KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
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NATURAL CAPITAL POLICY AND ECONOMIC DEVELOPMENT IN GHANA: DEVELOPMENT EFFECT OF THE 1994 FORESTRY POLICY IN THE ASHANTI REGION

BY

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CANDIDATE'S DECLARATION

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

Candidate's Name:……

Signature…….. Date……

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the Kwame Nkrumah University of Science and Technology, and the candidate has our permission to submit it for assessment.

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ABSTRACT

This thesis examines the effort to attain economic development in Ghana through natural capital. It evaluates natural capital policy in the context of global policies in developing countries. Suggestions from literature indicate that good natural capital policy is capable of improving the well-being of the poor and should be an area of high priority for natural resource-rich developing countries. The history of natural capital policy spanning over one hundred years in Ghana, made it a country of choice for empirical evidence and consequently the most prominent natural capital policy in the country -forestry policy.

The study, mainly quantitative, used both primary and secondary data. Primary data were obtained through the administration of questionnaire to household heads, selected through a two-stage probability sampling procedure, in forest communities in the Ashanti Region. Secondary data were obtained mainly from the Forestry Commission of Ghana's annual reports. The conceptual framework was based on economic criteria for evaluating inclusive wealth creation through forestry policy implemented in Ghana. Three analytical techniques were employed, namely: efficiency analysis based on the Policy Analysis Matrix, cost-effectiveness analysis and equity analysis based on Lorenz curve, and Gini-index assessments.

The thesis found that for all its life, forestry policy in Ghana had been driven by the normative forest science paradigm. Forestry policy in the Ashanti Region has met neither the necessary (efficiency) nor sufficient (equity) conditions for economic development. Therefore forestry policy has not been a driver of economic development in the Ashanti Region of Ghana, thereby serving as a drag on national economic development. The almost absolute silvicultural approach to forestry policy must give way to a more holistic approach at all stages of the forestry policy process to provide the needed driving force for economic development in Ghana.

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DEDICATION

To four special ladies:

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LIST OF ABBREVIATIONS

AAC – Annual Allowable Cut

CEA – Country Environmental Analysis

CER – Cost-Effectiveness Ratio

CFC – Community Forestry Committee

CSR – Corporate Social Responsibility

DA – District Assembly

DFID – Department for International Development, UK

DSF – Dry Semi – deciduous Forest

EPA – Environmental Protection Agency

EPC – Effective Protection Coefficient

ERP – Economic Recovery Programme

EU – European Union

EWF – Economic Welfare Function

FAO – Food and Agriculture Organization

FC – Forestry Commission

FD – Forestry Division

FDMP – Forestry Development Master Plan

FRMP – Forest Resource Management Programme

FLEGT – Forest Law Enforcement, Governance and Trade

FORIG – Forestry Research Institute of Ghana

FR – Forest Reserve

FSB – Forest Service Division

GDP – Gross Domestic Product

GNP – Gross National Product

GPRS – Growth and Poverty Reduction Strategy

GSS – Ghana Statistical Service

HFZ – High Forest Zone

IEA – Institute of Economic Affairs

IGF – Internally Generated Fund

IMF – International Monetary Fund

ISSER – Institute of Statistical, Social and Economic Research

ITTO – International Tropical Timber Organization

KMA – Kumasi Metropolitan Assembly

KNUST – Kwame Nkrumah University of Science and Technology

LI – Legislative Instrument

LMCC – Log Monitoring Conveyance Certificate

LRF – Lewis-Ranis-Fei

MEF – Most Evergreen Forest

MLNR – Ministry of Lands and Natural Resources

MVA – Manufacturing Value Added

NDPC – National Development Planning Commission

NFP – National Forestry Programme

NPC – Nominal Protection Coefficient

NRCD – National Redemption Council Decree

NTFP – Non-timber Forest Products

NTFR – Non-timber Forestry Resources

OASL – Office of Administrator of Stool Lands

OFR – Off – Forest Reserve

PAM – Policy Analysis Matrix

PNDCL – Provisional National Defence Council Law

RMSC – Resource Management Support Centre

SRA – Social Responsibility Agreement

SRP – Subsidy Ratio to Producers

TC – Traditional Council

TIDD – Timber Industry Development Division

TRMA – Timber Resources Management Act

TUC – Timber Utilization Contract

UN – United Nations Organization

US – United States of America

WD – Wildlife Division

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Growing global uncertainty looms around the ability of natural capital policies to drive economic development. While efforts are being strengthened in formulating and implementing natural capital policies, tropical deforestation, environmental degradation and deprivation among forest communities appear to be worsening in developing countries (World Bank, 2006; Larson *et al*., 2006; Keenan, 2015). The achievements of natural capital policies in these countries have been rather disappointing, as several studies including those of the World Bank and the Food and Agricultural Organization (FAO) of the United Nations Organization have observed (FAO, 2010; Larson and Ribot, 2007; Cholchester *et al*., 2006; Mayers and Bass, 1999). The current global search for solutions to tropical deforestation and environmental degradation, supported by colossal monetary budgets, is a demonstration of the need for appropriate policies towards a sustainable allocation of natural capital resources for economic development.

Westoby (1962) saw the forestry sector as a dynamo for the economic development of developing economies through industrialization. This however did not materialize for countries after almost two decades of forest industrialization. Dargavel *et al*. (1985), argued that poor applications only exacerbated the ineffectiveness of policies that were theoretically inadequate. By recognizing only the positive social and economic effects of industrialization, the diffusionist theory, on which industrial forestry rested, had proved to be theoretically inadequate to explain many negative realities (Chenery et al., 1974).

The failure of the forest industries development model to promote socio-economic development, together with the increasing rate of deforestation in most developing countries, contributed to the emergence of new approaches in forestry.

Forestry policy in the recent past has mainly sought to promote Sustainable Forestry Management (SFM) through standards which have sought to foster environmentally appropriate, socially beneficial and economically viable management of the world's forests. Some of the most prominent of these policies are the Forest Stewardship Council (FSC) and Programme for the Endorsement of Forest Certification (PEFC) standards, Debt-Nature Swaps, World Heritage Convention and Reduction of Emission from Deforestation and Forest Degradation (REDD+) policies.

While the forest certification policies have been trying to use standards of practice to achieve Sustainable Forest Management, the Debt-Nature Swaps seek to reduce the pressure on forests caused by the international debt owed by forested developing countries. This involves the purchase of a developing country's debt, offering cancellation of the debt in exchange for some forest conservation activities in the debtor country. The World Heritage Convention seeks to identify and preserve the cultural and natural heritage of outstanding sites globally. Ratifying nations may receive both financial and technical assistance to conserve forests through the World Heritage Fund. The United Nation's REDD+ policy was designed to create financial value for forest carbon alongside welfare improvement, offering incentives for developing countries to conserve forests for some financial rewards (Tietenberg and Lewis, 2012; FC, 2011).

Most local forestry policies globally have been tailored in the footsteps of some combinations of international forest policies, hoping that apart from conservation of forests some economic benefits would be realized to improve the living conditions of their citizens.

However, the results from these efforts do not seem to be as expected. The United Nations's Global Forest Resources Assessment (FAO, 2015) revealed that damage to global forests over the past 25 years has been considerable. Total forest area declined by three per cent between 1990 and 2015 from 4,128 million hectares to 3,999 million hectares – a loss of 129 million hectares. Significantly, loss of natural forested area was double the global total at six per cent, while tropical forests took the hardest hit with a loss rate of ten per cent. This is against the background where the world needs to be increasing forest area across all domains to provide for the forest benefits and services of a growing population through continued policy focus (Keenan, 2015). Agricultural land development, by large and small scale producers, is believed to be the main driver behind the decreases, with Brazil, Indonesia and Nigeria recording the biggest losses over the past five years. Forest is being more rapidly lost in some of the poorest countries, including India, Vietnam and Ghana despite several policy interventions (FAO, 2015). Brandt *et al.* (2015) also revealed that policies aimed at protecting tropical forests in the Congo Basin and globally contradict the collaborative goal to adopt Sustainable Forest Management since the 1992 Rio Summit.

The past two decades have seen the formulation of forestry policies more than ever before, locally and internationally, to guide decisions for sustained economic growth and development (Mayers and Bass, 1999). Forestry policy in Ghana has provided for forest

conservation, protection of water bodies, the provision of favourable conditions for cultivation of agricultural crops, and the promotion of public education and research since 1948 (Ghana Forestry Commission, 1994). In spite of these policies and interventions, the destruction of the country's natural forests continues at an alarming rate of about 2% per annum (Boon *et al*., 2009; Ghana Forestry Commission, 2012).

Baah-Nuakoh (2003) warned about the possibility of Ghana losing all its forest cover within 30 years if the rate of deforestation which was 65,000 hectares per annum in 2003 and is now about 135,395 hectares per annum (FAO, 2010), was not checked. Forestry policy could have a major role to play in reversing the current trend. The fundamental issue however is, if formal forestry policy has existed in Ghana since 1908 and yet the current trend has been the order of events, then, there is a need for research to ascertain the role forestry policy has played and continues to play towards successful forestry and hence human welfare improvement in Ghana. Would the situation have been worse if there were no formal forestry policy? In as much as forest resources serve as inputs for the production of goods and services and provide services which people are willing to pay for, forests are economic resources and their management can lead to economic growth and development. If forestry policies are the managing principles of forests, then these policies have the potential of generating economic growth and development. Therefore, good forestry policy can contribute positively to economic growth and development in Ghana if correctly implemented.

1.2 Statement of the Problem

Natural capital has been widely recognized as a crucial component of the total wealth of nations (Gundimeda & Atkinson, 2014). This has led to a substantial amount of work to account for natural capital of nations. However, a substantial amount of the studies have focused on non-renewable wealth while far less remains to be known about renewable wealth such as forest capital. Even what is known about forest capital, is largely restricted to timber values to the neglect of the several other roles forests play in economic development. One important step toward economic development through natural capital which remains largely underutilised is the role of natural capital policy in economic development (Collier & Laroche, 2015). Evidence on this role necessarily involves evaluation of natural capital policy as a tool for economic development, the subject of this thesis.

Forests have contributed significantly to human welfare improvement for many centuries, and in several ways. The Food and Agricultural Organization (FAO) of the United Nations Organization has observed that forests contribute to human welfare more than society usually realizes (FAO, 2010). In many forest-rich countries of the world, forestry has been a source of income, employment and varied goods and services, leading to some welfare improvements (Taylor *et al.*, 2006). For some developed economies like Canada and the United States of America, forests played a key role in the transition from primitive economies to modernized ones (Drapper, 2002; Duerr, 1993). This suggests that forest-rich economies can enjoy economic growth and development depending on how efficiently they manage their forest resources. However, some forested tropical countries

seem not to have been able to benefit from the opportunity of economic development through their forests. In spite of the opportunity for welfare improvement, Alemagi *et al* (2007) observed that economic growth in developing countries where forests occupied at least one-third of the land area lagged significantly behind those of developing countries whose forest cover were less. They further indicated that between 1974 and 2005, forest-rich African countries had mean annual gross domestic product (GDP) growing by 2.1% while those in forest-poor African countries grew by 3.5%.Thus, the inability of tropical forests to yield adequate resources for the sustenance of forest rich tropical countries, coupled with their uncontrolled destruction continues to generate concern locally and globally.

While it is well known in development economics that forest-rich countries could rely mainly on primary exports and thus get trapped in a "resource curse", Blomström and Kokko (2007) reveal that resource-rich countries like Sweden, Australia, Botswana and China used natural resource wealth to generate manufacturing capacity, educate and equip their populations with modern skills and also through export diversification, escaped the resource – dependence trap or "curse", to attain significant economic growth and development. Thus the abundance of forest cover may or may not result in economic development, depending on how these resources are managed. Suggestions from various quarters have implied that the difference in outcomes for different countries have depended on several factors, the main one being forestry policy. Barbier (1998) argued that a major factor affecting the development prospects of poor economies is their failure to place higher priority on natural resource policies. Good forestry policy is capable of

increasing government revenue (Repetto and Gillis, 1988) as well as the welfare of the poor (Ribot, 2008), while bad policies can be a drag on economies and diminish economic development.

Over the past 100 years, Ghana has emerged as one of the tropical countries with the highest rate of deforestation. The extent of this damage has been estimated to be worth about 10% of Gross Domestic Product (GDP) per annum (Ghana Forestry Commission, 2012). In addition, the loss of biodiversity and other ecological and aesthetic benefits, most of which are difficult to quantify, reflect the irreversible loss of natural capital. While the GDP loss may be a local issue, the loss of natural capital has global and generational implications. Preventing these losses could curtail the depletion of the stock of natural capital for human welfare improvement and result in economic development. Apart from loss prevention, maintaining and increasing the stock of forests would add to the stock of resources available, thereby enhancing the capacity for economic development. Expectations have always been that forestry policies being the governing principles, plans and courses of action that guide the management of forests, would help prevent these losses, enhance forest availability and result in economic growth and development (Cubbage *et al.*, 1992).

Thus, even though economic resources have been consistently devoted to forestry policy formulation and implementation in Ghana since the early 20th century, the economy has consistently lost between 4%-10% of GDP per annum through deforestation and degradation of forests, particularly in recent times (World Bank, 2006; Ghana Forestry

Commission, 2012). This trend of events appears to be a setback to economic development.

The state of affairs thus demands answers to questions regarding the current situation of forestry policy in Ghana, how efficiently forestry policy has been implemented as well as how forestry policy has promoted equity in Ghana to drive economic development. This thesis therefore attempted to fill the expressed knowledge gap, while recognizing existing thematic, geographic and empirical knowledge discussed later in this chapter.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of this thesis is to evaluate natural capital policy as a driver of economic development in Ghana. Based on this, it aims at ascertaining the consequence of implemented forestry policy on economic development in Ghana with evidence from the Ashanti Region.

1.3.2 Specific Objectives

Specifically, the thesis sought to:

1. Ascertain the state of forestry policy in Ghana after more than one century of forest policy implementation.
2. Assess the efficiency of forestry policy implementation in the Ashanti Region of Ghana.
3. Evaluate the net economic benefit of forestry policy in the Ashanti Region of Ghana.

4. Determine the equity effect of forestry policy in the Ashanti Region of Ghana.
5. Propose modalities for achieving sustainable economic development through forestry policy in Ghana.

1.4 Hypotheses

To authenticate the findings of the study the following hypotheses were tested:

1. H_0: Forestry policy implementation in the Ashanti Region of Ghana has not been efficient.

   H_1: Forestry policy implementation in the Ashanti Region of Ghana has been efficient.
2. H_0: Forestry policy has not generated net economic benefit in the Ashanti Region of Ghana.

   H_1: Forestry policy has generated net economic benefit in the Ashanti Region of Ghana.
3. H_0: The distribution of forestry policy benefits in the Ashanti Region of Ghana has not been equitable.

   H_1: The distribution of forestry policy benefits in the Ashanti Region of Ghana has been equitable.

1.5 Justification for the study

The terrain of natural capital policy has changed significantly with the entry of social scientists, after several years of dominance by natural scientists. The need for social

science concepts and analysis to make natural capital policy relevant to society makes this study an appropriate endeavour.

Very few studies on forestry policy exist in Africa (Woodcook, 2002). In Ghana, among the few existing studies, reports produced by officials of the Forestry Commission or their related agencies dominate. Almost all of these papers are based on the old paradigm of forestry, which regards forestry policy as the best professional advice to government forestry officials as against the currently more relevant analytical science approach. Most of these researchers have also served in positions on behalf of government, making their perceptions to a large extent aligned with official perceptions to the detriment of the rest of society. Thus, almost all existing research has been skewed towards top-down approaches rather than the balance needed, with virtually no study on forestry policy and economic development. This shows one important aspect of the knowledge gap. Also, the fact that almost all of these researchers are foresters is another dimension of the knowledge gap, since their training limits their perceptions, no matter how divergent they may wish to be. Rives *et al.*, (2012) argue that this knowledge gap comes from forest developers mainly being trained in forestry or agriculture, since they fail to understand the complexity of local social-ecological functions linked to rural forests.

Further, most foresters are still convinced that they have to teach local people how to manage a forest and are reluctant to share knowledge and control over forest resources with local communities (Macura *et al.*, 2012). Sayer and Palmer (1994) also found that African national forestry research had remained overwhelmingly silvicultural, despite the fact that the need for associated socio-economic research was appreciated in the 1930s.

The desire for a multidimensional approach to natural resource allocation for sustainable economic development makes it mandatory to obtain diverse experiences in holistic forestry policy analysis, which is currently lacking in developing countries, especially Ghana.

In addition, the extent of forestry policy's contribution to economic growth and development in Ghana needs to be ascertained, being an important sector of government spending. The seeming abundance of forest resources appears to have given a false sense of resilience to forest abuse, wastage and misuse which could affect economic growth and development. However, the literature on forestry in Ghana is completely silent on details of the nexus between forestry policy and economic development.

This thesis therefore derives its justification from three main sources, namely; the state of thematic and empirical knowledge, a social challenge and perceived policy inappropriateness. These issues are discussed in the following sub-sections.

1.5.1 State of thematic and empirical knowledge

Thematic knowledge on forestry policy in Ghana exists in the form of legislation, laws and policy documents and frameworks as well as strategic plans. The 1908 and 1948 forestry policies as well as the 1994 forestry and wildlife policy documents are key examples. The most recent document which was aimed at strengthening and reinforcing the implementation of the 1994 policy from1996 to 2020 was the 1996 Forestry Development Master Plan (FDMP). There exists also the most current policy which was approved in 2012 to replace the 1994 forestry and wildlife policy, waiting to be fully

operational. Apart from these major policy documents there are several legislations and initiatives that have been documented with the aim of guiding and directing forest resource use in Ghana. In addition to the several amendments of earlier legislation, some dating back to the early 20th century, these documents portray the forestry scene in Ghana as one rich in policy documents and activities.

Sayer and Palmer (1994) observed that Africa's forestry research was inadequate to meet its forestry challenges, while at the same time the research effort was proportionately small. Furthermore, Tropenbos International- Ghana (2004) observed that the works of key researchers like Lutterel (1997), Amegatse (2001), Kotey *et al.* (1998) and Birikorang (2001) have not been able to provide sufficient literature and insight for addressing issues of forestry policy formulation and implementation in Ghana.

