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THE INFLUENCE OF NATIONAL FORESTRY POLICY ON RURAL DEVELOPMENT IN BRONG AHAFO REGION IN GHANA

MSc. Thesis

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Objectives of thesis

Aim of this study is to investigate the influences of the Ghana's national forestry policy on rural development. Another aim is how Ghana's national forestry policy influences community forestry resources and rural communities' benefits and how the Ghana's national forestry policy can be framed to promote rural development for Brong Ahafo Region. Keeping the balance between the two chief objectives of the national forestry policy; conservation and socio-economic development is of vital importance in combating both deforestation and rural poverty.

Methodology

Reference books and journals will be reviewed, the Ghana´s National Forestry Policy – review and theoretical approaches, choosing an appropriate methods of community forestry benefits valuation. In exception of the households, forestry stakeholders and forestry and environmental experts are interviewed through office visits, telephone, and online interviews. Forest production outputs are evaluated. After that data will be collected and the community forestry benefits will be assessed. Results will be discussed and possible amendments of the Ghana´s National Forestry Policy will be proposed.

The proposed extent of the thesis

50 standard pages of text

Keywords

Forestry policy, rural development, forestry products, rural community

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Recommended information sources

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DECLARATION

By submitting this thesis, I hereby certify that the entirety of the work presented in this thesis entitled “The influence of national forestry policy on rural development in Ghana” is, to the best of my knowledge and belief, original, except as clearly acknowledged in the text and specified with due reference to the literature review. I further declare that the document has not been submitted, either in whole or in part, for a master’s degree at this university or any other institution.

In Prague on: ……. **Signature: …….**

Isaac Nyarko

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ABSTRACT

Forests are necessary for human survival and well-being. World Bank report in 2001 indicated 1.6 billion rural poor people globally, have their livelihood protection from forest (World Bank, 2001). Forest resources play an important role in protecting the environment and in sustainable development. Thus, apart from timber production, people who live in communities close to forest also obtain Non-Timber Forest Products from the forest as a source of food and medicinal purposes. The main aim of this study is to investigate the influence of the Ghana's national forestry policy on rural development. Data in the form of questionnaires and interviews were collected from three selected communities in the Brong Ahafo region of Ghana as well as local residents, forestry officers, and Ghana Statistical Services. The SWOT analysis was used as a tool to indicate community involvement in the forest sector. The research results indicate some major challenges facing the rural communities and the entire people living around the forest area.

Rural communities are aware of forest policies but perceive that it is the responsibility of the government to protect it since "the government" owns it. The national forest policy in Ghana has little to do with the development of rural communities. Therefore, the national forest policy in Ghana needs to be amended for positive rural developments and improvement of livelihoods of forest communities. It is necessary to improve the human dimension of forest and forest resources management, especially the indigenous perspective.

Keywords

Forestry policy, forestry products, rural community, rural development.

ABSTRAKT

Lesy jsou nezbytné pro život a zdraví lidí. Zpráva Světové banky z roku 2001 poukázala na fakt, že v celosvětovém měřítku žije na venkově 1,6 miliardy chudých obyvatel a jejich obživu zajišťuje les. Lesní zdroje hrají také důležitou roli při ochraně životního prostředí a při udržitelném rozvoji. Kromě dřevařské výroby získávají lidé, kteří žijí v komunitách poblíž lesa, také lesní produkty jako zdroje potravy a léků. Hlavním cílem této studie je zkoumat vliv ghanské národní lesnické politiky na rozvoj venkova. Údaje ve formě dotazníků a rozhovorů byly shromážděny od tří vybraných komunit v regionu Brong-Ahafo v Ghaně, stejně jako od místních obyvatel, lesních úředníků a Statistických služeb Ghany. SWOT analýza byla použita jako nástroj ukazující na zapojení komunity do odvětví lesního hospodářství. Výsledky výzkumu poukazují na některé zásadní výzvy, kterým čelí venkovské komunity a lidé žijící v okolí lesů. Vesnické komunity si uvědomují politiku v oblasti lesnictví, ale vnímají, že je odpovědností vlády jako vlastníka chránit lesy. Vnitrostátní lesnická politika v Ghaně má málo společného s rozvojem venkovských komunit. Je proto třeba pozměnit národní lesnickou politiku v Ghaně pro pozitivní rozvoj venkova a zlepšení života lesních komunit. Je nezbytné zlepšit hospodaření v lesích a s lesními zdroji a podpořit budoucnost domácího obyvatelstva.

Klíčová slova

Lesnická politika, lesní výrobky, venkovské komunity, rozvoj venkova.

ACRONYMS

EPA	Environmental Protection Agency
FAO	Food and Agricultural Organization
FC	Forestry Commission
FORIG	Forest Research Institute of Ghana
FSD	Forest Services Division
GDP	Gross Domestic Product
GIS	Geographic Information System
GSS	Ghana Statistical Services
ITTO	International Tropical and Timber Organization
NTFP's	Non-Timber Forest Products
REDD+	Reduced Emission from Forest Degradation and Deforestation plus
SFM	Sustainable Forest Management
SPSS	Statistical Package for Social Sciences
UN	United Nations
UNEP	United Nations Environment Programme

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CHAPTER ONE: INTRODUCTION

1.1 General introduction

In 2001, World Bank reported that about 1.6 billion rural poor people globally have their livelihood protection from forests (World Bank, 2001). Forest resources play important roles in protecting the environment and sustainable development (Boon et al., 2009). In the 1990's Ghana's forests were estimated to cover about 36% of the total land mass of the country which protected fragile soils, regulated the supply of scarce water resources, and was home to abundant biodiversity (Glantz and Katz, 1985; Rice and Counsell, 1993; FAO, 1999; UNEP, 2002; EU, 2006; FAO, 2007).

Although, global phenomenon like climate change is affecting the sustainability of the forests and other resources, it has been established that the inadequate functionality of forest resources policies and institutions is a major factor driving this degradation (Boon et al., 2009). EPA (2004), discovered a serious decline forests cover and resources due to over-exploitation to meet the growing socio-economic needs of the population in Ghana especially in the rural communities. This decline affects the livelihoods and development of forest communities. Therefore, the need to combat anthropogenic stress on forest ecosystem is prudent for both government and local inhabitants while the financial obligation to mitigate these effects cannot be under estimated.

Ghana's total forest zone is currently estimated at 81,342 km^2, out of this about 17,845 km^2 are known to be under reservation (Ghana Forestry Commission, 1995). The Government of Ghana realized the need to protect these rich resources for both community and national development thereby enacting regulations, acts and policies over the years to sustainably manage the forest. Forest resource policies created permanent forest estates, protected water supplies, provided favorable conditions for cultivation of agricultural crops, and promoted public education and research (Ghana Forestry Commission, 1994). Despite the availability of these policies, regulations and interventions, natural forests are still on a decline at the rate of 2% per annum (Boon et al., 2009). Intact closed forest in 1992 was estimated to be about 1.5 million hectares nationwide (Tropenbos International-Ghana, 2007).

Investigation by Tropenbos International, Ghana (2007), revealed the following factors as being responsible for the alarming decline in the forests cover and resources in the nation; over-exploitation of timber species, improper forest management systems, poor farming practices, population pressure, complex land tenure system, lack of community involvement, an unequal benefits-sharing system, weak institutions, inefficiency of the timber industry, flouting of laid down regulations, and lack of political will and commitment. It is estimated that agriculture expansion and bush fires destroy about 20,000 hectares per annum of forest reserves in Ghana (IUCN, 1992; Agyarko, 2001).

The degradation of forest resources has contributed to the decline of forestry sector contribution to the national economy. In 1994, Gross Domestic Product (GDP) and total export earnings from the timber industry was 6% and 18% respectively (FAO, 2018). This reduced to 2% and 7% in 2007 and 2012 (Ankomah, 2012).

1.2 Problem statement

National forestry policy analysis by Boon et al. (2009) found out that, most of the forest and wildlife policies do not address crucial issues of sustainable management of forest resources in Ghana. Attention was not given to major social, environmental, and economic issues relevant to the development of rural communities in the policies. For example, the Forest and Wildlife Policy of 1994 is too ambiguous and unachievable being handled by a single organization. Also, a skewed benefit-sharing mechanism and lack of transparency encourages unsustainable harvesting of forest resources and illegal logging (Boon et al., 2009). It is evident that the national forestry policy plays a major role in the socio-economic development of rural communities and calls for assessment. Illegal logging primarily initiated by rural communities is estimated at two-thirds of its total production in Ghana. The local community groups permit chain saw operators to harvest trees on their lands to increase their income for an improved livelihood (FORIG, 2012). There is a gap between what national forest policies promised local communities and what they really get which has kept this illegal activity ongoing across the country.

Most of the forest policies in Ghana have failed to address the fundamental challenges of forest management and rural development. Forest community members who are supposed to be actively involved in co-managing forest resources for protecting them from excessive exploitation are rather the perpetuators exploiting the forest for survival. The benefits sharing mechanism of the

policies do not cater for the actual land owners at all who are the community members. Improper and inadequate compensation paid landowners are key drivers for the increasing incidence of chainsaw operations and illegal extraction of forest resources (Boon et al., 2009). The alarming rate of declining of forest resources in the nation is a problem that needs urgent solution (Agyarko, 2001; Boon and Ahenkan, 2008). The depletion of forest resources has very long-term impacts on local communities, especially on women and children (Boon et al., 2009) as well as economic instability of the country as a whole. A huge gap has been found between the intentions of national forest policies and the realities on the ground.

Strongly concerned about the need to protect valuable resources against further depletion and environmental degradation, the government initiated a series of donor-assisted projects, culminating in the Forest Resource Management Project (FRMP) and the Forestry Planning Project (FPP). These projects have adopted a comprehensive approach towards sectorial development through the strengthen of forest management and relevant institutions, policy reforms, forest inventory, rural forestry programmes, and preparation of plans for management of national parks and other protected areas. If community people get satisfactory benefits from community forest resources, they will be more encouraged to manage the forests in sustainable manner rather than over-utilizing and degrading them. This can be achieved through both financial and technical support from the government, non-Governmental Organizations (NGOs) and other existing and potential forestry stakeholders.

1.3 Rationale of the study

This study aimed to investigate the influence of the Ghana's national forestry policy on rural communities' development by the means of community forestry programmes, whereby community people have both utilization and management rights over community forests resources. The study will also assess the extent to which forest in Brong Ahafo region of Ghana satisfies the community livelihoods in terms of enhancing local people access to forest-based opportunities without going against forest regulations in the country. Rural economic growth and diversification is essential in achieving sustainable national development. Therefore, the outcome of this study will be useful in helping the policy makers in amending and formulating the national forestry policy in a participatory approach that makes the forest communities owners and self-appointed guards of the forest resources. It will emphasis the need to see socio-economic development of the

rural communities as important as the conservation of forestry resources. Unemployment which is a major socio-economic and developmental challenge in Ghana especially in rural communities may be addressed if findings from this research are considered for opening up enterprises that rides on forests resources in these rural communities.

CHAPTER TWO: AIM AND OBJECTIVES

This chapter briefly describes the main aim and objectives as well as research questions and the general outcome of this paper.

2.1 Aims and objectives

The primary aim of this study is to investigate the influence of the Ghana's national forestry policy on rural development. The following are the specific objectives of the study:

a) To evaluate how Ghana's national forestry policy influences community forestry resources and rural communities' benefits.

b) To measure how Ghana's national forestry policy can be framed to promote rural development.

c) To recommend necessary amendments of the Ghana's national forestry policy to keep the balance between sustainable and socio-economic development with regard to community forests.

2.2 Main research questions

The research was based on the following key questions to address the above-mentioned objectives:

a) How is Ghana's national forestry policy influencing community forestry resources management?

b) How is Ghana's national forestry policy contributing to rural community benefit?

c) How best can the national forestry policy be framed or amended for full participation and implementation by rural communities?

d) What are the potential developmental projects that participatory national forestry policy implementation will bring to the rural communities?

e) What needs to be amended and how it could be done to promote sustainable socio-economic development in rural communities?

CHAPTER THREE: LITERATURE REVIEW

This chapter reviews all the most important literature and correlated researches as well as the policies, regulations, and national ACT in line with this study. It also contains all the significant researches that have been conducted previously by other researchers with similar objectives. A general description of Ghana and all the policies in relation to the study were also reviewed. Other sources of materials reviewed were published books, thesis, journals, leaflets, online documents and unpublished drafts of policies and research.

3.1 Ghana's background

3.1.1 Geographical features

Ghana is a West African country along the Gulf of Guinea just a few degrees north of the equator. It is bounded to the north by Burkina Faso, east by Ivory Coast and the west by Togo as well as the southern belt by the Gulf of Guinea. According to UN estimate in 2017, the population of Ghana stands at 29,195,625. Ghana has been divided into 10 major regions. The high forest zones are found in 4 regions; Brong Ahafo, Western, Ashanti, and Eastern. The rest of the regions also have forest reserves which are not as high as the above mentioned.

Soils in Ghana are generally fertile hence, agriculture remains a vital sector of the economy. There are many natural resources including, gold, bauxite, manganese, timber, cotton, coffee, cocoa, rubber, clay, industrial diamonds, Hydro-power, silver, limestone, petroleum, and Salt (GSS, 2012), placing the country as one of the richest in Africa.

Figure 1 Map of Ghana: GSS (2012)

3.2 Description of Forest Management Area

Bosomkese Forest Reserve

According to Hawthorne *et al.* (1995), Bosomkese Forest Reserve (BFR) derives its name from the shrine of a great god (Obosomkese) which is located in a portion of the high slopes of the reserve. The reserve falls between the parallels of latitudes 7° 00" and 7° 10" N and longitudes 2° 10" and 2° 20" W. The reserve lies in the North-Western part of Bechem Township and shares a common boundary with Aparapi Forest Reserve. Administratively, the reserve is located within two districts, namely Asutifi and Tano North all in the Brong-Ahafo Region of Ghana. It is however managed by the Bechem Forest District.

The reserve covers a total area of 138.35 km² (13,835 ha) out of which, 0.487 km² (48.75 ha) is made up of twenty-four (24) admitted farms. This leaves a net area of 137.86 km². The total length of the external boundary is 66.43 km whiles the internal boundary is 12.94 km. The external

boundaries are fixed with concrete pillars at approximately 800 metre intervals except at major changes of direction where the intervals vary. The pillars are numbered serially in clockwise direction around the perimeter of the reserve. Currently, some of the pillars are broken and/or defaced and will have to be replaced. These boundaries are made up of cut and cleared lines of 1.8 m wide. Bosomkese Forest Reserve shares approximately 2.57 km of boundary with the Aparapi Shelterbelt Forest Reserve (Hawthorne *et al.*, 1995)

Asukese Forest Reserve

Asukese Forest Reserve is named after River Asukese which drains the area. It is located in the Brong Ahafo Region of Ghana and lies west of Sunyani – Mim road through Atronie (about 19.3km south west of Sunyani). The Reserve lies between latitudes 7°05‟ N – 7°14‟ N and longitudes 2°24‟ W – 2°37‟ W. The Southern portion of the Reserve is bounded by Bia Tano Forest Reserve (1.92 km) whiles the North-Eastern end (9.8 km) is bounded by Amama Shelterbelt Forest Reserve. The Reserve covers an area of 269.36 km^2 with a total perimeter of approximately 139.27 km.

The Reserve is under the management of the Sunyani Forest District. However, in terms of political administration, it is under the jurisdiction of the Sunyani and Dormaa Municipalities and the Asutifi District Assembly. The boundaries of the Reserve were pillared during reservation at approximately every 800 m intervals and at every major change in direction (Hall *et al.*, 1981).

Bia shelterbelt Forest Reserve

The Bia shelterbelt Forest Reserve constitutes Forest Management Unit (FMU) 21. The Reserve was constituted in 1940, as part of the Bia Group. Chronologically, selection and demarcation of Bia-shelterbelt Forest reserve took place in 1937/1938. It was originally constituted under Native Authority Rules and between 1949 and 1950 and it was re-constituted under new Model Rules which made provisions for its organized management (Hawthorne *et al.*, 1995).

3.3 Background of Ghana and Forestry Condition

The history of forestry in Ghana dates back to 1906 when legislate was enacted to control the felling of commercial tree species, felled by creation of the Forestry Department in 1908. The demarcation and reservation of the forest estate were largely completed by 1939 and a Forest Policy was adopted in 1948. The policy provided for creation of a permanent forest estate for the

welfare of people, protection of water supplies, and maintenance of favorable conditions for agricultural crops, as well as public education and research. However, it mainly emphasized the sustained supply of timber for the wood industry and promoted the exploitation and eventual demise of unreserved forests (Agyei, 1994). Since the adoption of the forest policy, the wood industry grew steadily up to the 1970s, but like other sectors of the economy, it declined drastically until the introduction of the Economic Recovery Programme in 1983. About that time, the country suffered from the severe effects of a prolonged drought, followed by devastating wild fires, which forcibly awakened the entire population to the environmental consequences of deforestation. During the past decade, the government attempted to stimulate wood processing and exports through a range of initiatives which, hindered by inadequate institutional capability, yielded varied results (Agyei, 1994).

3.3.1 Forests and national development

When international attention turned to the developing countries in the early 1950s, economists were caught unprepared. They had no readily available conceptual model with which to analyze the economic growth process in these mostly agrarian societies. Many economists reasoned that developing countries would need to follow the same path taken by the world's richer nations in their transformation from agrarian to industrial economies. Development models described this growth process as a series of linear stages through which all countries must pass (FAO, 1993).

Natural resources such as forests received little or no attention in these initial models. Instead, development strategies highlighted capital formation and technical progress as the major factors responsible for rising incomes and economic growth. In general, forests were viewed as a source of land to be converted to more productive uses. While they could also be a source of revenue and foreign exchange, forests were seen as relatively unimportant in the struggle to promote sustained economic development." Forest industries other than pulp and paper were considered too small to be significant for industrialization efforts (FAO, 1993).

3.3.2 Forests in early development strategies

According to the FAO (1993), International donors also ignored the forestry sector relative to other activities. The World Bank did not establish a policy paper on forestry development until 1978. Between 1949 and 1968, it funded only two forestry projects in developing countries - a chemical pulp and newsprint mill in Chile and a paper mill in Bangladesh. During the same period, lending

for land colonization projects, dam construction, road building and related development projects resulted in the removal of forests. The World Bank's first forestry loan, focusing on soil conservation and watershed management, was made in 1980.

FAO incorporated forestry in its mandate in 1945. For the next 15 years, the Organization produced forest inventories, statistical and outlook reports and market analyses, but paid relatively little attention to the sector compared with its other activities. During the 1950s, FAO concentrated on four basic aims: increasing the yield from forests; reducing waste from logging operations and wood industries; accessing virgin forests in tropical countries; and planting new forests. Even after the 1960 Conference of FAO had approved a reorganization establishing large departments for Administration, General Affairs and Information and Development, forestry remained the responsibility of a division in the Technical Department. FAO finally established a Forestry Department in 1970 (FAO, 1993).

Perhaps the most negligent among the early development specialists were the economists. The development economics literature of the time contributed very little to our awareness of the role of forests in development. Development economics tended to neglect the forestry sector because it ignored the role of natural capital as a basis for economic growth. As a result, economists did not develop the conceptual and practical capacities to value natural capital. On the other hand, forest economics did what development economics did not do by developing optimization models that dealt explicitly with the relationship between natural capital, growth and income. However, these optimization models and techniques examined specific forest properties rather than the macro problems important to development economics.

Foresters began addressing questions of long-term optimization and the tradeoffs between present and future choices in the middle of the last century. For example, the German forester Faustman developed a long-term optimization model for optimal harvest time (or rotation age) in 1849. The early models focused on the relative merits of biological and economic efficiency to determine the optimal harvest time. In general, biological models maximize the volume of timber production from a stand, depending on the forest's growth rates. Economic models maximize the present value of the net benefits from the wood; criteria include the timber's value, the time value of money and other costs associated with planting and harvesting (FAO, 1993).

The optimization question is by far the most fully analyzed issue in forest economics, but its focus has remained at the micro level (examining specific timber stands). In the recent past, development economics began addressing questions of present-future choices at the macroeconomic level for non-renewable resources such as oil and minerals. Only more recently has it begun the process of applying the lessons learned from the optimization debate about renewable forest resources to a national scale.

