28 billion tons of material from the earth. The presence of gold deposits discovered in most places across the country has attracted a lot of unemployed youth and small-scale mining ventures to those areas. Brilliant and gifted students who could have blossomed into scholars of repute to take charge of the affairs of the nation end up in underground (pits). The activities of illegal small-scale gold mining (dubbed "galamsey") in those communities are causing serious environmental havoc and destruction (Tom-Dery, 2012). Most of the minerals are found in rivers, as such illegal mining companies resort to slating of these rivers and their surroundings to enable them the access to the targeted mineral without considering the consequences and dangers this activities will pose on trees, birds, animals, water source and on the health of individuals residing in those communities. Surface mining which is commonly practiced uncovers the minerals through the clearing of the forest leading to cutting done of trees

and removing the underlying vegetation cover to enable them achieve the go of gold extraction that result in land degradation. Greater portions of the vegetation cover in the mined areas lose its properties to be used for any other purpose such as farming and harbouring wildlife (Charis, 1994).

Illegal Chain Sawing Activities

Illegal exploitation of forest resources, by means of invasion through extension of admitted farms and timber harvesting by means of chainsaw milling is quite high in Ghana and are reported to play important roles in forest management activities (Kotey *et al.,* 1998; Ohene-Gyan, 2004).

Such illegal activity cost the forest lots of damages even though it is not clear exactly which illegal activities cost the forest more, illegal chainsaw activities have caught the attention of forest managers and policy makers in terms of its contribution to forest destruction, lost revenue to the state and the amount of conflict that it generates (Marfo, 2010). Lack of employment is a critical factor driving many people to use forests resources unsustainably through illegal chainsaw operation (Putz *et al.,* 1996). Studies in some countries indicate that there are five general factors contributing to the occurrence of illegal chain sawing activity in the forest sector (FAO, 2001).

These include; flawed policy and legal framework, minimal enforcement capacity, insufficient data and information about the forest resource and illegal operations, corruption in the private sector and in government and high demand for cheap timber. Brown (1994), determined adverse agricultural conditions due to sector policy that influence illegal forest activities. Such and other policies upset the conditions of production and productivity for rural people and thus pressure them into illegal 23 forest

activities. Dudley (2004) analyzed the intricacies of community's 'willingness to participate in illegal chain sawing. Based on a series of community interviews and social behaviour patterns, the study showed that involvement in illegal chain sawing primarily interplay between the need for income, the fact that others are already illegally logging, and the realizations of loss of their community 's control over traditional forest areas.

Over-Exploitation of NTFPs

Firewood collection and charcoal production (NTFPs) are in most cases the major products derived from the forests in Ghana (Palo and Yirdaw, 1996). The use and demand for these products keep increasing (Foli *et al.*, 2009). Firewood and charcoal account for more than 75 % of all energy consumed in the country (FAO, 2006). It is estimated that about 91 % of total round wood produced is used for firewood and charcoal production (Teye, 2005). The use of firewood and charcoal is not only limited to domestic purposes but also used in local breweries, bakeries and fish processing (Yiridoe & Nanang, 2001). The demand for firewood and production of charcoal especially in the transition zone has contributed to the loss of forests in Ghana (Foli *et al.*, 2009; Teye, 2005; Yiridoe & Nanang, 2001). Most of the firewood are collected from the off-reserve areas and fallow lands, however wood in these areas have become scarce therefore leading to increased pressure on the forest reserves (Kotey *et al.*, 1998; IUCN, 1992). Charcoal production has also impacted both the forest reserves and off-reserve areas (Yiridoe & Nanang, 2001). The entire chain in the production of charcoal from the extraction has negative impacts on the structure of the forests (Webi, 21 2005). With increasing population, the demand and consumption of firewood and charcoal has increased creating a

gap, and this gap will continue to intensify the pressure on forest reserves (Yirdaw, 1996).

2.12 Effects of IFA

The understanding of the effects from illegal forest activities (IFA) are viewed by biologist to be multiple with one linking with other across social, economic, and environmental perspectives and are seen from the actors. However, it is often assumed that any logging conducted under prescribed regulations intended to promote sustainable forest management (SFM) has a less destructive effect on forests than illegal logging, but in many situations SFM refers only to selective low impact logging (Pacheco *et al.,* 2016); this is because except the harvested area is afforested, the impacts are not different from those that are logged illegally. Notwithstanding, any assessment to the effects resulting from illegal forest activities is complicated since there is no clear-cut boundary between impacts associated with legal versus illegal activities since both may lead to similar effects considering the angle one view it.

Drivers of Change and Pressures on Loss of Biodiversity

Ecosystems vary greatly in size and composition, ranging from a small community of microbes in a drop of water, to the entire Amazon rain forest. The very existence of people, and that of the millions of species with which the planet is shared, is dependent on the health of our ecosystems. People are putting increasing strain on the world's terrestrial and aquatic ecosystems. Despite the importance of ecosystems, they are being modified in extent and composition by people at an unprecedented rate, with little understanding of the implications this will have in terms of their ability to function and provide

services in the future (World Bank, 2003). Currently, population growth and patterns of consumption, which lead to increased demand for ecosystem services and energy, are the most important drivers affecting biodiversity.

These drivers result in pressures that have direct impacts on ecosystems, species and genetic resources. Human activities cause changes in both the living and non-living components of ecosystems and these pressures have increased dramatically over the past few decades. Drivers and pressures seldom act in isolation. They tend to interact in synergistic ways, and their impacts on biodiversity are more than the sum of the effects of the individual drivers and pressures themselves (World Bank, 2003). Drivers and pressures act at different temporal and spatial scales. For example, sediments from 22 deforestations in the headwaters of the Orinoco River, deep in South America, have impacts far out in the Wider Caribbean Sea basin, changing the nutrient availability and turbidity of the waters (Hu *et al.*, 2004).

Economic Effects

The economic effects of illegal forest activities are manifold and are interrelated. According to report filed by the Ministry of Lands and Natural Resources, 2012; the formal forestry and wildlife sector employs about 120.000 Ghanaians, with employment predominantly in log processing industry. The timber industry is the fourth largest foreign exchange earner after minerals, cocoa and oil exports. Primary wood and processed products account for 89% and 11% of timber exports, respectively. These are lost every year due to the uncontrolled illegal forest activities within our reserves across the country.

I. *Illegal logging as the major factor tends to distort timber markets since it provides cheap wood to growing urban markets. This has negative effects on benefit distribution along the supply chain since it tends to undervalue the available timber stocks and pays relatively lower remuneration to local people, thus prompting an unequal distribution of the monetary benefits obtained from logging.*

II. *It also leads to significant losses for the state due to the evasion of forest fees. Increasing depletion of timber stocks leads to a progressive reduction in the economic value of the remaining forests vis-à-vis other land uses, which acts as an incentive for forest conversion to agriculture.*

III. *Furthermore, illegal logging constitutes a high risk to investors, thus ultimately reducing local access to affordable long-term sources of finance, and making forest-based activities unattractive financially.* (Pacheco *et al.*, 2016)

Environmental Effects

The environmental impacts from illegal forest activities are more evident. Forests as an ecosystem provide a number of goods and services, such as timber, carbon stocking, biodiversity, soil and water protection that are lost when illegal activities and unsustainable cutting take place, or when forests are converted to agriculture. If illegal logging practices which is contributing factor of IFA occur at a large destructive scale, it can lead to the conversion of forests to grassland, something which is evident in several areas of the study and the effects are real. Deforestation and loss of greenhouse gasses are some of major effects of illegal forest activities on the environment.

a) *Illegal logging and or farming in protected areas as being a major factor*

of IFA, tend to disrupt the carbon cycle.

b) Illegal trade in wildlife as a by-product of illegal logging operations, leading to a depletion of biodiversity; thus, extinction of some endangered fauna species (Callister, 1999).

a) Water, being a vital necessity of life is also affected both in quality and quantity by the activities of illegal miners. In Ghana, contaminations of surface and ground water bodies have particularly been experienced in gold mining communities especially, in the Ashanti, Eastern, and Western with particular emphasis on Birim, Tano, and Offin rivers as examples (Ansa-Asare, 2000).