Also, it has been asserted that the scattered and sometimes uncoordinated amendments to numerous Forest and Wildlife Laws in Ghana have led to inconsistencies in between the various acts and regulations. Although consolidated versions of some of the laws exist and although these consolidations are useful tools, there are a number of mistakes and omissions that have occurred along the way. Because of these problems, it has become almost impossible to understand duties and rights related to forests and wildlife included in Forest and Wildlife legislation (Clientearth, 2013)

Focusing on economic development as a desired outcome of natural capital policy, this study analyzes, synthesizes and broadens the existing scope of knowledge on forestry policy. It exposes policy makers and implementers to the effect of their actions and

inactions in terms of efficiency, cost-effectiveness and equity, thus providing them with evidence to help them take exact remedial action on any issue that needs correction to contribute to economic development in Ghana. The forest industry in Ghana in particular would find the Policy Analysis Matrix application and results useful in the sense that it would provide insight on the dynamics of profitability of their businesses anytime forestry policy is implemented. Households in forested communities through the equity analysis would also know exactly how their welfare has been influenced through forestry policy in Ghana, thus equipping them to respond appropriately to safeguard their welfare when necessary. Finally, the government of Ghana would have an idea of the consequence of forestry policy on the effort to improve the welfare of Ghanaians through the several investments it has made in forestry policy over the years. This will thus be a guide to the type of investment it should continue to make if it desires economic development for the citizenry.

1.5.2 Social challenge

Community interference has been perceived as one of the major hindrances to forestry policy in Ghana. The Ghana Environmental Protection Agency (EPA) (1991) asserted that the immediate self-interest of individuals, communities, agencies and firms defeat the purpose of forestry policy. They revealed that when it was in the short term interest of users to destroy the forest endowment, it was very difficult for policy to prevail.

The Ghana EPA thus believed in the use of persuasion and incentives as well as careful education rather than legislation to ensure sustainable use of forests when community

self- interests conflict with state policy. This means of addressing the issue however may succeed only after a substantial amount of forests had been destroyed. It may never even work at all (Field and Field, 2009). Since the average rural forest dweller in Ghana is poor and sees his use of the forest as a means of immediate source of survival, it stands to reason that in most cases authorities may be trying to persuade and educate groups of people who misuse the forest out of necessity, since they have no other immediate means of livelihood. The importance of this issue cannot be underestimated particularly when about 70% of Ghana's population depends on forest resources for livelihood and cultural purposes (Amelia *et al.*, 2007).

Forest dwellers advance the argument that they are not accorded a fair share of the forests they live in, by the state. This perceived inequity could be an important root cause of community interference with forestry policy implementation - the social problem at hand, therefore calling for immediate research and policy attention.

This study assesses the extent of existing inequity due to forestry policy implementation, thus providing the government of Ghana and policy makers a clue on the extent to which forestry communities can be compensated to eradicate the social challenge in order to create a serene and peaceful environment for forestry policy implementation to drive economic development. Forest communities would also be able to better examine the causes of their plight through an understanding of how they get deprived of benefits from forestry policy and seek redress through due process within the laws of Ghana.

1.5.3 Perceived policy inappropriateness

The World Bank (2008) asserted that forestry policies of some countries had emanated from unreliable generalizations about deforestation and poverty. They argued that despite the volume of published material, confusion still prevails about the causes of forest loss and forest poverty and about effective policy responses. If policy happens to be based on unreliable generalizations, the policy from its inception will lead to wrong actions which could derail rather than contribute positively to economic growth and development. This follows from the fact that a false assumption will lead to misallocation of resources and therefore inefficient practices which will result in wastage, economically unsustainable forestry practices and de-development.

Repetto (1988) described Ghana as having a relatively weak system of forest administration and yet some of its documented policy instruments were theoretically excellent. He cites the case of Ghana operating an effectively differentiated system of specific royalties in the 1980s. He observed that a different royalty rate was applied to each of the 39 commercial species and rates were charged per tree rather than per cubic meter harvested. He noted that the effect of such a policy was to encourage loggers to harvest a variety of species, to harvest large trees and thereby open the forest canopy for regeneration, and to utilize each stem cut as fully as possible. Ghana however, was not in a position to benefit from this policy since it had almost no virgin production forests left. This example shows policy not backed by good knowledge of what will work and what will not work for a particular country. No matter how many times policy changes occur, as long as they are not based on the correct assessment of a particular country's situation,

there is a strong likelihood that the trend of deforestation will inexplicably continue to worsen, further worsening the welfare of its citizens. Given the historical trend of affairs in the forestry sector therefore, it would be in line with prudent economic and development practice to ascertain the efficacy of the forestry policies that have been implemented in Ghana.

The uncertainties expressed above by researchers, the World Bank, the Ghana EPA as well as communities send a single message across – the need for forestry policy evaluation in Ghana. Unfortunately, not much is available in this direction. To crown this with recent evidence, the Majority Leader of Ghana's parliament (Mr. Alban Bagbin) together with the Director-General of the National Development Planning Commission (Dr. Nii Moi Thompson) decried the absence of policy evaluation in Ghana, which has denied citizens the opportunity to know the impact of government policies (graphic.com.gh, 2015). This revelation shows how timely this thesis is particularly for the natural capital policies of Ghana, as a means of providing the necessary evaluation to inform government agencies, researchers, civil society organizations and households toward improved welfare.

The Policy Analysis Matrix exposes how appropriate forestry policy has been by testing for efficiency. An inefficient policy should not be desirable. Also, policies which redistribute earnings against the domestic forest industry would definitely not generate economic development in an economy. Thus the analysis provides the government of Ghana and policy makers some feedback on the business-as –usual normative forestry

science approach which has been pursued, bringing out the need to replace such an approach with the more society-friendly analytical approach. Thus, the thesis carries out analysis which would assist policy makers to alter their inappropriate policies through the various evaluation criteria applied.

1.6 Scope of the study

This study applies the theory of inclusive wealth to evaluate natural capital policy in Ghana. For purposes of being a focused and concise study, it was not possible to evaluate all natural capital policies in this thesis. Forestry policy being the most prominent of all natural capital policies in Ghana was selected as natural capital policy. Pursuing the objectives of this thesis necessitated investigating how forestry policy and economic development relate and how they can be manipulated to create the desired impacts on economic development. Thus the cause (forestry policy) and effect (economic development) were modeled to inform policy, based on natural resource economics principles. The application of economic principles for the evaluation of forestry policy has traditionally been based on efficiency and equity considerations (Riera *et al.*, 2007). In terms of efficiency, the intertemporal social welfare point of view was used; in which not only the profit of the investor but also those of all other people affected by forestry policy matter. With respect to equity, income distribution among society was the criterion used, where the desirable outcome is a more equitable distribution of income.

The Ashanti Region was selected as the source of evidence, based on its leading role in forestry activities in Ghana. The region has more than 20% of Ghana's forest reserves,

hosts the highest number of timber firms and the largest single wood market in Ghana. The Ashanti Region houses the only Forestry Research Institute of Ghana (FORIG). The only Resource Management Support Centre (RMSC) of the Forestry Commission of Ghana is also located in the region; this unit acts as the storehouse of data for forestry in Ghana. Thus, the region has a unique and exceptional assembly of all the structures for forestry policy activities to warrant this study on forestry policy in Ghana.

The scope of data was curtailed at 2010 to take into account the fact that as at 2011, a transition had started in Ghana to introduce a new forestry and wildlife policy, which practically could not be evaluated alongside the already implemented policies. The new policy was approved in 2012, with work still ongoing for a full scale implementation (Forestry Commission of Ghana, 2014).

1.7 Definitions of some key terms

Due to the fact that some concepts in the social sciences have different shades of interpretation and meaning to different stakeholders, it is worth providing operational definitions of two key concepts that are used in this thesis. These are forests and forestry policy. Detailed discussions on these concepts are provided in the following chapter.

Forest

This thesis uses Ghana's adopted definition of forest, based on international standards adopted in the Kyoto protocol and Marrakesh accord. Thus a forest has a canopy cover of greater than or equal to 15% with 5 meters tree height covering an area of at least one

hectare (Forestry Commission, 2012). Due to the several uncertainties and arguments against the consideration of commercial tree plantations as forests, this thesis does not regard commercial tree plantations as forests. This is consistent with several studies which regard Ghana's forests to be mainly the closed forest zone (Kotey *et al.*, 1998; Fairhead and Leach, 1998). One important consideration also is that, plantations form a very insignificant proportion of forests in Ghana. Thus by forests, this thesis refers to natural forests.

Forestry policy

The term *"forestry policy"* is used in many different contexts, from a general statement of the overall aim, goals or general objective of forest resource management for a country, to a fairly detailed prescription of a course of action with specific objectives for a rather narrowly defined field (Fraser 2002; Shahbaz *et al.*, 2007).

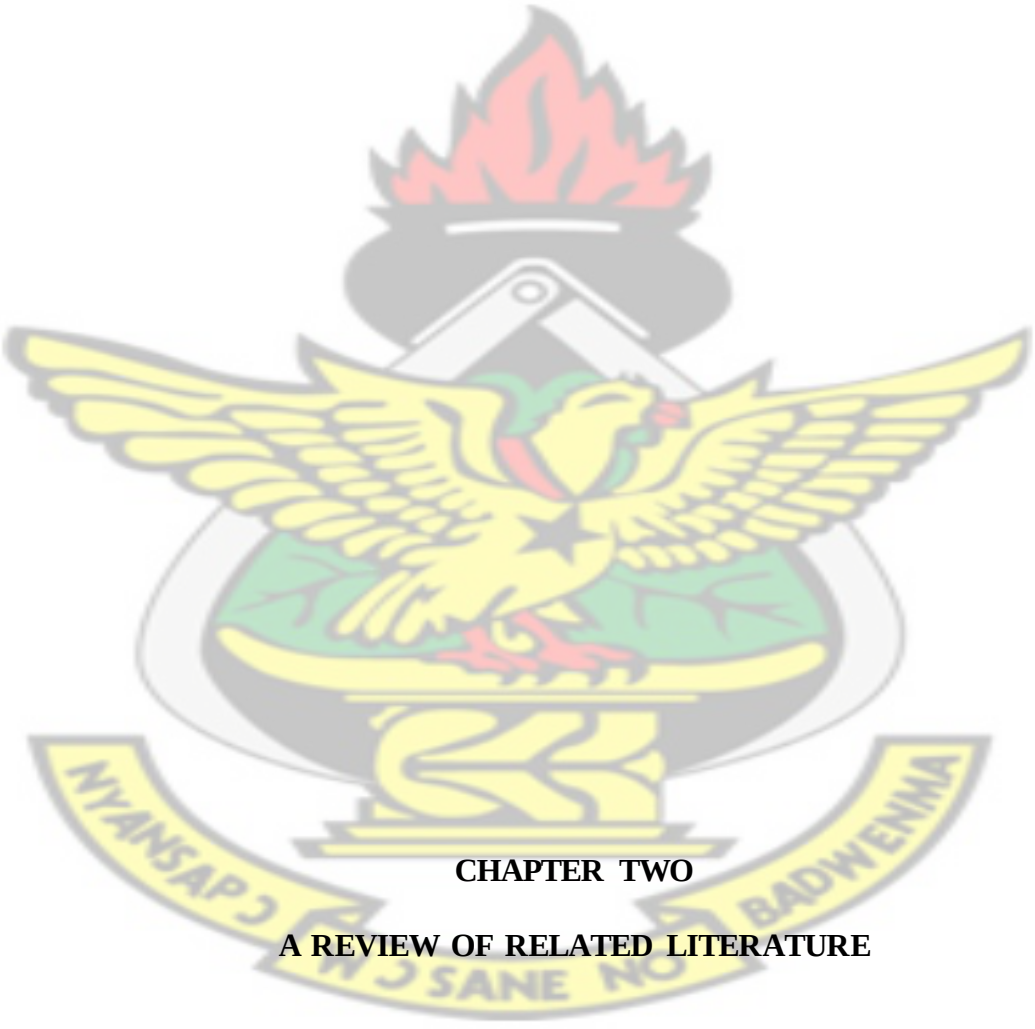
Thus, any combination of well thought out plans or actions for the management of forests qualifies to be called forestry policy. With respect to this thesis, forestry policy is the set of all implemented public decisions, plans, actions and inactions with state and/or Forestry Commission approval for the management of forests in Ghana, at any point in time. This implies forestry policy is cumulative, since in Ghana the practice has been to add new lines of action to existing ones, particularly when existing ones seem to be failing. This means, for Ghana, forestry policy is an aggregation of the 1908, 1948 and 1994 forestry policies as well as all the other implemented official decisions meant to direct or guide forestry activities in Ghana since the beginning of the 20th century.

1.8 Organization of the Study

The research was organized in three main phases, comprising of a literature review and documentation phase, a data collection phase and finally an analysis and synthesis phase. The literature review and documentation phase comprised the development of the research ideas and the conceptual framework as well as review of literature relevant to the thesis. The first three chapters of the thesis make up this first phase. Chapter one introduces the study with a background of the study, problem identification, the objectives, research questions, and hypotheses. Chapter two presents a review of related literature, which discusses the relevant theoretical concepts and empirical studies connected to the study. It also shows the linkages among the main variables in a conceptual framework. Chapter three presents the methodology of the study. It discusses the research design, data sources, the study area, sampling and data collection, processing and analysis.

The second phase addresses the specific objectives of the thesis. This is covered in chapters four, five, six and seven. Chapter four describes forestry policy in Ghana under six main coordinates – policy types, policy areas, policy content, policy instruments, policy actors and policy effects. Chapter five assesses the efficiency of the forestry policy process in Ghana by means of a Policy Analysis Matrix (PAM) model. Chapter six evaluates the net economic benefit of forestry policy in Ghana, while chapter seven assesses the equity effect of forestry policy in Ghana. In the third phase, chapter eight discusses how forestry policy can be made effective enough to deliver economic

development in Ghana, while chapter nine presents a synthesis of the results of the previous five chapters into summary, conclusion and policy implications.



CHAPTER TWO

A REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter explains the main theoretical propositions and concepts that provide a basis for evaluating forestry policy toward economic development in Ghana. It sought to

unearth from previous literature, the effects of forestry policy on economic development. It thus tries to present the outcomes of an attempt to integrate existing literature on forestry policy and economic development. The chapter begins by reviewing the theories of natural capital policy and natural capital policy evaluation. These are followed by a discussion of the paradigms of forestry policy. The succeeding sections then examine economic development and the relationship between forestry policy and economic development. The chapter concludes with the conceptual framework for the study.

2.2 Theory of Natural Capital Policy

Even though Arrow *et al.* (2003) and Dasgupta (2008) have laid some theoretical foundations for wealth-based policy evaluation, this has not yet been applied to many developing countries including Ghana. To attain economic development, concrete facts concerning recent performance of an economy and how it is likely to perform under alternative policies need to be understood and engineered. This requires evaluation of the economy concerned at a point in time, particularly before and after a perturbation has occurred. Such an evaluation would require criteria whose choice must be justifiable on ethical grounds (Dasgupta, 2008).

The theory of Inclusive wealth proposes the sustenance of the productive base of society's set of capital assets as a means of sustaining intergenerational well-being (Dasgupta and Maler, 2000). This means for any policy to contribute positively to inclusive wealth of a society, the present discounted value of its social profits will have to be positive and therefore acceptable (Arrow *et al.*, 2003). Inclusive wealth offers criteria for evaluating

natural capital policy by means of changing capital stocks which generally constitute the basic drivers of development (Collins *et al.*, 2014).

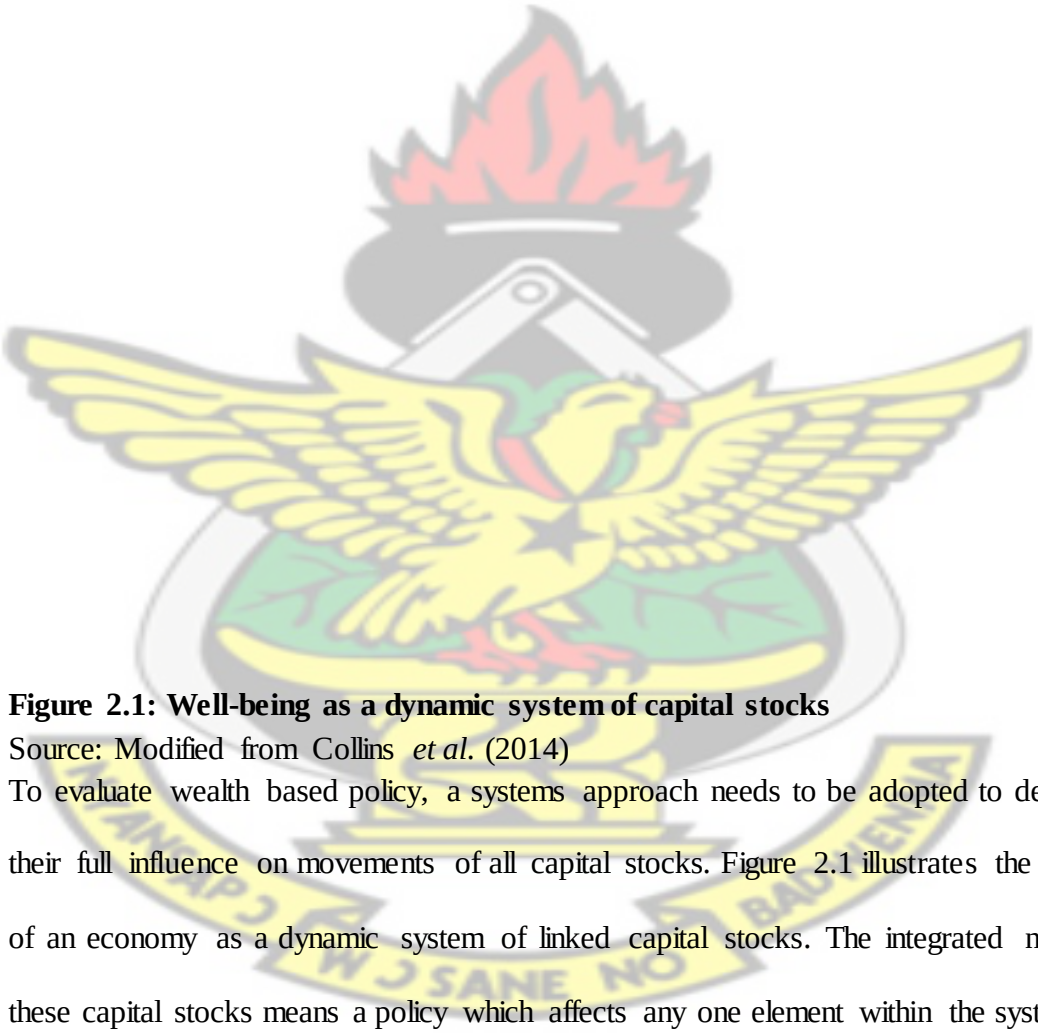


Figure 2.1: Well-being as a dynamic system of capital stocks
Source: Modified from Collins *et al.* (2014)

To evaluate wealth based policy, a systems approach needs to be adopted to determine their full influence on movements of all capital stocks. Figure 2.1 illustrates the concept of an economy as a dynamic system of linked capital stocks. The integrated nature of these capital stocks means a policy which affects any one element within the system will also affect the others through various links. The figure comprises of four linked feedback loops affecting well-being through economic activity (Collins *et al.*, 2014).