3.3.3 Forests in national economies

While most early development strategies generally ignored the forestry sector, there are two noteworthy exceptions. First Hirshman (1958), emphasized the importance of special attributes and forward and backward linkages. Hirshman's analysis highlighted important economic growth linkages of lumber, wood and paper manufacturing. Second, Westoby led a team at FAO to challenge the conventional approach to forestry in the special chapter of The State of Food and Agriculture 1962). The FAO study reasoned that those responsible for setting development priorities were unaware of the potential contribution of forests to industrial-based development. The report drew on Hirshman's concept of growing points, lagging regions and backward and forward linkages to demonstrate how the forests (as natural capital) could play a more vital role in promoting economic growth. Among the many arguments presented are the following:

- Forest industries are based on a renewable resource that all developing countries possess or could create.
- These industries have considerable flexibility regarding both their scale of operations and technology; they also have pronounced backward and forward linkages, implying important multiplier effects on the whole economy.
- Because of their remote location, forest industries can create development poles and provide a wide range of products, including basic necessities, for poor populations.
- Forest products can substitute for expensive imports and can earn valuable foreign exchange when exported. Most developing countries are net importers of forest products (exporting logs and importing higher valued products). Internal demand is expanding as populations grow and incomes increase.
- Forests offer a multitude of raw materials for domestic industries and for export.

- Forest industries have acquired great importance in advanced countries, providing a renewable raw material for a whole range of industries.
- Capital requirements are relatively low and labor needs are high compared with many other industries. In addition, the investment range is wide, allowing smaller investors to start- up businesses.
- Harvesting time is flexible within considerable limits, permitting adaptation to short-term fluctuations in demand, without danger of spoilage or excessive storage problems.

Westoby's study helped attract international attention to the forestry sector. Over the next decade, the frequency and funding for forestry projects increased substantially and projects were more carefully prepared, documented and justified than in the past. Two additional factors motivated donors to increase funding. First, market analysis predicted large increases in industrial countries' demand for timber and wood products from the developing world. Second, forestry projects demonstrated higher success rates than other types of development projects.

More than a decade later, however, when Westoby looked back on how the forestry sector had developed, he rejected his initial vision. In a paper presented to the Commonwealth Forestry Association in 1975, he concluded that the exploitation of massive tracts of virgin tropical forest had been, for the most part, reckless, wasteful and even devastating. Westoby argued that nearly all operations lacked a profound or durable impact on the economic and social life of the countries in which they had taken place. Too many forestry projects failed to contribute to vital local needs (FAO, 1993).

Several other studies arrived at similar conclusions, reporting that forestry projects contributed little to the industrialization process, created few jobs and had a minimal impact on the overall growth process. In 1980 the Director of FAO's former Forestry Industries Division argued that:

"Forests, on the whole, are simply being mined, taking out the easiest to get and the most highly priced trees without any real concern for what happens afterwards. For the forests and the people who are dependent on them, the only obvious lasting effect is retrogression" (FAO, 1980).

By the late 1970s, changes in the overall concept of economic development had created a new role for forestry. Experience revealed that development assistance strategies focused solely on promoting industrialization were not working satisfactorily. Poverty increased steadily in many

countries, even though their economies expanded at a strong pace. To address this dilemma, development experts turned their attention to poverty reduction, employment generation and improved equity. Furthermore, policy-makers began to recognize that natural resource degradation seriously impedes economic development and poverty alleviation. Sustainability gradually emerged as the major development principle. At the same time, natural resource and environmental economics flourished, strengthening analytical techniques and enhancing macroeconomic development models (FAO, 1993).

Today, forests are recognized as an integral part of national economies, Forests contribute to development in many ways, for instance in the form of natural capital, production inputs and environmental goods. But forests also constrain and limit development. In some countries, forests are viewed as obstacles that must be removed before productive activities are possible. For example, in the past, land tenure legislation in many countries required settlers to remove all trees on a parcel before ownership rights were granted. In other circumstances, forests are treated as a scarce natural resource that must be protected from all types of exploitation. Several factors help explain how forests both contribute to and limit policy choices for national development strategies.

First, roads, commerce and agrarian populations have penetrated and settled much of the world's forest land; few forest areas remain unused or disconnected from national interests. Forest areas have undergone "agrification", involving the use of forests and trees in farming systems and the formation of agricultural mosaics within forest systems. Forests are increasingly managed for their range of resource flows, their ability to support rural well-being and their capacity to promote industrial opportunities, Forests provide large, albeit different, ranges of goods and services for virtually all patterns of human settlement and livelihood. They are not contiguous blocks of timber beyond the frontier, but are active parts of life everywhere (FAO, 1998).

Second, economic development strategies are beginning to include the capital values of forests in national policies and programmes that modify forest stocks, qualities and distributions. Forests are now widely acknowledged as both productive capital stocks and as components of public infrastructural systems. As ecological analogues of industrial capacity and physical infrastructure, forests are entering the central equations of macroeconomic growth, often with new definitions of what the forest is and does. Advances in national accounting make it possible to incorporate explicitly the capital value of forest resources as productive stocks, and to assess the effects of

changes in them on national productive capacity. Conventional national accounting systems overstate sustainable income in two ways. First, the accounts disregard depreciation of forest and other natural capital. Second, the costs of mitigating or offsetting the side effects of resource depletion (e.g. anti-sedimentation measures in a deforested watershed) are not subtracted from national income. This conveys the wrong message: that income gained from depleting forest resources can continue forever.

Some countries are establishing new accounting systems that measure the depreciation of forest resources in excess of their reproductive capacity (both quantitative and qualitative). For instance, the French system shows trade-offs between the economic, ecological and social functions of natural resources. This system, known as the "natural patrimony accounts", records separate accounts for forests, wildlife, water and soil. As infrastructure, forest systems provide services that would otherwise require capital expenditures or reductions in human well-being. For example, by storing water, regulating flows, protecting channels and cleansing impurities, forests form a structure of hydrological services akin to structures for transportation and communication. Recent economic methods make it possible to account for these infrastructural services on a national rather than project scale.

Third, forests represent productive assets that are increasingly used as a means for attaining national development objectives, including equity, stability, investment and growth. Programmes in community forestry have become central to agrarian reforms that seek to build more productive relations between rural communities and public lands. Community forestry programmes are widely implemented to strengthen investment incentives and encourage civic participation in the growth and use of forests and trees (FAO, 1998). Fourth, forests have emerged as significant factors in economic and political relations among nations. For example, forests have taken on foreign policy dimensions through their roles in both economic and environmental trade. Forest conditions increasingly affect national dependence on processing capacity, wood products and international trade. Trading patterns grow more complex as nations shift emphasis from primary to secondary and tertiary forms of production, increase their purchasing power and diversify their consumption requirements.

Furthermore, changes in the extent and quality of forests have become the subject of global environmental concerns. Changing forest conditions represent factors in biodiversity, relations

between industrial and non-industrial nations which occupy and use the same global atmosphere as a carbon source and sink and expressions of interdependence between nations. Such developments create pressure on national governments to consider forests in the realm of international relations. Some nations are already moving towards international agreements that tie matters of economic and environmental trade together in the service of larger, global interests.

For all of these reasons, national forest politics and policies have evolved out of a narrow sectorial prerogative to enter pluralized mainstream political interests involving highly diverse groups. Throughout the world, forests are the topic of discussion among articulate groups of populists, industrialists, statists, internationalists, consumers, environmentalists, farmers, indigenous forest communities, city dwellers, scientists, educators and humanists. The perspectives and demands of these politically diverse groups have proliferated, placing a significant strain on the institutions of forest policy that evolved when forests meant only timber belonging to the state and were controlled by a small professional cadre. These competing pressures, combined with a wider understanding of the importance and complexity of forests' non-wood services and values, are strongly influencing forestry policy today (FAO, 1993).

3.4 Impact of forest policy on rural development

In many countries, people living in rural areas have lower incomes and are generally less prosperous than those in urban areas. Therefore, rural inhabitants settle to gain more influence of forest resources (both timber and NTFPs) without replenishing them, rendering most forest to different levels of degradation. Thus, governments often attempt to promote rural development through the development of forests resources (Michon, 2013). However, ‘do governments maximize revenues from this sector? And if they do, ‘is there a guarantee that they would be used for rural development’?

Meanwhile, “domestic” or “rural” forests are distinct from conventional forest and have historically been overlooked by the forestry sector and impacted by forest policies and regulatory frameworks.

Rural development policies in developing countries however, often focus on meeting more basic needs (Danielson et al., 1999). For example, FAO places great emphasis in its policies and programmes on increasing food security and improving access to food, because this is a high priority for many developing countries. A number of governments and international agencies also

stress the importance of providing access to clean water and basic educational services, medical care, maintenance of favorable conditions for agricultural crops, public education, and research (Ahenkan and Boon, 2010). In other words, because of the nature of rural areas in many developing countries, there is often a need to look beyond just simply increasing income and employment. The role of governments in rural development in developing countries is quite different to that in developed countries. Because of the generally much weaker tax bases of most developing countries, direct assistance to rural development (in the form of grants and subsidies) is much less common. Rather, governments tend to focus on low-cost and no-cost policy options to try to meet their rural development objectives. Thus, for example, direct subsidies and grant schemes are rare, but loans, credits, tax incentives and exemptions from government levies or charges are relatively more common. In some countries, substantial government extension services and/or the provision of free tools and materials are used to indirectly subsidize forestry and agricultural development in rural areas. Another no-cost option that is favored in many developing countries is the use of regulation that requires private-sector companies to engage in rural development activities when they are granted access to natural resources for commercial use. It is quite common for forest concessionaires to be required to build infrastructure and/or provide some services to local communities in the areas in which they operate. The main benefits to rural areas from forestry development appear to be in the area of non-market benefits rather than income and employment. This suggests that, to maximize rural development benefits, local communities have to be quite intimately involved in the protection and management of their surrounding forest resources. It appears that this may be easier to achieve where forest resources are of relatively low value (e.g. degraded forests rather than commercially valuable forests).

CHAPTER FOUR: METHODOLOGY

This third chapter of the research document deals with the research methodology and study area description. It is divided into several sections starting with the study area and its selection criteria. The sampling method, research flow chart and several approaches employed to meet the objectives of the study are also defined here. Different types of data collection and analysis methods used in this study are also described. It also explains different approaches used in analyzing the data to identify the links between the national forestry policies and rural developments in the sampled communities.

4.1 Study Location

4.1.1 Selection Criteria of Region

The Brong Ahafo region was selected because it hosts two major National parks in Ghana that is, the Bui National Park and the Digya National Park. The Bui National Park stretches from Atebubu to the Bui Dam passing through Banda. Many rare wildlife and vegetation are located in these two national parks in the region (GSS, 2013). It is also the transitional zone serving between the forest zone in the southern part of Ghana and Savanna zone in the North (PPD, 2014) and suffers the pressure of transition from both agro-ecological and geophysical zones. Brong Ahafo is the second largest region in Ghana covering a land area of 39,554 sq. km with vast span of forest reserves both reserved and non-reserved (GSS, 2013; PPD, 2014). Brong Ahafo is popularly known as the "bread basket" or "food basket" of Ghana, since it contributes about 30% of the local food requirements in the Nation and therefore has a vibrant agricultural system that might impeach sustainable forest reservation as crop production increases (GSS, 2013). Excessive logging in Ghana have led to reduction in standing volumes of tree species, species depletion and loss of biodiversity. Agyarko (2001) reported that the north-west part of moist semi-deciduous and south-east subtype of forest zones is the worst affected areas of the 14% of the total permanent forest reserves in Ghana which are without adequate forest cover. Brong Ahafo region falls within this zone that is described as worst affected areas of forest depletion.

4.1.2 Location and Extent of Region

Brong Ahafo region lies between latitude 6º 18.4' N and 8º 49.3' longitude 0º 23.3' E and 3º 17.6' W and shares boundaries with Northern Region to the North, Ashanti and Western Regions to the

South, Volta Region to the East, Eastern Region to the south east and Cote D'Ivoire to the West (GSS, 2013; Figure 3.1). The climate is tropical with bi-modal rainfall pattern and mean temperature of 23.9°C. Rainfall ranges from an annual average of 1000 mm to 1400 mm. Brong Ahafo is covered by the moist semi-deciduous forest and the guinea savannah woodland mostly in the southern parts and northern respectively (GSS, 2013). The Region is the third largest producer of cocoa and most cashew products in Ghana. The rich deposits of minerals such as gold, diamond, iron-ore and bauxite in the region have attracted companies like Newmont Ghana Limited currently mining them. Tourist attractions site like; the Kintampo water falls, the Fuller Falls, the Chiridi Waterfalls, the river Tano Pool which houses sacred fish, the Buabeng-Fiema Monkey sanctuary, the forest also provides a natural habitat for different species of butterfly, the Buoyem and Pinihini Amovi caves and the Tanoboase Sacred Grove are all located in this Region (GSS, 2013)

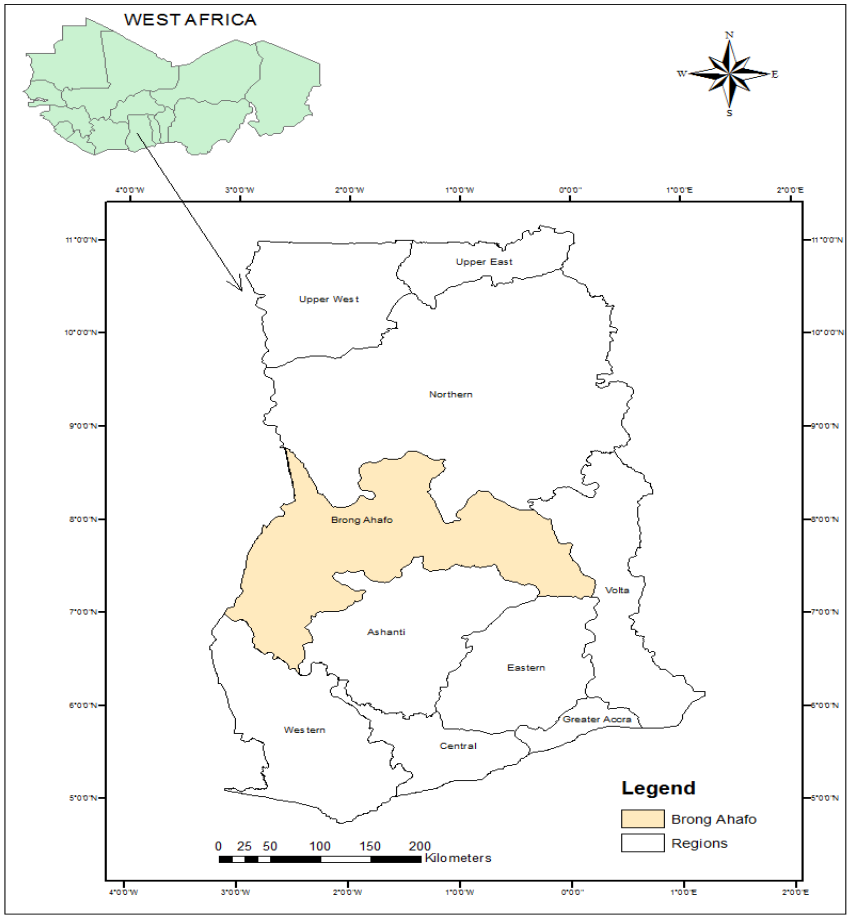

Figure 2 Map of Ghana showing selected region for study

4.1.3 Sampling of Communities

The Ahafo area of the region is prominent in the production of timber especially around Mim, Goaso and Acherensua (GSS, 2013). Most of the forest reserves in the region are located in the Ahafo area as shown in Figure 3. Since the aim of the study is to assess the impact of national forestry policy on rural development, three districts located in the Ahafo area were randomly selected. The districts were Sunyani Municipal, Tano North District and Asunafo North District (Figure 3) Rural communities especially the ones lying close to the forests (both reserved and non-reserved) obtained their livelihood from the rich resources of the forest and are mostly affected by these policies that either enhances their living standard or reduces it.

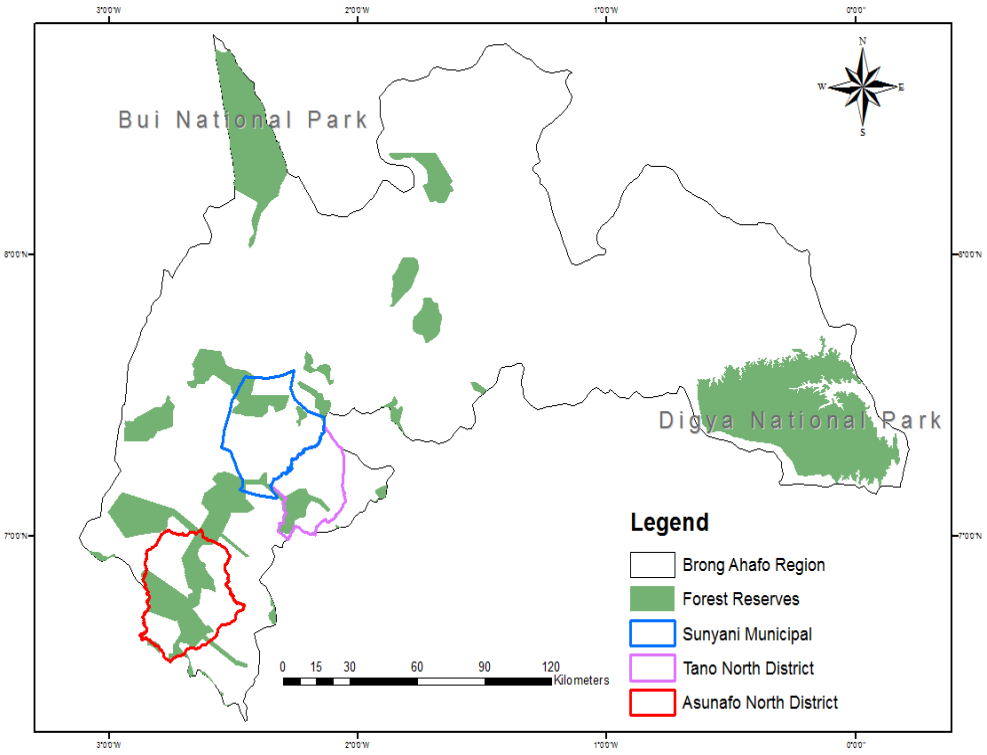

Figure 3 Map of surveyed Districts

Three rural communities were further purposively selected to be surveyed with semi-structured questionnaire in each of the three (3) districts already marked from the region. The following factors were considered in the selection of the three rural communities per district in order to achieve the aim of the study:

1. The degree of the relevance of the study to the communities' around,

2. Authorized administration, that is, the availability of forest guards and management,

3. Effectiveness in the implementation of policies in the area,

4. Data accessibility,

5. Community accessibility by vehicle or foot,

6. Closeness of forest to community and

7. Major source of income of the community or area.

4.1.4 Sunyani Municipal

The Sunyani Municipal Assembly is located at the heart of Brong Ahafo Region lying between latitudes 7º 20'N and 7º 05'N and longitudes 2º 30'W and 2º10'W and covers a land area of 506.7 km^2 (GSS, 2014a). It shares borders with Sunyani West District on the north, Dormaa East District on the west, Asutifi District on the south and on the South and east by Tano North District. It lies within the Wet Semi-Equatorial Climatic Zone of Ghana with monthly temperatures variation between 23ºC and 33ºC (GSS, 2014a). The average rainfall is 889 mm and mean relative humidity ranging between 75% and 80% during the rainy seasons and below 70% during the dry seasons (GSS, 2014a). Sunyani Municipality is largely within the Moist – Semi Deciduous Forest agro-ecological zone and contains most of the valuable timber species. Yaya and Amoma forest reserves are the two major forest reserves in the Municipality.

Sunyani Municipality use to be a predominantly agrarian economy before the upsurge of commercial, industrial and service activities which has diversified the local economy now (GSS, 2014a). According to the 2010 population census, 34.3% of households in the municipality are engage in agriculture whereas in the rural localities, eight out of ten households (72.2 %) are agricultural households. The percentage reduces to 28% households in urban localities engaged in agriculture (GSS, 2014a).

4.1.5 Asunafo North Municipal

The Asunafo North Municipal is bordered by Asutifi District in the north-east, Dormaa Municipal in the north-west and Juaboso Bia and Sefwi-Wiaso districts in the south-west, and Asunafo South District in the south-eastern border. All districts are in the Brong Ahafo Region except Juaboso Bia and Sefwi-Wiaso districts which are in the Western Region of Ghana (GSS, 2014b). The total

land area of the municipality is 1,412.0km^2 with about 41% (578.63 km^2) of the landmass largely covered by forest reserves. The soil type in the municipality is mostly forest acrisol symbolizing the dominance of forest in the district (GSS, 2014b).

The municipality lies within the wet semi-deciduous climatic zone with annual bi-modal rainfall ranging between 1250 mm and 1750. The mean monthly temperature for the municipality is about 25.5ºC. Farming activities, lumbering and settlements by peasant farmers in the forest in the Municipality has resulted in scattered patches of secondary or broken forest (GSS, 2014b). Agriculture activities in the municipality are centred mainly on crop production. About 72% of households in the Municipality are engaged in agriculture. Also, 85.9% and 51.1% of households in rural and urban localities respectively are agricultural households. This was from the 2010 population census carried out in the Municipality (GSS, 2014b).