Social Effects

Fringe communities along forest reserves often rely on the reserve for their livelihood through foul means. However, destruction of forest resulting from IFA tend to put a tremendous pressure on the indigenous dwellers forcing them to migrate to more densely populated areas in search of new life (Reboredo, 2013). Every forest reserve is known not to provide only timber product, but also several non-timber forest products; some of which cannot be quantified (for example, regulatory services of an ecosystem).

2.13 Strategies to Promote Forest Industry and Economic Gains

The importance of every well-conserved and managed forest reserve cannot be undermined, considering the various ecosystem services man derives from natures given priceless asset on the planet earth. Forests play a critical role in supporting the livelihoods of people globally, especially in meeting the daily subsistence needs of the world's poor (Toivonen, 2007). Therefore, in order to rely and enjoy this life-supporting benefits man obtains from the

forest, it is important to understand the value of a forest for today and the future. It is on this that the following strategies would be crucial in meeting the benefits forest provides for individuals, communities, countries, and the world at large.

2.14Enforcement of Forest Laws

a. Strengthening of law enforcement could be more successful if support is also provided for the legal arms of the forestry commission and the judiciary, particularly to enforce the publication of information.

a. An attempt to work with the forestry commission to build internal will and support for the successful prosecution of illegal forest activities practitioners are very important in curbing the situation.

b. Efforts to identify individuals who may become champions within national institutions, or who continue to push for disclosure, are likely to be long-term strategies to improve suppression of illegal forest activities(Downs, 2013).

The United Nation's Sustainable Development Goals underline the need to balance objectives and potential trade-offs between poverty reduction, growth and sustainability. For instance, **Goal 15 and Goal 13**: lays critical emphasize on sustainable forests management, to combat desertification, halt and reverse land degradation, halt biodiversity loss and to take urgent action to combat climate change and its impact: placing forest management and sustainability into the international development framework for both developing and developed countries (Morrison-métois & Lundgren, 2016).

Sustainable forest management is defined to mean practice of managing our forest resources to meet the needs of today without compromising the

benefits to the unborn generations (Green works, 2005). Forests provide wide-range and diverse benefits to people in the world and these benefits consist of economic outputs such as the income and employment that is generated by forest industries (Amarh, 2014). Well-managed forest is where felling limit is adhered to, in order to meet the benefits which cannot be valued in monetary terms. However, understanding the value that people place on these benefits provides useful information for the management of forest resources with the future generations in mind.

Education

With the increase of illegal forest activities across the world, it has become necessary to educate all and sundry on the importance of forest to the existence of man. In view of that, it is prudent to focus on the need to widen the traditional education and training of foresters so as to incorporate multiple land use, sustainable development and an awareness of how land use interacts with social conditions (FAO, 1994) . Considering all the various ecosystem services obtained from the forest, it has become more important to socialized fringe communities in order to desist or limit illegal practices.

2.15 Changing the Status of the Reserve

Converting the status of the forest to farmland is a deliberate attempt, and this is done by considering the benefits derived from the timber stock of a given compartment as compared to the degraded part of the same reserve. However, taking into accounts the various illegal activities: for example; illegal farming within the forest reserves then can inform in decision making as to whether to convert a forest to farmland or not. A typical example however is, in parts of the New Guinea Highlands, this type of transition has led to the

conversion of a formerly productive forest-garden that saw a cycle of deforestation being converted to subsistence horticulture and woody re-generation into a short grassland ecosystem for grazing (Oldfield & Dearing, 2013). More importantly, it becomes apparent that in order to understand the present-day status and future changes in contemporary systems that are undergoing this type of pressure, it is necessary to study impact over relatively long time periods before concrete decision is made (Sandor & Gesper 1988, Sandor & Eash 1991). In many examples of forest degradation through human activities, the key issue is a critical shift in the balance between the rate of depletion of key functional attributes and the rate of their renewal within a given system of production. Beyond a certain threshold in the shifting balance, a persistent state of lower productivity may develop that is difficult to reverse.

Compliance to International Agreements

Several international agreements are emerging between producer and consumer countries, aimed at committing them to jointly in improving compliance with logging and forest products trade laws (Contreras-hermosilla, 2003), due to the current illegal activities witnessed in the forest industry over the years. This section highlights on the 1973 Convention on International Trade in Endangered Species. For those most directly relevant to forestry and the timber trade, it evaluates the potential for the international community to use their provisions to reduce illegal logging and trade in illegal timber. According to Luca Tacconi, Boscolo, & Brack, 2003; the 1973 Convention on International Trade in Endangered Species, commonly known as CITES held in Washington aims to protect endangered species from over-exploitation by controlling international trade, under a system of import and export

permits. From the said global meeting, species were categorized and placed on different lists dubbed Appendix.

Appendix I includes all species that are threatened with extinction; Appendix II includes species that are not necessarily threatened with extinction now but may become so unless trade in such species is subject to strict regulation; and Appendix III includes species that a party identifies as being subject to regulation for the purposes of preventing or restricting exploitation, and where it needs the co-operation of other parties in controlling trade. Trade in any species under any of the appendix is prohibited except in accordance with CITES. The treaty has had some successes in preventing the extinction of some endangered species, especially those categorize under Appendix I listing, (Luca Tacconi *et al.*, 2003). Also, under the Rio conventions, the convention on Biological Diversity (CBD), the United nations convention to combat Desertification (UNCCD) and the United nations Framework convention on climate change (UNFCCC), recognize the significant contribution of forests to the achievement of their respective goals and objectives (UNFCCC, 2012), hence the need for member countries to prioritise in the adherence and compliance of all commitment they all endorsed.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Timber plays an essential role in the economy of the country. Forest reserves houses a lot of flora and fauna that are of great importance. However, poverty, increasing human population and expansion of farms towards forest reserves has led to the over-exploitation and increased number of illegalities in forest reserves. The study was conducted to identify the effects of illegal activities on timber production in Southern Scarp Forest Reserve (SSCP). Ten communities were selected using random sampling technique. A total of hundred respondents were selected with ten from each of the ten communities. Both questionnaires and interviews were used in the data collection exercise. Purposive sampling was used in selecting a total sample of 100 participants from the study population. Illegal farming was noted as the main contributing factor to the destruction of forest reserves. There is the believe that, illegalities on timber production in the reserve have led to the destruction of water bodies and degradation of lands. The results also indicated that there was a decline in fauna and NTFPs e.g. (snail) in the reserve due to illegalities in the reserve. As a means of ensuring effective ways of managing the forest reserve, forest guards should be well equipped and motivated to work to their full ability. Also, frequent monitoring and patrols by responsible stakeholders should be done. Moreover, communities in forest fringe areas should be educated on the importance of forest and effect of illegalities. Areas affected by such illegalities should be planted up by offenders when apprehended. There is also the need to

advice timber contractors who work in timber concessions to employ sustainable logging to reduce the impact of logging on the forest.