The first loop of Figure 2.1, loop I, with components R_1, R_2 and R_5, represents a reinforcing loop. This shows that changes in one variable will ultimately feedback to produce further change in the variable in the future, holding all things equal. The reinforcement shown by this loop is similar in effect to the neoclassical growth models, depicting economic output as dependent on the stock of manmade capital, with some fraction of output reinvested to produce more capital, to further increase output (Collins *et al.*, 2014).

On a similar basis, increasing production and consumption in an economy drives economic growth, which also causes an increase in the stock of manmade capital. This generates further activity within the economy. The channel for the operation of the second reinforcing loop II is human capital. Generally, a growing stock of human capital leads to a growing stock of manmade capital, causing production and consumption to increase (Collins *et al.*, 2014; Romer, 1989).

Economies rely heavily on natural capital to produce goods and services. Incorporating natural capital into the development discourse brings up the idea of balancing loops. Here a change in a variable causes a feedback through the balancing system to change the same variable later in the future. The third loop, III, which is a balancing loop, shows the depletion of resources. A growing stock of manmade capital results in a decline in natural capital stock, eventually diminishing the resource dependent manmade capital (Collins *et al.*, 2014).

The balancing effect may be influenced by technological progress as well as the timing and extent to which this loop can affect society. The diagram sums up stocks of manmade and natural capital into one variable. However, scarcity and other market conditions could result in some substitution between assets, which will to a large extent depend on available technology and the socio-economic dynamics of the economy concerned (Collins *et al,* 2014). Substitution, however, will always be constrained by biophysical laws. The effect of depletion of stocks of natural capital on human capital caused by pollutants and degradation of the ecosystem is captured by the second balancing loop, IV. The extraction of natural capital to develop manmade capital causes pollution and ecosystem degradation in an economy, reducing the stock of human capital largely through morbidity. Declining stocks of human capital cause a decline in production and consumption and for many economies could cause immediate fall in well-being (Collins *et al.,* 2014).

The effect on the trend of development depends to a large extent on the relative strengths of the two kinds of loops. Three main results can be observed. First, in a situation where the reinforcing loops dominate the balancing loops, development would be sustainable due to the fact that manmade and human capital would be growing at a higher rate than the rate at which natural capital decreases. However, the situation in which the system is dominated by the balancing loops degenerates into development which is not sustainable, since the decrease in natural capital induces a decline in manmade capital stock. In the case of the latter, there could still be increases in production and consumption particularly when they are measured by gross domestic product, since it fails to account for several

forms of human well-being. The outcome therefore confirms the central tenet of inclusive wealth theory, which states that well-being moves in the same direction as wealth, the value aggregation of all capital stocks in an economy's productive base (Dasgupta, 2009; Arrow *et al.*, 2003).

Hence the implications of well-being as a dynamic system of capital stocks are the following:

If $f(R_1, R_2, R_3, R_4, R_5) \geq g(B_1, B_2, B_3)$, where f and g are functions of the reinforcing loops and balancing loops respectively, then, development is sustainable, which implies economic development has occurred, resulting in improvement in well-being in the economy concerned. Otherwise, development is not sustainable, implying there has not been any improvement in well-being in the economy concerned.

Thus, integrated models are useful for wealth-based policy analysis because they provide a method for implementing the systems view in evaluation by capturing capital stock linkages and interactions. Models focused exclusively on either the physical world or the economy cannot readily do this (Collins *et al.*, 2014). We therefore use the integrated and therefore cumulative forestry policies of Ghana as one system to evaluate whether or not inclusive wealth (and therefore well-being) increased or decreased as a result of the corresponding forestry policy interventions so far implemented.

Therefore, this thesis seeks to ascertain the occurrence or otherwise of economic development in Ghana through the application of this derived relationship between well-

being and changes in natural capital stock, through natural capital policy. The theoretical basis for the policy evaluation criteria used are developed in the next section.

2.3 Theory of Natural Capital Policy Evaluation

The simplest way to describe a region's inclusive wealth is by accounting for its consumption-saving decisions (Dasgupta, 2009). This thesis adapts the theoretical approach of Dasgupta (2009) by holding the set of assumptions necessary for the accounting process to be that the region has a constant population size and operates a deterministic, competitive market economy.

To concretize the system, let $t(\geq 0)$ represent time, a continuous variable. Also let $r(> 0)$ be the market interest rate charged on capital. Then let $W(t)$ represent wealth at t, where $W(t) \geq 0$ and assume at $t = 0$ the region owns assets worth $W(0)$ in market value. If $C(t)$ is the region's consumption rate, then the region's wealth changes according to the equation,

$$dW(t)/dt = rW(t) - C(t) \quad (1)$$

From equation 1, for the region's wealth never to decrease, its consumption $(C(t))$ must never exceed its income $(rW(t))$. Lindahl's (1933) and Hicksian definition of "income" as the maximum consumption rate that maintains wealth generalizes this idea.

Solow (1974) and Hartwick (1977) strengthened the content of Lindahl's "income" through their study of an economy whose production involved manmade and natural resources. Making the assumption for the case without technological progress, Solow

proposed conditions within production possibilities which yield sustained consumption above zero perpetually. Thus, Solow and Hartwick showed that for consumption to be maximized at a constant rate, net investment in manmade capital for any point in time, must be equal to the rate at which natural capital is depleted. This, according Dixit *et al.* (1980), is Hartwick's Rule, which formalizes Lindahl's proposal for an economy's income to be defined as the ceiling that must be imposed on consumption to ensure that its inclusive wealth never decreases (Dasgupta, 2009).

To obtain the evaluation criteria, there is the need to assume that at time t, $K(t)$ is a numerical index of the economy's set of manmade capital assets, $L(t)$ is the amount of human capital per person, where the population is constant and has identical people. So $L(t)$ is the total quantity of human capital at time t.

Dobson *et al.* (1997), captured environmental concerns in a model that accounted for nature in human activities. In the situation where nature's services are extracted for production, we need to assume R(t) is a numerical index of the rate of extraction of such resources and $A(t)$ is total factor productivity facilitated by ideas and effectiveness of institutions in the economy, where $Y(t)$ is the economy's aggregate output expressed as:

$$Y(t) = A(t)F(K(t), L(t), R(t)) \quad (2)$$

Where F is a non-decreasing, twice differentiable function. For the economy, if manmade capital depreciates at the rate λ (> 0), with the amount of output consumed being C(t) and the quantity of output used to acquire human capital being J(t), then, the net accumulation of manmade capital, ex-post, should satisfy equation (3),

$$dK(t)/dt = A(t)F\big(K(t), L(t), R(t)\big) - J(t) - C(t) - \lambda K_t \quad (3)$$

Representing the depreciation of human capital $\mu(> 0)$ through death as equation (4),

$$dL(t)/dt = J(t) - \mu L(t). \quad (4)$$

The evolution of natural resources can be described by expressing $N(t)$ as the aggregate stock of natural capital, with $M(N)$ as the natural growth rate. The dynamics of natural capital then becomes

$$dN(t)/dt = M(N(t)) - R(t) \quad (5)$$

For any government which might not be necessarily optimizing, implementing any policy will change the existing mechanism for the allocation of resources (say α) (Dasgupta, 2009).

If a policy starts from t = 0 and ends at t = T, the policy can have an effect on an existing allocation mechanism α; such an effect could be indefinite irrespective of the implementation period of the policy. Assuming the output of the policy at $t\epsilon[0, T]$ is $\Delta Y(t)$ which was derived from using up $\Delta K(t)$ and $\Delta L(t)$ units, respectively, of manmade capital and human capital through extracting more natural capital at the rate $\Delta R(t)$. To evaluate this project, we proceed as below, noting that for an efficiently formulated policy equation (6) would be true:

$$\Delta Y(t) = (A\partial F/\partial K)\Delta K(t) + (A\partial F/\partial L)\Delta L(t) + (A\partial F/\partial R)\Delta R(t) \quad (6)$$

Assuming the project was not designed efficiently, then, the policy's implementation would alter $\Delta C(t)$. The corresponding alteration to $U(t)$, the instantaneous well-being at time t, would be $U'\big(C(t)\big)\Delta C(t)$. This alteration would be made up of both direct and indirect changes which would go beyond the period T. Shadow prices provide a way of

estimating $\Delta C(t)$ through a valuation of the output of the policy, the excess natural capital extracted as well as the reallocations of manmade and human capital resources. The estimated shadow prices exist under α for small scale policies while those which are big relative to the economy's size will need an estimation of consumer's surplus resulting from the policy to carry out a full evaluation (Dasgupta, 2009).

2.3.1 Derivation of the measure of well-being

To derive the measure of well-being due to natural capital policy, we need to assume the following in line with Dasgupta (2009):

i. $U'(C(t))$ = shadow price of $C(t)$
ii. $P(t)$ = shadow price of manmade capital
iii. $\overline{p}(t)$ = shadow price of manmade capital where $\Delta K(t)$ is to be displaced for deployment in the policy implementation at t.
iv. $\xi(t)$ = shadow rental on manmade capital
v. $\theta(t)$ = shadow wage rate
vi. $n(t) =$ shadow price of $\Delta R(t)$
vii. $y(t)$ = shadow price of $Y(t)$

From the above definitions, the contribution of the policy to well-being is given as:

$$\int_0^\infty [U'(C(t))\Delta C(t)\, e^{-\delta t}]dt$$

It is therefore concluded that

$$\int_0^{\infty} [U'(C(t))\Delta C(t)\, e^{-\delta t}]dt$$

$$= \int_0^{T} [y(t)\Delta Y(t) - \theta(t)\Delta L(t) - \xi(t)\Delta K(t) - n(t)\Delta R(t))e^{-\delta t}]dt \ldots (7)$$

The right hand side of Equation 7 represents the present discounted value of social profit of the policy. This is the value obtained from the Policy Analysis Matrix (PAM), the analytical procedure used to compute the value of the right hand side of equation 7. The left hand side of Equation 7 equals $\Delta V(0)$, the latter being the change in well-being at t = 0 that would be brought by the policy. So, Equation 7 can be re-expressed as

$$\Delta V(0) = \int_0^{T} [y(t)\Delta Y(t) - \theta(t)\Delta L(t) - \xi(t)\Delta K(t) - n(t)\Delta R(t))e^{-\delta t}]dt \ldots\ldots\ldots\ldots\ldots\ldots (8)$$

Equation 8 provides the first criterion for policy evaluation:

Criterion 1: *A policy should be accepted if and only if the present discounted value of its social profit is positive.*

Since inclusive wealth at t is the shadow value of the economy's complete list of capital assets, the policy reallocates these capital assets. The present discounted value of social profits occurring on the right hand side of Equation 8 represents the change the policy would make to inclusive wealth at t = 0 by the marginal reallocation of capital assets in the economy. This is also called the efficiency criterion for natural capital policy evaluation. Criterion 1 also implies cost-effectiveness as far as the implementation of the policy is concerned, and can therefore be re-stated as criterion 2 on that basis.

Criterion 2: *A policy should be accepted if and only if its acceptance would increase the economy's inclusive wealth.*

Criterion 2 is also called the cost-effectiveness criterion for natural capital policy evaluation. The two criteria are applied to determine the efficiency and cost-effectiveness of natural capital policy in Ghana in chapters 5 and 6 of this thesis. The third criterion, which is equity, is discussed in section 2.18.

2.4 Forestry Policy

Forestry policy is any rational system based on deliberate aims and plans or a consequence of political activity arising from a series of decisions on forestry (FAO, 2010). Good forestry policy is expected to provide guidance and a sense of direction over a reasonably long period of time. It is also intended to guide and determine present and future decisions and actions. Worrell (1970) indicated that current, effective forestry policy does not involve only the principles but also the whole set of settled courses which are adopted in dealing with the forest. On the surface, it is seen as the resultant of all applicable legislation, but true policy is consciously an evolved political framework with which legislation is made to conform (Pepler, 1980). Such a framework comprises of objectives and lines of action to achieve the objectives. It also includes the various activities that would be carried out and finally specifies who the main stakeholders are as well as their roles.

Forestry policy involves content and process, which respectively are the policy statements and instruments on one hand and the policy making, implementation and reviewing on the other. It usually has two components: a set of aspirations, goals or objectives and an

outline of a course of action to achieve them (Mayers and Bass, 1999; Kotey *et al*., 1998). This means the substance of forestry policy must carry the same weight as the processes involved in the development and implementation of forestry policy.

According to Byron (2006), two component items define the beneficiaries of forestry policy. The first is the spatial beneficiaries in whose interest the policy is made. The policy will need to clearly identify these people, and to ascertain whether it is meant to benefit the whole country or part of it in space. The second is the sectoral component, where government may be targeting some relevant interest group. Byron (2006) suggested that any national forestry policy which would be effective must not just emanate from the ministry responsible for forests, but must have the commitment of the entire government as well as support from society.

At the basic level, forestry policy must answer the questions about who manages the forest and the purpose for which they are managed. Byron (2006) suggests that the managers could be government, agencies, communities, private entities or a mixture of some of these. The beneficiaries however may depend on the objectives of the policy. Byron and Arnold (1999) hold that rural development and poverty reduction could be achieved normally through some supposedly minor forestry products for several millions of deprived people. This means the answer to who benefits from forestry must never be overlooked, being one basic goal of economic development.

2.5 The Changing face of Forestry Policy

Since the second half of the 20th century forestry policy studies have gone through significant changes. The focus of forestry policy has consistently changed from the normative, which pursues how forest management could be improved toward the analytical which deals with the way policy processes are explained. The change in focus each time involved an important transformation in thinking (Wiersum *et al.*, 2013).

2.5.1 The need for a paradigm shift

The notions of Kuhn (1970) on occasional paradigmatic change received explicit attention in forestry science at the end of the 20th century. Several scientists discussed whether the conventional approach to forestry was being challenged, and whether a paradigmatic change was needed. Changes in forestry policy paradigms at the end of the 20th century were related to new socially-oriented developments in forestry policy in tropical countries (Westoby, 1989; Arnold 2001). These involved the issue of whether a 'people-centered' paradigm should replace the conventional 'forest-centered' paradigm (Gilmour and King 1989; Wiersum 1999).

Discussions of the values and beliefs underlying forestry (e.g. Bengston, 1994; Kennedy *et al.* 1998; Scott 1998) and the need for a new vision in both forestry science and practices (Gordon, 1994) also took place (Coufal, 1989).

2.5.2 The role of early forestry policies

Wiersum *et al.* (2013) reveal that government defined the roles of forestry science historically. Such roles were intended to improve and transmit knowledge to meet government's needs. This explained the normative nature of forestry policy, a sub-

discipline of forestry science, which was a non-academic but practical science. Generally, forestry policy had to serve the interests of politically powerful people in government. Thus professional foresters received training to serve state officials. This training concentrated on the design and application of technical standards with respect to the biological and technical principles (Wiersum *et al.*, 2013).

Increase in societal demands due to forest resource use was the main reason for the emergence of forestry policy, which came as a tool to provide systematic information to guide policy makers to improve their capacity to make decisions. However, little attention was given to the relationship between forestry policy and socio-economic and political circumstances as well as how these policies were formulated and implemented (Gluck, 1992; Wiersum *et al.*, 2013). This means forestry policy provided advice for governmental decisions, giving the state the ultimate say in forestry policy issues. Also, the new role of the forestry policy maker was added to that of the existing role of the forest manager (Worrell, 1970).

2.5.3 The new orientation of forestry policy

Hummel (1984) saw the need to involve both government and all other stakeholders in forest decision making, even though he thought government should bear ultimate responsibility. By the latter part of the 20th century, forestry policy had become embedded in policies from other sectors of the economy which were non-forestry. This started a change in the orientation of forestry policy in the 1980s. As at this time there had arisen

issues of forestry policy in rural development concerns, environmental policy and governance (Wiersum *et al.*, 2013).

Due to rising concerns that forestry policy did not contribute much to economic development in the second half of the 20th century, development oriented organizations like the Food and Agricultural Organization of the United Nations Organization (FAO) and the World Bank carried out some activities to assist in forestry influencing rural development. This was through the 'Development Forestry' concept. The new trend of events brought up the 'Forestry for local community development' programme, leading to the design of forestry to include households and how their basic forest related needs could be met. This brought 'poor people's products' into forestry policy considerations (Arnold, 2001).

This new phase in forestry policy was welcomed by the World Forest Congress of 1976, which assisted in trying to focus more of forestry's contribution to human development as against the earlier focus on timber and state benefits. Thus existing forestry policy came under scrutiny for adjustment to meet the new standard created. Accompanying this development was the need for a new forestry policy professional, well versed in the work of different practitioners and the frameworks in which they operated. These professionals were required to explain policy changes rather than solve forest sector problems for government. This means they had to come to terms with different perspectives expressed by different actors on issues of forestry decision making as well as the dynamics of the different institutions concerned (Fairfax and Fortmann, 1990; Dargavel *et al.*, 1985).