4.1.6 Tano North District

The Tano North District covers a land area of 837.4 km^2 and lies between latitudes 7º 00' N and 7º 25'N and longitudes 2º 03' W and 2º 15' W. It is within the semi–equatorial climatic zone and experiences bi-modal rainfall regime at an average annual rainfall between 1250 mm and 1800 mm. The major raining season is from April–June while September–November is the minor raining season and mean annual temperature is 28ºC (GSS, 2014c). The district is covered by gross forest cover vegetation type of about 157.45 km^2 in the south-eastern part and moist semi-deciduous forest, mostly in the southern and guinea savanna vegetation in the northern and north western parts of the district. The three main forest reserves in the districts are; Aparipari, Bosomkese and Omankwayemu Forest Reserves (GSS, 2014c).

The district is richly endowed with resources; both human and natural, particularly tourist attraction sites, mineral deposits, forest and timber species, rich soil and good climatic conditions. Dickson and Benneh (1970) reports of large deposit of gold in the mountain ranges that run across Yamfo, Tanoso, Terchire, Adrobaa and Bomaa. Some common tree species in the forest reserves in the districts are Odum (*Milicia excelsa*), Mahogany (*Khaya ivorensis*), Ceiba (*Ceiba petandra*), Cassia (*Cassia sieberiana*), and Akasa (*Chrysophyllum spp*). Clay deposits which are dominant are being explored by inhabitants of the town for the production of a wide range of products including earthen pot (Apotoyowa), floor and wall tiles, beads, glazed ware, ceramics and burnt bricks (GSS, 2014c).

Agriculture, which is the back-bone of the District's economy, employs 67.1% of the active work force in the district. According to the 2010 population census in the District, households engaged in agriculture was 76.9%, nine out of ten households in the rural localities and two thirds in the urban localities are agricultural households (GSS, 2014c).

4.2 Research design and Flow Chart

The research followed seven (7) major steps as depicted in the study flow chart (Figure 3.3) to successfully meet the objectives by answering the research questions. The study used three types of data during data collection; interview using a semi-structured questionnaire, informal interviews, and observations during survey and information from literature specifically on national forestry policies in Ghana. Literature was the first point of call in assessing available information on forestry policies and forest districts. Literature was also used in choosing study area. The next step which directly benefited from literature was the designing of the questionnaire. Informal interviews and consultation with experts helped to reshape the questions to suite the purpose of the study. Field visits were done to seek the assistance of forest guards and community leaders for an acceptable and appropriate community entry protocols. It made it easier to have community members who were willing to participate in the study. During the questionnaire administration, forest guards were interviewed to provide information on the study. Data from survey were analyzed using the appropriate software and methods in combination with the secondary data from literature. The SWOT analysis was employed to assess the role of national forestry policy in rural development while the implication of the study, comprising of the conclusion from the findings and recommendation were made.

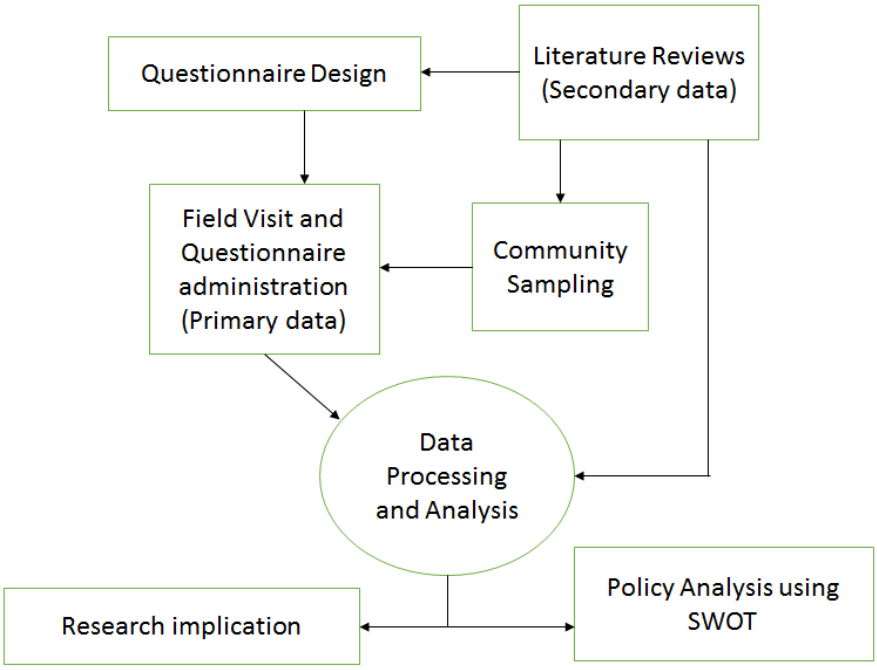

Figure 4 Flow Chart of Research

4.3 Data collection Methods

Mixed method research design was used in this study by the combinations of both quantitative and qualitative research methods. A multi-stage sampling procedure was used to arrive at the final point of collection of information. Firstly, purposive sampling was performed to select one forest region out of the ten (10) regions in Ghana where this study will have relevance. Afterwards the Districts were clustered and three (3) districts that fell within areas with both reserve and non-forest reserves were further purposely selected. Simple random sampling was then used to select 3 communities lying close to forest which benefited directly from the forest resources. Finally, simple random sampling was used again to select ten (10) respondents from each community. Forest guards were classified as experts and purposively interviewed. This was a non-probability sampling technique that only considers forest guards as experts in the forestry field (Lincoln *et al*., 2011). Observation was another profound method used during the survey to confirm that residents of the communities truly benefitted from the resources in the forest. Observation as defined by Fetterman (1988), is the act of recognizing and noting facts or occurrences or phenomena was also used in validating the respondent's answers. The data collection was more of participatory.

4.3.1 Primary data collection

A semi-structure questionnaire, both of open and closed ended questions with simple and clearly defined instructions, was designed for collection of data from the community members (Nichols, 1990; Clem *et al.*, 2008). Two enumerators with one forest guard were engaged to assist in the administering the questionnaires. A total of ninety (90) respondents were interviewed; ten respondents per community, three communities per district and three districts in the survey region. The questionnaire covered three sections; socio-economic characteristics of respondents, knowledge of respondents on forestry and forest resources benefits and lastly on the national forestry policy. Confidentiality was key research ethics maintained by requiring that respondents do not provide their names on questionnaire. This was to promote honest response to the questions. A maximum period of two (2) weeks was used to administer the questionnaire across the nine (9) rural communities. Informal interviews were conducted for forest guards via two mediums either face-to-face or by telephone depending on their schedule.

Three (3) forest guards were interviewed during the survey by the enumerators. The researcher also interviewed five (5) experts from the office of Forest Service Division (FSD) in the three districts. These interviews were not guided, just an informal conversation to fish out vital information relevant to the study. This was to bridge the knowledge gap between community members understanding of what forestry is all about and what is really on ground by policy.

4.3.2 Secondary Data Collection

Appropriate literatures were reviewed for secondary information such as peer reviewed journal publications, thesis, project reports, maps review, regulations and policies as well as several studies collected from various governmental organizations such as Forestry Service Division (FSD), CSIR- Forest Research Institute (FORIG) and FAO. Several existing reports by the two institutions that work hand in hand in the conservation of Ghana's forests and wildlife; FSD and FORIG were analyzed and reviewed as well. Other reports on forestry research and interventions by non-governmental organization (NGOs) and foreign ministries like Danish Government were also used. Most of the sources were retrieved from internet where they are published.

4.4 Data Analysis

Questionnaire was coded into IBM Statistical Package of Social Sciences (SPSS) version 21 after data collection for analysis. Analysis was mainly quantitative. Descriptive analysis of frequencies and cross-tabulations were done in SPSS in answering the research questions of the study. Information from informal interviews with experts and literature were used in discussing the outcome of the analysis. Microsoft Excel 2016 was used for presentation of results in bar and pie charts. Respondent's assessments were also analyzed and compiled in the research report.

4.4.1 SWOT analysis

Appropriate recommendations were arrived at utilizing the Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis. This analysis was done using the national forest policies, regulations and act of Ghana, forest staff interviews (formal and informal) and community members' opinions collected during the study.

4.5 Limitations of study

The study was faced with a number of challenges the foremost was language barrier. Respondent were not literate in the forestry terms and jargons and therefore had to be administered in the local language "*Twi*" which had limited interpretation from the original forestry terms. Also, most of the forestry guards were hard to get for interviews due to longer distance from their homes to communities surveyed.

The second limitation was the inadequate fresh prior researches accessed to review the literatures. This is because, despite the considerable entrepreneurship potentials, the Ghana's forests economic significances are not apparent. As a result, many researchers are neglecting forestry sector economy.

Climate change which is a global problem also contributed to the unavailability of respondents to be interviewed. The rains poured early and most of the farmers were preparing their lands in expectation of the rains for the season.

4.6 Delimitation of study

This study was delimited to questionnaire interviews with community residents, forest guards and forest experts who are the most active participants in the community forest managements. For the sake of time and budgetary costs, the study was restricted to three (3) communities in each of the

three selected districts based on criteria given earlier in this chapter. The community lying close to forest was considered appropriate for this study because they are eligible for REDD+ projects, on farm reserves with much potential for communal enterprises to improve the rural livelihoods. Community people have possibilities to create jobs and to sell forest products to generate income in these surrounding towns or to get all the necessary services from these towns to improve their initiatives.

CHAPTER FIVE: PRESENTATION OF RESEARCH RESULTS

The study results of how the national forests policy of Ghana affects and influences the rural people of Brong Ahafo forest community areas and how to benefit from forest resources in sustainable manners. Forest provides a wide range of economic and social benefits to humankind. These include contributions to the overall economy – for example through employment, processing and trade of forest products and energy – and investments in the forest sector. They also include the hosting and protection of sites and landscapes of high cultural, spiritual or recreational value. Maintaining and enhancing these functions is an integral part of sustainable forest management (FAO, 2005).

Economic benefits are usually measured in monetary terms and may include income from employment in the sector; the value of the production of goods and services from forests; and the contribution of the sector to the national economy, energy supplies and international trade. In addition, the economic viability or sustainability of the sector can be assessed by measures such as the profitability of forest enterprises or the level of investment (FAO, 2005).

This chapter also takes into consideration economic values on forest products and gives employment figures; the impacts of urbanization, respondents' views and communal level programmes that Brong Ahafo community forest has provided in the past five years (2011-2015).

5.1 Socio-Economic Characteristics of Respondents

5.1.1 Physical and Social Status Characteristics Distribution

The gender distribution of the survey tailored towards men as majority. Males were 66.7% while females formed 33.3% of the respondents interviewed. Age distribution about 20% for three categories of age accessed in the study. The highest percentage of respondents at 28.9% was between the age of 41 – 50 years and the least were those under 30 years and above 50 years, both at 22.2%. Respondents between the ages of 31 – 40 years was 26.7%.

The marital status of respondents is shown in Figure 5. Married was the highest marital status of the respondents at 63.3%, followed by single at 22.2% and divorced was the least at 2.2%. There were also records of separated and widowed respondents.

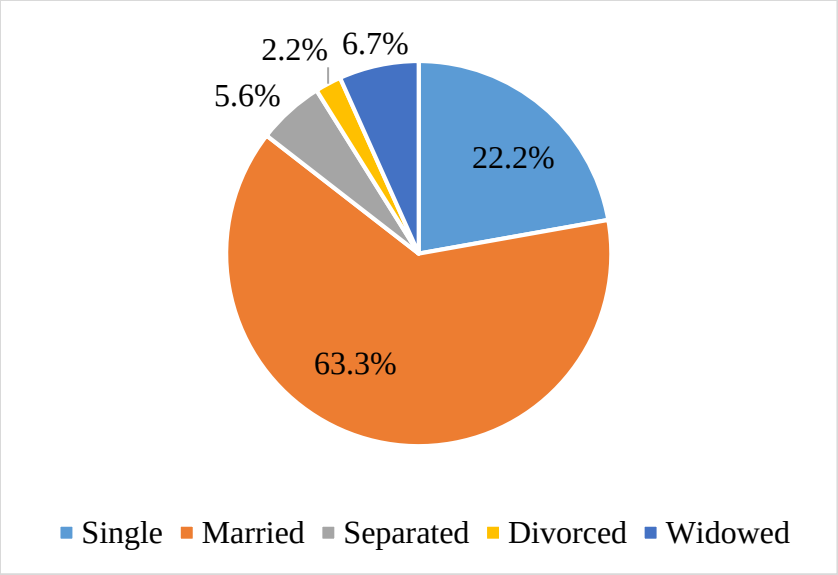

Figure 5 Marital status of respondents

The highest percentages of respondents were illiterate with no formal education. This group made up 35.6% of the total respondents. Respondents who had attained tertiary education were the least at 3.3%. The other education levels in descending order were Junior High School (JHS), Primary, Senior High School (SHS)/O level/A level/ Agriculture or Educational college and Non-formal at 31.1%, 17.8%, 6.7% and 5.5% respectively (Figure 6).

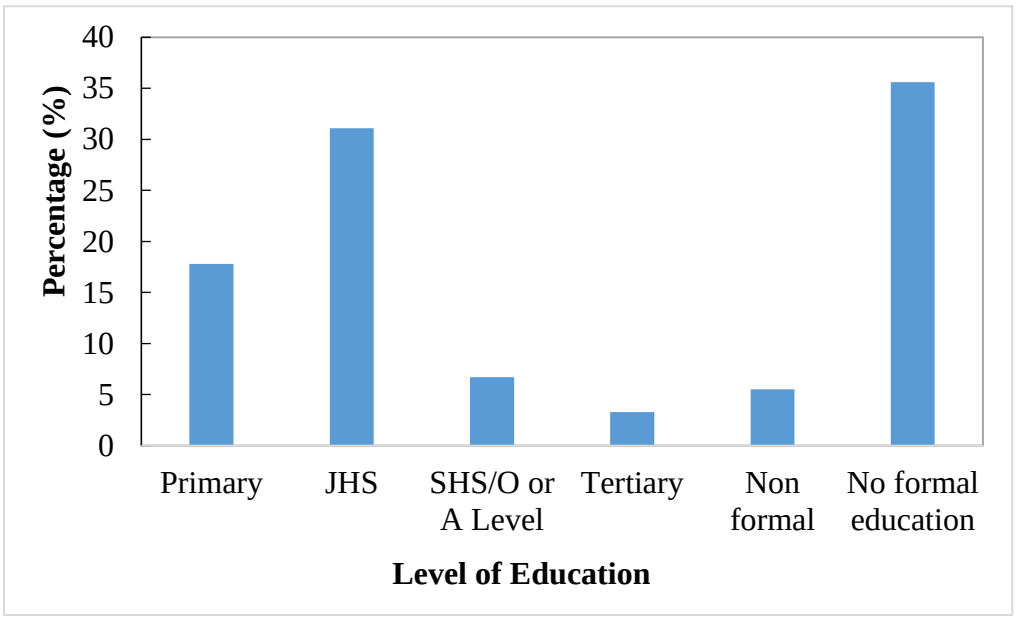

Figure 6 Educational status of respondents

5.1.2 Household and Family Position

The highest household size was between 5 – 10 people and that accounted for 54.4% of the total respondents. Above 10 people was the second highest at 23.3% while the least amongst the three category of household size was those under 5 people (22.3%). The number of children in the households was also categorized and the highest category was children from 5 to 10 years representing 46.7%. A household with number of children below 5 years was 36.7% while above 10 years and no child were 8.8% and 7.8% respectively.

Figure 7 shows the various positions of the respondents in their families. Majority of the respondents were head of the family (46.7%). The next to the head was the wife position which was 20.0%, followed by sons was 15.6% and others, comprising of grandmother and brothers to the head of the household was 6.6%. Nephew, Daughter and Niece were the lowest in descending order.

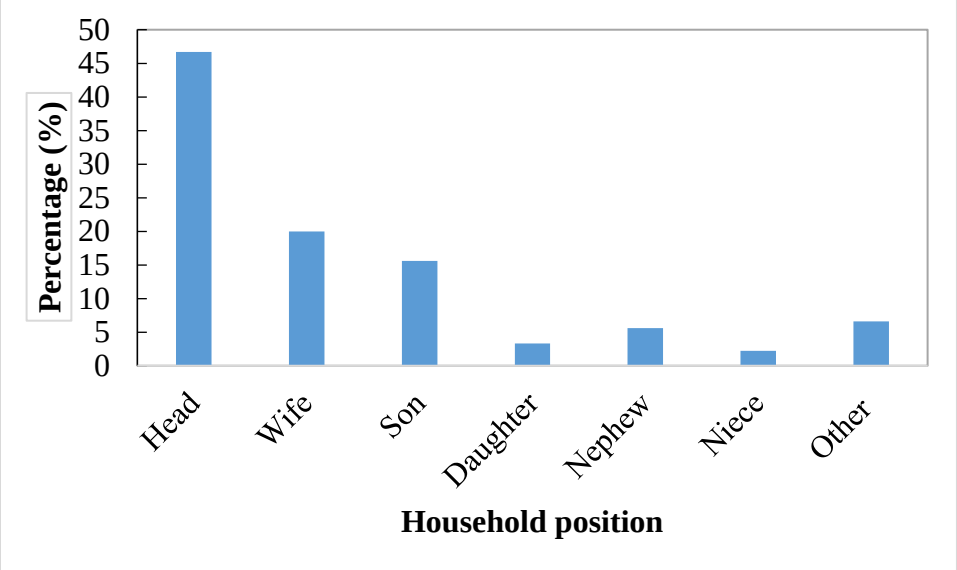

Figure 7 Position of respondents to the household

Figure 8 presents the amenities respondents have access to in their communities. About 73.3% access primary education, 54.4% have access to electricity and 53.3% can drink clean water from pipe borne water in their communities. Access to Junior High School (JHS) education and health post or clinic was 50.0% and 38.9% respectively. There is very limited access to tarred road to this

forest communities. Access to tarred road was 7.8% and it was the least amongst the amenities accessed as shown in Figure 8:

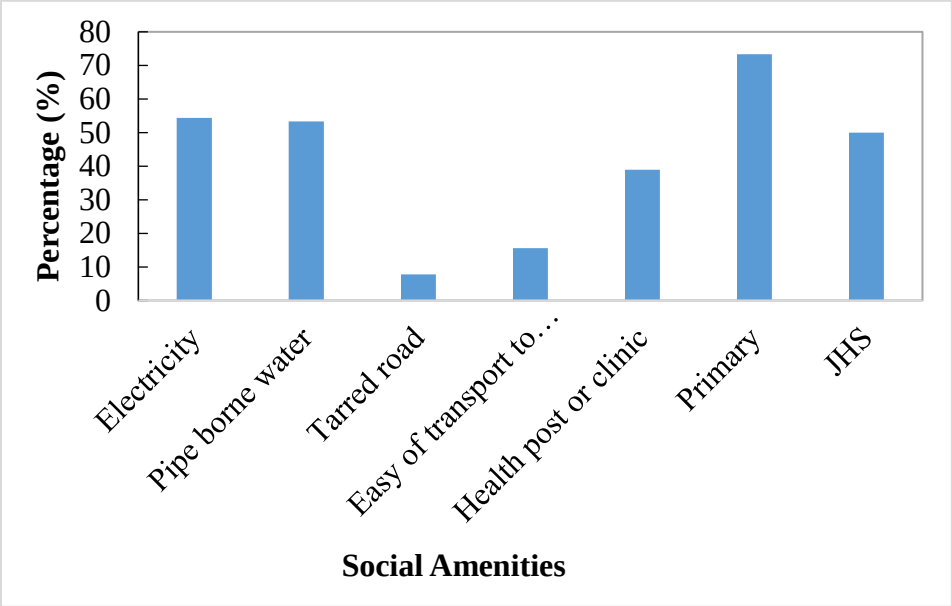

Figure 8 Access to social amenities by respondents

5.1.3 Occupational Status of Respondents

Figure 9 shows the ranking of occupation of respondents in this study. Farming and Trading were the main occupation of majority of respondents. Farming employed 81.1% of respondents as their first occupation while 14.4% were traders. Farming was also the highest second ranked occupation at 16.7% followed by professional services, handiwork and trading at 3.3%, 2.2% and 1.1% respectively. Only farming was ranked at the third level for those engaged in professional services and trading and at 1.1% (Figure 9).

Since farming education was dominant in the forest communities, the number of years each respondent had engaged in farming was assessed. The highest percentage of respondents at 41.1% had been in the farming business from 10 to 20 years. The least percentage was 26.8% had been farming above 20 years whereas those who were within a decade of farming (below 10 years) were 32.1%.