The study methodology followed a sequence of steps to achieve the objectives of the paper. First, a description of the area in which the study will be conducted is presented to provide the reader with some background and geographic information. Next, the type of data collected and the rational for collecting them will be highlighted. Primary data will be collected from target people within some selected fringe communities as well as some resources guards around the reserve. Furthermore, the researcher will provide instruments that will be used to analyse the primary data.

3.2 Study Area

The Southern Scarp Forest Reserve, Akim portion is believed to have been established in 1935. The reserve is located in the Eastern Region of Ghana and falls within four (4) Political Districts. These are Fanteakea North and South and Atiwa District Assemblies as well as East Akim Municipal Assembly with their capitals as Begoro, Kwabeng and Kibi respectively. It falls under the Akim Abuakwa Traditional council and share boundaries with Kwahu portion of the Southern Scarp at a distance of 5.5km and Worobong South Forest Reserve at a distance of 13.95km respectively. The Southern Scarp Forest Reserve has total land area of about 15,223ha and lies on mountainous range which peaks up to 640m above sea level, and is characterized by plateaus.

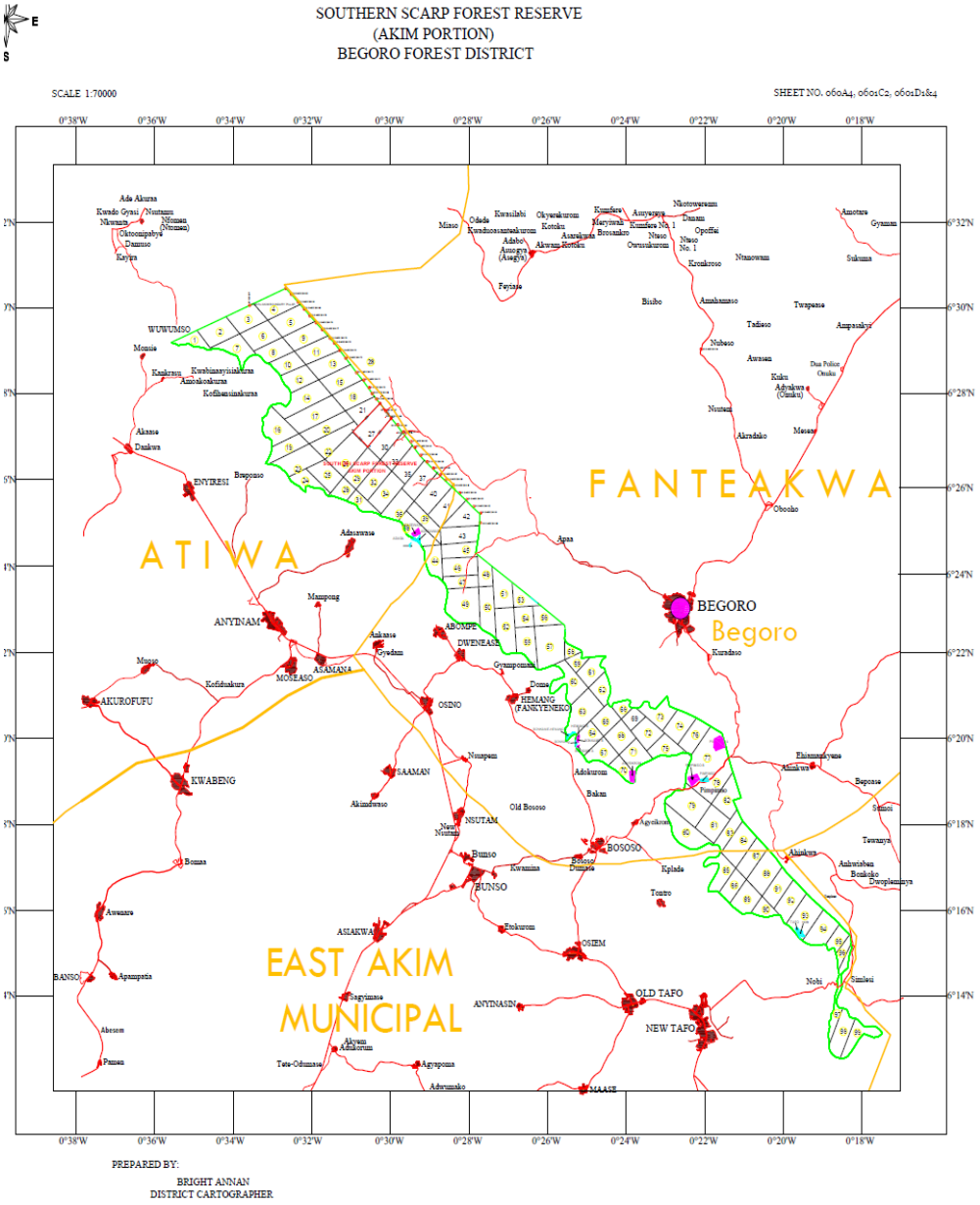


Figure 1: Map of Southern Scarp Forest Reserve, Akim Portion

Source: Forestry Commission-Eastern Regional Office

3.3 Topography, Drainage and Geology/Soils

The Southern Scarp Forest Reserve's topography as the name depict has steep slope or cliff at the edge of a plateau gently rolling with hills ranging between 1,840 meters and 2,330 meters above sea level. The reserve is fairly well–watered forming the catchments area for major rivers such as Akrasu,

Bosu, Subri, Ahinkwa, Ponpon, Danswa, Asuduasa, Aboabo and Bremuadaa. The numerous small rivers and streams running through some portions of the reserve become water-log during the peak of the rainy season. The district is generally hilly and has an undulating landform. Average height of the land is about 8,762 metres above sea level. The reserve is also recognized as a nationally important tourist site because of Atiwa Waterfall located at Adasawase which is also a source of water for irrigation and domestic use for surrounding communities. Geologically, the underlying rock of the reserve is upper and lower Birimian and Voltain sandstone. The soil varies from reddish to brownish colour and it is mostly sandy loam with patches of clay. In the rocky areas, the soil is reddish clay or quartz on the side of the rocky outcrops. The soils in this area are mostly ochrosols with forest oxysols occurring in the wet swampy area.

3.4 Climate and Vegetation

The Akim portion of the Southern Scarp Forest Reserve lies within the Tropical humid climatic zone with two pronounced seasons due to it closeness to the Atiwa Range: thus, the hot-dry harmattan season coupled with North-Easterly Harmattan winds which are charged with fine dust particles occurring between December and March and the rain bearing South-Westerly winds occurring in the rainy season. The mid portion of the reserve which lies between Dwenease and Fremponso is the wet semi-equatorial climatic zone, which is characterized by high temperatures and a double maxima rainfall regime. It has a mean monthly temperature of between 24 and 29°C, and experiences a mean annual rainfall of between 1500 and 2000mm. The first rainfall peak occurs in March-Early August with the second occurring in Late

August-November while October recording the maximum. The dry seasons are really distinct with the main season commencing in November and ending in late February. Temperature is found to be fairly uniform ranging between 27°C in August and 31°C in February. Relative humidity is generally high throughout the year, ranging between 70% - 80% in the dry season and 75% - 80% in the wet season (Ansa-Asare & Asante, 2005).