Consequently, these developments in forestry necessitated a re-evaluation of conventional forestry policy as well as the development of new tools for analyzing forestry policy issues. Hence, the change in the role of forestry policy scientists from givers of advice to practitioners, to professionals who analyze forestry policy issues related to socio-economic and political phenomena (Gluck, 1992; Wiersum *et al*., 2013).

2.5.4 The new approach to forestry policy

One result of the new approach to forestry has been to change forestry policy from a normative science, where the forestry policy expert saw himself as one to offer best professional advice, to an analytical science. Here, the role of forestry policy is to analyze issues on welfare of mankind such as economic development, thereby demanding the forestry policy expert to be necessarily responsive to socio-economic and political phenomena (Wiersum *et al*., 2013).

2.6 National Forestry Policy

Generally, a national forestry policy is considered to be a negotiated agreement between government on one hand and other stakeholders on the other hand. The other stakeholders are normally all those who depend on or benefit from forests or who decide on, control or regulate access to these resources. Such agreements normally focus on the orientations and principles of actions which need to be adopted. They are also constructed to conform to national socio-economic and environmental policies, toward the sustainable use and conservation of forest to ultimately benefit society (FAO, 2010).

Byron (2006) observes that it is difficult to imagine a national forest policy that can be relevant and useful without being firmly placed within the broader aims of society. This means a forestry policy should be a policy for people, not for the forest administration, as the case has been for many years particularly in developing countries. This therefore means that a formal national forestry policy is the official position of the government, as a clear statement of a country's goals and objectives, made public so that all parties know the directions being pursued and the outcomes to be achieved (FAO, 2010). This provides a justification for not considering private policy in many evaluations.

2.6.1 Features of national forestry policies

A national forest policy is a formal statement presenting a long-term vision for the forestry sector of a country. It is expected to guide and support activities for the realization of set goals through all stakeholders of the forest industry. The needs and aspirations of the stakeholders usually determine the structure and content of the formal forestry policy. This means forestry policy statements would differ considerably from one country to another. The size of the policy statement would also depend on the choice of the country concerned. Some countries produce simple frameworks while others use long-term planning documents. In scope, such policy documents usually try to capture all forest resources in the country concerned.

Generally, the United Nations' seven thematic elements of sustainable forest management tend to be the focal point for such policy statements (UN, 2008). These are the extent of forest resources; forest biological diversity; forest health and vitality; productive

functions of forest resources; protective functions of forest resources; socio-economic functions of forest; and legal, policy and institutional framework. Most of such policy statements have been reviewed after about 10 to 20 years as and when circumstances change (FAO, 2010).

2.7 Forestry policy documentation

Forestry policy differs from forestry laws, national forest programmes, strategies and action plans, all of which are forestry policy documents. While forestry policy sets out a wide long-term vision to guide the use of forests, it falls short of the specific details concerning its implementation instruments. Forest legislation therefore comes in to provide the legal framework for the distribution and enforcement of rights and responsibilities.

Legislation allows or disallows certain actions and also prescribes sanctions for offenders. They also tend to be more stable in the event of changes in political leadership. Table 2.1 summarizes the main difference between forestry policy and legislation. A written forestry policy usually states the way to attain set goals through strategies, programmes or action plans.

Table 2.1: Main difference between forest policy and forest law

Forestry Policy	Forest Law
Subject to adaptation and amendment through different procedures and agencies	Subject to adoption and amendment only through parliamentary procedures
Not legally binding	Legally binding
Specifies vision, goals and how to achieve them.	Allocates rights and duties based on a policy
Usually enough to be adapted to changing circumstances	Requires specific terms to enable judicial dispute resolution and universal application
Can be soft on offenders	Provides judicial power to punish offenders
Can be modified by bodies that adopt the policy based on their circumstances	Can be modified only constitutionally

Source: Adapted from FAO (2010)

While the terms are used loosely in practice, a strategy usually provides direction on the approach to achieve the goals and objectives set by a policy. A programme is considered more of a long-term master plan to implement the policy or strategy. "Action plans" or "work plans" are usually more specific or short term (FAO, 2010). These relationships are illustrated by Figure 2.2.

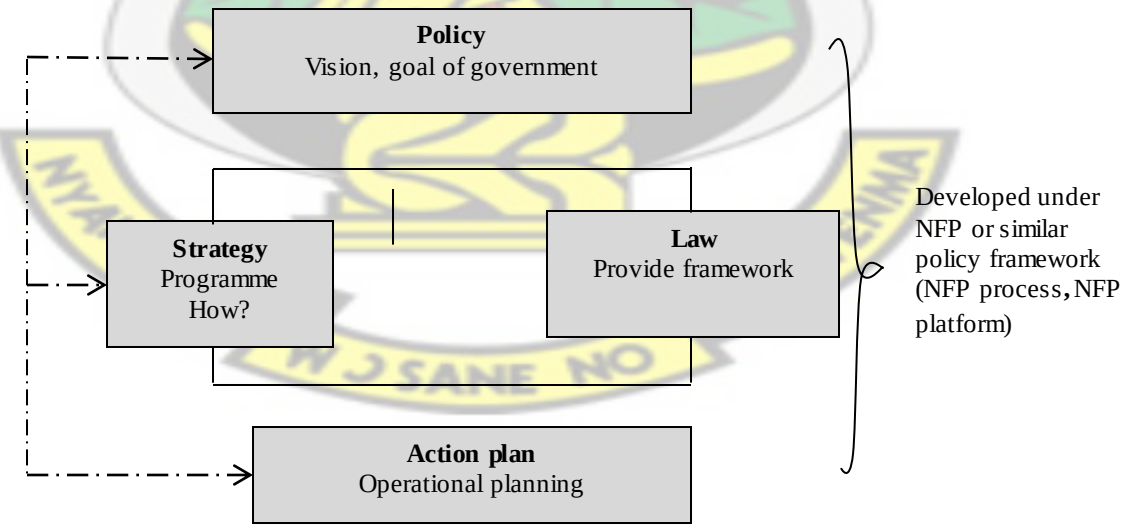


Figure 2.2: The relationship between policy, strategy, law and action plans

Source: FAO (2010).

2.8 Forestry Policy objectives and Instruments

Generally, government policies are required to be directed towards achieving the greatest benefits for the greatest number of people. This is the rational behavior of government in all economies, no matter their stages of development. Governments in this case are charged with the responsibility for maintaining and, if possible, improving the capital-resource position for current and future generations. Forestry policies must therefore be in the position to reflect this goal.

In connection with the current generation, government is normally charged with the responsibility of creating and fostering conditions for a thriving economy for the current generation. Applying this thinking to the forest economy, it becomes clear that carrying out this responsibility requires improvement over any existing status quo (Pepler, 1980). Such improvements are expected to eventually culminate in natural capital accumulation and hence economic development. Government has a number of instruments at its disposal for drafting and implementing forestry policy. These are regulation, financial or fiscal instruments and advisory or promotional instruments. These instruments can normally be assessed in terms of their cost-effectiveness, efficacy, efficiency and equity.

2.9 Forestry Policy Models

To explain and predict policy consequences, many models have been applied by policy experts. Due to the varied nature of these models only a few relevant ones are discussed below:

2.9.1 The Rational Model

The rational model asserts that public policy is made based on logically sound assessments (Herbert, 1976). This model thrives on four assumptions namely:

1. The stability of the environment or system
2. Government being a rational and unitary actor
3. The policy problem not being ambiguous
4. The absence of time or cost limitations

The main issue behind the use of this model is to achieve maximum social benefit. To embark on the use of the rational model some predetermined steps must be followed. Thomas (2007) describes these steps as the following:

i) Identifying problems
ii) Assessing the consequences of all actions
iii) Relating consequences to values (this involves developing a set of criteria against which performance or consequence of each option can be judged or measured.
iv) Choosing the preferred option

Various critiques of the rational model indicated that its assumptions are not realistic since social and environmental values can be difficult to quantify (Dye, 2007, Morgan et al, 1999). However, Thomas (2007) argued that the model provides a good perspective since in modern societies rational things tend to have good price and hence worth trying. The model would not be applicable to developing countries even though its theoretical basis

appears sound. Developing countries generally have complex and unstable systems with serious resource constraints, which defy three of the four assumptions.

2.9.2 The Institutional Model

The Institutional model argues that political institutions such as the legislature, executive and judiciary determine public policy. This is to suggest that to analyze public policy the institutions that determined them should be focused on (John, 1998). The assumptions of this model indicate that government universally applies policy to all citizens without the influence of the self-interests of the officers involved. Due to the expectation for institutions to follow laid down procedures it is expected that various groups outside of state institutions will have no influence on public policy. Generally, the prepositions of this model though partly relevant are not realistic. It is a fact that powerful groups outside state institutions are capable of influencing executive and even legislative decisions in their favour (Rhodes, 1986, Smith, 1993). A slight modernization of this model recognized the influence of public policy based on the prevailing economic and political environments of states (March and Olsen, 1989).

Institutional policy analysis, the second leading theory, claims that rational choice cannot fully explain human behaviors and political outcomes. Choices are mediated by rules, norms and beliefs, to be defined as 'institutions' (Ostrom, 1990). People do not behave solely on the basis of the highest expected utility, but on the basis of what is appropriate in a certain institutional setting. Therefore, policy making should focus on designing the 'right' institutions for specific types of problem-solving. In forest policy analysis,

rationalism has mainly been used in explaining conflicts of interests in the forest sector, while institutionalism has, for example, been applied to explain the (lack of) effectiveness of forest management by referring to (in)appropriate rules of the game (Ostrom, 1990; Krott, 2005).

2.9.3 The Socio-Economic Model

The Socio-Economic Model explains that the agenda and implementation programmes of public policy are largely determined by powerful socio-economic influences (John, 1998). Evidence attests to the fact that when socio-economic conditions change, policy is influenced to respond to such changes (Donhoff, 1970, Bowels and Gintil, 1976 and Aglietta, 1979).The influence on policy could be from a global perspective, where global socio-economic factors change (Peterson, 1981) or from internal political changes (Boyre, 1996). This approach is useful in analyzing some aspects of forestry policy which may be due to the alterations in international conditions of demand, supply and pricing of forestry products.

2.9.4 Natural Resource Policy Models

The analysis of natural resource policy models provides more insight into the outcomes of forestry policy than general policy models. This makes it imperative to have a separate discussion as is done in this section on three most relevant natural resource policy models. Miller (1994) asserts that forestry policy in many countries is closely related to agriculture and land use policy as well as trade and employment policies. Thus any changes in any of these policies can result in changes in forestry policies. This theory presupposes that

other macroeconomic factors would be responsible for forest policy changes without necessarily accounting for the competition among various users of forests for the resource. The Miller's forest policy model is well positioned to explain forestry policy in Ghana given the dominance of Ghana's macroeconomic policies over all other policies.

2.9.5 Policy Ambiguity

Governments might issue paper policies to comply with the demands for policy reform from international pressure. In some instances, with such governments, there may be no real commitment to these "paper policies". Grainger and Konteh (2007) distinguished between stated forest policy and actual policy. While the policy documented in official records exists, the latter shows the true intentions of a government towards forest resources. The purpose of the divergence is to provide powerful pressure groups with some "assurance" that the divergent concerns are catered for, while government goes ahead to implement policies in state executive interests. Apart from deliberately implementing polices differing from stated ones, government may also face a situation where the goals of state change after the publication of stated policies between stated and actual policy. This exposition defeats the proposition that forestry policy reflects a balance of power between two groups; one seeking conservation of forests while the other seeks exploitation (Grainger and Marlayang, 2006). The eventual focus of policy will reflect the more powerful of the two pressure groups at any point in time. This is because stated policy may seek to just pacify the most powerful, while actual policy shows otherwise. The case of Ghana could be due to one of the reasons explained above,

particularly when it appears there is a divergence between stated and actual forestry policy in Ghana.

2.10 Economic Development

Development is a framework for improving the quality of life and standard of living of people (Dernbach, 2011). Economic development involves the transformation of a traditional dual-system society into a productive framework in which members contribute and receive benefits accordingly (Kooros and Badeaux, 2007). This occurs when all sectors of the society derive benefits from economic growth as a result of economic efficiency and equity.

Economic development ensures the enjoyment of higher living standards and welfare by the residents of the nation that attains it. Economic Development is therefore regarded as a process of growth and change aimed at raising people's living standards (Smith, 1994). The rationale of economic development is expressed as ensuring that scarce resources are utilized so as to maximize the net long-term benefits for mankind (Earl, 1975). Macmillan and Fell (1992) added that economic development involves improvements in human welfare, while Heilbroner (2001) asserts that it is an increased ability to provide for the material well-being of humanity.

The definitions above, while representing all the different shades of complex definitions for economic development, all stick to the core issue of economic development - economic welfare.

Generally, most economists have used the terms economic development and economic growth almost interchangeably. This provides very little distinction between the two, a situation which has to a large extent created confusion between the two concepts. There is the need to make a clear distinction between economic growth and economic development since they are not equivalent terms. Growth represents a horizontal quantitative expansion of existing capacities and activities in society; whereas development involves a qualitative enhancement in the structural capabilities of society, an increasing capacity for organization, coordination, and complexity. Growth may be regarded primarily as an economic concept, but development in any field belongs to the wider realm of society as a whole. Growth generates more of the same on a larger scale.

Development generates something new and better than what was not possible earlier. The concept economic development is a complex one which depicts improvement in human welfare. Economic growth is usually regarded as a necessary but not sufficient condition for economic development (Dasai and Potter, 2008). This means that economic development can be said to have occurred if inequality is reduced within a growing economy. Economic Development did not feature prominently in economies' programmes prior to the middle of the twentieth century. It has been asserted that strategically, the forces of imperialism and colonialism designed little provision for economic and social progress in the current developing world. It was the duty of the colonies to supply raw materials and cheap labour to their colonial masters (Harris, 2000). Around this same time the richer economies in Europe, North America and Japan had economic growth as the key indicator of progress without much concern for equity and

social justice. Thus growth indicated progress in the midst of abject poverty and deprivation even in these countries because policy was not driven by the needs of the majority of residents (Harris, 2000).

Economic development, with its social and institutional correlates became a major preoccupation of governments when colonialism began to crumble after the Second World War. Economic development policy was to raise living standards of all economies, providing steadily more goods and services for the satisfaction of growing populations. The births of the International Monetary Fund (IMF), the World Bank and the United Nations Organization were all for the fulfillment of the goal of economic development.

2.11 Goals of Economic Development

The goal of economic development simply seeks to create the wealth of a nation (Dang and Sui Pheng, 2015). Before the 1970s, rapid economic growth was considered a good proxy for economic development (Todaro and Smith, 2009). The following sub-sections explain the changes that have emerged since the 1970s.

2.11.1 Gross National Income growth

The most known "measure" of well-being, Gross National Product (GNP) is beset with several shortcomings, being insensitive to the depreciation of capital assets (Dasgupta, 2008). Also, GNP does not measure wealth. GNP is a flow whiles wealth is a stock. GNP is not a welfare measure but a measure of output of final goods and services. Thus using GNP as a measure of welfare or well-being has three major problems:

- It does not capture income inequality by giving the same weight to a dollar for both rich and poor.
- It is not a correct measure of opulence as explained, being a flow, while opulence is a stock (Sen (1987), Anand and Ravallion (1993), UNDP (1994)).
- Even though GNP responds to improvements in education and wealth, it does not adequately reflect the well-being people enjoy when they are educated or healthy (Sen, 1987, 1999; Bauer, 1971).

The arguments for the use of Net National Product (NNP), a general aggregate consumption ceiling for the maintenance of an economy's wealth are also inadequate (Lindahl, 1933; Solow, 1974; Hartwick, 1977 and Dixit et al., 1980). It is worth noting that well-being is not the same as consumption (Dasgupta, 2008). This is mainly because the use of NNP assumes not only that all goods and services have markets but also that market prices are the shadow prices of these good and services. The dominant issue of missing markets, which is principal for natural capital is thus violated by the building up of NNP. A further issue is raised by Steffen et al. (2004) regarding the "convexity" assumption about commodity transformation possibility, as explained by the NNP set of assumptions. This does not agree with the general natural processes which are "complex" and therefore non-linear. Thus the most popular measure of well-being, NNP does not capture the characteristics of natural capital and hence cannot account for it adequately.

2.11.2 Quality of Life

The experiences of many developing countries like Ghana who attained high per-capita income growth rates but insignificant changes in living conditions of large sections of the populace raised questions about per-capita income growth as economic development (Dang and Sui Pheng, 2015). Thus the goal of development around the 1970s was not restricted to economic growth, but also on the reduction of poverty, inflation and unemployment (Seers, 1979). This requirement changed when in the 1990s it became increasingly clear that it was the quality of life which made the difference between developed and developing countries (Dang and Sui Pheng, 2015) consequently the World Bank (1991) upheld improvement in the quality of life as a goal of development. Thus even though higher income is necessary, it is not sufficient to improve the quality of life. This therefore changed the goals of economic development from the promotion of growth to the promotion of well-being (Dang and Sui Pheng, 2015). The changes in definition of development goals necessitated the construction of indices to reflect the quality of life. This led to the use of the Human Development Index (HDI) which has been published annually since 1990.

The use of the Human Development Index (HDI) was no solution because of the arbitrary choice of relative weights of its components. GNP and HDI do not respond to depreciation of natural capital, making them useless when it comes to inter-temporal welfare assessment. Both GNP and HDI of a country can be increasing while its overall productive base shrinks making them deceptive measures of well-being.

2.11.3 Sustainable Development

The exploitation of natural resources to attain rapid economic growth has created negative feedbacks for the human environment which serves as a source of material inputs for the economies of the world. A long-term neglect of these effects is likely to jeopardize the durability of economic growth (Thampapillai, 2002).

Sustainable development refers to development which meets the needs of present generation without compromising the capacity of future generations to meet their own needs (WCED, 1987). Since the Brundtland Commission definition, there have been several other definitions of sustainable development with slightly different wording and emphasis (Bartelmus, 1997; Becker *et al*., 1999; Tisdell, 1988 and Choucri, 1999). The differing definitions though may appear confusing, all aim at achieving sustainable development from various perspectives, with emphasis on the three dimensions of human welfare - ecological, social and economic.