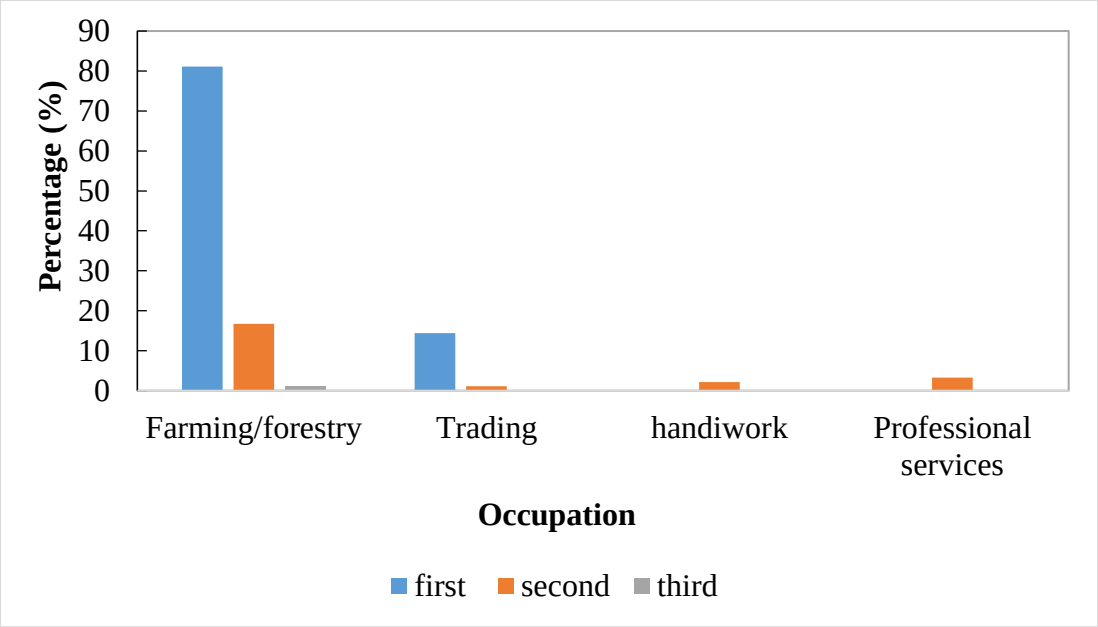

Figure 9. Occupation ranking of respondents

5.2 Benefit from community forest resources

5.2.1 Forest Resources Accessed by Community Members

The study revealed that food was the highest benefit communities gained from the forest around them. Forest resources benefiting forest communities in this study are shown in figure 10. About 88.9% sourced their food from the forest. Only 2.2% mentioned fresh air as benefit they gained from the forest. Other benefits in descending order were medicine, timber, fuel wood and meat (Figure 10). About 70% of the respondents said that these resources are profitable while 23.3% considered them to be unprofitable. Those who were not sure if the resources from the forest were profitable formed 6.7% of the respondents.

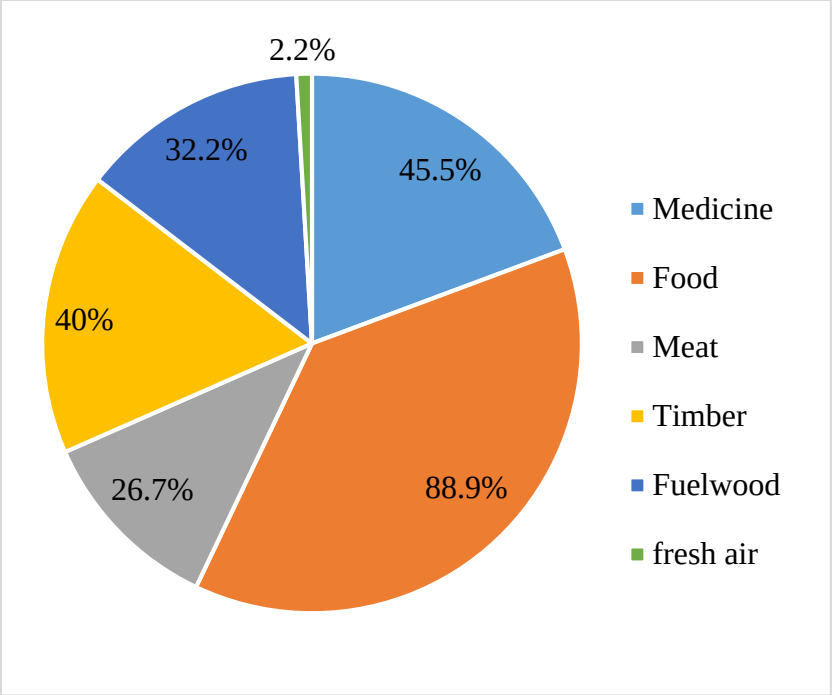

Figure 10 Forest resources accessed by respondents

Ranking the profitability of the forest resources to the livelihood of communities, 54.4% of respondents selected food as first resource they benefit from the forest. After food was timber 20.0%, medicine was 11.1%, fuel wood was 7.8% and meat was 5.6% (Figure 11). The resource mostly ranked second was fuel wood with 14.4% and the least was meat (2.2%). Food was ranked second with 5.6% of respondents as the resource they benefit from the forest and was not ranked third by any of the respondents interviewed. Timber was the highest ranked as third resource benefit from forest with 5.6% (Figure 10).

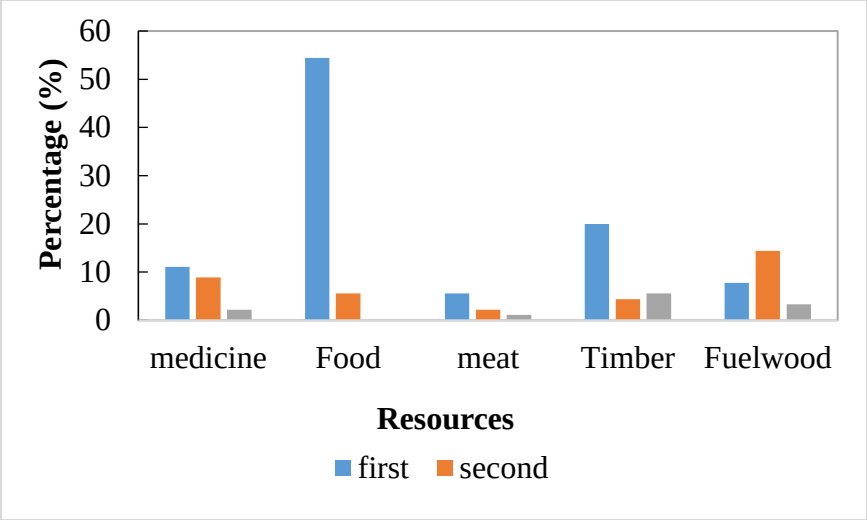

Figure 11 Ranking profitability of forest resources to households

5.2.2 Tree Species and Forest Sizes

Tree species identified from respondents in this study includes, Odum (*Milicia excelsa*), Mahogany (*Kaya ivorensis*) and Framo (*Terminalia superba)*; were about 50% confirmed to be in the forest around the surveyed communities. However, Onyina (*Ceiba pentandra)***,** Abako (*Tieghemella heckelli*), and Emire (*Terminalia ivorensis*) were not common in the forest (Figure 12).

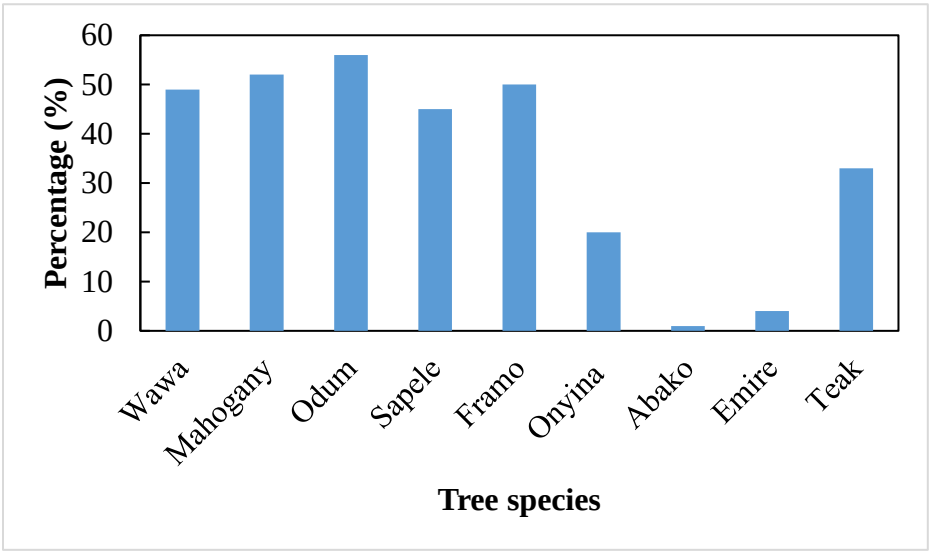

Figure 12 Tree species perceived to be in forest

The highest forest area from the surveyed communities was between 501 – 1000 ha at 36.7% (Figure 13). Very few forests of about 3.3% were between 50001 – 10000 ha. Almost all of the forest sizes between101-200 ha at 4.4% was owned by individuals and had planted teak on them.

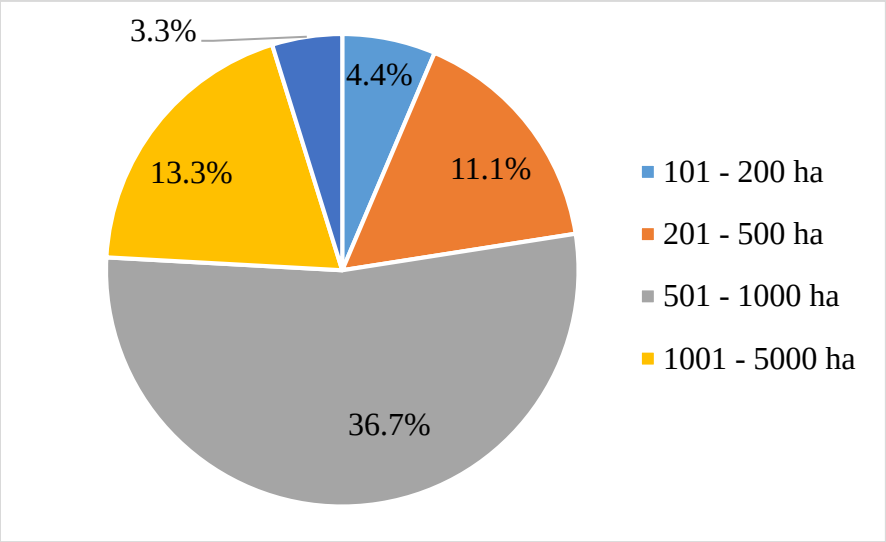

Figure 13 Estimation of forest sizes in communities by respondents

5.3 Benefit from community forest resources

5.3.1 Perception on Forest Ownership and Management

Figure 14 shows the perception or knowledge of respondents on who owns and manages the forest in their communities. A corresponding number of 84.4% perceived the forest to belong to the governments and government is the one managing them. A small number of respondents at 2.3% perceived that the forest was owned by both the government and communities. Community, individual and private company ownership and management of forest were perceived by about 5% or less of the respondents.

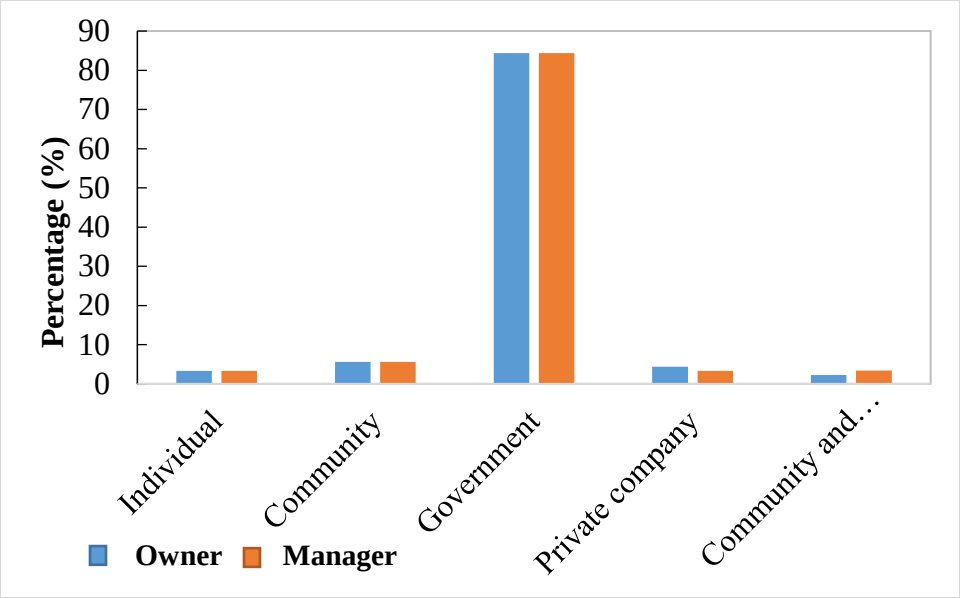

Figure 14 Perception of respondents on forest ownership and managers

5.4 Knowledge and relevance of the National Forestry Policies

5.4.1 Awareness of the National Forestry Policies and Regulations

A very high percentage of respondents in forest communities are aware of forest policies, regulations and laws in Ghana as shown in Figure 15. Awareness of the national forestry policy, chainsaw operation regulation of 1983 and 1991 and the prevention of bushfire law of 1990 was 77.8%, 77.8%, and 78.9% respectively. Those who were not aware of the polices were less than 20% for national forest policy and chainsaw operation regulation while those who did not know the bushfire prevention law was 10.0%.

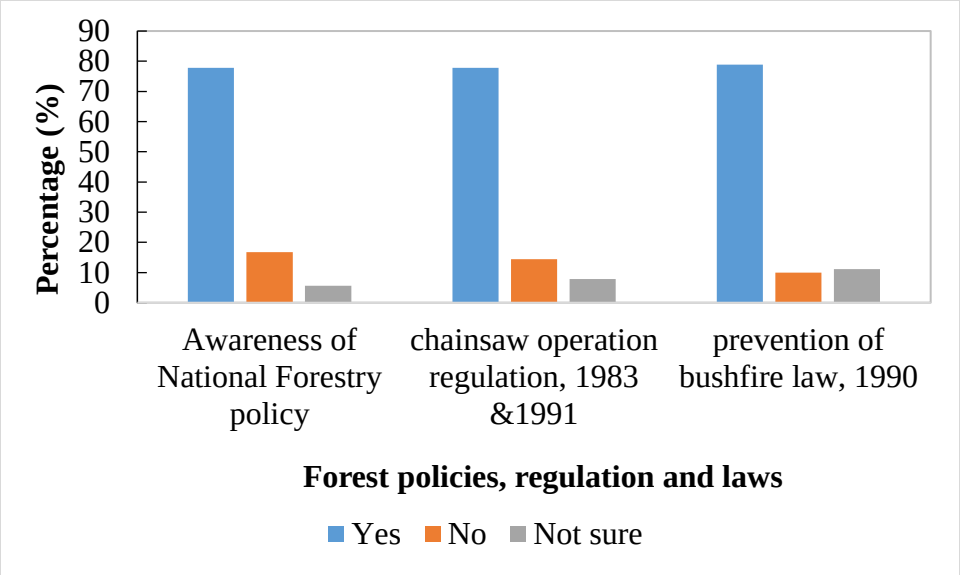

Figure 15 Awareness of forestry polices, regulations and laws

The study also found out that respondents that liked the forest policies and see it to be important to use the policies were about 80% as shown in Figure 15. Those who did not like the idea of national forestry policy and others who were not sure were all about 10%. Some of the reasons giving for liking the national forestry policy were; it will conserve the forest, protect farms around the forest areas, maintain law and order, prevent bushfires and wildfires, climate change benefits and to attract government incentives for forest protection. The same was the reasons for acceptance to implement or use the national forestry policies (Figure 16). Additions were to prevent illegal logging in the forest communities and allow developmental projects to come to the forest communities.

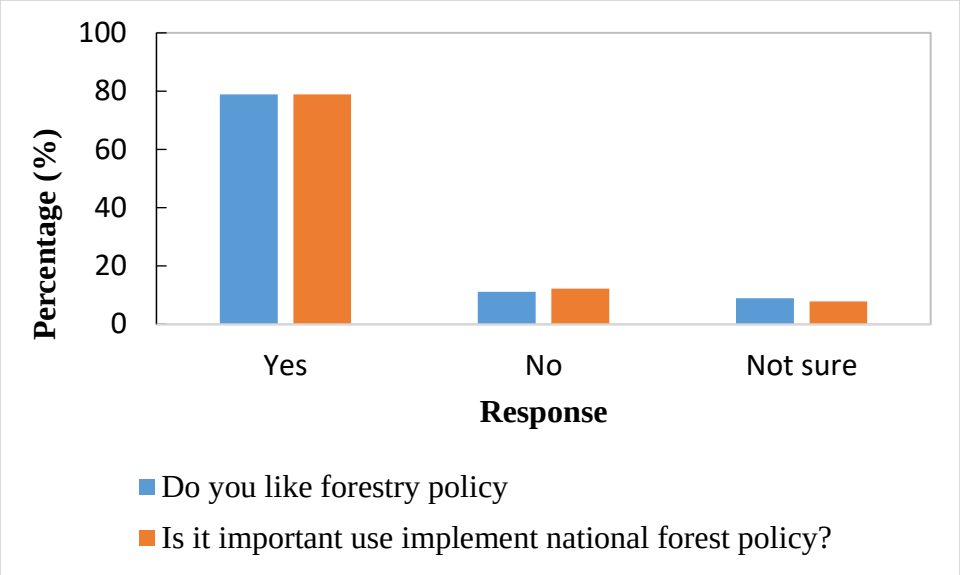

Figure 16 Acceptance of the national forestry policy

5.5 The role of National Forestry Policies in the Economy of Forest Communities

5.5.1 Perceptions about forest policies and Economic Livelihood of Respondents

Figure 17 presents the perception of respondents on the national forestry policies and their livelihood. The highest percentage (64.4%) of respondents believe that forest policies bring improvements to their communities whereas 20% and 15.6% disagreed and were not sure of their stand respectively. The perception that forest policies can improve forest management was accepted by 68.9% while 13.3% disagreed. Also, 70% of respondents said yes to the perception that consistent enforcement of forest policies will protect water supplies (rivers) and maintain favourable conditions for cultivation of agricultural crops while 17.8% said no and the remaining number were not sure of their stand (Figure 17). It is worth noting that 53.3% believed that the national forestry policies do not affect their income. Only 28.9% responded “yes” to the fact that their income will increase if there were no laws guiding their utilization of the forest while 17.8% were not sure.