The vegetation consists basically of the wet-semi deciduous rain forest and the savannah scrub which is found at the Akim New Tafo stretch of the reserve. The wet-deciduous part of the reserve is characterised with thick vegetation, however experiencing continuous human activities including illegal farming, illegal logging, illegal mining, collection of non-timber forest products. The vegetation cover also includes few patches of some troublesome terrestrial invasive species such as *Chromolaena odorata* and *Megathyrsus maximus.*

3.5 Methods of Data Collection

The study was conducted by the use of questionnaire and an interview guide in gathering relevant information from the selected communities. The questionnaire was made up of both open and closed ended questions that helped in the collection of relevant data from the field of study. Interview guide was also used in the collection of data from specific key informant, thus District Officers of the Forestry Commision, and other opinion leaders within the selected communities. Secondary data was also sourced from books, relevant articles, journals and magazines as well as relevant publications and researches conducted on the subject matter by individuals and institutions.

3.6 Sampling Technique

The study employed non probability sampling technique, hence it deployed both purposive, random and snowball sampling techniques which enabled the researcher locate the target as accessible as possible. These were used to select ten (10) respondents each from ten (10) selected communities. Therefore, a sample size of one hundred (100) respondents specifically loggers, hunters, miners and farmers from the four political districts were interviewed. The sample was selected to suit the purpose of the study. A reconnaissance survey was first undertaken in some fringe communities of the study area that helped to identify the problems and developed research strategies which aided in the administering of the instrument used for primary data acquisition and also embarked upon personal interactions with the major stakeholders from the Forest Services Division of the Forestry Commission in the District and other opinion leaders within the selected communities.

3.7 Data analysis

The research was analysed by deploying themes base on the responses from the various target population, stakeholders as well as field observation. Both statistical package for social scientist (SPSS version 22) and Microsoft Excel were used in analysing the data to yield detailing comprehensive results with the provision of tables and charts for the discussion.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Age Distribution of Respondents

One hundred (100) questionnaires were administered to ten (10) communities with ten respondents from each selected community. The questionnaires were aimed at gaining relevant information from loggers, farmers, miners and hunters and key persons who have stayed in various selected communities for years in other to help determine the variation in condition regarding the effect of illegal activities on timber production in Southern Scarp Forest Reserve over time. Findings from the study shows that 4% of the respondents were within the age category of 65 years and above, 13% fell within the age category of 55 – 65 years, 26% fell within the 45 – 54 years age category, 26% also were within the 35 – 44 category, 22% fell within the age category of 25 -34 whiles 9% of the respondents were within the age category of 18 – 24. This indicates that middle age men and women outnumber the youth and the aged and therefore engage themselves in all forms of illegal activities. The survey results of age respondents are shown below in Table 1.

Table 1:Age Distribution

Age of Respondents (Years)	Number	Percent
18-24	9	9.00
25-34	22	22.00
35-44	26	26.00
45-54	26	26.00
55-65	13	13.00
65+	4	4.00
Total	100	100.00

Source: Field Survey (2020)

4.2 Sex, Educational Background and Other Occupations of The Respondents

The survey revealed that, out of the 100 respondents interviewed, 75% of the respondents were males while 25% of them were females. However, people in the study area do not only depend on the income from farming for their livelihood, they are also being involved in alternative occupations that can help supplement the meagre income. Some occupations community members are involved in includes; tailoring, driving, carpentry, trading, mining, and farming activities. Therefore, information gathered was one way or the other from people who have been involved in at least one of the illegal activities degrading the forest and the environment at large.

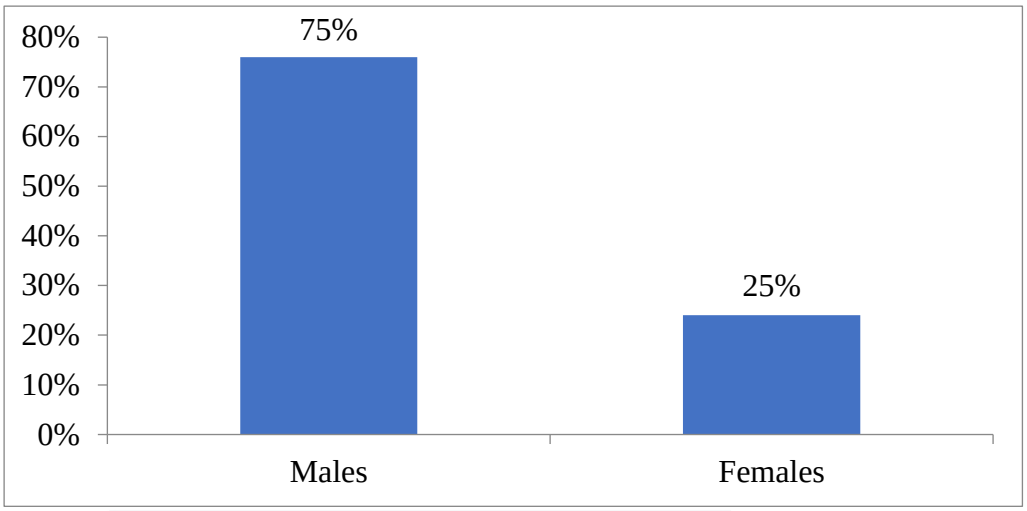
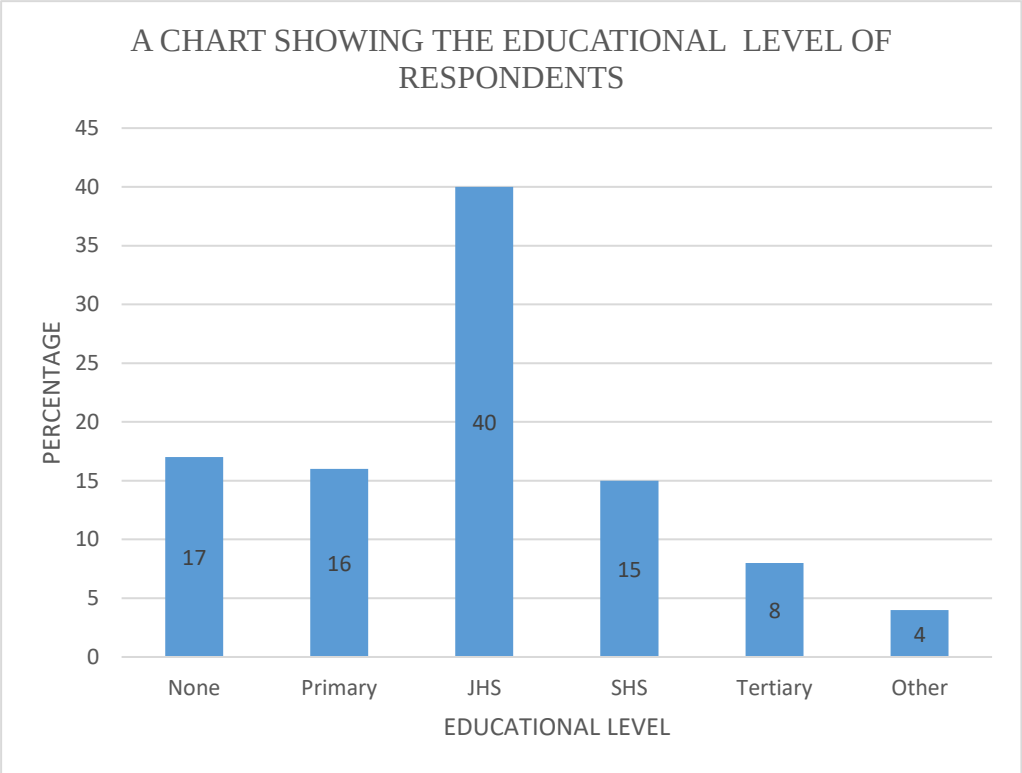


Figure 2:Sex Characteristics of Respondents

Source: Field Survey (2020)

4.3 Education of the Respondents

The result from the data collected indicates variations in the educational statuses of respondents. Majority of the respondents have had at least some form of formal education, either in basic, secondary or tertiary education. 17% of the respondents had no formal education, 16% of the respondents had education up to the primary level, 40% had education up to the junior high school level and 15% of respondents had senior high school level education with 8% of the respondents having tertiary education while 4% of the respondents also had other forms of education. From these figures it can be deduced that most of the respondents have had some level of formal education with only few who had no formal education.