Thus, sustainable development requires the maximization of net benefits of economic development while maintaining the services and quality of environmental resources over time (Pearce and Turnner, 1990). This seeks to improve the quality of life in a comprehensive way where the economic, social and environmental systems are integrated to enhance intergenerational well-being (World Bank, 2003).

Following from the sustainable development paradigm, eight Millennium Development Goals were adopted in 2000 by the United Nations Organization. These were to address the most urgent problems of developing countries by 2015. These goals however were

criticized for excluding other essential needs of developing countries as well as not being ambitious enough and also not prioritized (Todaro and Smith, 2009). The latest additions to the goals of development are the Sustainable Development Goals (SDGs) which took effect from 2016. These were designed to answer the short comings of the MDGs and in addition provide a comprehensive systems approach to economic development for resource and humanity in general. The 17 goals have been under discussion for some time and the world awaits their implementation for holistic development.

Applying the Brundtland Commission concept of sustainable development which has had the widest acceptance and use, it is evident that forestry policy must be implemented to achieve intragenerational and intergenerational equity. Such equity must occur within the three dimensions of the holistic model of human welfare- social, economic and ecological. The concept of equity as applied to forestry policy in this thesis reflects both intragenerational and intergenerational equity. Also, evaluating for net benefit from forestry policy implementation implies ascertaining whether the resource stock is capable of meeting the needs of present generation without putting future generations at risk. In addition, the efficiency concept applied in this thesis to evaluate forestry policy seeks to provide evidence on whether the resource stock is misused or wasted by present generation, putting future generations at risk. Thus the evaluation carried out in this thesis meets the standard requirement for sustainable development.

Another issue for consideration is the different approaches to sustainable development by natural scientists and economic scientists. While for natural scientists sustainable development would mean ensuring a constant physical flow of forest resources, for the

economic scientist this would mean maintaining the value of the flows. Again, this thesis captures these different shades of approaches where the efficiency concept applied answers the natural science concern while the cost-effectiveness and equity concepts address the economic as well as the social science concerns.

Further, the arguments on weak and strong sustainability paradigms are also both catered for through the evaluation criteria of the thesis. While the weak sustainability paradigm accepts maintenance of the total stock or value of forests (efficiency), the strong sustainability paradigm seeks to maintain each component of forest resource stock and value (efficiency and equity). Therefore, irrespective of the concept of sustainable development used, the only variation that could occur would be the analytical approach, but the outcomes would be identically equivalent to what this thesis provides.

2.12 Natural Capital drivers of Economic Development

2.12.1 The forestry development stages argument

The use of forest lands has followed a common pattern as a driver of economic development of many countries in the world. Various nations and regions at different stages of economic development have shown a similar pattern of forestry policy development (Sharpe *et al.*, 1995). These policies largely depended on the stage of forestry development and the level of economic development attained. The first stage or settlement stage occurs when commercial timber resources are harvested for export and domestic use, creating jobs and income while at the same time creating cleared land for agricultural use. This stage is characterized by destructive logging, uncontrolled fires, and inability to replant trees successfully. This process has however been seen as necessary

to create an opportunity to feed growing populations. Economies are thus compelled at this stage to craft forestry policies to deal with the settlement stage issues.

A protective era commonly follows the settlement stage – the custodial stage – this is a constructive response to the preceding destruction and loss of forests. The reality of timber scarcity begins to down on other forest uses, leading to desire to control logging, stop fires and regenerate woods. During this stage, logging and forest based industry decline as readily accessible supplies of commercial timber are exhausted and forest industry becomes much less important in the region's total economy. In this stage, land is placed under professional management and a rebuilding process begins. This sparks off a new generation of forestry policy with active government involvement to reconstruct and repair, thereby influencing economic development in its effect.

The custodial stage leads to a management stage as forests are regrown and are capable of supporting commercial harvest once again. This stage of development seeks to increase the value and productivity of the forest and its related resources through better management, to encourage, yet control, commercial use at sustainable levels and to develop the recreation, wildlife and other uses of forests for the benefit of a broader segment of society. In this stage forest resources begin to make a more stable, sustainable and multifaceted contribution to economic growth and development through forest management policies.

The management stage normally gets constrained by public input, which calls for major changes in forest management direction and practices on public and private land in

response to increases in awareness of how forest management affects economic amenity and environmental value. This is the environmental stage, the most advanced stage.

There is currently great concern about forest degradation and deforestation in Ghana, where agricultural practices, uncontrolled logging and mining are destroying forests. Concerns over the known effects of such degradation and deforestation and their attendant effects such as global warming and biodiversity loss seem to be beginning to help modify forestry and development policies. This reveals a link between forestry policy and economic development. How can jobs be created, income be obtained and growing populations be fed in the light of the stage Ghana is in? And what will be the effects of these policies on economic development? The answers to these questions are welfare based and result in forestry policy development, which, in turn influence the levels of economic growth and development.

2.12.2 The Capital Accumulation Argument

Development theory as well as the experiences of developed economies provides evidence that capital accumulation is one main means of attaining economic development. To accumulate capital, there must be a sacrifice to defer current consumption for future benefits. The promise of a long-term improvement in living standards is usually seen as adequate motivation for this investment.

Capital has a limiting effect on economic development if not managed to maintain its stock over time. The literature on capital makes a distinction among five kinds of capital.

Financial capital facilitates economic production through ownership and/or control of man-made capital. Natural capital comprises of the resources and ecosystem services of the natural surroundings of man, this is where forests belong. Man-made capital comprises of all man-made assets which enhance the production of goods and services, while Human capital refers to the productive capacities of a person acquired through education and training (Goodwin, 2003). The last but not least is social capital which is seen as the stock of trust, mutual understanding, shared values and socially owned knowledge.

For economic development to occur, it is required to maintain and even increase the stocks of the entire human endowment of capital. Hicks (1940 and 1946) provided the necessary condition under which income could be regarded as an index of welfare. Hicks maintained that all income that did not impoverish future consumption could be considered welfare-improving. For this to be ensured, the stock of capital had to be maintained intact. The significance of this precondition was extended to natural and human capital by analysts such as Hamilton and Clemens (1999), Dasgupta and Maler (2000) and Dasgupta (2001).

The case of forests as capital is special because it usually gets depleted and degraded through the production process with no conscious effort for replacement through the production process. The key issue of concern is that if a country's future ability to produce goods and services is diminished, potential and actual economic well-being would have declined as a result of failing to maintain and/or increase natural capital stock. There is no doubt that the use of forests end up in the production of items that are economically

desirable. To attain economic development, there must be a sustenance and preservation of the overall quality and quantity of the resource base for welfare maintenance and enhancement. This principle is what is observed in the depreciation of physical (man-made) capital in national income accounts. If stocks of facilities and amenities and equipment wear out in a country without replacement, the standard of living and therefore welfare in that country would decline. This is because the worn out capital would not be able to produce as much goods and services as it did before, thereby reducing the productive and service capacity of the resource.

Depreciating physical capital seeks to provide an avenue for its replacement to maintain the quality of life by offsetting the worn out capital's capacity to reduce welfare. There has been progress in such depreciation through the use of the current ways of measuring national income.

However, the impact of economic activities on the stock of natural forests in particular has almost always been negative. This is because their use results in the drawing down on existing stocks of natural forests (with only about 10% replacement in developing countries) as well as a diminishing of its quality (degradation). This has a direct negative impact on quality of life and therefore welfare in the long run, since the finite nature of natural forests is bound to experience a limit to the size of flow of production for use in the near and distance future. Thus policy that enforces forest resource maintenance would contribute to economic welfare improvement and hence economic development.

2.12.3 Economic Growth

It is widely held that improvement in human welfare cannot occur without economic growth. This makes it imperative for projects which seek to improve human welfare to target policies which promote economic growth. There is some evidence of policies that promoted growth having improved welfare of the poorest in some societies (Ardito-Barletta, 1928). However, since economic development is not only quantitative, it is worth noting that economic development could also occur without any evidence of economic growth.

Economic growth is defined as an increase in the productive capacity of an economy (McEachern, 2002). Thus any economy that is able to increase its productive capacity is said to have had economic growth which would be a basis for the production and consumption of more goods and services by its residents. Kuznets (1973) defined a country's economic growth as a long term rise in its capacity to supply increasingly diverse economic goods to its population. Most economists have accepted the fact that economic growth occurs when there is either an increase in the national income of a country or in the country's productive capacity (Smith, 1994, McEachern, 2002). The reference to productive capacity implies the ability of the country to generate more income than before.

The fact that forests generate actual and potential growth is a point of departure from the common trend for most economic goods. Any increase in forest stock would generate both actual and potential growth. This is so because once an increase in natural capital

stock (forest cover) occurs, that increase begins immediately to generate goods and services without being tapped consciously by the economy. These goods and services are in the form of carbon sequestration, aesthetic beauty, biodiversity gains, maintenance of soil fertility and many more. Thus some environmental goods and services come with the forest resource beginning from the short-run. This means that for the forest stock, any increase in resource base generates both potential growth (long-run) and actual growth (short-run). Some of the long-run benefits are added when the resource is consciously tapped for human benefit on a sustainable basis. On the other hand, a decrease in forest stock indicates de-development since most of the mentioned goods and services would be lost to the economy.

Thus an increase in forest stock generates both actual and potential growth which is an increase in the productive capacity of the economy concerned. This means any net increase in forest stock indicates that some economic growth has occurred. This indication of economic growth forms the basis for assessing economic growth through the forestry sector in this thesis. The difficulty that may arise is that of reconciling value at the level where the resource has not been tapped (*in situ*) with value at the level when it is finally fully utilized. The former is mainly indirect-use value while the latter includes direct use-value. The total economic value of any natural resource is made up of the use value (value in use of the resource) and non-use value (value which accrues even when the resource is not in use).

This concept of total economic value makes it clear that forest resources have value *in situ*, which, must be recognized as part of man's resource stock. Even where there is growing capacity for an economy through net forest stock increase, Kuznets (1973) observed that the growing capacity needed to take into account the necessary institutional adjustments for welfare attainment. Since a country's forests can be a limiting factor to the capacity to supply economic goods, the forestry sector's institutional policy performance becomes key to its economic growth. This makes forestry policy an important economic growth variable for countries endowed with forest resources. Economic growth would thus have occurred if forestry policy is efficacious and efficiently implemented, all things being equal.

2.12.4 Efficiency

To result in economic growth and development, forestry policy must practically lead to a reduction and eventual elimination of waste of both financial and material resources. Acquiring increased productive capacity is tied up with not wasting resources during economic activity. Along the production possibilities frontier of any economy, one assumption that is satisfied is that of economic efficiency. Hence to fulfill the strict criterion for economic growth, an economy must be operating efficiently — attaining both technical and economic efficiency. Technical efficiency means producing in such a way as to avoid wastage of resources. Economic efficiency, on the other hand, means moving resources from the least valued uses to the highest valued uses. Hence, this thesis upholds efficiency as a necessary condition for economic growth. To prove that economic development has occurred, we must first prove that economic growth (which necessarily

implies efficient use of resources) has occurred. Thus efficient allocation of forest resources leads to forest induced economic growth.

Applying the Pareto criterion (Arrow & Hahn, 1971; Mas-Colell *et al.*, 1995), if someone's welfare could be improved without diminishing the welfare of anyone else, the new situation would be preferred, and the change in the allocation of resources would consequently be efficient. A somehow more relaxed criterion is the Hicks – Kaldor one (Hicks, 1939; Kaldor, 1939). The basic idea is that if the welfare of some people can be improved, and the winners could potentially compensate those who would lose some welfare, and still be better off, the new situation would be socially preferable (more "efficient"). "Efficiency" implies the balance between forestry policy formulation and implementation marginal costs and marginal benefits. An efficient forest policy is one that moves us to, or near, the point where marginal forestry policy costs and marginal benefits are equal. To discover where this point is we must know both costs and benefits. This thesis combines the costs and benefits into the Policy Analysis Matrix (PAM) to assess the efficiency of forestry policy implementation.

2.12.5 Cost-effectiveness

It is often the case that many damages produced by forestry policy cannot be effectively measured at some points in time. Cost-effectiveness may then be the primary policy criterion. A forest policy is cost-effective if it produces the maximum forest improvement possible for the resources being expended or, equivalently, it achieves a given amount of forest improvement at the least possible cost. For a policy to be efficient it must be cost-

effective, but not necessarily vice versa. A policy might be cost-effective even if it were aimed at the wrong target. For a policy to be socially efficient it must not only be cost-effective, it must also balance costs with benefits.

The capability of a forest policy to achieve cost-effective reductions in depletion and degradation of forests, besides yielding the maximum improvement for the resources spent, is also important for another reason. If programs are not cost-effective, the policy-makers and administrators will be making decisions using an aggregate abatement cost function that is higher than it needs to be, leading them to set less restrictive targets in terms of desired amounts of depletion and degradation reduction. Efficiency and cost-effectiveness are important because, although preserving forest resources is critically important, it is only one of the many desirable things that people seek.

Advocates are usually convinced that their objectives are automatically worth the cost, but success depends on persuading large numbers of other people that forest policies are efficiently designed. Thus, the resources devoted to forest quality improvement ought to be spent in ways that will have the greatest impact. This is especially important in developing economies like Ghana, where people have fewer resources to put in forestry policy programmes and can ill afford policies that are not cost-effective and efficient. No economy that wastes its resources can really be said to be enjoying economic development.

2.12.6 Equity

Efforts to attain economic development in developing countries seem to have favoured the wealthy rather than the most deprived. It is however a hard fact that not many countries in the world have succeeded in improving on the level of inequity in their economies. The effects of significantly large income disparities within economies have been largely distabilizing (Kooros and Badeaux, 2007). The destabilization could emanate from the instigation by exogenous forces of aggression of the masses of impoverished and deprived people. Thus apart from improved economic welfare being an achievement, it is also supposed to not nurture any risk of revolt or conflict associated with widening income gaps. More equity promotes stability and satisfies the maximization of social and economic benefit in the sense that external costs of development would be nearly zero.

Kuznets (1955) suggested that income inequality generally rose in the early stages of economic development, while in the latter phases of the development process, inequality declined. This hypothesis, known as the Kuznets Curve shows an inverted-U relationship between inequality and development. Kuznets' (1955) study attracted several comments in the 1960s and 1970s either to formalize Kuznets' hypothesis or to check its empirical validity. In the early 1980s interest in the link between income inequality and development declined. In recent years, however, there has been a clear resurgence of research in this field, essentially for three reasons: the appearance of the "new growth" theories, the application of the theory of public choice to new areas and the availability of more sophisticated data sets (Deutsch and Silber, 2000).

Many definitions of equity exist. Most users of equity seem to refer to vertical distribution of incomes, which depicts a distribution between the rich and the poor. Vertical equity is seen by egalitarians as using confiscatory taxation and other means to redistribute income in favour of the poor. Another notion of vertical equity is that, incomes of households must not fall below a certain level based on the size and composition of the household (Kooros and Badeaux, 2007). Others argue that vertical equity means using progressive taxation and pro-poor ideas in carrying out public spending so as to make income distribution more equal. While it is worth noting that the above ideas of vertical equity are not contradictory, some believe that vertical equity implies all of the above concepts. McLure, Jr. (1988) observed that the first two notions of vertical equity if used to formulate policies would be counter incentive for productive work, except under conditions where productive behaviour is insensitive to prices. There is however so much indication that productive behaviour is price sensitive. Thus these policies could cause general decline in the economies where they are applied.

Horizontal equity on the other hand refers to the case where a redistributive policy provides fiscally equal treatment for equals (Galbiatti and Vertova, 2008). The meaning and mode of utilization of horizontal equity have been explained extensively by Maggrave (1959, 1976, 1990) and Kaplow (1989, 2000) as well as Lambert (1998, 2004). These notwithstanding other issues remain unresolved given that the theoretical debate has not yet clarified what the exact features and content of the concept are. Even though

the exact meaning of horizontal equity is not clear, there is consensus as to the relevance and importance of the concept.

Galbiati and Vertova (2008) argued that any policy must necessarily select some individual characteristics which will be relevant for subdividing a population into groups of individuals which can be considered as equals. They contended therefore that the definition of "equals" was not a normative problem since it was usually satisfied by every policy. They further claimed that the proper way to use a Horizontal Equity index is to measure the extent to which a policy deviates for the Equity Criterion. In the developing world, the issue of segmented markets will make the use of horizontal equity too problematic. The issue of horizontal equity has to see some more theoretical stability. It is worth noting however that the concept of "equals" does not occur in this thesis and hence the use of horizontal equity will not be necessary. Thus the use of equity in this thesis refers to vertical equity as a redistribution of forestry costs and benefits among different groups – government, traditional authorities and households.

2.13 Models of Economic Development

Development literature has only a limited quantum of economic development models. Smith (1776), Ricardo (1830), Marx (1880) and Rostow (1953) have been among the major early contributors in terms of ideas to the economic development literature. Kooros and Badeaux (2007) observed that most of the models were descriptive or normative except the Leontief and Kooros models. It is worth noting also that the Leontief and the Kooros models dealt with inputs and corresponding outcomes covering several sectors of

the economy. This thesis however, following a one sector model analysis, does not intend to follow the path of the two models of Leontief and Kooros.

Two main bedrock theories of economic development relevant to this thesis and discussed in the literature are the Rostow's stages of Development and the Lewis-Ranis-Fei theories. Rostow (1960) suggested that countries passed through five stages of Economic Development. These were the traditional society, the transitional stage (precondition for takeoff), the takeoff, the drive to maturity and finally high mass consumption. From the beginning Rostow explained that the economy was dominated by subsistence activity, with labour intensive production methods where resource allocation was determined by traditional methods. The second stage sees increased specialization, with the emergence of transport infrastructure. As income, savings and investment grow; entrepreneurs emerge with external trade occurring mainly in primary produce exports.

In the third stage is a switch of workers from agriculture to manufacturing, with growth concentrated in a few regions. Rostow contended that in this stage the level of investment reaches about 10% of Gross National Product (GNP). The fourth stage sees the economy diversifying into the production of a wide range of goods and services with less reliance on imports due to technological innovation.