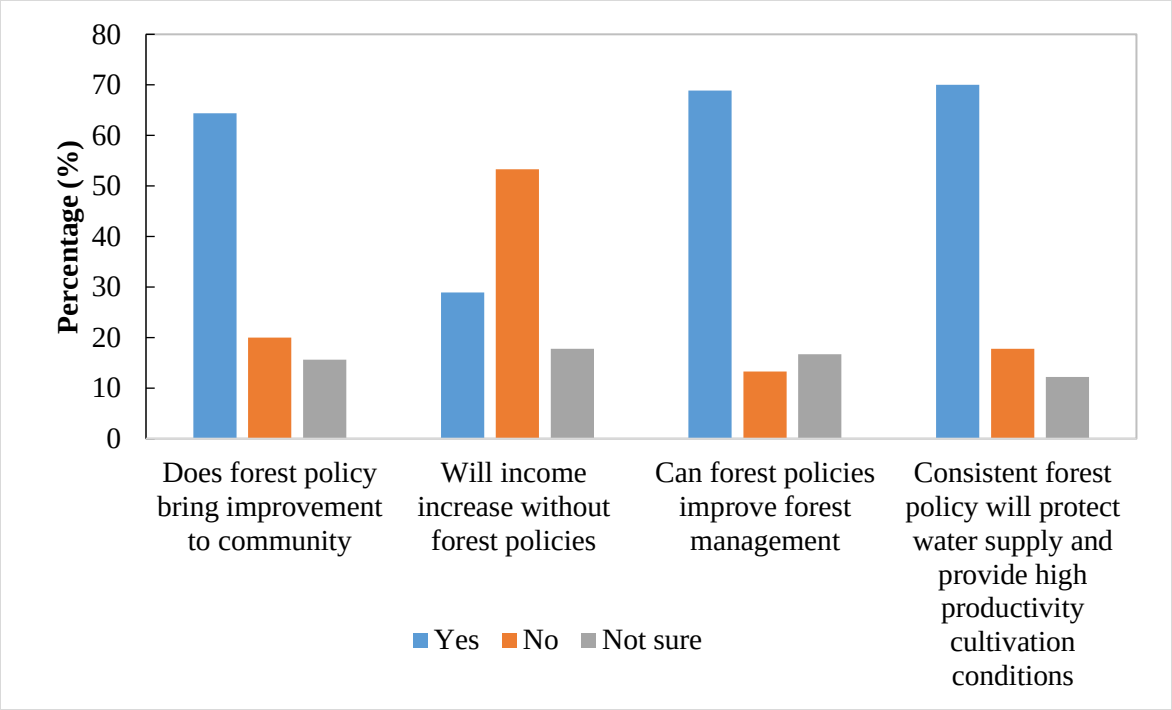

Figure 17 Perception on the link between forest policies and livelihood

5.5.2 Community involvement in National Forestry Policies

In assessing the level of involvement of communities in the formulation and making of forest policies that affects them, it was found that the level of involvement according to this study was less than 30%. Figure 18 presents the results on community involvement in making of forest policies and views of respondents on whether policies should be changed or not. Almost half of the respondents (48.9%) said that their community were not involved in the making of forest policies that affect them whereas 28.9% said they were involved and 22.2% where not sure if their communities were involved in the policy making process. About 48.9% of respondents called for change in the national forestry policies while 34.4% of them said the national forestry policies should be maintained. The remaining 16.7% were not sure whether it should be changed or maintained (Figure 18)

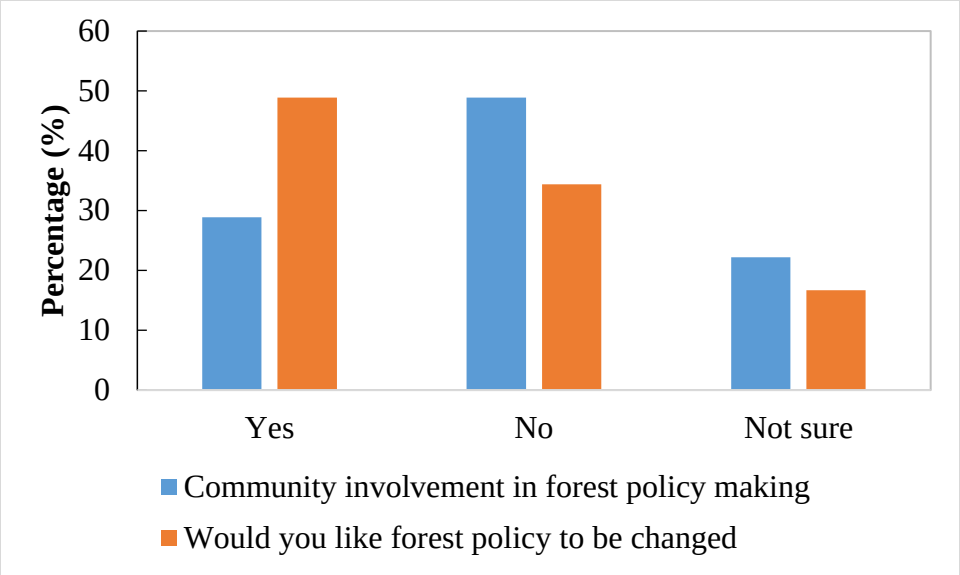

Figure 18 Community involvement in forest policies

5.6 National Forestry Policy Implementation Media

5.6.1 Implementation media of national forestry policies

Respondents settled on three media through which national forestry policies should be passed on to citizens and forest community members. Figure 19 shows the perception of respondents on how policies could be implemented in their communities. Community awareness using media such as information centre announcements and training and information vans was the highest at 63.4% while education system was the least medium at 14.4%. Those who perceived radio as the best medium were 22.2% (Figure 19)

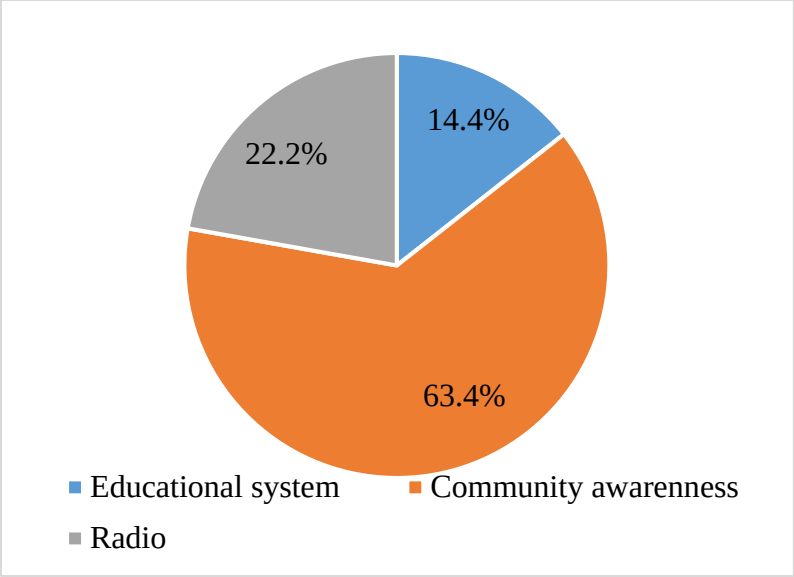

Figure 19 Perception on implementation of media for forest policies

An incentive has been one tool that globally has been used to influence policy implementation. The study therefore accessed whether forest communities were receiving incentives and how incentives will influence their compliance with the forest policies in the nation. The results showed that 30% were receiving some form of government incentives in their communities whereas 42.2% had no incentives from the government and the remaining 27.8% were not sure if government was giving incentives to their communities (Figure 20). The study also showed that incentive is perceived to help implement policies as 62.3% of respondents agreed that receiving incentives will help them comply with forest policies in the communities. Although 24.4% were not sure of their attitude towards forest policies if they were given incentives, 13.3% were sure that incentives will not help or change them to adhere to forest policies in their communities (Figure 20).

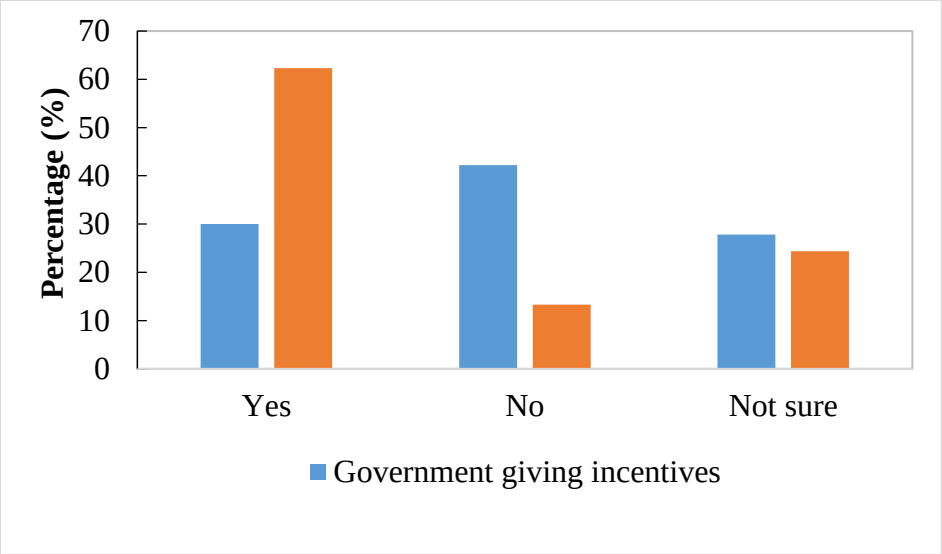

Figure 20 Role of incentives in forest policies implementation

The study also found out that, it will be better to educate children about forestry from their basic education as 74.4% said yes to it and 14.4% disagreed. Those who were not sure if the idea of forestry education in the basic school was best were 11.2%.

5.6.2 Perceptions on punishing offenders of forest policies

In assessing the understanding of respondents in area of law breaking, it was found that 71.1% agrees and believes that those who break the national forestry laws should be punished as shown in Figure 21. The reasons giving for the high percentage for punishing offenders of the forest policy were to scare others from breaking the policy in order to protect the forest and surrounding farms against illegal logging, bushfire and wildfire. Other reasons for them agreeing to punish forest law breakers were to help use the forest adapt to climate change and gain fair resources distribution from the government A very low percentage of 6.7% did not want offenders to be punished while 22.2% were not sure whether to go for punishment or no punishment for offenders of the forestry policies in the Ghana (Figure 21).

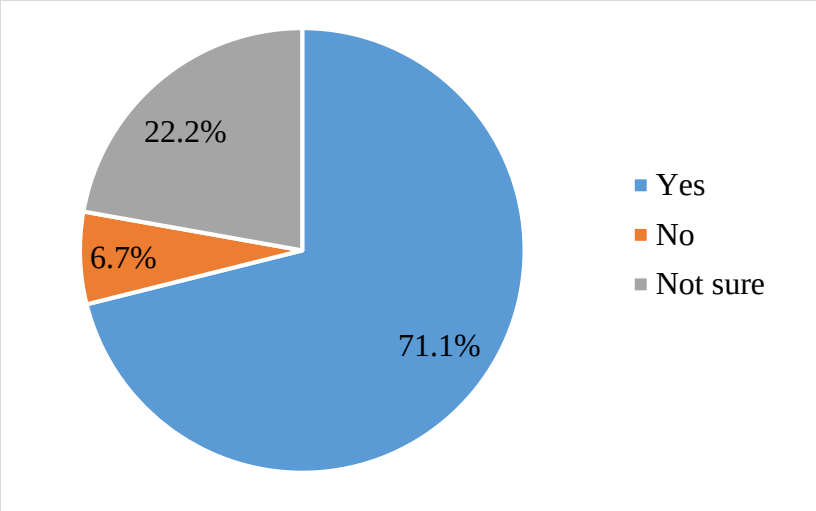

Figure 21 should forest policies breakers be punished?

5.7 SWOT Analysis

The SWOT analysis was used to assess the influences of the national forests policies, regulations and laws in Ghana on rural development using Brong Ahafo as the case study. This was done by using the results from the 90 respondents in the questionnaire survey and the three (3) experts (forest guards) from the three different districts in comparison with the information in the national forestry policies in Ghana. It was found out that some policies on forestry and wildlife such as the Forest and Wildlife Policy of 1994 needs amendment to have equity (equal benefits sharing) on forest. This was a weakness of the national forestry policy but the communities per their response from the study are willing to collaborate and participate with government in implementing the forest policies that will enhance their livelihood.

Table 1: *The SWOT analysis on the influences of the national forestry policy on rural development*

Strength	**Weakness**
• Community willingness to participate and collaborate with government • Strong local institutions (chieftaincy system) • Literate and trained personnel as forest guards	• Unequal benefit sharing in national forestry policies (e.g. Forest and Wildlife Policy of 1994) • Lack of government incentives community • High illiteracy levels in forest communities • Low developmental projects in forest communities
Opportunities	**Threats**
• Community awareness and training on forestry policies and regulations • Availability of forest resources • High dependency of the community on forest • Off-farm business • NGO activities and availability	• Illegal logging • Uncontrolled wild and bushfires • Climate change • Forest resources depletion

CHAPTER SIX: DISCUSSIONS OF THE RESULTS

The main objectives of this study are to assess the influence of the Ghana's National forest policy on rural development. This study is carried out base on three major objectives: To evaluate how Ghana's national forestry policy influences community forestry resources and rural communities' benefits. To measure how Ghana's national forestry policy can be framed to promote rural development. To recommend necessary amendments of the Ghana's national forestry policy to keep the balance between sustainable and socio-economic development with regard to community forests. This chapter discusses the results from the previous chapter by comparing findings with both local and internationals reports on the same topic.

6.1 Community forestry resources and rural communities' benefits

The research confirms that most of the rural communities in the forest areas in the Brong Ahafo Region largely depend upon the forest resources (Non-Timber Forest Products) for their livelihood. It was observed after the interview that the majority of the people were married representing 63.3% and out of this percentage, 40.9% were males and 22.4% were females. This was the highest because they are farmers who have lived in the community and depend on the forest for their livelihood for many years. According to Voth et al. (1999), a community qualifies to be forest dependent if majority of its economy comes from the forest and most of the labor force is into farming. These as a result show that most of the greater populations in the forest zones are farmers confirming the dependence of these communities on forest and its resources for their livelihood.

The results revealed that forest communities in this study benefited most in terms of food from the forest resources around them. It implies that forest communities are aware of the direct benefit of the forest with little to no knowledge about the other indirect benefit or services they enjoy from the forest. This also falls under one of the disadvantages of forest dependent communities, that is, they make low investment in human capital to increase their income and improve their livelihood (Voth et al., 1999, Johnson and Stallman, 1994). Products such as timber, fuel wood, medicine and meats were generally perceived to be profitable to the communities. The basic benefit in three level ranking, obtained from the forest resources by the communities was food. This result confirms the findings of Whiteman (2000) that rural development in developing countries mostly has to do with food security. Timber products were ranked at third level. This implies that, meeting the basic

needs of the communities will go a long way to conserve the timber resources of the forest. Timber products common to the three districts surveyed in the study were "Odum" (*Milicia excelsa*), "Mahogany" (*Khaya ivorensis*) and "Framo" (*Terminalia ivorensis*). The emergence of Teak plantation shows the level of agroforestry adoption in the communities. It also implies the acceptance of the benefit of the tree species in meeting their need. It was confirmed by the Teak plantation on farm sizes from 101-200 ha which were all owned by individuals.

Economic reconstruction has been reported to be difficult in forest dependent communities largely due to the international forces and companies that have interest in the resources produced in their environment (Voth et al., 1999). According to Pouliot et al. (2012), agricultural lands and non-forest environment are more valuable to rural households than forest. Income from agriculture or farming is very higher compared to what the communities gain from the forest (Whiteman, 2000). These findings in West Africa (Burkina Faso and Ghana) was reported to result from the restrictive and inequitable forest policies (Pouliot et al., 2012).

About 85% of the respondents think that the forest in their community belongs to the government and is the responsibility of the government to manage it. They see the government to be the body of rulers or political leaders who decide what should be done in the forest.

6.2 Promoting rural development through Ghana's national forestry policy

In the field of educational status, the highest percentages of respondents were illiterate without formal education representing 35.6% and followed by another 31.1% representing people who attained Junior High School. From the interview it was clearly stated that inhabitants in this various forest communities do not know about the national forest policy and it implementation. Respondents expressed their suggestions that it could be more beneficial if the forest policies could be written in their own language for easy reading and understanding.

Most of the community per the survey (77%) were aware of the national forestry policies in Ghana. Managing forest has become their unconscious responsibility as part of their lives (Michon et al., 2013). They are aware that national forestry policies are to conserve the forest and protect those who benefit from it. They agreed to the fact that illegal logging was taking place around their communities and the policies will help to stop or reduce the rate of deforestation. Almost 80% of the respondents from the forest communities like what the national forestry policy stands for and

thinks that it must be implemented. Forest when conserved by these policies will improve rural economies by protecting and enhance crop production (Lust and Nuchtergale, 1998).

Majority of the respondents perceive that rural development has a bearing on forestry policies. Forest policy was perceived to have the capacity to improve management of the forests. Community involvement in national policy formulation and implementation was less than 30%. It has been well established that rural forests are not managed a professional perspective but more of indigenous (Michon et al., 2013). A bottom-up based approach will encourage community members to own and manage the forest. Half of the respondents perceived that a rural community inclusion in the national forestry policy formulation will shape the upcoming generation and reconstruct their economy (Michon et al., 2013; Whiteman, 2000; Voth et al., 1999).

National forestry policies focus on the resources protection rather than the development of the nearest dwellers that have a major role to play in protecting the forest. The main forest resource benefiting communities are climate dependents. The contribution of the forest to the microclimate fostering the production of food cannot be overemphasized. Although, most of the respondents have limited education, the benefits from forest might be the reason for the wide acceptance of the national forestry policy and the need to make amendment for rural participation in the implementation process. Bottom-up approach of forestry development have been found to be more successful compared to the top-down approach which is currently in use in Ghana (Whiteman, 2000). The right utilization of forest resources has the potential to improve the livelihoods of the communities. However, the dependent of forest communities on agriculture and non-forest environment must be considered in proposing these strategies that will reconstruct the economies of the forest communities (Pouliot et al., 2012; Whiteman, 2000; Voth et al., 1999). Training, awareness of policies and linking of markets of forest products to the communities will encourage the dwellers to own the forest and thereby ensure its protection.

Assessing the local potential of both economic and social benefit of forest will aid in the appropriate formulation and benefiting sharing from forest resources to improve rural development (Slee and Snowdon, 1999). Non-Timber Forest Products (NTFPs) and payments of forest ecosystem services have been reported as potential strategies of improving livelihoods in rural settings especially those that lie within or around forest reserves (Nikodemus and Hajek, 2015). However, the national forest policies fail to address its role in poverty reduction in rural

communities (Ahenkan and Boon, 2010). A critical look at NTFP's might lead to the creation of jobs through entrepreneurships and start-up supports from government and other NGO's interested in forest conservation.

6.3 Possible amendment sections of Ghana's national forestry policy for socio-economic development

Table 6.1 present the Major forest policies and legislations with their major focus (1948-1994) reported by Ahenkan and Boon (2010). Forestry policies must be sustainable and offer better opportunities for the recognition and development of rural forests, particularly through rural empowerment mechanism like promoting NTFPs and equitable sharing of benefits (Michon et al., 2013; Ahenkan and Boon, 2010). Forestry policies when realistic may contribute to the rural development in developing countries (Whiteman, 2000).

The implementation of the national forestry policy needs to consider the media of awareness since the community members perceive that the policies are good and will results in the development of their localities and improve their livelihoods. Generally, the respondents agreed that the best medium for passing on policy information to them was through community awareness via information centre announcement, community training and information fans. This medium makes them feel part of the whole process as it can be considered as a bottom-up approach since the community members can contribute to the information being passed to them in person (Michon et al., 2013; Whiteman, 2000). Open and inclusive process despite it disadvantages of conflicts has proven to be more successful in the implementation of forest policies (Voth et al., 1999). Through the community medium of passing information, groups can be formed and empowered to take responsibility in the various forest communities to achieve sustainability.

***Table 2**: Major forest policies and legislations with their major focus (1948-1994)*

Forest policies and legislation	**Major Objectives**
1948 Forest Policy	• Creation of permanent forest estates • Protection of forests • Protection of water catchment areas • Environment protection for ecological balance
Forests Ordinance, 1951	• Protection of forests • Protection of forest reserves
Forest Improvement Act of 1960	• Forest plantation development • Timber plantation establishment

	and management
Wild Animals Preservation Act, 1961 (Act 43)	• Conservation of wildlife
Wildlife Reserves and Conservation Policy of 1974	• Protection of wildlife resources • Species conservation • Wildlife conservation areas • Protected areas development
Forest Protection Decree, 1974	• Defined forest offences • Forest protection
Trees and Timber Decree 1974	• Logging guideline for timber industry • Sanctions for non-compliance with the guidelines • Promotion of export of processed timber
Forest Protection Decree, 1974	• Forest protection • Protection catchment areas
Trees and timber (chain saw operation) regulation of 1983	• Regulation of felling of trees • Forest plantations • Regulation of logging activities
Forest Protection (Amendment) Law, 1986	• Defines forest offenses and penalties • Forest Protection • Protection of water bodies • Species conservation
Forest Protection (Amendment) Act, 2002	• Forest protection • Reviewed forest offences and fines upwards
1994 Forest and Wildlife Policy	• Protection of forests • Species conservation • Regulation of timber harvesting • Development of cottage and agrobased industry • Community forestry and forest conservation • Deregulation and streaming of bureaucratic controls on wood export marketing • Involvement community in conservation of forest and wildlife Resources • Rehabilitation and development of degraded forests
Timber Resource Management Act, 1997 - Act 547	• Timber utilization contract • Offences for illegal logging • Protection of logging on farms and plantations
The Forest Protection Amendment Act 2002	• Community forestry and forest conservation • Protect forest and wildlife • Reforestation and afforestation Programmes • Forest offences penalties • Protection of water catchment areas
Timber Resources Management (Amendment) Act 2002	• Timber utilization contract • Offences for illegal logging

	• Protection of logging on farms and plantations • Community forestry and forest conservation • Protect land with farms from Logging • Protection private forest plantation • Duration of timber concession rights

(Source: Ahenkan and Boon, 2010)

It was found out that some policies on forestry and wildlife such as the Forest and Wildlife Policy of 1994 needs amendment to have equity (equal benefits sharing) on forest. Promoting social equity in forest conservation and sustainable development is a challenge (Lust and Nachtergale, 1998). This was a weakness of the national forestry policy but the communities per their response from the study are willing to collaborate and participate with government in implementing the forest policies that will enhance their livelihood. According to Ahenkan and Boon (2010), the 1994 Forest and Wildlife Policy (FWP-94) and its implementation process from 1995 to 2008 has a negative impact on NTFPs promotion and development in the Ghana. They reported that, most of the national forest policies aim at forest conservation and timber production and totally ignore the livelihood opportunities of NTFPs for local communities (Ahenkan and Boon, 2010).