Source: Field Survey (2020)

Figure 3:Bar Chart Showing the Educational Status of Respondents

4.4 Years of Residency

Data obtained from the survey indicated that, 50% of respondents questioned have lived in the community for over 20 years; also 20% have resided in the community for 10-14years; 11% have lived 15-19years; 10% have lived 5-9 years and 9% have lived 1-4 years in the community. This implied that most of the respondents have been residing in the area for quite a long time and as a result they depend on the forest resources to meet their various needs.

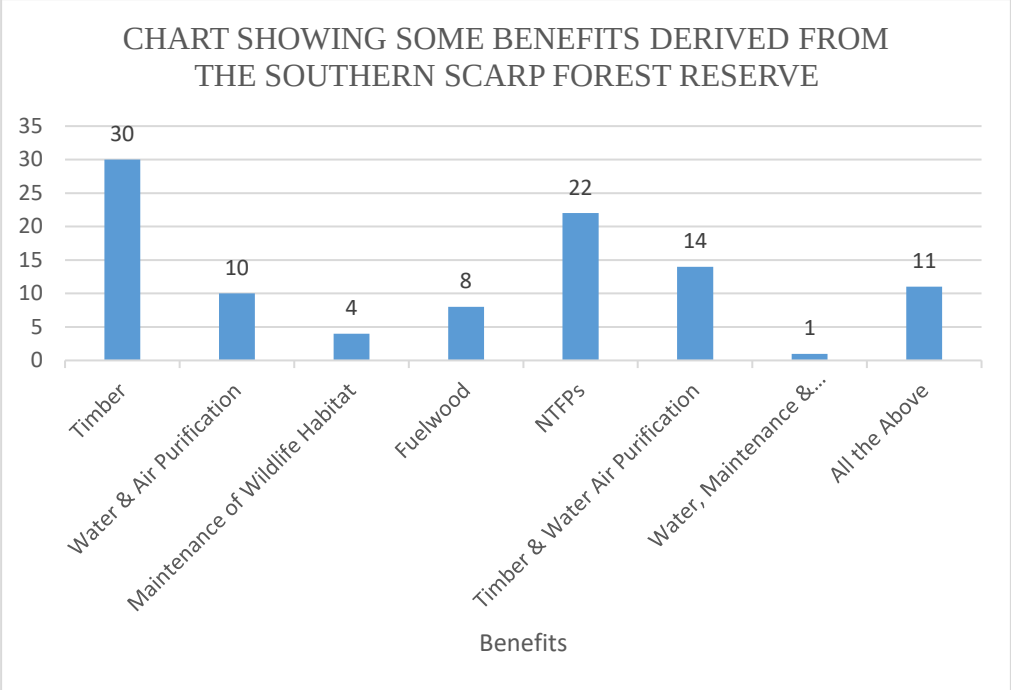
4.5 Other Occupations of the Respondent

Communities situated around the Southern Scarp Forest Reserve indulge in farming activities. About 59% of respondents questioned were farmers. This is a clear indication that most communities in forest areas depend on the forest as a means of generating income to support the family needs. However, people

in the study area do not only depend on the income from farming for their livelihood, they are also being involved in alternative occupations that can help supplement the meagre income. Other occupations involved include teaching, driving, trading, carpentry and tailoring. Furthermore, 20% of persons questioned are unemployed.

4.6 Benefits Derived from the Forest Reserve

Timber was stated by respondents as the major benefits that are obtained from the forest reserve. Timber serves as an important resource in the forest. 30% of respondents questioned mentioned timber as the most important resource in the forest that benefits the community and the country as a whole. The community benefits from some forest when contractors harvesting timber in the concession pay an amount as Social Responsibility Agreement, thus, 5% of the estimated stumpage amount to the community. Such amount can be used for developmental projects in the community. Non-Timber Forest Products (NTFPs) are very important to the people that live around forest reserves. Community depend on the resources (NTFPs) such as charcoal, mushrooms and snails to fend for their families. The chart below shows the benefits the community derive from the forest as well as the country at large.



Source: Field Survey (2020)

Figure 4:Figure 4: Some Benefits Derived from the Southern Scarp Forest Reserve

4.7 Illegal Activities posing threat to the Reserve

The study revealed most of the illegal activities that are posing threat to the Forest Reserve. The table below provides view of the menace affecting the reserve according to respondents;

Table 2: Illegal Activities Posing Threat to The Reserve

Activities	Frequency	Percentage
Illegal farming & Mining	7	7.00
Illegal farming, mining & hunting	7	7.00
Illegal farming, hunting & logging	34	34.00
Illegal mining, hunting & logging	5	5.00
All the above	47	47.00
Total	100	100

Source: Field Survey (2020)

Illegal activities pose a series of threat to the environment. Illegal activities such as mining activities not only affect the soil but also pollute streams in the forest. Miners often use chemicals to mine in the reserve. Such chemicals get washed into the water bodies and make it very intoxicated with heavy metals that are very harmful to human and aquatic life. Farmers around forest have cleared and burned several portions of the forest reserves to pave way for farming activities. Not only is the land burned, fauna that have their habitat in the forest reserves get swept away by fire. Some farmers do not concern themselves with the timber species that have been planted, but are only interested in their crops that they clear the land for. Other respondents also mentioned hunting as another factor posing threat to the reserve. This occurs whereby farmers set fires into certain portions of the reserve in bid to catch ''game''. Most of the illegal activities is mostly caused by the community members themselves. Due to less education on the conservation of the reserve, mismanagement of it has become the norm to indigenes of such forest fringe communities

Many respondents had the opinion that, there has been a massive decline in the state of the reserve comparing it to some years back. About 86% of respondents also said that, comparing then to now, there has been a decline in the diversity and composition of the forest reserve. Others attributed the decline in species diversity to anthropogenic activities such as bush burning, hunting, farming and other illegal activities. Some also stated that some species has been over-exploited and has led to the decline in such timber species. 5% of respondents also stated that they feel the forest has got better over the years.

The Table below shows the opinion of respondents concerning the state of the reserve;

Table 3:Current State of SSCP Forest Reserve

Unit	Frequency	Percentage
No Idea	5	5.00
Getting Worse	86	86.00
Staying the Same	4	4.00
Getting Better	5	5.00
Total	100	100.00

Source: Field Survey (2020)

4.8 Illegal Activities Communities Involve Themselves In

Members residing around the reserve one way or the other are involved in an illegal activity that rapidly leads to the decline in the resources in the reserve. One way or the other, community members have been involved in at least one or more offence pertaining to illegal activities. 54% of respondents have been involved in illegal farming in the forest reserve. Most inhabitants of forest fringe communities depend on their immediate surroundings for their needs. 12% of respondents also have been involved in hunting activities in the forest. 11% have also been involved in illegal logging of timber species in the reserve. The table below shows the illegal activities on-going in the reserve.