Rostow saw development as dependent on capital investment. Thus for developing countries to grow, conditions had to be created for investment in capital. This theory is criticized to have a western cultural background and not applicable to developing

countries. It is also seen to be too generalized not specifying the details of preconditions for growth. As a predictive model some think it is not very helpful, even though it strongly highlights the need for investment in capital. The focus on capital investment by Rostow is in consonance with the concept of natural capital formation as a basis for development, which, to a large extent falls in line with the capital formation argument of this thesis.

The Lewis-Ranis-Fei (LRF) model explains that the development process is triggered by the transfer of surplus labour from the traditional sector to the modern sector where significant economic activity had already began. Low traditional sector wages paid in the modern sector due to excess labour availability ensures profit in the modern sector which expands to absorb the excess labour in the traditional sector, until the traditional sector pays labour its marginal product due to imminent shortage. The existence of surplus labour in the modern sector ensures capital accumulation which also produces using agricultural inputs from traditional sector. In the LRF model, saving and investment are driving forces of economic development. This theory like the Rostow model also hinges on investing saved resources which agrees with the concept of natural resource (forest) conservation. This means the two most fundamental theories of economic development are in complete agreement with using forestry policy to conserve forests as investment for economic growth and development.

It is worth noting however that none of the models of economic development seemed to provide sufficient direction for the operation of forestry policy as a driver of economic development. Westoby (1962), focused on the potential benefits to optimistically write

that by liquidating part of their forest capital, developing countries could make hard currency available to build up their infrastructure and industry, to the point of take-off into self-sustaining growth. To Westoby's dismay, the inability and unwillingness of governments to turn this potentially valuable process into reality seemed the only response (Westoby, 1987).

In countries which had logging profits not repatriated, it was observed that these profits were too frequently frittered away on prestige projects without development content, or diverted to additional consumption by the relatively well-off (Price, 1994). Even the minimal investment required to replace the lost tree cover all-too-often was not forthcoming (Nadkarni, 1989). Thus as the forest resource disappears, several developing countries are nearing the end of the development 'runway' it could have provided, without the aircraft of self-sustaining economic development seeming any closer to becoming airborne (Price, 1994).

2.14 Effects of Forestry policy

Byron (2006) found that almost every country had a formal written forestry policy statement; this was the case even for the countries that did not have *de facto* policies. He also asserted that many important matters derive from such a policy: legislation and regulations, government structures, research facilities and educational centres, industry organizations and professional bodies. These policies produce effects on forests and people, which eventually also produce effects on the citizens' welfare and hence economic development.

Table 2.2 summarizes various empirical studies that link some forestry policy effects and the economy. The extreme left column (a) provides a forestry policy implication for implemented forestry policy. The second column (b) describes the linkage between each policy implication and the forest resource base. The third column (c) examines the effect at stand level of the forest resource. The final column (d) provides the effect on the economy.

Tietenberg and Lewis (2006) asserted that some government policies could create perverse incentives leading to inefficiency in forest use. Non-forestry policies can exert significant influence on forests and then on communities since there exists a link between some non-forest policies and forestry. This means that apart from inappropriate forestry policies distorting outcomes for communities and households, other policies can be a source of further distortion (Ruitenbeek & Cartier, 1998). These policies range from macroeconomic to sectoral.

Johnston (1972) contended that forestry policy was formulated by governments based mainly on political considerations and judgments. Since these political judgments are influenced by various competing interests, forest policy cannot be evolved in isolation, which means the eventual consequence of forestry policy could be clouded by several other effects from sources other than forestry policy. In this thesis, the trajectory of clear cut forestry policy is traced to its eventual consequence based on economic development indicators. The purpose of such an approach is to ascertain whether forestry policy meets

the requirements for attaining economic development and not to measure the final impact of forestry policy on the economy as a whole. This makes the analysis quite independent of non-forest policy effects.

Table 2.2: Forestry policy effects and the economy

Forestry Policy implication (a)	Linkage to forest resource base (b)	Effect at stand level of forest (c)	Effect on economy (d)
Underpriced Timber (Source: Vincent & Binkley, 1992)	Excess profits prompt over-cutting	Extraction rate above social optimum	–Inefficient use of forest resources. –Inequitable distribution of forest resources.
Insufficient Price Differentiation by Species, Grade and Value (Source: Vincent & Binkley 1992).	Removal of only most valuable stems of primary species	Extensive logging with extraction damage and wastage	–Inefficient use of most valued species.
Harvesting Rules: Selective Cut	Removal of only most valuable stems	Wastage and severe extraction damage	–Inefficiency in forest resource use. –Inequitable distribution of forest resources.
Taxation of log exports to foster domestic processing (Source: Repetto, 1988)	Waste in both harvesting and processing	Extraction rate above social optimum and stand wastage	–Inefficiency in forest resource use. –Inequitable distribution of forest resources.
Log Export Bans to foster domestic processing (Source: Vincent & Binkley, 1992)	Waste in both harvesting and processing	Extraction rate above social optimum and stand wastage	–Inefficiency in forest resource use. –Inequitable distribution of forest resources.
Vertical Integration of Forestry Industry (Source: Gillis 1988)	Narrow management goals	Damage to NTFPs	–Inefficiency in forest resource use. –Inequitable distribution of forest resources.
Lack of Property Rights on NTFPs – Market Failure (Source: Gillis 1988)	Neglect and degradation of non-timber resources	Possible exclusion of NTFP users and reduced forest protection	–Inefficiency in forest resource use. –Inequitable distribution of forest resources.

Source: Author's compilation from the stated sources.

2.15 Motivation for forestry policy driven economic development

The developed world sacrificed most of its forests for real income along its development path. Pearce (1992) identified three main reasons why the developing world must not do

the same. The first reason was that mismanagement of forest resources in temperate zones was likely to cause less loss to human welfare than similar mismanagement in tropical zones where the 'margin of fragility' is much lower. It is noted that small changes in forest cover have bigger economic effects in most developing countries.

Secondly, developed economies are still suffering from the abuse of their forests and are spending large sums of money and effort to combat the effect and to also prevent further damage. Policies to cause damage before repairing the system must be avoided, since some natural capital damages are irreversible.

Thirdly, it is currently unnecessary to follow the steps of developed economies in the deforestation and degradation of forests. Theory and practice have revealed that it is possible to develop without deforestation and degrading of forests. Developing without regard to the forest threatens the permanence of the development exercise and eventually leads to de-development (Pearce, 1992).

Pearce (1992) argued that most of the debate in the 1970s about the natural environment and development was centered on the developed economies of the world. Developing economies only came into the debate in the 1980s, alongside the problems of the 'global commons' like ozone layer depletion and global warming.

For developing economies, the 1970s debate was about the development process principally to reduce poverty and provide their basic needs. Issues about natural assets

came up later in the 1980s. Within this period it became clear that the fact that a resource was renewable did not mean it would renew itself. The critical issue rested mainly with the actual management regime in place, which is policy. During this period it also became evident that for developing economies, it was their renewable resources that mattered most for their immediate livelihoods. The reasoning was that if water, biomass, forests and soil were overexploited, the implication for human welfare could be grave (Pearce, 1992). Thus the import of policy was to ensure that overexploitation did not occur to affect welfare adversely.

2.16 Measurement of the Effects of Forestry Policy

The effects of forestry policy with respect to economic development will normally be reflected in a change in economic welfare (well-being) arising from the implementation of the policy. This means measuring the effects of forestry policy will require some measure of economic welfare change based on forestry policy implementation. A measure of economic welfare encompasses some changes in society, even though it is worth noting that a single generally acceptable index of welfare may never be obtained (Denison, 1971). The following indicators are generally regarded as the bedrock of economic welfare or well-being:

1. The output available to satisfy human wants and needs is one key determinant of economic welfare. No matter the need one is faced with, one can more easily find resources to deal with it when output is large and growing than when it is not. This makes real economic growth necessary for economic welfare improvement.

2. An index of real costs incurred in production is key in determining economic welfare. This is because, one would be better off if one got the same output at less cost. This cost may not be only in terms of loss of man-made capital but also natural capital.
3. Another index needed is that of the "goodness" of the size of income distribution. Generally there appears to be some consensus that, given the same total income and output, a distribution with fewer families in poverty would be better than a distribution with more families ending up being poor. It also implies that less inequality throughout the distribution would result in an improvement.

The first two issues discussed above constitute the efficiency and the cost-effectiveness criteria which together form the necessary condition for economic development. These two criteria were derived earlier in section 2.3. The third issue is the equity criterion which stands for the sufficient condition for attaining economic development, which is derived in the following section. Thus, forestry policy which satisfies all of these criteria results in economic welfare improvement and provides economic development.

The measure for efficiency (criterion 1) will be provided through the Policy Analysis Matrix (PAM), while the cost-effectiveness analysis will be employed to assess cost-effectiveness (criterion 2). The following sub-sections discuss the theories of these measures briefly.

2.16.1 Theory of the Policy Analysis Matrix (PAM)

The PAM is a computational framework, developed by Monke and Pearson (1989) and augmented by Masters and Winter-Nelson (1995), for measuring input use efficiency in production, and the degree of government interventions (Nelson and Panggabean, 1991). The PAM is formatted as a matrix with two-way accounting identities as shown in Table 2.3.

The first row calculates private profitability *(N)*, defined as the difference between observed revenue *(Q)* and costs *(R+S)*. Private profitability indicates the competitiveness of the natural capital system, given available technologies, input prices, outputs, and policy.

The second row of the matrix computes the social profit, which is reflection of social opportunity costs. Social profits measure efficiency and comparative advantage. In addition, comparison of private and social profits provides a measure of efficiency. A positive social profit implies a country uses scarce resources efficiently. Negative social profits imply a waste of resources which could have been used more efficiently in another sector of the economy. This means, the cost of domestic production is greater than the cost of imports, an indication that the sector concerned is not capable of surviving without state support at the margin. The PAM therefore provides a measure of the addition to well-being produced by natural capital policy (Criterion 1 of section 2.3).

The third row of the PAM measures the difference between the first and second rows. The difference between private and social values of revenues, costs, and profits can be explained by policy interventions.

The PAM framework is also used to compute important indicators for policy evaluation. The nominal protection coefficient (NPC), is an indicator of the incentives or disincentives in the sector in question. This is defined as the ratio of domestic price to a comparable world (social) price. NPC can be computed for both output (NPCO) and input (NPCI). The farm gate price or procurement price is normally used as the domestic price, while the world reference price is the international price adjusted for transportation, marketing, and processing costs.

Table 2.3 : The PAM Table

		Input Values		
	Output Values	**Tradable**	**Domestic Factor**	**Profit**
Private Prices	**Q**	**R**	**S**	**A**
Social Prices	**T**	**U**	**V**	**B**
Policy transfer	**W**	**X**	**Y**	**C**

Source: Adapted from Monke and Pearson (1989)

Note: Private profit: A=Q-(R+S); Social profit: B=T-(U+V); Output transfer: W=Q-T; Input transfer: X=R-U; Factor transfer: Y=S-V; Net policy transfer: C=A-B.

Two additional indicators can be computed from the PAM. These are the effective protection coefficient (EPC) and the domestic resource cost (DRC). EPC is the ratio of value added in private prices (Q-R) to value added in social prices (U-V). If EPC is more than one, it means government policies provide positive incentives to producers while

EPC of less than one shows that producers are not protected by public policy interventions.

The DRC is the most useful indicator among the three. It compares the relative efficiency among natural capital goods and is defined as the shadow value of non-tradable factor inputs used in an activity per unit of tradable value added ($V/(T-U)$). The DRC shows the extent to which the use of domestic factors is socially profitable (DRC<1) or not (DRC>1).

One main advantage of the PAM approach has to do with the many degrees of disaggregation it provides. It also provides analysis of policy-induced effects in a simple way. The PAM procedure has been criticized because it is static analysis and not suitable for dynamic systems (Nelson and Panggabean, 1991). One way to overcome this limitation is to conduct sensitivity analysis under various assumptions. The use of sensitivity analysis under various assumptions overcomes this limitation and makes the PAM suitable for dynamic settings.

2.17 Measuring forestry policy induced Equity

The uses of utilitarian preferences imply neutrality to inequality where only mean incomes are considered important. On the other hand, Rawlsian preferences lend themselves to infinite inequality aversion, bringing into focus incomes of the poorest. However, Lorenz curves rank income distributions, showing that the characteristics of preferences of decision makers are embedded in Economic Welfare Functions (EWF). An income-seeking decision maker who is inequality averse, considers transfers from

poorer to richer persons as unacceptable, while transfers from richer to poorer people are desirable, all things being equal.

Generally, with the government as the sole decision-maker, it would favour a reduction of inequality for the benefit of the poorer people than to increase inequality to favour the rich. This means all things equal; government would apply the diminishing transfers' principle of the Economic Welfare Function (EWF) as explained by Bellu and Liberati (2005) below.

This principle suggests that the increase in the economic welfare generated by a transfer of a given amount of forestry benefit (income) from a richer to a poorer person, both of whom are in the lower part of income distribution, increases the economic welfare more than a transfer of the same amount of benefit from a richer to a poorer individual, both of whom are in the upper part of income distribution. The Economic Welfare Function, $w=w(y)$ where w = welfare and y = income:

i) Increases with income and argues that all things equal, income increases Δy at the income levels y_1 and y_3, will lead to positive changes of welfare Δw_1 and Δw_3, respectively as shown in Figure 2.3.

ii) Reflects inequality-aversion which is the principle of transfers by arguing that all things being equal, an income increase Δy at income level y_3 generates a lower welfare increase Δw_3 than the welfare increase Δw_1 generated by the income increase Δy at the income level y_1, showing that, $(\Delta w_3 < \Delta w_1)$

Therefore, the welfare change decreases as forestry benefits (income) increases, implying,

$$(\Delta w_3 - \Delta w_1) < 0$$

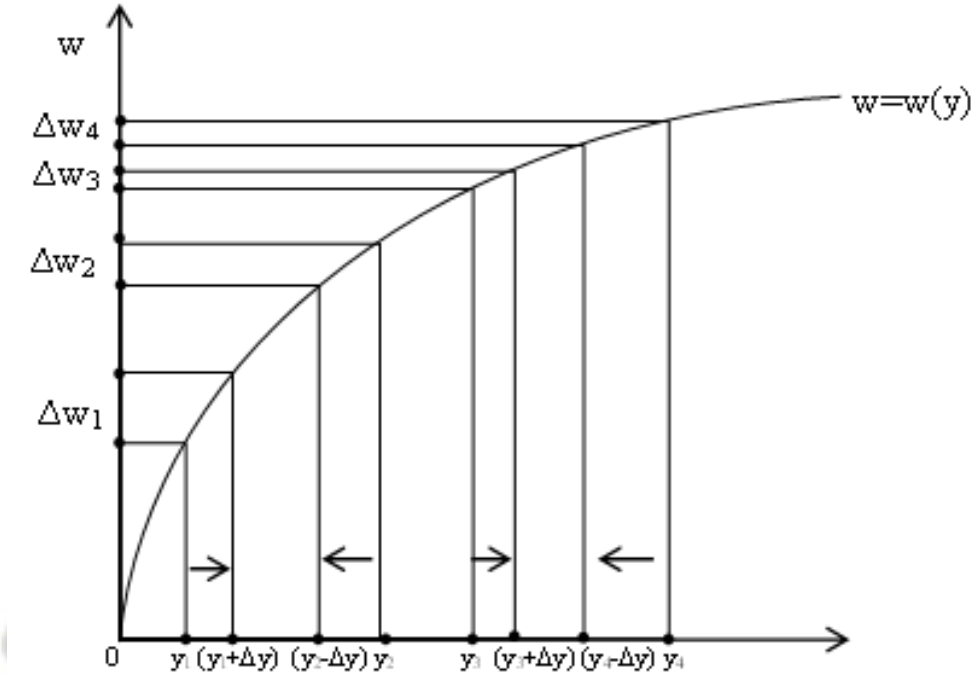


Figure 2.3: The principle of diminishing transfers
Source: Bellu and Liberati (2005)

iii) Confirms the principle of diminishing transfers that for small transfers of income Δy, the gain in welfare, due to a transfer of income from richer to poorer people in the lower part of the distribution, say from y_2 to y_1 (as indicated by the arrows), is greater than the gain in welfare due to a transfer of income from richer to poorer people in the upper part of the distribution, say from y_4 to y_3. From Figure 2.3 this can be stated as:

$$(\Delta w_1 - \Delta w_2) > (\Delta w_3 - \Delta w_4)$$

(Recipient – Donor) (Recipient – Donor)

Re-arranging the inequality shows that $(\Delta w_4 - \Delta w_3) > (\Delta w_2 - \Delta w_1) > 0$.

Thus an increase in the economic welfare obtained by a transfer of a given amount of benefit (income) from a richer to poorer person, both in the lower part of income distribution, more than offsets the loss of welfare generated by the transfer of the same amount of benefit (income) from a poorer to a richer person, both in the upper part of income distribution.

Therefore this thesis ascertains whether through forestry policy there had been any significant transfer of forest benefits (income) from the richer to the poorer, both of whom were in the lower income range, in the Ashanti Region as one criterion that drives economic development. This is criterion 3 for evaluating natural capital policy. The Lorenz curve with its accompanying Gini-index was used to measure the extent of income distribution.

2.18 A review of empirical literature

Explaining the geographical patterns of research on tropical forestry, Rudel *et al* (2000) observed that the number of studies was distributed roughly in proportion to the extent of rain forests across nations. Countries with large rain forests were studied frequently, while countries with small forests were rarely studied. The coefficient of correlation between the size of rain forest and the number of deforestation studies in a country was 0.842 ($p < 0.001$). Analysts, they revealed also tended to study places with highest deforestation rates (correlation coefficient being 0.402, $p < 0.01$). Following this pattern, it is worth noting that compared to other tropical countries; Ghana's forestry sector has

attracted a reasonable attention from local and international authorship, particularly under silvicultural themes.