Ecosystem payments in the form of incentives has been a major global system of conserving natural resources and their services (Michon et al., 2013). Although, less number of the respondents are receiving some kind of support from the government as incentives, over 60% of them perceive that payment of services provided by the forest in the form of incentives will encourage adherence to the national forestry policies. Also, the inclusion of these policies in the basic education curriculum to inform citizens about them was perceived to be a right step in assuring adherence to the national forestry policies. Punishment as law enforcement measure of the national forestry policy was generally perceived to be the right thing to do by respondents. Punishment will always scare other potential law breakers and conserve the forest and it resources. The forest communities are aware of the benefits from the forest and also perceive that protecting the forest resources against illegal logging, bushfires and wildfires will help them adapt to climate change.

Communities are willing to collaborate with government on management of forests. Change of unequal benefit sharing and provision of incentives. Ignoring the inputs of the local communities in policies might results in conflicts and rejections of the policies (Voth et al., 1999). The

chieftaincy is a strong local institutional system that use to protect the forest. Empowering them again will facilitate the process of adoption and adherence. The institutional distribution of the policies for example the Forest and Wildlife Policy of 1994 does not promote equitable sharing within the communities. The institutional management of Namibia which considers the role of communities and thereby apportions them a share in the benefit can be studied and adopted in Ghana (Mogaka et al., 2001). This reform might lead to impactful change and great development in the forestry sector as it has been reported for other African countries (Mogaka et al., 2001).

If the local communities are supplied with the necessary management support (tools and equipment) and regular community training, less effort will be required at the higher levels in seeing these policies implemented (Voth et al., 1999). Recognizing the human dimension of forest management and empowering the rural communities through both long term and short-term plans will be more effective than what is being achieved.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

This chapter gives a summary of the whole study. It also draws conclusion by identifying the gaps in knowledge which may serve as future research areas. Finally, recommendations on the findings are presented.

7.1 Conclusion

Although, forest covers are reducing in Ghana yearly, the potential of rural poverty alleviation or reduction through the adoption of NTFP**s** enterprises and reconstruction of forest community's economy has not been fully explored. The focus of the national forest policies is mostly on forest protection and timber resources production with little or no consideration of the development of the rural community who thinks that forest conservation is their inborn responsibility. Forest policy tends to bring conflict in rural communities due to its unequal sharing of forest benefits. Unequal sharing of government incentives in the rural communities might promote negligence in undertaking their responsibility of forest protection. Also, the perception that incentives will encourage adoption and adherence to national forest policies calls for the promotion of ecosystem service payments in these communities.

The top-down approach of policy formulation and implementation has not been successful. The respondents perceive that involvement of the communities from scratch will make it easy for the forest communities to own the policies and ensure it implementation. The forest communities benefits from the forest resources were generally food which can be suggested to be from agriculture landscapes more than the forest. This was confirmed by their high percentage of farming engagement as employment status of respondents. Therefore, forestry policies must take into consideration agriculture activities and non-forest environment benefits in planning the developments of these communities that live within or around forest reserves.

The National forest policies in Ghana needs to be amended for positive rural developments and improvement of livelihoods of forest communities. An all-inclusion forest policy will in a way reduce urban migration and close the wide gap between rural and urban economies. Forest communities are suitable for the creation of tourism and research centers that will attract the urban to the rural. Non-timber forest products have been found to be a game changer from basic needs of food security as in the case of these communities to economic needs of improved livelihood. Beside the food needs which is majorly from the agriculture lands, medicinal products and other

NTFPs might be developed through entrepreneurship trainings and skill empowerment workshops to reduce youth unemployment in the rural communities. A start-up capital or incentives from government to establish these economic ventures will help reduce the illegal logging and destruction of the forest and its resources. Both national and international interventions are required to combat forest degradation through the reformation of national forest policies and forest programs that benefits the forest communities.

Community involvement in the formulation of the policies is critical to its acceptance. Farmers or respondents although might not be benefiting (economic) directly from the forest resources, recognize the importance of the conservation of the forest to their agriculture activities. They are aware of forest role in adapting to climate change and how it serves as protection for their farms from bushfires. Creating a more direct benefit platform for the rural communities will encourage them to make forest protection their lifetime responsibility. Also, dissemination of policy through radio has little impact in these communities. A face to face awareness creation through the van information and information centers in the communities was the perceived best media.

Rural communities are aware of forest policies but perceive that it is the responsibility of the government to protect it since "the government" owns it. National forest policies should clearly address the issue of ownership and payment of compensation and ecosystem services to individual land owners in these communities. The national forest policies in Ghana has little to do with the development of rural communities. Therefore, amendment is necessary to improve the human dimension of forest and forest resources management, especially the indigenous perspective.

7.2 Recommendations

The following recommendations are suggested to improve the situation in Ghana;

- Forestry should be included in the basic school syllabus for nation-wide and generational awareness creation on the ecosystem services provided by forest nature.
- A translation of the national forestry policies from English to dominant local language in the forest zones will reduce the barrier between rural communities and 'governments'. This will make it possible for the elderly enrolled in adults' education to read and understand the policies governing the conservation of the forest.
- There should be a regular and consistent review and amendment of forest policies to suite the situations at hand with focus on both national and rural community developments.

- Memorandum of understanding (MoU) should be signed between Forestry Commission (FC) timbers companies operating in the forest communities on clearly spelt out social intervention. FC should ensure the implementation of MoU in the rural communities.
- Rural development must be part of forest commission agenda and missions in conserving the forest resources in the nation.

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APPENDICES

APPENDIX I: Questionnaire

THE INFLUENCES OF NATIONAL FORESTRY POLICY ON RURAL DEVELOPMENT IN GHANA

Questionnaire Code……. District……

Community……. Lat ……Long…….

Nearest Town……... Date of Interview..…/…. /…….

SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

1. Age of respondents……a. Under 30 years [ ] b. 31-40 years [ ] c. 41-50 years [ ]

d. Above 60 years old [ ]

2. Gender: a. Male [ ] b. Female [ ]

3. Marital status: a. Single [ ] b. Married [ ] c. Separated [ ] d. Divorced [ ] e. Widowed [ ] f. Co - habituating [ ]

4. Highest Education Level: a. Primary [ ] b. JHS [ ] c. SHS/O Level/A Level/Voc/Tech/Agric. Col. [ ] d. Tertiary (Uni/TC/Nurs.) [ ] e. Non formal [ ] f. No formal education. [ ]

5. Household size……

6. Position of the respondent to household head: a. Head [ ] b. Wife [ ] c. Son [ ] d. Daughter [ ] e. Nephew [ ] f. Niece [ ] g. Other (Specify): …….

7. Total number of children ……....

8. Access to infrastructure: Tick all that apply

Electricity [ ] Pipe borne water [ ] Tarred road [ ] Easy transport Market [ ] Health post/Clinic [ ] Primary school [ ] JHS [ ] SHS [ ]

9. Rank your occupation: 1. Trading [ ] 2. Handiwork [ ] 3. Professional/Service [ ] 4. Farming/Forestry [ ] 5. Others (Specify)……

10. Years in Occupation: …….

KNOWLEDGE AND BENEFITS FROM FOREST

11. What benefits do you get from the forest? Tick all that apply

a. Medicine [ ] b. Food [ ] c. Meat [ ] d. Timber [ ] e. others (specify)……

12. How many years have you benefited from the resources of the forest (years)?

a. below 10 [ ] b. 11-20 [ ] c. 21-30 [ ] d. above 30 [ ]

13. Are the benefit from the forest profitable? a. Yes [ ] b. No [ ] c. Not sure [ ]

14. Which resource from the forest is most profitable to your livelihood? Rank 1 – 3 (1 as most profitable)

a. Medicine [ ] b. Food [ ] c. Meat [ ] d. Timber [ ] e. others (specify)……

15. What are some of the tree species that you have in the forest in your community? Tick all that apply

a. Wawa [ ] b. Mahogany [ ] c. Odum [ ] d. Sapela [ ] e. Framoo [ ] f. Others (specify) ……..

16. How big is the forest around here in your estimation? a. Under 50 ha [ ] b. 51-100 ha [ ] c. 101-200 ha [ ] d. 201- 500 ha [ ] e. 501- 1000 ha [ ] f. 1,001 - 5,000 ha [ ] g. 5,001 – 10, 000 ha [ ] h. Specify if more …….

17. Who is the owner of the forest in your community? a. Individual [ ] b. Community [ ] c. Government [ ] d. Private company [ ] e. Others specify ……

18. Who manages the forest around your community? a. Individual [ ] b. Community [ ] c. Government [ ] d. Private company [ ] e. Others specify ……

NATIONAL FORESTRY POLICIES

19. Are you aware of the national forest policy? a. Yes [ ] b. No [ ] c. Not sure [ ]

20. Have you heard about the law about trees and timber cutting from forest without seeking appropriate permission? (Trees and timber (chain saw operation) regulation of 1983 and 1991)

a. Yes [ ] b. No [ ] c. Not sure [ ]

21. Have you heard about the law regarding setting bush fire in the forest? (Control and prevention of bushfires Law of 1990)

a. Yes [ ] b. No [ ] c. Not sure [ ]

22. If yes to 19 or knowledgeable about 20 & 21,

Do you like the national forest policies? a. Yes [ ] b. No [ ] c. Not sure [ ]

23. Reasons for answer in 22 …….....

.....

24. Do you think it is important to use forestry policies in Ghana? a. Yes [ ] b. No [ ] c. Not sure [ ]

25. Reasons for answer in 24 …….....

.....

26. Does the forest policies bring improvement to the community and Ghana? a. Yes [ ] b. No [ ] c. Not sure [ ]

27. One specific improvement you perceive the policy will bring to your community? ……
……

28. Will your income increase if there were no laws guiding your utilization of the forest? a. Yes [ ] b. No [ ] c. Not sure [ ]

29. Do you think the forestry policy can improve the management of the forest? a. Yes [ ] b. No [ ] c. Not sure [ ]

30. Do you believe that a consistent forest policy will help protect water supplies (rivers) and maintain favorable conditions for cultivation of agricultural crops?

a. Yes [ ] b. No [ ] c. Not sure [ ]

31. Was your community involved in the making and amendment of forest policies in Ghana?

a. Yes [ ] b. No [ ] c. Not sure [ ]

32. Would you like the government or policy makers to change the policy system in Ghana?

a. Yes [ ] b. No [ ] c. Not sure [ ]

33. How would you like the forestry policy in Ghana to be implemented in various communities?

a. Educational system [ ] b. Community awareness [ ] c. Radio [ ] d. Publications [ ] e. Newspaper [ ] f. Others specify ……

34. Does the government give incentives to the community where forest is located?

a. Yes [ ] b. No [ ] c. Not sure [ ]

35. Do you think government incentives to forest community will help in adhering to forest policies?

a. Yes [ ] b. No [ ] c. Not sure [ ]

36. Do you think that it would be better to educate children about forestry from their basic education?

a. Yes [ ] b. No [ ] c. Not sure [ ]

37. Do you suggest that offenders of the forestry policy should be punished? a. Yes [ ] b. No [ ] c. Not sure [ ]

38. Any reason for answer in 37……

APPENDIX II: Data from Forest Guards

Code	**FG1**	**FG2**	**FG3**
Interview_date	15-Feb-18	15-Feb-18	15-Feb-18
Age	3	2	1
Gender	1	2	1
Marital_status	2	2	1
Education	4	4	4
Household_size	8	7	4
Family_position	1	2	7
Other_fam_pos	Tenant	Tenant	Tenant
Children	4	4	2
Electricity	1	1	1
Water	2	2	1
Tarred_road	2	2	1
Market	1	2	1
Health_post	1	2	1
Primary_School	1	2	1
JHS	1	2	1
SHS	2	2	1
Rank_Trading	0	0	0
Rank_Handiwork	0	0	0
Rank_service	1	1	1
Rank_farming	0	0	2
Ran_other_job	0	0	0
Years	19	12	8
Medicine_Benefits	1	1	1
Food_benefit	1	1	1
Meat_benefit	1	1	1
Timber_benefit	1	1	1
Other_Benefit		Clothing	
Years_of_forest_benefit	4	2	3
Forest_profitability	1	1	1
Medicine_for_livelihood	2	1	1
Food_for_livelihood	1	0	0
Meat_for_livelihood	0	0	0
Timber_for_livelihood	0	0	0
Other_for_livelihood	0	2	0
Wawa_specy	1	1	2
Mahogany_specy	1	1	2
Odum_specie	1	2	2

Sapele_specie	1	2	2
Framo_specie	1	1	1
Other_species		Cydrala	Teak
Size_of_forest	#NULL!	3	6
Owner_of_forest	5	8	5
Other_owners			
Forest_Manager	5	8	3
Other_managers			
Nat_Forest_Pol	1	1	1
Chainsaw_Law	1	1	1
Bushfire_law	1	1	1
If_Yes_to_NFP	1	1	1
Reason_for_22	Protection	Conservation and poverty reduction	Conserve forest ecosystem
Using_NFP_in_Ghana	1	1	1
Reason_for_24	environmental benefits from forest	Food and reduce unemployment	Keep it for posterity
Policy_improvement	1	1	1
State_improvement	reduced illegal logging	food for community, create jobs for youth	promote natural environment
Income_increase	2	2	2
Mgt_improve_by_policy	1	1	1
Consistency_of_policy	1	1	1
Community_involvment	2	1	2
Change_of_policy	2	3	2
NFP_implementation	3	2	3
Other_implementation_medium			
Incentives_on_NFP	2	1	2
Government_incentives_for_NFP	1	1	1
Children_education	1	1	1
Offenders_punished	1	3	1
Reason_for_37	Policy enforcement	Ignorant of the laws	policy enforcement

APPENDIX III: Data from Communities

Code	Community	Nearest town	District	Latitude	Longitude	Interview date	Age	Gender
SLD1	Dagombakrom	Limankrom	Sunyani	7.41	-2.19	06-Feb-18	1	2
SLD2	Dagombakrom	Limankrom	Sunyani	7.41	-2.19	06-Feb-18	1	2
SLD3	Dagombakrom	Limankrom	Sunyani	7.41	-2.19	06-Feb-18	2	1
SLD4	Dagombakrom	Limankrom	Sunyani	7.41	-2.19	06-Feb-18	2	1
SLD5	Dagombakrom	Limankrom	Sunyani	7.41	-2.19	06-Feb-18	2	1
SLD6	Dagombakrom	Limankrom	Sunyani	7.41	-2.19	06-Feb-18	1	2
SLD7	Dagombakrom	Limankrom	Sunyani	7.41	-2.19	06-Feb-18	3	2
SLD8	Dagombakrom	Limankrom	Sunyani	7.41	-2.19	06-Feb-18	1	1
SLD9	Dagombakrom	Limankrom	Sunyani	7.41	-2.19	06-Feb-18	4	1
SLD10	Dagombakrom	Limankrom	Sunyani	7.41	-2.19	06-Feb-18	3	2
SSA1	Atakrom	Sawmill	Sunyani	7.38	-2.21	06-Feb-18	2	1
SSA2	Atakrom	Sawmill	Sunyani	7.38	-2.21	06-Feb-18	2	1
SSA3	Atakrom	Sawmill	Sunyani	7.38	-2.21	06-Feb-18	1	2
SSA4	Atakrom	Sawmill	Sunyani	7.38	-2.21	06-Feb-18	3	1
SSA5	Atakrom	Sawmill	Sunyani	7.38	-2.21	06-Feb-18	4	1
SSA6	Atakrom	Sawmill	Sunyani	7.38	-2.21	06-Feb-18	4	2
SSA7	Atakrom	Sawmill	Sunyani	7.38	-2.21	06-Feb-18	4	2
SSA8	Atakrom	Sawmill	Sunyani	7.38	-2.21	06-Feb-18	3	1
SSA9	Atakrom	Sawmill	Sunyani	7.38	-2.21	06-Feb-18	3	2
SSA10	Atakrom	Sawmill	Sunyani	7.38	-2.21	06-Feb-18	4	1

SYF1	Fokuo	Yawhema	Sunyani	7.35	-2.25	06-Feb-18	1	2
SYF2	Fokuo	Yawhema	Sunyani	7.35	-2.25	06-Feb-18	2	2
SYF3	Fokuo	Yawhema	Sunyani	7.35	-2.25	06-Feb-18	1	2
SYF4	Fokuo	Yawhema	Sunyani	7.35	-2.25	06-Feb-18	1	1
SYF5	Fokuo	Yawhema	Sunyani	7.35	-2.25	06-Feb-18	2	1
SYF6	Fokuo	Yawhema	Sunyani	7.35	-2.25	06-Feb-18	4	1
SYF7	Fokuo	Yawhema	Sunyani	7.35	-2.25	06-Feb-18	1	1
SYF8	Fokuo	Yawhema	Sunyani	7.35	-2.25	06-Feb-18	2	1
SYF9	Fokuo	Yawhema	Sunyani	7.35	-2.25	06-Feb-18	3	1
SYF10	Fokuo	Yawhema	Sunyani	7.35	-2.25	06-Feb-18	3	2
TAA1	Assin	Agona	Tano North	7.20	-2.34	07-Feb-18	2	1
TAA2	Assin	Agona	Tano North	7.20	-2.34	07-Feb-18	3	1
TAA3	Assin	Agona	Tano North	7.20	-2.34	07-Feb-18	3	1
TAA4	Assin	Agona	Tano North	7.20	-2.34	07-Feb-18	2	2
TAA5	Assin	Agona	Tano North	7.20	-2.34	07-Feb-18	3	1
TAA6	Assin	Agona	Tano North	7.20	-2.34	07-Feb-18	3	1
TAA7	Assin	Agona	Tano North	7.20	-2.34	07-Feb-18	2	1
TAA8	Assin	Agona	Tano North	7.20	-2.34	07-Feb-18	1	1
TAA9	Assin	Agona	Tano North	7.20	-2.34	07-Feb-18	3	1
TAA10	Assin	Agona	Tano North	7.20	-2.34	07-Feb-18	4	1
TYT1	Tano Ano	Yamfo	Tano North	7.21	-2.30	07-Feb-18	3	1
TYT2	Tano Ano	Yamfo	Tano North	7.21	-2.30	07-Feb-18	4	1

TYT3	Tano Ano	Yamfo	Tano North	7.21	-2.30	07-Feb-18	2	1
TYT4	Tano Ano	Yamfo	Tano North	7.21	-2.30	07-Feb-18	2	1
TYT5	Tano Ano	Yamfo	Tano North	7.21	-2.30	07-Feb-18	3	1
TYT6	Tano Ano	Yamfo	Tano North	7.21	-2.30	07-Feb-18	3	1
TYT7	Tano Ano	Yamfo	Tano North	7.21	-2.30	07-Feb-18	2	1
TYT8	Tano Ano	Yamfo	Tano North	7.21	-2.30	07-Feb-18	4	1
TYT9	Tano Ano	Yamfo	Tano North	7.21	-2.30	07-Feb-18	1	2
TYT10	Tano Ano	Yamfo	Tano North	7.21	-2.30	07-Feb-18	1	1
TTA1	Agona	Tano Ano	Tano North	7.20	-2.32	07-Feb-18	4	2
TTA2	Agona	Tano Ano	Tano North	7.20	-2.32	07-Feb-18	2	1
TTA3	Agona	Tano Ano	Tano North	7.20	-2.32	07-Feb-18	3	1
TTA4	Agona	Tano Ano	Tano North	7.20	-2.32	07-Feb-18	1	1
TTA5	Agona	Tano Ano	Tano North	7.20	-2.32	07-Feb-18	3	2
TTA6	Agona	Tano Ano	Tano North	7.20	-2.32	07-Feb-18	3	1
TTA7	Agona	Tano Ano	Tano North	7.20	-2.32	07-Feb-18	4	1
TTA8	Agona	Tano Ano	Tano North	7.20	-2.32	07-Feb-18	3	1
TTA9	Agona	Tano Ano	Tano North	7.20	-2.32	07-Feb-18	2	1
TTA10	Agona	Tano Ano	Tano North	7.20	-2.32	07-Feb-18	3	2
AMA1	Asumura	Mpomaase	Asunafo North			06-Feb-18	4	2
AMA2	Asumura	Mpomaase	Asunafo North			06-Feb-18	4	1
AMA3	Asumura	Mpomaase	Asunafo North			06-Feb-18	2	1