Table 4:Illegal Activities Communities Involve In

Activity	Frequency	Percentage
Illegal Farming	54	54.00
Illegal Mining	9	9.00
Illegal Logging	11	11.00
Illegal Hunting	12	12.00
Illegal Sawing	6	6.00
None	8	8.00
Total	100	100.00

Source: Field Survey (2020)

4.9 Factors That Causes Illegal Activities in The Reserve

From the survey, 68% of respondents attributed the causes of illegal activities in the reserve to high unemployment rate in the country. Most of the inhabitant within the study area are unemployed and do not have fixed means of income unlike as if they had been employed. This makes them heavily dwell on the resources in the reserve. 15% also attributed the cause of the illegal activities to negligence. Communities in such areas need to be educated on the importance of the forest to the ecosystem and how its conservation will go a long way to help the community and the country as a whole. 13% of respondents also said that, the illegal activities that go on in the reserve can be as a result of the blockage of the boundary lines in the reserve. A clear boundary makes it easy to patrol compared to the bushy boundary.

Furthermore, 3% of respondents also attribute the cause of illegal activities to the low motivation to resource guards. Others also said that, forest guards sometimes fuel the illegal activities in the reserve by extorting an

amount of money from operators in other to serve as inside-men for such operators. It is believed that if forest guards had been well equipped and motivated, such irresponsible activities on their side could be mitigated. The table below indicates factors that cause illegal activities in the reserve stated by respondents.

Table 5:Causes of Illegal Activities in The Reserve

Factor	Frequency	Percentage
Negligence	15	15.00
High Unemployment Rate	68	68.00
Low Motivation to Resource Guards	4	4.00
Blockage of Boundary Lines	13	13.00
Total	100	100.00

Source: Field Survey (2020)

4.10 Lack of Community Support

Another important contribution towards illegal activities in the forest reserves is the lack of support from community. The combating of illegal activities can be effective with the involvement of the community but the situation is on the other way round where the local communities provide information to the illegal operations as other studies have indicated (Nketiah *et al.,* 2003; Afful 2006). Members of the community act as informants to illegal operators and give them information as to where to seek refuge when they are being pursued by responsible bodies. To add to this, system where the local community cannot cultivate the culture of sustaining forest resources and its management and the high level of illiteracy are some of the problems

hampering the enforcement of the forest resource management programmes. Over the year the lack of local community participation in forest protection and management, has led to the massive depletion of the forest and its resources.

4.11 Factors That Drive People into Illegal Activities in the Reserve

People residing in areas of vast resources seek to exploit the resources, and this area if no exception. Residents exploit from the reserve illegally. The chart below shows some factors according to respondents drive them into such activities. Several factors drive people into certain things. 25% of respondents mentioned poverty as one important factor that drives them into illegal activities. Some members often go to the forest to try and make a living from the resources they harvest since they have no other means of fending for their families. 4% also recognised the fact that, population increase is a driver for illegal activities in the reserve. Population increase means more mouth to feed in the family. This therefore compels them to go to the reserve to clear land for farming activities to supplement the meagre money they have.

Table 6:Factors that Drive People into Illegal Activities in the Reserve

Factor	No.	Percentage
Poverty	25	25.00
Population Increase	4	4.00
Limited Farmlands	35	35.00
Table: 6 cont'd		
Unemployment	31	31.00
None	5	5.00

Source: Field Survey (2020)

4.12 Actions Taken to Combat these Illegal Activities

Actions believed that when taken into consideration will help curb the menace of illegal activities in the reserve includes the following arranged in order of effectiveness below:

- **Conservation Education to Fringe Communities**

Education on the importance of forest and the ecosystem ought to be communicated to the people in fringe areas in other to help them know the essence of the forest. Some exploit the forest without thinking about the aspirations of future generations. Informing them about the benefits, forest contributes to the environment will go a long way to educate them

- **Stopping the Expansion of Farms towards Forest Reserves**

Farmers in such areas are used to practicing fallow cropping. After exploiting the land, they farm on, they live it in search of a new land to grow crops on. However, they then tend to seek for such lands in the forest reserves where the land is very fertile and good for farming. Farmers who involve themselves in such activities should be stopped from expanding of their farms towards the forest reserves to prevent depletion and degradation of the reserve.

- **Motivation for Forest Resource Guards**

Forest Guards are the watchmen of the forest and ought to be well equipped to protect the forest. Protecting the forest requires equipment (Protective materials) and material that will aid them. They ought to be well motivated in other to be able to work to their full potential

- **Enacting Strict laws and regulations concerning logging**

Strict laws and regulations should be enacted. Penalties and fines can be implemented to check logging and illegal activities in the reserve. Heavy fines should also be implemented to serve as a deterrent to people.

4.13 Illegalities in the Reserve

Communities residing in areas of forest reserves tend to exploit the resources in them. Such is the case in the Southern Scarp Forest Reserve. In Ghana, increasing evidence indicates that, the rate of environmental degradation has increased in recent times (Gyasi *et al.*, 1995), with previously well-endowed forest being degraded. The decline in forest resources can be attributed to anthropogenic activities.

Such activities that cause the reduction in the resources in the forest reserve include:

- Farming
- Illegal Logging
- Mining
- Hunting Activities and Wildfires

Most of these activities occur owing to the fact that the indigene in areas of forest reserves depend on their immediate surrounding vegetation to supplement their basic needs.

4.14 Farming Activities

Fifty-four (54%) of respondents interviewed attributed the decline in the forest resources to farming activities. Many inhabitants indulge in farming activities to ease the pressure that comes with having to fend for the family.

Agriculture is considered as the main contributor to the economy of Ghana. About 60% of the economically active population is involved in different agricultural activities, with forests and land as the main production input (Teye, 2005; Benhin & Barbier, 2004; Palo & Yirdaw, 1996). Despite the great benefits of farming to the community and economy at large, many people practice unsustainable agriculture in the reserves. People clear the forest and burn the vegetation to grow crops for a short period and subsequently clear other areas when they render the soil infertile. The persistent migration by settlers to the southern parts of the country has been found to contribute to the high rates of forest degradation (ITTO, 2006)

This conforms to what (Riswan & Hatanti, 1995) said, that the traditional practice of shifting cultivation was itself not destructive to the forest ecosystem, however the challenge is the continued clearing of large tracts of forest areas (Benhin & Barbier, 2004). Shifting cultivation is considered as the main cause of deforestation, accounting for more forest loss than the combined effects of all the other direct factors (Sandler, 1993; Myers, 1992). Forest Reserves have been destroyed by farming which has been blamed for the loss of several hectares of forest. The major factor impelling the increased farming activities was population pressure and unemployment.

4.15 Illegal Logging

One important cause of degradation of the forest is logging. Illegal logging constitutes a serious problem in Ghana. 11% of respondents mentioned mining as one of the factors that cause the deterioration of the forest. However, respondents also mentioned the unsustainable way of logging and extraction of timber by contractors. Some also raised very important causes

of forest damage through excessive logging which makes the forest susceptible to fire by causing loading residues which are highly combustible. There is shared support for this view by many researchers, (Palo & Yirdaw, 1996; Hawthorne & Abu-Juam, 1993) in particular, who said logging has been very intense especially in the semi-deciduous zones and has not only led to changes in the composition but also degradation of the forests. Others also stated that, inaccessible roads have been opened up to illegal chainsaw operators as roads have been constructed during logging operations. Logging in Ghana has generally been seen as very wasteful. Residuals from logging serve a great fuel for forest fires. Inefficient logging activities have affected the forest reserve. Data obtained from Forest Service Division also indicated that, timber companies given concession in forest reserves deliberately fell outside the approved yield.