Empirical literature abounds on the forestry sector in Ghana. The large volumes however mostly dwell on silvicultural as well as agricultural themes, only very few have social science themes with probably none directly on economic development. It is worthy of note that none of the existing studies made a deliberate effort to study economic development through forestry policy in Ghana. Prominent among the studies conducted on forestry in Ghana with some social sciences considerations are the ones reviewed below:

Kotey *et al.* (1998) examined the processes behind the making and implementation of forestry policies in Ghana. They tried to sort out policies that had worked as against those that had not worked. Their report examined the resource base, the stakeholders, the history of official forestry policy and some cases of policies being implemented. Their study was elaborate on the general effect of forestry policy in Ghana. However, analysis that could serve as a link to economic development was conspicuously missing.

Marfo (2009) conducted an exploratory study on effective planning, formulation and implementation of forestry policy in Ghana. He carried out detailed analysis with the intention of providing critical scientific input for improving the forestry policy arena in Ghana. His comprehensive analysis went as far as to involve the participation of clients in joint reviews of reports on forestry in Ghana, where theoretical and practical issues

needed clarification. His conclusions generally touched on stakeholder participation and representation, institutional and legislative issues, corruption and cross-sectoral linkages. The study portrayed the forestry policy environment in Ghana in the most explicit form possible. However, there was no attempt to provide economic analysis which could provide some clues on economic development.

FAO (2003) identified various outlooks and set up two major scenarios for Ghana's forestry sector to achieve the goals set by policy. The business-as-usual scenario turned out to be unsustainable while the sustainable Ghana Scenario (based on Growth and Poverty Reduction Strategy (GPRS) projections) turned out to be sustainable for Ghana's forestry sector. The study carries pertinent implications for forestry policy in Ghana. It is worth noting however that it did not go beyond the scenario analysis. The study serves its purpose however, since it clearly provides a general outlook for Ghana.

Gillis (1988), writing on the effect of public policy on deforestation in Ghana, asserted that there was no evidence that forestry policy had any effect on deforestation in Ghana. Rudel *et al.* (2000) took inventory of tropical deforestation literature in which they observed and analyzed the patterns of causation for the entire tropical world. From their analysis, in every geographical region studied, public policy was a significant cause of deforestation. This finding thus contradicted what Gillis (1988) found.

Birikorang (2001) analyzed aspects of the Ghana Wood Industry in relation to the government imposed Log Export Ban. He proved that Primary Timber Processing in

Ghana was a value-subtracting industry. This depicts a loss of resources through wood processing and hence a decrease in general productive capacity. Basically his paper provides a short-run analysis of the wood industry in Ghana. One strong point of the paper is that it provided useful computations which could facilitate further analysis particularly concerning the wood industry in Ghana but not the forestry sector in general.

Awudi (1999) assessed timber pricing and concession policies for Sustainable Forest Management in Ghana. Grut *et al.* (1991) examined forest pricing and concession policies in managing the high forests of West and Central Africa. These papers proved that despite the variety of taxes and charges (pricing policies), the government of Ghana did not capture substantial amounts of timber values. Birikorang and Rhein (2005) supported this assertion by going a step further to assert that the loss of residual forest rent by the government of Ghana was between $10 and $45 million per year. These writers attribute the losses to policies that allow inefficient mills to operate or for efficient operators to retain the residual rent as "super profits". Even though these papers touched on some tax related policies in the forestry sector, their scopes were generally narrow for generalization purposes as far as the entire forestry sector was concerned.

Agyeman *et al.* (2003) examined the equity of forest reserve plantation revenue sharing in Ghana. Their paper assessed the extent of community involvement in collaborative management of forests. They observed that though some advances had been made from central government and the Forestry Commission through policy, the measures were not effective enough. It is however worth noting that their use of equity was quite shallow, in the sense that they used the raw government sharing ratios of revenue generated through

forest plantations. In reality, revenue goes beyond the percentage shares allocated by law. These as well as other benefits derived through policy implementation would all have to be assessed to determine each stakeholder's actual share of revenue. It was also clear that their work restricted itself to only forest plantations, which are a very small proportion and also generally not representative of the normal forestry sector in Ghana.

Teye's (2008) thesis on forest resource management in Ghana provided an integrated policy network model for analyzing forestry policy formulation and implementation in Ghana. He examined the influence of power networks on forestry policy outcomes in Ghana. His key emphasis was on forestry policy formulation and implementation modeling. While he modeled the processes of policy formulation and implementation, the economic impact of forestry policy was not modeled.

The World Bank (2006) in its Country Environmental Analysis (CEA) carried a comprehensive report on natural and environmental resources in Ghana. The forestry component of this report examined some policy issues, but did not carry out systematic economic analysis towards economic development evaluations.

2.19 The conceptual framework

Forestry policy can either enhance or constrain economic development. This is because policy provides the guidance and framework by which forestry as an industry can be organized. Since forestry is about a natural resource, it is a question of maintenance, rejuvenation and efficient use. Planning the use of forest resources such that they are not

depleted but rather maintained and grown is a requirement for any good forestry policy. Policy is needed to guide how these should happen and policy instruments should give the necessary direction. If they are statements of intent, then, they can become a cause while the outcome of policy becomes the effect of any effort to attain benefits from forest resources.

In as much as forest resources serve as inputs for the production of goods and services and provide services which people are willing to pay for, forests are economic resources and their management can lead to economic growth and development. If forestry policies are the managing principles of forestry, then these policies have the potential of generating economic growth and development. Figure 2.4 shows the conceptual framework for the study. The portion of the framework on the left hand side portrays the cause while the right hand side portrays the effect of decision making to attain economic development in the forestry sector.

Forestry policy generally comes in the form of statements of intentions on the part of policy makers. These intentions are expressed further through legal instruments, institutional frameworks and mechanisms for implementation of the policies, which together form the policy instruments. The working of the policy instruments generates effects on people, the economy and the forest resource. These effects determine whether forestry policy will result in economic development or otherwise.

No matter the ideological leaning of official forestry policy, it can be assessed based on its ability to perform the following tasks:

i) Delivering its stated aims (that is its efficacy)

ii) Delivering its stated aims at reasonable costs to society (i.e. it's cost-effectiveness or efficiency) and

iii) Providing benefits to some people while at the same time making other people worse off than before (that is equity)

These three main areas tend to be the reasons for which forestry policy is formulated while at the same time being basic indicators for evaluating the occurrence of economic development as discussed earlier. Generally, the effect of forestry policy on people's welfare could be realized either directly or through forestry development. While directly policy might aim at the forest as the ultimate target, the benefit or cost of any such effects on the target would directly or indirectly influence people's economic welfare. There is also the situation in which forestry policy could have a direct and almost immediate effect on the welfare of people. While influencing forest stock, taxes or subsidies imposed on forestry operations for example would directly affect incomes of people and therefore affect their economic welfare as well.

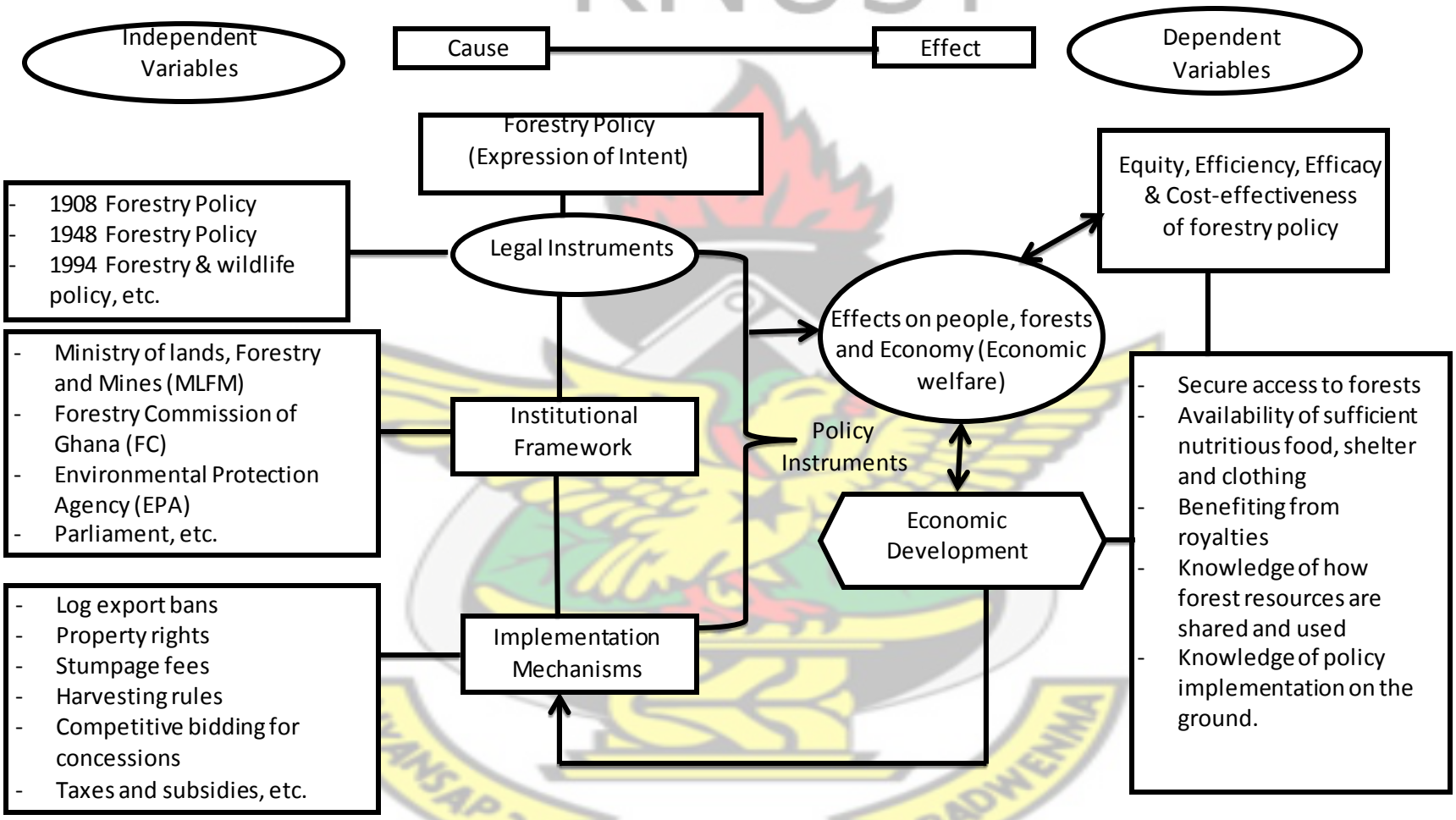


Figure 2.4: Conceptual framework for forestry policy and Economic Development in Ghana
Source: Author's Construct

CHAPTER THREE

METHODOLOGY

3.1 Introduction

Four main procedures were employed in the execution of this research. These were: carrying out a review of literature, collection and analysis of official secondary data on Ghana and Ashanti Region, field survey design and execution and the analysis and synthesis of results. The content and structure of the four main procedures are discussed in this chapter as a sequel to the analysis and synthesis of outcomes of the study.

3.2 Research Design

The general hypothesis that forestry policy is a driver of economic development was empirically tested in this study. Its design is generally quantitative and quasi-experimental. The study used both primary and secondary sources of data. Questionnaire on the effects of implemented forestry policies were constructed and administered to household heads in sampled forestry districts of the Ashanti Region of Ghana. Informal interviews were also used to obtain information from Forestry Commission officials. Official data were mainly obtained from the Forestry Commission of Ghana in the Ashanti Region. Respondents to the questionnaire were aware that the study was taking place. This was not expected to influence the results, since each respondent had agreed to provide honest and true responses. The variables of interest were not under the researcher's direct control. Information on efficiency, cost-effectiveness, efficacy and equity effects of forestry policy implemented in Ghana was elicited with respect to the

Ashanti Region. Thus the study sought to describe and evaluate the real influence of forestry policy on Ghana's economic development.

3.3 Data sources

The nature of the study necessitated the use of both primary and secondary data to aid in assessing the impact of forestry policy on economic development in Ghana. Secondary data were required to assess the efficiency of the forestry policy implementation process. This was achieved mainly through the construction of the Policy Analysis Matrix(PAM) and the computation of the cost-effectiveness ratio. Most of the information needed for the construction of PAM was obtained from Ghana Forestry Commission (FC) data compilation by Hamilton Resources and Consulting in collaboration with the Danish Centre for Forest, Landscape and Planning, Denmark. The compilation relied on primary and secondary sources like the FC's industry data base developed in an industry dialogue process in 2000, a review undertaken by the FC in 2002 and Ghana Statistical Service data. Also, a data pool from UN European Commission, and ITTO tropical timber data were consulted (Birikorang *et al.*, 2007).

The cost of forestry policy in the Ashanti Region was obtained from the government subvention received by the Ashanti Regional Office of the Forestry Commission as discussed in chapter one. These remittances were documented in the Bank Account of the Commission through the Bank of Ghana. The Accounts provided monthly remittances for the commission's operations. These included salaries and personal emoluments of staff as well as money for projects and programmes of the Commission. The accounts

covered the period from the end of 2003 to the beginning of 2009 inclusive. The real annual harvest volumes of timber in the region for the various years were obtained for 1998 to 2008 from the RMSC of the Forestry Commission in their forestry districts database. The main source of primary data was sampled forestry districts in the Ashanti region. Household heads from sampled households responded to questionnaire. These heads of households were considered as the most qualified and resourced to provide complete situational information about their respective households. The responses formed the basic primary data set for empirical analysis.

3.4 The study area

The field survey was carried out in the Ashanti Region of Ghana. The selection of the region was based on its distinctive forestry characteristics as described under the forestry profile section of this chapter. The empirical study comprised of a profile analysis of the region as well as the forestry districts and household responses to questionnaire on forestry benefits. The regional profile examined the social, economic, demographic and institutional settings. The forestry profile outlined the various vegetation divisions by describing the forest types and their characteristics and brings out the importance of forestry to the people of the region. This framework provides understanding of the setting within which forestry policy operates in the region.

3.4.1 Location and Physical features

The Ashanti Region is located centrally in the middle belt of Ghana between longitudes 0.15^0W and 2.25^0W, and latitudes 5.50^0N and 7.46^0N. It occupies a total land area of

24,539 square kilometres representing 10.2 per cent of the total land area of Ghana, being the third largest region after Northern (70,384 sq. km) and Brong Ahafo (39,557 sq. km) regions. It has a population density of 196.0 persons per square kilometre, the third after Greater Accra and Central Regions. More than half of the region lies within the wet, semi-equatorial forest zone. The forest vegetation of parts of the region, particularly the north-eastern part, has been reduced to savanna mainly because of the degrading effects of bushfires and human activities. The region is enriched geographically with lakes, scarps, forest reserves, waterfalls, national parks, birds and wildlife sanctuaries. The Lake Bosomtwe, the largest natural lake in the country, and Rivers Offin, Prah, Afram and Owabi serve as the natural drainage systems for the region. Several other smaller rivers and streams serve as sources of drinking water for residents of some localities in the region (GSS, 2013).There are 30 administrative districts in the Ashanti Region including the Kumasi metropolis which serves as its political capital. The region also has the highest number of constituencies and electoral areas in the country (GSS, 2013).

3.4.2 Forestry Profile of the Ashanti Region

A little over 20% of Ghana's forest reserves are found in the Ashanti Region. This is the highest number of forest reserves found in any one particular region. Naturally therefore the region is prominent in forestry activities in Ghana. With the highest population in Ghana, the region is a place where the impact of any policy can be experienced by the largest number of people in one homogeneous location.

The historical role of chieftaincy in forestry legislation and development in Ghana has been remarkable. The Ashanti kingdom being probably the most powerful chieftaincy setup in Ghana could have had the most pronounced chieftaincy influence on forestry policy in Ghana, given the region's strong chieftaincy structures. This influence is two-fold; collaboration and resistance where necessary to ensure that traditional land title was maintained and also that appropriate royalties to stools were duly paid.

The Ashanti Region houses the only Forestry Research Institute of Ghana (FORIG). The Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi complements the work of FORIG by running the Faculty of Renewable Natural Resources and the Faculty of Forestry. The only Resource Management Support Centre (RMSC) of the Forestry Commission of Ghana is also cited in the region. This unit acts as the storehouse of data for forestry in Ghana. The Ashanti Region hosts the highest number of timber firms in Ghana. In addition, the largest single wood market in Ghana has for several years existed in the region.

With this background, it was the opinion of the researcher that forestry policy in the Ashanti Region would have enough implementation experience and impact to affect the welfare of forest communities, district assemblies in which these forests were located as well as the Ashanti Region as a whole. The region hosts a unique and exceptional assembly of all the structures for forestry policy activities to warrant study on forestry policy impact in Ghana.