AMA4	Asumura	Mpomaase	Asunafo North		06-Feb-18	2	2
AMA5	Asumura	Mpomaase	Asunafo North		06-Feb-18	2	2
AMA6	Asumura	Mpomaase	Asunafo North		06-Feb-18	1	1
AMA7	Asumura	Mpomaase	Asunafo North		06-Feb-18	3	1
AMA8	Asumura	Mpomaase	Asunafo North		06-Feb-18	4	2
AMA9	Asumura	Mpomaase	Asunafo North		06-Feb-18	4	1
AMA10	Asumura	Mpomaase	Asunafo North		06-Feb-18	1	2
AWA1	Akrodie	Wawase	Asunafo North		06-Feb-18	3	1
AWA2	Akrodie	Wawase	Asunafo North		06-Feb-18	2	1
AWA3	Akrodie	Wawase	Asunafo North		06-Feb-18	1	1
AWA4	Akrodie	Wawase	Asunafo North		06-Feb-18	3	2
AWA5	Akrodie	Wawase	Asunafo North		06-Feb-18	1	1
AWA6	Akrodie	Wawase	Asunafo North		06-Feb-18	4	1
AWA7	Akrodie	Wawase	Asunafo North		06-Feb-18	2	2
AWA8	Akrodie	Wawase	Asunafo North		06-Feb-18	1	1
AWA9	Akrodie	Wawase	Asunafo North		06-Feb-18	3	2
AWA10	Akrodie	Wawase	Asunafo North		06-Feb-18	2	1
AGB1	Bediako	Gambia No.1	Asunafo North		06-Feb-18	1	2
AGB2					#NULL!	1	1
AGB3					#NULL!	4	2
AGB4					#NULL!	3	1
AGB5					#NULL!	4	1
AGB6					#NULL!	2	2
AGB7					#NULL!	3	1
AGB8					#NULL!	4	1
AGB9					#NULL!	2	2
AGB10					#NULL!	4	1

Code	Marital status	Education	Household size	Family position	Other family position	Children	Electricity	Water	Tarred road
SLD1	2	1	9	2		3	1	1	2
SLD2	1	1	4	4		2	1	1	2
SLD3	2	6	5	1		3	1	2	2
SLD4	2	6	7	1		5	1	2	2
SLD5	1	2	6	5		4	1	2	2
SLD6	2	6	6	2		4	1	2	2
SLD7	2	5	7	2		6	1	1	2
SLD8	1	2	6	5		4	1	2	2
SLD9	2	6	7	1		5	1	1	2
SLD10	3	6	5	7	Grandmother	6	1	2	2
SSA1	2	#NULL!	4	#NULL!		2	2	1	2
SSA2	2	5	6	#NULL!		4	2	1	2
SSA3	1	2	8	#NULL!		6	2	1	2
SSA4	2	6	7	1		6	2	1	2
SSA5	2	2	6	1		4	2	1	2
SSA6	2	1	7	2		5	2	1	2
SSA7	2	1	2	2		6	2	1	2
SSA8	2	6	9	1		7	2	1	2
SSA9	2	6	14	#NULL!		12	2	1	2
SSA10	2	6	16	1		14	2	1	2
SYF1	2	2	8	4		6	2	2	2
SYF2	2	6	7	2		5	1	1	2
SYF3	2	1	5	2		4	1	1	2
SYF4	1	2	7	3		5	1	2	1
SYF5	2	6	7	1		5	1	2	2
SYF6	4	1	1	1		9	1	2	2
SYF7	1	2	9	3		7	1	1	2
SYF8	2	6	12	1		10	1	2	2
SYF9	2	6	12	1		10	1	2	2
SYF10	2	2	10	2		8	2	2	2
TAA1	2	2	6	1		4	2	1	2
TAA2	2	6	11	1		9	1	2	2
TAA3	2	2	8	7	Brother	0	2	2	2
TAA4	2	1	6	2		4	1	2	2
TAA5	2	2	7	3		5	2	2	2
TAA6	1	6	9	1		7	1	2	2

TAA7	1	6	3	1		1	2	2	2
TAA8	2	6	4	1		2	2	2	2
TAA9	2	2	9	1		6	2	2	2
TAA10	2	1	1	1		0	2	1	2
TYT1	2	6	13	1		11	2	2	2
TYT2	2	2	6	1		4	2	1	2
TYT3	2	6	5	1		3	2	2	2
TYT4	2	2	10	3		10	2	1	2
TYT5	2	2	13	1		8	2	1	2
TYT6	2	1	5	1		3	2	1	2
TYT7	2	3	15	1		13	2	2	2
TYT8	2	6	10	1		8	2	2	2
TYT9	1	6	15	2		15	2	1	2
TYT10	1	3	15	3		8	2	1	2
TTA1	2	3	10	2		8	2	1	2
TTA2	1	2	6	3		2	2	1	2
TTA3	2	6	8	1		6	2	2	2
TTA4	2	2	5	1		3	2	2	2
TTA5	2	6	3	2		2	2	1	2
TTA6	1	2	3	3		0	2	2	2
TTA7	2	2	12	1		10	2	1	2
TTA8	2	6	10	3		7	2	2	2
TTA9	2	2	2	1		0	2	2	2
TTA10	1	6	2	2		1	2	1	2
AMA1	5	6	6	1		6	1	2	2
AMA2	5	3	12	1		12	1	1	2
AMA3	2	4	11	1		3	1	1	1
AMA4	2	2	4	2		4	1	1	2
AMA5	1	2	6	5		6	1	1	2
AMA6	1	6	3	3		3	1	2	2
AMA7	2	1	4	1		4	1	2	2
AMA8	5	6	3	2		3	1	2	2
AMA9	5	6	7	1		7	1	2	2
AMA10	2	1	2	6		0	1	1	2
AWA1	3	6	6	6		6	1	1	1
AWA2	2	2	10	1		10	1	1	2
AWA3	1	4	1	1		1	1	1	2
AWA4	2	1	2	2		2	1	2	2
AWA5	1	6	10	1		10	1	2	1
AWA6	5	5	12	1		12	1	1	2
AWA7	3	2	1	4		1	2	2	2

AWA8	1	4	10	3		10	1	1	1
AWA9	2	3	5	5		5	1	1	2
AWA10	4	5	3	3		3	2	2	2
AGB1	1	2	12	3		0	1	1	2
AGB2	1	2	10	3		0	1	1	2
AGB3	5	3	12	2		10	1	1	1
AGB4	2	1	30	1		5	1	1	1
AGB5	2	6	12	1		6	1	1	2
AGB6	3	2	16	5		3	1	2	2
AGB7	2	1	16	3		4	1	1	2
AGB8	2	1	20	1		6	1	1	2
AGB9	3	2	9	2		4	1	2	2
AGB10	2	1	7	1		14	1	2	2

Code	**Market**	**Health post**	**Primary School**	**JHS**	**SHS**	**Rank Trading**	**Rank Handiwork**	**Rank service**	**Rank farming**
SLD1	1	1	1	2	2	0	0	0	1
SLD2	2	2	1	2	2	0	0	0	1
SLD3	2	2	1	2	2	0	0	0	1
SLD4	2	2	1	2	2	0	0	0	1
SLD5	2	1	1	1	2	0	0	0	1
SLD6	2	2	1	1	0	0	0	0	1
SLD7	2	2	1	2	2	0	0	0	1
SLD8	2	1	1	1	2	0	0	0	1
SLD9	2	2	1	2	2	1	0	0	2
SLD10	2	2	1	2	2	0	0	0	1
SSA1	2	2	2	2	2	0	0	0	1
SSA2	2	2	2	1	2	0	0	0	1
SSA3	2	2	2	2	2	1	0	0	2
SSA4	2	2	2	1	2	0	0	0	1
SSA5	2	2	1	1	2	0	0	1	2
SSA6	2	2	1	1	2	0	0	0	1
SSA7	2	2	1	2	2	0	0	0	1
SSA8	2	2	1	1	2	0	0	0	1
SSA9	2	2	1	1	2	0	0	0	1
SSA10	2	2	1	1	2	0	0	0	1
SYF1	2	2	2	2	2	0	0	0	1
SYF2	2	2	2	2	2	1	0	0	2
SYF3	2	2	2	2	2	1	0	0	2

SYF4	2	2	1	1	2	0	0	0	1
SYF5	2	2	1	1	2	0	0	0	1
SYF6	2	2	1	1	2	0	0	0	1
SYF7	2	2	2	2	2	0	1	0	2
SYF8	2	2	1	1	2	0	0	0	1
SYF9	2	2	1	1	2	0	0	0	1
SYF10	2	1	1	2	2	1	0	0	2
TAA1	2	2	2	2	2	0	0	0	1
TAA2	2	2	2	2	2	0	0	0	1
TAA3	2	2	1	1	2	0	0	0	1
TAA4	2	1	1	1	2	2	0	1	3
TAA5	2	2	1	1	2	0	0	0	1
TAA6	2	2	1	1	2	0	0	0	1
TAA7	2	2	1	1	2	0	0	0	1
TAA8	2	2	1	1	2	0	0	0	1
TAA9	1	2	2	1	2	0	0	0	1
TAA10	2	2	1	1	2	0	0	0	1
TYT1	2	2	1	2	2	0	0	0	1
TYT2	2	2	1	2	2	0	0	0	1
TYT3	2	2	1	2	2	0	0	0	1
TYT4	1	2	1	2	2	0	0	0	1
TYT5	2	2	2	2	2	0	0	0	1
TYT6	2	2	2	2	2	0	0	0	1
TYT7	2	2	1	2	2	0	0	0	1
TYT8	2	2	1	2	2	0	0	0	1
TYT9	1	2	1	2	2	0	0	0	1
TYT10	2	2	2	2	2	0	0	0	1
TTA1	2	2	2	2	2	0	0	0	1
TTA2	2	2	2	2	2	0	0	0	1
TTA3	2	2	1	1	2	0	0	0	1
TTA4	2	2	2	2	2	0	1	0	2
TTA5	2	2	2	2	2	0	0	0	1
TTA6	1	2	2	2	2	0	0	0	1
TTA7	2	2	2	2	2	0	0	0	1
TTA8	1	2	2	2	2	0	0	0	1
TTA9	1	2	2	2	2	0	0	0	1
TTA10	2	2	2	2	2	1	0	0	2
AMA1	2	1	1	1	2	0	0	0	0
AMA2	2	1	1	1	2	0	0	0	1
AMA3	2	1	1	2	2	1	0	0	1
AMA4	2	1	1	1	2	0	0	0	1

AMA5	1	1	1	1	2	0	0	0	1
AMA6	2	1	1	1	2	0	0	0	1
AMA7	2	1	1	2	2	1	0	0	1
AMA8	1	1	1	1	2	0	0	0	1
AMA9	2	1	1	1	2	0	0	0	1
AMA10	2	1	1	2	2	0	0	0	1
AWA1	2	1	1	2	2	0	0	0	1
AWA2	1	1	1	1	2	1	0	0	2
AWA3	1	1	1	1	2	0	0	1	2
AWA4	2	1	1	1	2	0	0	0	1
AWA5	1	1	1	2	2	1	0	0	2
AWA6	2	1	2	1	2	0	0	0	1
AWA7	2	1	1	2	2	0	0	0	1
AWA8	2	1	1	2	2	0	0	0	1
AWA9	2	1	1	2	2	1	0	0	2
AWA10	1	1	1	1	2	0	0	0	1
AGB1	2	1	1	1	2	0	0	0	1
AGB2	2	1	1	1	2	0	0	0	1
AGB3	2	1	1	1	2	0	0	0	1
AGB4	2	1	1	2	2	1	0	0	2
AGB5	2	1	1	1	2	0	0	0	1
AGB6	2	1	1	1	2	0	0	0	1
AGB7	2	1	1	1	2	0	0	0	1
AGB8	2	1	1	1	2	0	0	0	1
AGB9	2	1	1	1	2	0	0	0	1
AGB10	1	1	1	1	2	1	0	0	2

Code	**Ran other job**	**Years**	**Medicine Benefits**	**Food benefit**	**Meat benefit**	**Timber benefit**	**Other Benefit**	**Years of forest benefit**	**Forest profitability**
SLD1	#NULL!	13	1	1	2	2		2	1
SLD2	#NULL!	8	2	1	2	2		1	1
SLD3	#NULL!	10	1	1	2	2	fuelwood	#NULL!	1
SLD4	#NULL!	15	1	1	2	1	fuelwood	2	1
SLD5	#NULL!	#NULL!	2	1	2	2	fuelwood	2	1
SLD6	#NULL!	2	1	1	2	2		1	1

SLD7	#NULL!	15	2	2	2	2	fuelwood	2	1
SLD8	#NULL!	#NULL!	2	2	2	2	fuelwood	2	1
SLD9	#NULL!	10	2	2	2	2	fuelwood	2	1
SLD10	#NULL!	30	1	1	2	1	fuelwood	2	1
SSA1	#NULL!	5	1	1	2	1		1	1
SSA2	#NULL!	10	1	1	2	2	fuelwood	1	1
SSA3	#NULL!	4	1	1	2	2	fuelwood	1	1
SSA4	#NULL!	15	11	1	2	1	fuelwood	2	1
SSA5	#NULL!	9	2	2	2	1		1	1
SSA6	#NULL!	20	2	1	2	2	fuelwood	3	1
SSA7	#NULL!	10	2	1	2	2		2	1
SSA8	#NULL!	17	1	1	2	1	fuelwood	2	1
SSA9	#NULL!	40	2	1	2	2	fuelwood	4	1
SSA10	#NULL!	30	2	1	2	2	fuelwood	3	1
SYF1	#NULL!	#NULL!	2	2	2	2	fuelwood	2	1
SYF2	#NULL!	5	2	1	2	2	fuelwood	1	11
SYF3	#NULL!	10	2	2	2	2		#NULL!	3
SYF4	#NULL!	10	2	1	2	2	fuelwood	1	1
SYF5	#NULL!	25	1	1	2	1	fuelwood	3	1
SYF6	#NULL!	10	1	1	2	2	fuelwood	1	1
SYF7	#NULL!	3	2	2	2	2		1	3
SYF8	#NULL!	10	1	1	2	2		2	1
SYF9	#NULL!	20	1	1	2	1	fuelwood	2	1
SYF10	#NULL!	35	2	1	2	2		4	1

TAA1	#NULL!	5	2	1	2	2	fuelwood	1	1
TAA2	#NULL!	20	1	1	2	1	fuelwood	2	1
TAA3	#NULL!	5	2	1	2	2		2	1
TAA4	#NULL!	#NULL!	2	1	2	2	fuelwood	2	1
TAA5	#NULL!	7	2	1	2	2		1	1
TAA6	#NULL!	30	1	1	2	2		4	1
TAA7	#NULL!	10	1	1	2	2		1	1
TAA8	#NULL!	2	2	1	2	1		1	1
TAA9	#NULL!	30	2	1	2	2		3	1
TAA10	#NULL!	2	2	1	2	2		1	1
TYT1	#NULL!	30	2	1	2	2		4	1
TYT2	#NULL!	32	2	1	2	2	fuelwood	3	1
TYT3	#NULL!	20	2	1	2	2		2	1
TYT4	#NULL!	10	1	1	2	2		1	1
TYT5	#NULL!	40	1	1	1	1		4	1
TYT6	#NULL!	15	1	2	2	2		2	1
TYT7	#NULL!	25	2	1	2	2	fuelwood	4	1
TYT8	#NULL!	30	2	1	1	1		3	1
TYT9	#NULL!	8	1	1	2	2		1	1
TYT10	#NULL!	10	2	1	1	2		3	1
TTA1	#NULL!	12	2	1	2	2	fuelwood	2	1
TTA2	#NULL!	5	2	1	2	2	fuelwood	1	1
TTA3	#NULL!	16	1	1	2	2		2	1
TTA4	#NULL!	12	2	1	2	1		2	1
TTA5	#NULL!	40	1	1	2	2		4	1
TTA6	#NULL!	15	2	1	2	2		2	3
TTA7	#NULL!	10	2	1	1	2	fuelwood	2	1
TTA8	#NULL!	21	2	1	2	2		3	3
TTA9	#NULL!	8	2	1	2	2		1	1
TTA10	#NULL!	10	1	2	2	2	fuelwood	1	1
AMA1	#NULL!	#NULL!	2	1	1	1		3	2
AMA2	#NULL!	20	1	1	1	1		1	2
AMA3	#NULL!	12	2	1	1	1		1	2

AMA4	#NULL!	#NULL!	1	1	1	1		2	2
AMA5	#NULL!	18	1	1	1	1		2	2
AMA6	#NULL!	5	1	1	2	1		1	3
AMA7	#NULL!	#NULL!	2	2	2	1		3	1
AMA8	#NULL!	20	2	1	2	2		3	2
AMA9	#NULL!	27	2	1	2	1		3	1
AMA10	#NULL!	5	2	1	1	1		1	2
AWA1	#NULL!	15	2	1	1	1		3	2
AWA2	#NULL!	7	1	1	2	1		2	3
AWA3	#NULL!	6	2	1	1	1		1	2
AWA4	#NULL!	5	1	1	1	1		3	1
AWA5	#NULL!	15	2	1	1	1		1	2
AWA6	#NULL!	25	1	1	1	1	fresh air	3	1
AWA7	#NULL!	2	1	1	1	1		1	1
AWA8	#NULL!	2	1	1	1	1		2	1
AWA9	#NULL!	2	1	1	1	1	fresh air	1	1
AWA10	#NULL!	2	1	1	2	1		3	2
AGB1	#NULL!	2	1	1	1	2		1	2
AGB2	#NULL!	2	2	1	2	2		1	2
AGB3	#NULL!	15	1	1	1	1		2	2
AGB4	#NULL!	6	2	1	2	2		2	2
AGB5	#NULL!	20	2	1	2	2		2	2
AGB6	#NULL!	10	1	1	1	2		2	2
AGB7	#NULL!	7	2	1	1	1		2	2
AGB8	#NULL!	#NULL!	1	1	2	1		2	2
AGB9	#NULL!	4	1	1	1	2		2	2
AGB10	#NULL!	16	1	1	1	1		1	2

Code	**Medicine for livelihood**	**Food for livelihood**	**Meat for livelihood**	**Timber for livelihood**	**Other for livelihood**	**Wawa specie**	**Mahogany specie**	**Odum specie**	**Sapele specie**
SLD1	0	1	0	0	0	2	2	2	2
SLD2	0	1	0	0	0	2	2	2	2
SLD3	0	1	0	0	2	2	2	2	2
SLD4	2	1	0	3	0	2	2	2	2
SLD5	0	1	0	0	2	2	2	2	2
SLD6	2	1	0	0	0	2	1	1	1
SLD7	0	0	0	0	1	2	2	2	1
SLD8	0	0	0	0	1	2	2	1	2

SLD9	0	0	0	0	1	2	2	1	2
SLD10	0	1	0	2	3	2	2	2	2
SSA1	0	1	0	2	0	2	2	2	2
SSA2	1	2	0	0	3	2	2	2	2
SSA3	3	1	0	0	2	2	1	2	2
SSA4	1	2	0	3	0	2	2	2	2
SSA5	0	0	0	1	#NULL!	2	2	2	2
SSA6	0	0	0	0	1	2	2	2	2
SSA7	0	1	0	0	#NULL!	2	2	2	2
SSA8	0	1	0	0	2	2	2	2	2
SSA9	0	1	0	0	2	2	2	2	2
SSA10	0	1	0	0	2	2	2	2	2
SYF1	0	0	0	0	1	2	2	2	2
SYF2	0	1	0	0	2	2	2	2	2
SYF3	0	0	0	0	0	2	2	2	2
SYF4	0	1	0	0	2	2	2	2	2
SYF5	2	1	0	0	3	2	2	2	2
SYF6	0	1	0	0	1	2	2	2	2
SYF7	0	0	0	0	0	2	2	2	2
SYF8	2	1	0	0	0	2	2	2	2
SYF9	2	1	0	3	0	2	2	2	2
SYF10	0	1	0	0	0	2	2	2	2
TAA1	0	1	0	0	2	1	2	1	2
TAA2	3	2	0	1	0	2	2	2	2
TAA3	0	1	0	0	0	2	2	2	2
TAA4	0	0	0	0	1	2	2	2	2
TAA5	0	1	0	0	0	2	2	2	2
TAA6	0	1	0	0	0	2	1	2	1
TAA7	0	1	0	0	0	2	1	2	1
TAA8	0	1	0	2	0	2	1	1	1
TAA9	0	1	0	0	0	1	2	1	1
TAA10	0	1	0	0	0	1	2	2	2
TYT1	0	1	0	0	0	1	2	1	2
TYT2	0	1	0	0	2	2	2	2	2
TYT3	0	1	0	0	0	1	1	1	1
TYT4	2	1	0	0	0	1	1	1	1
TYT5	1	2	0	3	0	1	1	1	1
TYT6	1	0	0	0	0	1	1	1	1
TYT7	0	1	0	0	0	1	1	1	1
TYT8	1	0	2	3	0	1	1	1	1
TYT9	0	1	0	0	0	1	1	1	2