4.16 Wildfires and Hunting Activities

Data revealed that, 12% point out wildfires and hunting as a cause of reserve degradation. Wildfires play such an important role in natural cycle which influence the development and structure of forest ecosystems (Attiwell, 1994). Most forest fires is however caused by anthropogenic activities The residents said people burn the forest reserves in bid to clear the place for farming activities thereby burning down some saplings and vegetation. Some also set fire in the reserves to hunt for bush meat. These practices affect ecosystem balance in the reserve. Fire causes a lot of damage in the country. The damage cause by wildfires has been estimated at US$24 million every year (ITTO, 2006). Some also attributed the causes of wildfires to the irresponsible behaviour of some persons in the community. Some intentionally set fire into

the reserve to clear the place to set up their farms. They believe it is easier to clear the land with fires to using a cutlass and doing it manually.

However, this practice kills the soil by evaporating minerals that help plant life. Though recent figures from the Wildlife Management Project suggest a reduction in the frequency of fires, the spread and intensity are still causing serious effects on the forests. Hunting activities are no different from wildfires as it also impacts on the forest negatively. Some farmers sort to the use of fires to trap some animals in the reserve. E.g. Rat. They set fire in the habitat of such animal in bid to harvest it for a meal. Such fires cause worse than good to the forest. Not only is the rat harvested, but also some important ecosystem engineers (microorganism) affected by such activities. One way or the other, hunting and wildfires are intertwined.

4.17 Mining

Even though mining plays a pivotal role in the country, the negatives that it contributes to society ought to be mitigated. Mining activities in the reserve has led to the destruction of water bodies in the reserve. Some water bodies affected by mining includes, Bosu, Aprapon. Etc. Chemicals used for mining activities gets washed into the water bodies thereby harming the aquatic life and making the water not safe for drinking. Despite the fact that mining contributes a lot of revenue to the country, the negatives it causes cannot be overlooked. Miners often degrade the land. Such lands after use become very infertile and become susceptible to erosion.

4.18 NTFPs

Harvesting of NTFPs is very common in such forest fringe communities. Firewood collection is very common in such areas as farmers depend on offcuts as fuel for domestic use. The use of firewood keeps increasing due to over-population in such areas. NTFPs such as snails, mushrooms amongst others also get harvested in the forest reserves as well. Some of the products generated from the forest is not only used for domestic use only, but sometimes sold to make some money from them. They see firewood as a cheaper option to the Liquefied Petroleum Gas (LPG). However, some over-exploit the NTFPs in the reserves. They go to extreme length just to harvest such resources. Some species of snails and mushrooms have become difficult to find due to excessive exploitation of them in the reserves.

4.19 Impacts of Various Illegalities on Timber Production within the Reserve

Timber makes a significant contribution to the economy. As stated by Marfo (2010), timber is the fourth largest contributor to Ghana's foreign exchange aside minerals, cocoa and tourism. However, its unsustainable exploitation has led to the distraction of the forest reserves. Respondents also stated that, the distraction of timber in the reserve has led to the pollution of streams in the reserve and has made it quite difficult to use for domestic activities. Others also believe that such illegal activities have led to the decline in None Timber Forest Products (NTFPs) such as mushrooms, snails in the forest reserves. Forest reserves hoards a vast of flora and fauna and any illegal activities that goes on affect the balance of the ecosystem. Farmers that seek to clear portions of the forest for farming activities using fire affect the land.

Certain nutrients in the soil get evaporated into the atmosphere and also makes the soil loose. Although forest reserves hoards lots of resources, it unsustainable exploitation might lead to the extinction and rarity of some flora and fauna species in the reserve. Sixty-five (65%) of respondents stated that, they believe the illegal activities on-going in the reserve has a very impact on the forest resources. Measures ought to be put in place to check the illegal activities going on in the reserve.

4.20 Rare Species

Majority questioned stated that there has been a decline in the availability over the years of timber species in the reserve. Respondents mentioned some timber species that have become quite rare in the Southern Scarp Forest Reserve due to the on-going illegal activities. The table below are some species according to respondents has become very rare in the Southern Scarp Forest Reserve.

Table 7: Rare Species in the Southern Scarp Forest Reserve

Local Name	Scientific Name
Okoro	Albizia zygia
Sinuro	Alstonia boonei
Odum	Milicia excels
Kusibiri	Diospqros sanza-minika
Watapuo	Cola gigantean
Asanfena	Aningeria spp
Kokrodua	Pericopsis elata
Papao	Afezelia Africana

Table 7 Continued

Local Name	Scientific Name
Sapele	Entandrophragmacylindricum
Wawa	Triplochiton scleroxylon
Wama	Ricinodendron heudelotii
Oprono	Mansonia altissima
Hyedua	Daniellia ogea
Avodire	Turraeanthus africanus
Ofram	Terminalia superba
Kaku	Scientific Name
Bako	Lophira alata
Dahoma	Tieghemella heckelii
Akasaa	Piptadeniastrum africanum
Koto	Chrisophyllum albidum
Afina	
Otie	Pterygota marcrocarpa
	Strombosia pustulata
Esa	Pycnanthus angolensis
Kwabohoro	Celtis mildbreadii
Danta	Guarea cedrata
Aprokuma	Nesogodonia papaverifera
Kusia	Antrocaryon micraster
Yaya	Nauclea diderrichii
Akye	Amphimas pterocarpoides

Table 7 Continued

Local Name	Scientific Name
Prepresa	Blighia sapida
Penkwa	Celtis philippensis
Funtum	Entandrophragma cylindricum
Chenchen	
Hyedua	
Kyereye	Funtumia elastic
Subaha	Antiaris Africana
	Daniella ogea
Wama	Pterigota macrocarpa
	Mitragyna stipulosa
	Ricinodendron heudelotii

Source: Field Survey (2020)

4.21 The Way Forward

- **Forestry Commission**

Respondents indicated the need to strengthen forest regulations. They emphasized on the need for community sensitization on the relevance of protecting the nation's forest reserves; similarly, others also believe that governments should have a strong political will and also provide incentives to the workforce if effective policy implementation is to be achieved. It was evidently clear from the study that; most forestry field supervisors were not on top of their jobs. Consequently, respondents were of the view that there should be capacity building for staff so as to upgrade them to meet the challenges the

job brings. They further intimated the essence of involving fringe communities in forest protection whiles others also suggested the provision of logistics to help ensure effective forest protection and management.

- **The District Assemblies**

The District Assemblies (DAs) in Ghana are statutory institutions which was enactment of the 1992 Constitution of the Republic of Ghana, under Decentralization and Local 30 Government in section 240 of the Constitution that seeks to decentralize local governance administration to the local communities for development under the Local Government Act 462 of 1993. The act empowers the district assemblies to exercise political and administrative authority in the district, to provide guidance, give directive and supervise all administrative authorities in the districts. The district assemblies through their power can enact by-laws which lead to combating the operations of the chainsaw operations. The assembly could involve Area Councils and Unit Committees to strictly monitor the activities of the chainsaw operators and apply appropriate sanctions to defaulting operators to discourage prospective offenders.

4.22 Some Strategic Decisions for the Effective Management of The Forest Reserve

Forest Reserves serves humanity in so many ways. Not only to we obtain timber and NTFPs from the forest, the ability for trees to absorb carbon dioxide from the atmosphere is a great. Trees in the forest also serve as a habitat for fauna in the forest. So, harvesting and destruction of the reserves not only affect the land but also the fauna that depend on the forest for survival.