TYT10	0	0	1	0	0	2	2	1	2
TTA1	0	1	0	0	2	1	1	2	2
TTA2	0	1	0	0	2	2	2	1	2
TTA3	2	1	0	0	0	2	1	2	1
TTA4	0	1	0	2	0	2	1	2	1
TTA5	2	1	0	0	0	2	1	1	2
TTA6	0	1	0	0	0	1	1	1	2
TTA7	1	2	3	0	0	2	1	1	1
TTA8	0	1	0	0	0	1	2	1	2
TTA9	0	1	2	0	0	1	1	1	2
TTA10	1	0	0	0	2	1	2	1	2
AMA1	1	0	0	0	0	1	1	1	1
AMA2	0	0	1	0	0	1	1	1	1
AMA3	0	0	1	0	0	1	1	1	2
AMA4	0	0	1	0	0	1	1	1	2
AMA5	0	1	0	0	0	1	1	1	1
AMA6	0	0	0	1	0	1	1	1	1
AMA7	0	0	0	1	0	1	1	1	1
AMA8	1	0	0	0	0	1	2	1	1
AMA9	0	1	0	0	0	1	1	1	2
AMA10	0	0	0	1	0	1	1	1	1
AWA1	0	0	0	1	0	1	1	1	1
AWA2	0	0	0	1	0	1	1	1	1
AWA3	0	0	0	1	0	1	1	1	1
AWA4	0	0	0	1	0	1	1	1	1
AWA5	0	0	0	1	0	1	1	1	2
AWA6	0	0	0	1	0	1	1	1	1
AWA7	0	1	0	0	0	2	1	1	1
AWA8	0	0	0	1	0	1	1	1	1
AWA9	0	1	0	0	0	1	1	1	1
AWA10	0	0	0	1	0	1	1	1	1
AGB1	0	0	0	1	0	1	1	1	1
AGB2	1	0	0	0	0	1	1	1	1
AGB3	0	0	1	0	0	1	1	1	1
AGB4	0	0	0	1	0	1	1	1	2
AGB5	0	1	0	0	0	1	1	2	1
AGB6	0	1	0	0	0	1	1	2	1
AGB7	0	0	0	1	0	1	2	1	1
AGB8	0	0	0	1	0	2	1	1	1
AGB9	0	1	0	0	0	1	1	1	1
AGB10	0	0	0	1	0	1	1	1	1

Code	Framo specie	Other species	Size of forest	Owner of forest	Other owners	Forest Manager	Other managers
SLD1	2	Teak	#NULL!	1		1	
SLD2	2	Teak	#NULL!	1		1	
SLD3	2	Teak	5	3		3	
SLD4	2	Teak	#NULL!	3		3	
SLD5	2	Teak	5	3		3	
SLD6	2		#NULL!	3		3	
SLD7	2	Teak	4	3		5	
SLD8	2	Teak	5	3		3	
SLD9	2	Teak	5	3		3	
SLD10	2	Teak	#NULL!	3		3	
SSA1	1	Teak	#NULL!	3		3	
SSA2	1	Teak	5	3		3	
SSA3	2		5	3		3	
SSA4	2	Teak, Ceiba, Petandre	#NULL!	3		3	
SSA5	2	Teak	5	3		3	
SSA6	2	Teak	5	3		3	
SSA7	2	Teak	5	3		3	
SSA8	2	Teak, Ceiba, Petandre	#NULL!	3		3	
SSA9	2	Teak	5	3		3	
SSA10	2	Teak, Ceiba, Petandre	#NULL!	3		3	
SYF1	2	Teak	5	3		3	
SYF2	2	Teak	5	3		3	
SYF3	2		#NULL!	3		3	
SYF4	2	Teak, Ceiba	#NULL!	3		3	
SYF5	2	Teak, Ceiba, Petandre	#NULL!	3		3	
SYF6	2	Teak, Ceiba, Petandre	#NULL!	3		3	
SYF7	2	Teak	#NULL!	3		3	

SYF8	2	Teak, Ceiba, Petandre	5	3		3	
SYF9	2	Teak, Ceiba	#NULL!	3		3	
SYF10	2	Teak	5	3		3	
TAA1	1		5	3		3	
TAA2	2	Teak	#NULL!	3		3	
TAA3	1	Emire	5	4		4	
TAA4	2	Teak	5	3		3	
TAA5	2	Ceiba	5	3		3	
TAA6	1		#NULL!	3		3	
TAA7	1		#NULL!	3		3	
TAA8	1		#NULL!	3		3	
TAA9	1		#NULL!	3		3	
TAA10	1		5	3		3	
TYT1	1	Emire, Abako	6	3		3	
TYT2	2	Emire	6	2		2	
TYT3	1		6	5		5	
TYT4	1		6	5		3	
TYT5	1		6	3		3	
TYT6	1		#NULL!	3		3	
TYT7	1		6	3		3	
TYT8	1		6	3		3	
TYT9	1		#NULL!	3		#NULL!	
TYT10	1	Ceiba, Petnadra	5	3		3	
TTA1	2	Emire	5	3		3	
TTA2	1		5	3		3	
TTA3	2	Teak	#NULL!	3		3	
TTA4	1		#NULL!	3		3	
TTA5	1		#NULL!	3		3	
TTA6	1		#NULL!	3		3	
TTA7	1		6	3		3	
TTA8	1		#NULL!	3		3	
TTA9	1		#NULL!	3		3	
TTA10	1		5	3		3	
AMA1	1		7	3		3	
AMA2	1		7	3		3	
AMA3	1		4	3		3	
AMA4	2		3	3		3	

AMA5	1		5	3		3	
AMA6	2		7	2		2	
AMA7	1		3	3		3	
AMA8	1		4	2		2	
AMA9	1		5	3		3	
AMA10	2		6	4		3	
AWA1	2		5	2		2	
AWA2	1		5	4		4	
AWA3	1		5	3		3	
AWA4	2		3	1		1	
AWA5	1		5	3		3	
AWA6	1		4	2		2	
AWA7	2		5	3		3	
AWA8	1		6	3		3	
AWA9	1		6	3		3	
AWA10	1		4	3		3	
AGB1	2		4	3		3	
AGB2	1		4	3		3	
AGB3	2		5	3		3	
AGB4	1		3	3		3	
AGB5	1		6	3		3	
AGB6	1		4	3		3	
AGB7	1		4	3		3	
AGB8	2		5	3		3	
AGB9	2		4	3		3	
AGB10	2		5	4		4	

Code	**Nat Forest Pol**	**Chainsaw Law**	**Bushfire law**	**If Yes to NFP**	**Reason for 22**	**Using NFP in Ghana**	**Reason for 24**
SLD1	2	2	2	#NULL!		1	Developmental projects
SLD2	2	2	1	1	Secure lands for owners	1	Secure lands of individuals
SLD3	1	1	1	1	Forest protection	1	Forest protection

SLD4	1	1	1	1	Protect farms against fire	1	Protect farms around forest
SLD5	1	1	1	1	Forest protection	1	Maintain law and order
SLD6	1	1	1	1	Forest protection	1	Serve as warming
SLD7	1	1	1	1	Forest protection	1	Forest protection
SLD8	1	1	1	1	Prevention of accidents and casualties in the forest	1	Forest protection
SLD9	1	1	1	1	Prevention of accidents and casualties in the forest	1	Forest protection
SLD10	1	1	1	1	Forest protection	1	Forest protection
SSA1	1	1	1	1	Forest protection	1	reduce deforestation
SSA2	1	1	1	1	Forest protection	1	Maintain law and order
SSA3	1	1	1	1	Forest protection	1	Forest protection
SSA4	1	1	1	1	Prevention of bushfire	1	Protection of surrounding farms
SSA5	1	1	1	1	Forest protection	1	Prevention of forest fire
SSA6	1	1	1	1	To attract incentives from government	1	Protection of surrounding farms
SSA7	1	1	1	1	To maintain law and order	1	Forest protection

SSA8	1	1	1	1	Prevention of bushfire	1	Forest protection
SSA9	1	1	1	1	Forest protection	1	Prevent illegal logging
SSA10	1	1	1	1	Prevention of bushfire	1	Forest protection
SYF1	1	1	1	1	Prevention of bushfire	1	Forest protection
SYF2	1	1	1	1	Forest protection	1	Forest protection
SYF3	1	1	1	1	Forest protection	1	Forest protection
SYF4	1	1	1	1	Forest protection	1	Forest protection
SYF5	1	1	1	1	Forest protection	1	Forest protection
SYF6	1	1	1	1	Forest protection	1	Forest protection
SYF7	1	1	1	1	Forest protection	1	Forest protection
SYF8	1	1	1	1	Forest protection	1	Maintain law and order
SYF9	1	1	1	1	protect farms	1	development in community
SYF10	1	1	1	1	Prevention of bushfire	1	Forest protection

TAA1	1	1	1	1	Forest protection	1	Forest protection
TAA2	1	1	1	1	Protect farms	1	Prevent bushfire on farms
TAA3	1	1	1	1	Forest protection	1	Protect farms close to forest
TAA4	1	1	1	1	Prevention of bushfire	1	Forest protection
TAA5	1	1	1	1	Improve livelihood	1	Protect resources of community
TAA6	1	1	1	1	Forest protection	1	Forest protection
TAA7	1	1	1	1	Forest protection	1	For climate protection
TAA8	1	1	1	1	Disaster prevention	1	Prevention of bushfire
TAA9	1	1	1	1	Forest protection	1	Forest protection
TAA10	1	1	1	1	improve climate	1	Forest protection
TYT1	1	1	1	1	Prevention of bushfire	1	Forest protection
TYT2	1	1	1	1	Prevention of bushfire	1	Forest protection

TYT3	1	1	1	1	protect community resources	1	Forest protection
TYT4	1	1	1	1	protect community resources	2	Forest protection
TYT5	1	1	1	1	climate benefit	1	Improved livelihood
TYT6	1	1	1	1	Forest protection	1	
TYT7	1	1	1	1	Forest protection	1	Forest protection
TYT8	1	1	1	1	Forest protection	1	Forest protection
TYT9	1	1	1	1	To scare others	1	Forest protection
TYT10	1	1	1	1	Forest protection	1	Improved livelihood
TTA1	1	1	1	1	Forest protection	1	Forest protection
TTA2	1	1	1	1	Prevention of bushfire	1	protect farms
TTA3	1	1	1	1	Forest protection	1	Forest protection
TTA4	1	1	1	1	Forest protection	1	Forest protection

TTA5	1	1	1	1	protect farms	1	Forest protection
TTA6	1	1	1	1	Prevention of bushfire	1	Forest protection
TTA7	1	1	1	1	Prevention of bushfire	1	Forest protection
TTA8	1	1	1	1	Prevention of bushfire	1	Forest protection
TTA9	1	1	1	1	Prevention of bushfire	1	Forest protection
TTA10	1	1	1	1	Forest protection	1	Forest protection
AMA1	2	2	3	3		2	
AMA2	2	2	2	3		2	
AMA3	2	2	2	2		2	
AMA4	2	2	3	3		2	
AMA5	2	2	2	2		2	
AMA6	3	3	3	3		3	
AMA7	1	1	1	1	Forest protection	1	Afforestation
AMA8	3	3	3	3		3	
AMA9	1	1	1	1	Forest protection	1	Forest protection
AMA10	2	2	2	2		2	
AWA1	3	3	3	3		3	
AWA2	3	3	3	3		3	
AWA3	2	2	2	2		2	
AWA4	1	1	1	1	Forest protection	1	Forest protection
AWA5	2	3	3	2		3	
AWA6	2	2	3	3		2	

AWA7	2	3	2	1	Resources from forest	1	Forest protection
AWA8	1	1	1	1	Forest protection	1	Forest protection
AWA9	1	1	1	1	Forest protection	1	Forest protection
AWA10	1	1	1	1	Forest protection	1	Forest protection
AGB1	1	1	1	1	Forest protection	1	Forest protection
AGB2	1	1	1	2		2	
AGB3	1	1	1	1	Forest protection	1	Forest protection
AGB4	2	2	2	2		3	
AGB5	3	3	3	2		2	
AGB6	1	1	1	1	Forest protection	1	Forest protection
AGB7	1	1	1	1	Forest protection	1	Forest protection
AGB8	2	2	3	2		3	
AGB9	2	2	2	2		3	
AGB10	1	1	1	1	Awareness on forest destruction	1	Forest protection

Code	**Policy improvement**	**State improvement**	**Income increase**	**Mgt improve by policy**	**Consistency of policy**	**Community involvement**	**Change of policy**	**NFP implementation**
SLD1	1	electricity	1	1	1	2	1	2
SLD2	1	electricity	1	1	1	2	2	2
SLD3	1	electricity, school	1	1	1	2	1	2

SLD4	1	electricity	1	1	1	1	1	2
SLD5	1	prevent illegal logging	2	1	1	3	1	1
SLD6	1	food	1	1	1	2	1	3
SLD7	1	employment	1	1	1	1	1	3
SLD8	1	protecting waterbodies	2	1	1	1	2	2
SLD9	1	protecting waterbodies	2	1	1	1	2	2
SLD10	1	policy against bushfire	2	1	1	2	2	2
SSA1	1	protecting waterbodies	2	1	1	2	1	3
SSA2	1	community forest protection	2	1	1	3	1	2
SSA3	1	Protection of community properties	2	1	1	2	1	3
SSA4	1	none	2	1	1	2	1	2
SSA5	1	Protection of community properties	2	1	1	1	2	3
SSA6	1	Protection of community properties	2	1	1	1	1	2
SSA7	1	incentive to community	2	1	1	1	2	2
SSA8	1	Protection of community properties	2	1	1	2	2	3
SSA9	1	Forest protection	3	1	1	3	3	3
SSA10	1	none	1	1	1	2	2	2
SYF1	1	prevention of bushfire	1	1	1	1	2	2
SYF2	1	Forest protection	3	1	1	3	3	3
SYF3	1	improved food production	3	1	1	3	3	2

SYF4	1	electricity	1	1	1	2	1	2
SYF5	1	Fuelwood	1	1	1	1	1	2
SYF6	1	food	1	1	1	1	1	3
SYF7	1	Forest protection	3	1	1	1	2	2
SYF8	1	food	1	1	1	1	1	2
SYF9	1	fuelwood	1	1	1	1	1	2
SYF10	1	Forest protection	2	1	1	3	1	6
TAA1	1	protect resources in community	2	1	1	1	1	3
TAA2	1	electricity	1	1	1	2	1	2
TAA3	1	protect heritage of community	2	1	1	1	1	6
TAA4	1	Prevention of bushfire by forest greenbelt	3	1	1	3	3	3
TAA5	1	Forest protection	2	1	1	2	1	2
TAA6	1	food	2	1	1	2	2	2
TAA7	1	food	2	1	1	2	1	2
TAA8	1	food	1	1	1	2	1	3
TAA9	1	Forest protection	1	1	1	2	1	2
TAA10	1	protect community resources	2	1	1	2	1	3
TYT1	1	protect community resources	2	1	1	1	1	2
TYT2	1	protect community resources	2	1	1	1	1	6
TYT3	1	protect community resources	2	1	1	1	1	2
TYT4	2	protect community resources	2	1	1	2	1	2

TYT5	1	Government will benefit	1	1	1	2	2	3
TYT6	1	Prevention of bushfire	1	1	1	2	2	3
TYT7	1	Forest protection	2	1	1	2	1	2
TYT8	1	protect community resources	2	1	1	1	1	2
TYT9	1	Forest protection	1	1	1	2	1	2
TYT10	3	Rainfall	2	1	1	2	1	3
TTA1	1	protect community resources	2	2	1	1	1	2
TTA2	1	improved rainfall pattern	2	1	1	1	1	6
TTA3	1	food	2	1	1	2	2	3
TTA4	1	food	2	1	1	2	1	2
TTA5	1	food	1	1	1	2	1	3
TTA6	3		1	1	1	1	1	2
TTA7	1	protect farms close to forest	1	1	1	1	1	2
TTA8	3	afforestation	1	1	1	1	1	2
TTA9	1	Forest protection	1	1	1	2	1	3
TTA10	1	improved rainfall pattern	2	1	1	1	1	3
AMA1	2		2	2	2	3	2	2
AMA2	3		2	3	2	2	2	1
AMA3	2		2	2	2	2	2	2
AMA4	2		3	2	2	3	3	2
AMA5	2		2	2	2	2	2	2
AMA6	2		2	2	2	2	2	1
AMA7	2		2	2	2	2	2	1
AMA8	2		2	2	2	2	2	#NULL!
AMA9	3		3	3	3	3	3	#NULL!
AMA10	2		2	#NULL!	2	2	2	2
AWA1	3		3	3	3	3	3	#NULL!

AWA2	3		3	3	3	3	3	#NULL!
AWA3	2		2	2	2	2	2	#NULL!
AWA4	3		3	3	3	2	2	1
AWA5	3		3	3	3	3	3	#NULL!
AWA6	2		2	3	2	1	3	1
AWA7	2		1	3	2	3	2	2
AWA8	1	Afforestation	2	1	1	2	2	1
AWA9	1	Roads	1	1	1	3	1	2
AWA10	3		3	3	3	3	3	#NULL!
AGB1	3		2	3	2	2	2	1
AGB2	3		3	3	2	2	2	2
AGB3	2		2	2	3	3	2	1
AGB4	3		3	3	3	3	3	2
AGB5	2		3	1	1	2	3	2
AGB6	2		3	3	3	2	2	1
AGB7	2		2	3	3	3	3	2
AGB8	2		2	2	2	2	1	1
AGB9	3		2	3	2	2	3	1
AGB10	2		2	2	3	3	2	1

Code	**Other implementation medium**	**Incentives on NFP**	**Government incentives for NFP**	**Children education**	**Offenders punished**	**Reason for 37**
SLD1		2	1	1	1	To scare others
SLD2		2	1	1	1	To scare others
SLD3		2	1	1	1	To scare others
SLD4		2	1	1	1	To scare others
SLD5		3	3	1	1	To scare others
SLD6		2	1	1	1	To scare others

SLD7		3	1	1	1	To prevent forest fires from nearby farms
SLD8		1	1	1	1	To scare others
SLD9		1	1	1	1	To protect forest
SLD10		1	1	1	1	They destroy both forest and farms
SSA1		3	1	1	1	To stop illegal logging
SSA2		2	1	1	1	To scare others
SSA3		3	1	1	1	To scare others
SSA4		1	1	1	1	To scare others
SSA5		1	1	1	1	To scare others
SSA6		1	1	1	1	Fair distribution of incentives
SSA7		1	1	1	1	Forest protection
SSA8		1	1	1	1	To scare others
SSA9		3	1	1	1	Sustainable forest management
SSA10		1	1	1	1	To scare others

SYF1		3	3	1	1	To promote fair resources distribution
SYF2		3	3	1	1	To scare others
SYF3		1	1	1	1	Forest protection
SYF4		1	1	1	1	Forest protection
SYF5		1	1	1	1	Forest protection
SYF6		1	1	1	1	To scare others
SYF7		3	3	1	1	Forest protection
SYF8		1	1	1	1	Forest protection
SYF9		1	1	1	1	Forest protection
SYF10	Information center	1	1	1	1	To scare others
TAA1		1	1	1	1	To scare others
TAA2		2	1	1	1	Protect farm produce
TAA3	Information van	1	1	1	1	Forest protection
TAA4		2	2	1	1	Forest protection
TAA5		2	1	1	1	To scare others
TAA6		1	1	1	1	To scare others
TAA7		1	1	1	1	To scare others
TAA8		1	1	1	1	Forest protection

TAA9		2	1	1	1	To scare others
TAA10		2	1	1	1	Forest protection
TYT1		1	1	1	1	To scare others
TYT2	Infomation van	1	1	1	1	To scare others
TYT3		1	1	1	1	To scare others
TYT4		2	1	1	3	To adapt to climate change
TYT5		2	1	1	1	To prevent illegal logging
TYT6		3	2	1	1	To prevent illegal logging
TYT7		2	1	1	1	To scare others
TYT8		2	1	1	1	To scare others
TYT9		2	1	1	3	To scare others
TYT10		2	1	1	1	To scare others
TTA1		2	1	1	1	To scare others
TTA2	Infomation van	1	1	1	1	Forest protection
TTA3		1	1	1	1	To scare others
TTA4		1	1	1	1	To scare others
TTA5		2	1	1	1	To scare others
TTA6		2	1	1	1	To scare others

TTA7		2	1	1	1	To scare others
TTA8		2	1	1	3	To scare others
TTA9		2	1	1	1	To scare others
TTA10		3	3	1	1	Forest protection
AMA1		3	2	1	1	Forest protection
AMA2		3	3	3	2	
AMA3		3	3	2	3	
AMA4		2	3	2	3	
AMA5		2	2	2	2	
AMA6		3	3	2	2	
AMA7		2	2	2	3	
AMA8		2	3	3	3	
AMA9		3	3	3	3	
AMA10		2	2	2	2	
AWA1		3	3	3	3	
AWA2		3	3	3	3	
AWA3		2	2	2	2	
AWA4		3	3	1	3	
AWA5		3	3	3	3	
AWA6		3	2	2	3	
AWA7		3	3	1	1	
AWA8		2	1	1	1	Forest protection
AWA9		3	3	1	1	To scare others
AWA10		3	3	3	3	
AGB1		3	2	2	3	
AGB2		2	3	2	3	
AGB3		2	3	2	3	
AGB4		3	3	3	3	
AGB5		2	1	1	1	Forest protection
AGB6		2	2	3	3	
AGB7		2	2	3	1	Forest protection
AGB8		2	1	1	1	Forest protection

AGB9		2	2	2	3	
AGB10		2	3	2	2	