The forest is very important and provides numerous benefits. Therefore, its protection is very paramount to the environment and ecosystem as well. Everyone one interviewed mentioned a strategic method that will help in the effective management of the forest reserve. The following are strategies that respondents emphasized on;

- Educating fringe communities on the importance of the forest to the environment, the effect illegal activities has on the forest reserve and making them know the importance of sustainability.
- Frequent patrols on the boundaries of the reserves by Forest Guards and stakeholders that are responsible for that.
- Forming of Community Volunteer Groups to help with monitoring duties in forest fringe communities.
- Forming Fire Volunteer Groups within the community will help in checking the outbreak of bush fires in the reserve.
- Illegal operators when apprehended must not only be punished (penalty), but also made to plant-up the area of destruction.
- Motivation for Forest Guards and provision of necessary equipment that will aid their work.
- Educate and advise timber contractors to operate sustainably and to practice sustainable logging in the reserve to help minimize the effect of their activities.
- Clearing of boundary lines in the reserve to make patrolling duties very easy and boundary accessible

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

Illegal activities in the Southern Scarp Forest Reserve have led to a decline in the quality and quantity of flora and fauna alike in the reserve. Respondents believe that, illegalities on timber production in the reserve have led to the destruction of water bodies and degradation of lands. Some also stated that, there has been a decline in fauna and NTFPs e.g. (snail) in the reserve due to illegalities in the reserve as well. As a means of ensuring effective ways of managing the forest reserve, many stated that, forest guards should be well equipped and motivated to work to their full ability. Also, frequent monitoring and patrols by responsible stakeholders should be done.

5.2 Conclusion

The study identified the various illegal activities in the Southern Scarp Forest Reserve that are contributing to the rampant decline of timber production. Most of these factors leading to the destruction is anthropogenic activities. 54% of respondents named farming as the major illegal activity leading to the decline in timber production in the reserve, while wildfires and hunting activities 12% the cause of the decline according to respondents. Also, Illegal logging was named by 11% of respondents, also 9% and 6% named mining activities and illegal chain sawing respectively as factors leading to decline in timber production in the reserve. Respondents believe that, illegalities on timber production in the reserve have led to the destruction

of water bodies and degradation of lands. Some also stated that, there has been a decline in fauna and NTFPs e.g. (snail) in the reserve due to illegalities in the reserve as well. And this destroys the balance in the ecosystem. Furthermore, some also emphasized that, some timber species have become rare as a result of such destructions in the reserves.

As a means of ensuring effective ways of managing the forest reserve, many stated that, forest guards should be well equipped and motivated to work to their full ability. Also, frequent monitoring and patrols by responsible stakeholders should be done. Moreover, communities in forest fringe areas should be educated on the importance of forest and effect of illegalities and areas affected by such illegalities should be planted up by offenders when apprehended. Some also stated that, timber contractor who work in timber concessions should also be advised to employ sustainable logging to reduce the impact logging has on the forest.

5.3 Recommendations

In view of the findings made in the study, the following recommendations are drawn for successful mitigation of illegal activities in the reserve;

1. Regular seminars should be organized to educate the fringe communities on wildfires, and the importance of forest to the environment.
2. Forest guards should be motivated and well equipped with relevant materials that will enhance their work in order to improve their ability to monitor and safeguard the reserve.

3. Studies should be carried out to find the impacts of illegal activities on fauna in the forest reserve to provide enough data for further research.
4. There should be regular and frequent monitoring by field supervisors in charge to serve as a check measure to putting the forest guards on their toes to yield maximum productivity.
5. Volunteer Task Team (VTT) in forest fringe areas should be formed to act as monitors in their communities to report and check on incidences of fire and also illegal activities.
6. Apart from penalties being implemented when caught, offenders should be made to plant up the area of destruction in bid to help reforest the area that has been affected.

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APPENDIX

The questionnaire is a research instrument for my master's degree thesis on "an assessment of effects of illegal activities on timber production in Southern Scarp Forest Reserve", and it is mainly for academic purpose. All information collected will be solely for the purpose for which it is intended

PART A: Demographic Characteristics of Respondents

1. Name of respondents……..…..
2. Age of respondents
   a) 18-24years b) 25-34years c) 35-44years d) 45-54years e) 55-64years f) 65years and above
3. Gender:
   a) Male ☐ b) Female ☐
4. Educational Status:
   a) None b) Primary c) JHS d) SHS e) Tertiary f) Other
5. Marital Status:
   a) Single ☐ b) Married ☐ c) Divorced ☐
6. Occupation:
   a) Teacher b) Seamstress c) Farmer d) Unemployed e) Tailor f) Carpenter h) Driver i) Trader g) Other

PART B: Dwellers know how on Forest Illegalities

7. For how long have you lived in the community?
   a) 1-4yeras b) 5-9years c) 10-14years d) 15-19years e) 20years and above
8. What are some benefits we derive from the forest as a community and a country as a whole?

a) Timber b) Water and air purification c) Maintenance of wildlife habitat d) Fuel wood e) None-Timber Forest Products

9. What is the current state of the reserve?

a) Getting better b) Staying the same c) Getting worse d) Don't Know

10. What are some of the illegal activities in your view posing threat to the reserve?

i) Illegal farming ii) Illegal mining iii) Illegal hunting iv) Illegal logging

a) i & ii b) i, ii & iii c) i, iii & iv d) ii, iii & iv e) All the above

11. Which of the illegal activity have you been involved before?

a) Illegal farming b) Illegal mining c) Illegal logging d) Illegal hunting e) Illegal sawing

12. What are your reasons for getting involved in those illegalities?

a) Poverty b) Population increase c) Limited farmland d) Unemployment

13. How often are these illegalities in the reserve?

a) Fairly often b) Very often c) Most high often d) Fiercely often

14. What do you think has accounted for that?

a) Negligence b) High unemployment rate c) Low motivation to resource guards d) Blockage of boundary lines

15. What are your general concern/view on the various activities?.....

.....

PART C: Effect of the illegalities on the Reserve and the Economy

16. How has the said impacted on the forest?

    a) Severely b) Fairly c) No effect d) No idea

17. What are some of the economic species that were initially found in the reserve?.....

    .....

18. In the absence of these economic species, how has it affected the people around the reserve and the country at large?

    .....

PART D: Strategies to halt Forest Illegal Activities

19. What actions have been taken to combat these illegal activities?

    a) Forest guards have been resourced and motivated

    b) Ban on logging for timber

    c) Ban on Charcoal burning

    d) Conservation education to forest fringe communities

    e) Stopped the expansion of farms towards forests

20. What do you suggest should be done to protect the reserve?.....

    .....

21. What alternative land use can the reserve be put to realise its full objectives and/or importance?.....

    .....

22. How can you in your own way help in the conservation of the forest reserve?.....

    .....

23. What strategy would you recommend to be included in the management of the reserve to protect economic species?.....
24. Why is it important to conserve the forest?.....

Interview Guide for key Informant and other Stakeholders

1. How long have you lived here?
2. How was the state of the forest decades ago?
3. In your view, what do you think is affecting the state of the reserve?
4. What do you think has accounted for the current happenings in the reserve, can you name some?
5. Comparing the reserve's status today to about 10 years ago, what can you say?
6. In your own view, what do you think has accounted for this?
7. Have these factors in any ways affected the reserve and the country? How?
8. How have you been managing the forest reserve, and why?
9. What do you suggest should be done differently to protect the reserve?
10. Have you been encountering some challenges in your field of work?
11. What challenges do you encounter in the field of work pertaining to the conservation of the reserve?
12. Any recommendations or suggestions on the conservation of the reserve?