3.4.3 Natural Vegetation

The region has two main forest vegetation zones namely the semi-deciduous and savannah. These are further sub-divided into six sub-vegetation zones namely the Moist Semi-deciduous (South East subtype), the Moist Semi-Deciduous (South West subtype), Savannah Woodland, Moist Evergreen, Dry semi-deciduous (fire zone) and Dry semi-deciduous (inner zone). It has a total of 59 forest reserves covering a total area of 3,796.23sq km which is about 15% of the land area of the region. The remaining 85% of the region falls under the off- reserve forest areas of Ghana. Figure 3.1 shows the vegetation of the region.The various vegetation zones are described below:

3.4.3.1 Moist evergreen forest

The moist evergreen forest (MEF) occurs to the immediate north and east of the rain forest; it is actually a transitional zone between the latter and the moist semi-deciduous type. It lies in the south-western part of the region and occupies an area of about 164,500 hectares

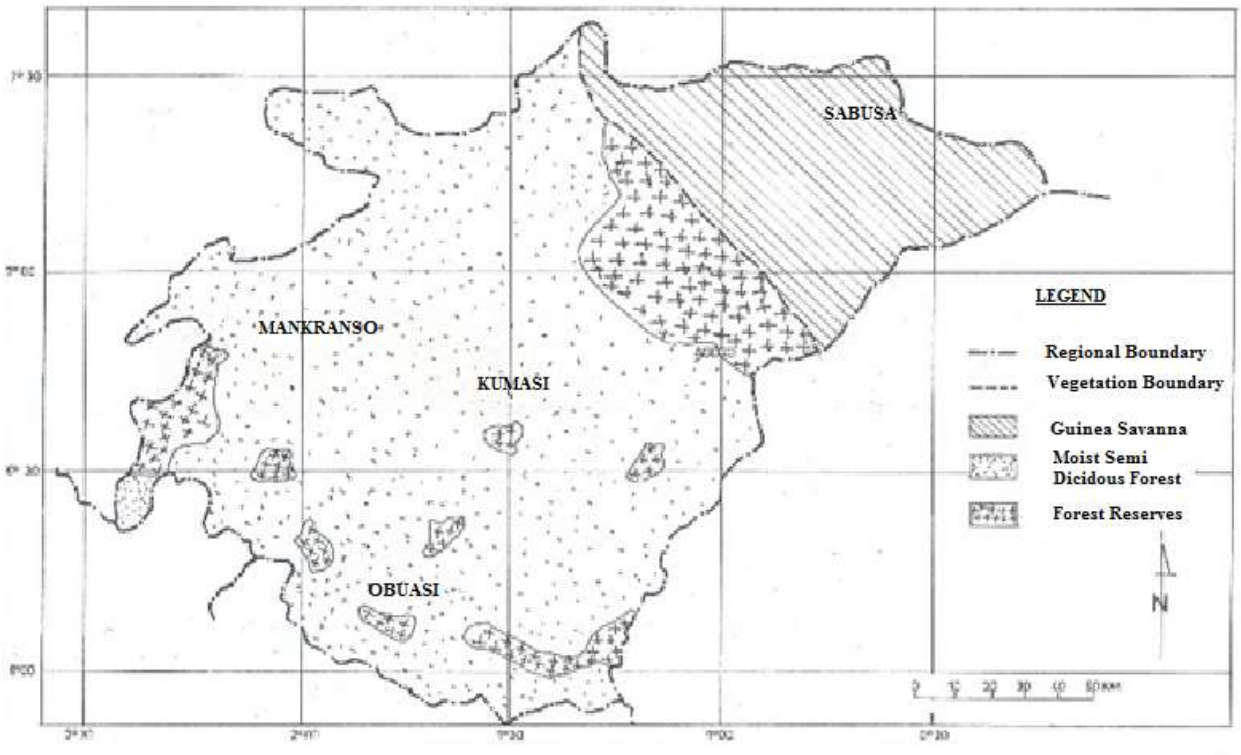


Figure 3.1: Vegetation Map of Ashanti Region

Source: Kumasi Metropolitan Assembly

3.4.3.2 Moist Semi-Deciduous Forest

This vegetation occurs in the central portion of the region. It lies between Moist Evergreen Forest and south of the Mampong scarps and its continuation to the northwest. Near the big towns, repeated farming has reduced the vegetation to shrub, with an occasional big tree as a relic of the former forest.

3.4.3.3 Dry Semi-Deciduous Forest

The dry semi-deciduous forest (DSF) occupies the northern limit of the tropical high forest. It comprises the inner zone and fire zone subtypes. It has a narrow breadth and runs almost northwest to south west. It occupies an area of 301,200 ha. The forest is slightly different in structure from the rest of the high forest, for there is no significant

difference between the upper and emergent canopies. The upper storey is uneven and broken. Water availability becomes very crucial here, since this vegetation is more exposed to drying effects of the ‘’harmattan’’ than the forests to the south.

3.4.3.4 Savanna woodland

The Savanna Woodland occupies the north-eastern part of the region. It has an area of 522,800 ha. The area is sparsely populated. This woodland is normally composed of short statured trees, usually not forming a closed canopy, and often very widely spaced. Most of the tree species are fire resistant and / or fire-hardy and have thick bark. The ground flora is often composed of a continuous layer of grass. The area lies within the ‘’one peak’’ rainfall zone (August- September). Even though the annual precipitation is scarcely less than 1,000 mm and may reach 1,250 mm, the severe dry season is the limiting factor on the vegetation.

3.4.4 Forest Administration

Forest administration in the Ashanti Region, just as in the whole of Ghana is based on the Forest districts concept. The Regional forestry administrative system is made up of 7 forest districts. These are Bekwai Forest District, Offinso Forest district, Nkawie Forest district, Juaso Forest district, New Edubiase Forest district, Mampong Forest district and Kumawu Forest district.

Each forest district has a district manager with his staff, who report to the regional office on quarterly and monthly basis respectively depending on the reporting requirement of

the specific project being implemented. These districts being within a uniform ethnic, vegetation and political region are generally homogeneous, making it easy to apply outcomes in one district to the others. Figure 3.2 shows the forest districts in the Ashanti Region.

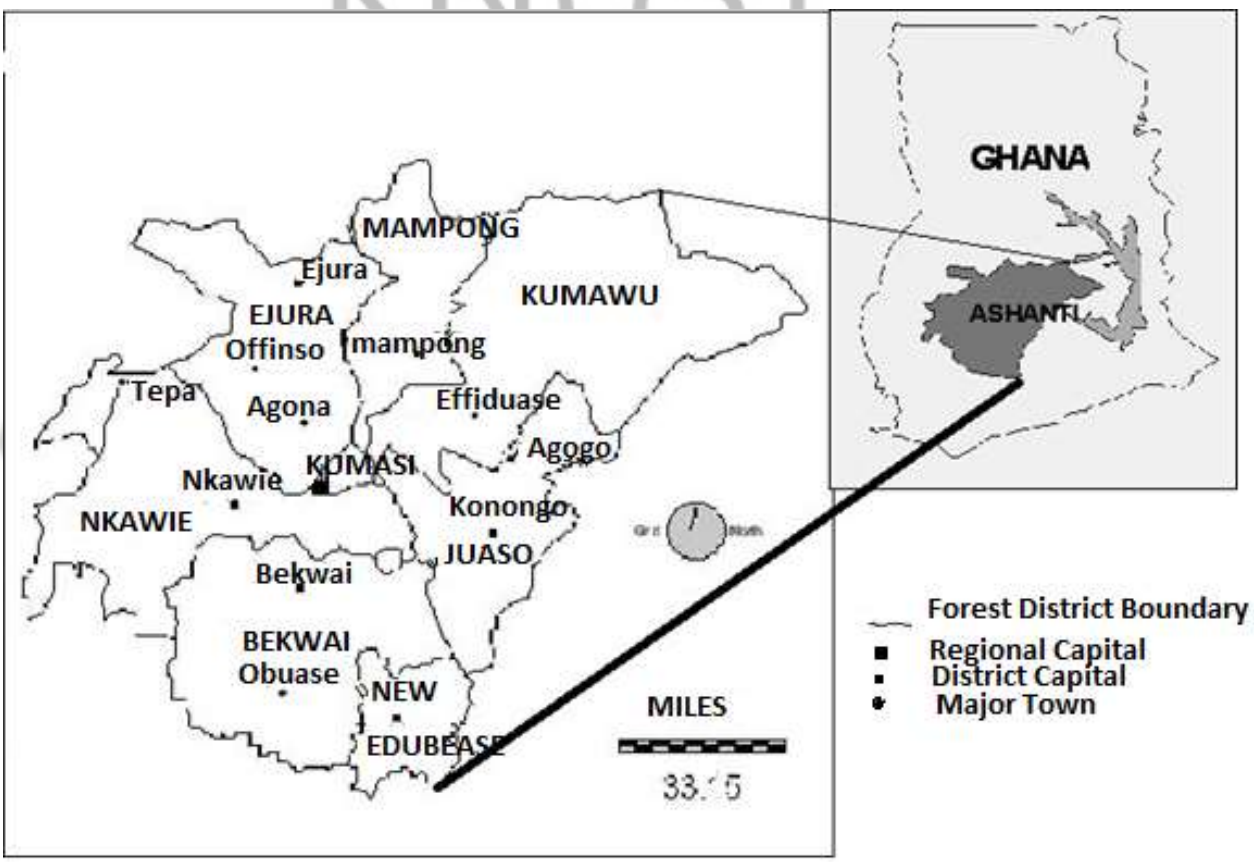


Figure 3.2: Map of Ashanti Forest Districts

Source: Kyem (2000)

Each district oversees forested areas within its boundaries and is catered for from the regional budgetary allocation. It is empowered to generate funds internally and account for it to the regional office. The forestry districts are not aligned to the political administrative districts. Thus one forestry district may fall within more than one political

district and vice versa. This attribute of the forestry districts makes them operate not in conformity with the political administrative system, in one sense advantageous and in another disadvantageous. Thus the implementation of forestry policy within each forestry district needs to be monitored not on political administrative criteria but on forestry administration criteria. Such an administrative system rids the forestry sector of some political interference which a politically based administrative system would have created.

3.4.5 Demographic and Social Characteristics

A major influence is exerted on the forestry sector in the region by the demographic, social, economic and cultural characteristics of the region. Even though more than half of the population in the region is in the urban areas, 20 districts have more than half of their population in rural areas. The age structure of the population in the districts is skewed towards the youth. Apart from the Kumasi metropolis, between 40.0 and 47.0 per cent of the population in the remaining districts are below 15 years. The female population exceeds the male population in most (21) districts.

The proportion of the dependent population in the districts is relatively high, varying between 42.2 per cent and 57.3 percent. The proportions of male-headed households exceed that of female headed ones in all the districts (GSS, 2000, 2010).

3.4.6 Population characteristics

The region is the most populous and one of the most rapidly growing regions in the country. The2000 census recorded the region's population as 3,612,950, representing 19.1 per cent of the country's population. This increased to 4,780,380 representing 19.4 per cent of the country's population in 2010. The region's share of the national population

increased steadily from 16.5 per cent in 1960 to 17.3 per cent in 1970 but remained almost the same (17.0%) in 1984 and increased to 19.1 per cent in 2000 before increasing to its current level (19.4%) (GSS, 2013).

3.4.7 Economic characteristics

3.4.7.1 Types of economic activity

Agriculture/Hunting/Forestry is the major source of employment for majority of the people in the districts. Except in three districts, Agriculture provides employment to more than half of the economically active population in the region. Trade, which is the next most important economic activity in twelve districts, employs between 3.1 and 20.7 per cent of the economically active population. Manufacturing is the second largest industry in terms of employment in six districts,

The Adansi West District where the Ashanti Goldfields Company has its largest operational mine in Ghana, has a relatively high proportion (19.4%) of its population engaged in Mining/Quarrying. The proportion engaged in Mining/Quarrying activity is not significant in the remaining districts.

3.4.7.2 Major Industrial Activities

The timber and wood products trade in the region is the most prominent in Ghana. The largest single wood market in Ghana was located in Kumasi (Anloga wood market). This market has now been relocated to Sokoban wood village, which is also in the region. The 2003 industrial census of Ghana identified some benefits derived from the timber and wood products sector in the region. The benefits captured by the census were mainly in terms of employment and income, which were widely spread within the districts. The

benefits were almost evenly spread among the districts with the most populous getting more. Generally the average benefit was not significant when distributed equally among workers in the sector. The average income per worker was GH¢ 910.46 per annum for the 17,900 workers in the sector in the region. The value added as captured by the census was GH¢ 73,982,200. This means 22% of the value added was paid in the form of wages and salaries to workers in the sector who are mainly people in the low income group. The remaining 78% of the value added went to owners of land, capital and entrepreneurial skills. Thus the low income groups were not treated equitably regarding the distribution of the gains from the timber and wood sector business in the Ashanti Region (GSS, 2003).

3.4.8 Wood and energy use characteristics

Construction of housing units has been one of the main sources of forest depletion in terms of local consumption of wood and wood products. The wood used here has predominantly come from illegal chainsaw operators.

Wood and charcoal are the two main sources of fuel for cooking. Over 92.0 per cent of households in 14 districts and between 74.8 and 89.1 per cent in four districts, including the Kumasi metropolis, use either charcoal or wood for cooking. Apart from the Kumasi metropolis, where 10.8 per cent of households use gas for cooking, the proportion of households in the remaining districts, using gas for cooking, is less than 5.0 percent. This energy use structure makes it imperative to design a forestry policy which would provide enough wood for fuel and at the same time lead to conservation of the forest resource.

3.5 Land use in Ashanti Region

The present pattern of land use in Ashanti Region, like the rest of Ghana, is the result of the interaction between a number of factors of the region's physical and human geography. The broad demarcation is determined by physical factors. For example, whereas cereal production is prominent in the Savanna Woodland, cocoa production is the dominant crop cultivated in the high forest zone, the two requiring different rainfall patterns. The pattern of non-agricultural land use is of secondary importance to this demarcation. Non-agricultural occupations within the structure of subsistence economy, such as gathering, hunting, and fresh-water fishing, are similar throughout the region and are complementary to agriculture. Table 3.1 shows land use classes in the region for 1986 and 2003. In 1986 the most important land use form was forest which covered over 71% of the region. The situation however changed in favour of agriculture and housing and utility by 2003 and has continued to be so.

Table 3.1: Acreages of land use classes in the Ashanti region

Categories	Land use class areas in km^2 (and %)	
	1986	**2003**
Forest	528.35 (71.22)	246.96 (33.24)
Agriculture	169.13 (22.77)	358.68 (48.28)
Stable	1.89 (0.25)	2.15 (0.30)
Housing &Utility	43.49 (5.85)	135.07 (18.18)
Total	742.86 (100.00)	742.86(100.00)

Source: Koranteng and Zawila-Niedzwiecki (2008).

3.5.1 Crops

Cocoa, the most important commercial crop, is extensively cultivated in the region, which is one of the largest producers of the crop. Coffee is to some extent regarded as an alternative to cocoa but of minor importance in the region. The cereals are maize, rice,

millet and guinea corn. Other arable crops consist of cassava, yam, cocoyam, and plantain. Fruits and vegetables comprise pineapple, oranges, tomatoes, garden-eggs, okro, groundnuts and pepper.

3.5.2 Mining

Gold is the ore which is mined on a significant scale in the region. Several high-yielding underground gold ore-bodies occur in the Tarkwaian and Brirrimain formation in the forest zone. Gold is mined in underground workings mainly at Obuasi and Konongo. The direct effect of mining on land use is small, but their location has a considerable indirect effect. Communications have been built and labour has been attracted to areas concerned and the demand for food, fuelwood and pit props which the mines have created has radically modified the local subsistence economy. Small-scale surface mining has assumed alarming proportions leading to interference in some of the traditional land use activities. Some forests are mined destroying the vegetation and biodiversity.

Koranteng and Zawila-Niedzwiecki (2008) wondered whether the people in the region were aware of the outcomes of the Rio Earth Summit (1992) and other international conventions to protect the environment. This reaction emanated from their discovery of how the people of the region did not seem to care about forest conservation (Klein, 2001). This however could be a misconception as the causes of deforestation and other environmental degradation issues are esteemed in the struggle for survival and economic freedom in Ghana. Ghanaians have long cherished traditions of managing their environment. For example it is a taboo to farm along rivers and other water bodies. The

traditional laws sought to protect rivers, lakes and their catchments from drying (Akuoko, 2001). However, these traditions are threatened and eroding as a result of civilization and proliferation of diverse modern beliefs.

The modern Ghanaian society and for that matter its environments are governed by proper laws. For example, laws and statutory bodies protect trees in forest reserves. For quite a long time the real problem of deforestation was the management of trees outside of the forest, which were unregulated and left to the mercies of landowners (Boffa, 2001). Deforestation is a real problem in Ghana. It is escalating as the years go by. It is estimated that, Ghana loses about 130,000 hectares of forest every year (FAO, 2010). This could be attributed to the forest policies which were tailored to the establishment of forest reserves with the goal of maximization of timber production. The main thrusts of these policies were economic and not the maintenance of ecological systems and environmental conservation of the forest reserves (Koranteng and Zawila-Niedzwiecki, 2008).

Table 3.2shows that changes in land use/cover from 1986 to 2003 (seventeen year interval) was clearly driven by anthropogenic forces. Hens and Boon (1999) argued that a major characteristic of land use/cover in Ghana has been competition among three main economic sectors namely agriculture, mining and logging. Within a period of seventeen years (1986-2003), the land cover had been altered so much mainly by the expanding human settlements and agriculture. According to Koranteng and Zawila-Niedzwiecki (2008), the land use/cover change in Kumasi and its environs is attributed to the following factors:

1. Rapid increase in the population contributing significantly to deforestation;
2. High incidence of illegality in the timber industry leading to an estimated US$50 million of wood illegally exported from Ghana annually;
3. Most clearing done for agricultural purposes – grazing cattle, planting crops and
4. Developing countries relying heavily on wood fuel, the major energy source for cooking and heating.

3.6 Forestry and livelihood support

People have always used trees as a source of food, energy and shelter, for the production of tools and weapons, for building materials, medicine, fibre, tannins, dyes and many other uses. The forests of Ashanti have played a major role in meeting the forest product needs of the people in the region. The unreserved forest of the region, including bush fallows and farmlands, have been a major source of timber, fuelwood, poles and other valuable forest products. These areas are often more easily accessible to the rural population than the reserved forest areas. In 1970, for example, about 40% of the timber extraction from the forest zone in Ghana was obtained from the unreserved forest zone in which Ashanti Region featured prominently (Forestry Department, 1978).

According to the FAO (2003), wood is the main fuel used for cooking and heating in rural areas and is partly replaced by charcoal in the urban areas in Ghana; the Ashanti Region is no exception. The consumption rate is based on 1.0m^3 and 0.2 m^3 of fuelwood and charcoal respectively per capita per year. The Forestry Department (1971) reported that other products, including shingles, bamboos, cane, palm oil, palm wine, gums and resins

were also produced mainly from the unreserved forest areas, including farmlands and bush fallows. Particularly, in the rural settlements in the region, wood carving, basket weaving, mortar manufacturing, canoe making and other village industries were prevalent, most of the raw materials being obtained from bush fallow lands and farmlands.

Due to the increasing demand for wood and wood products, both at the regional and national levels, as a result of factors such as increased urbanization, industrialization and population growth, coupled with the clearance of the original forest, the capability of the forest to provide forest products is likely to have declined. Brookman-Amissah (1985) reports that, even in the Subri area (a rural forest locality), the forest reserve was gradually becoming the area's only source of fuelwood and that firewood has ceased to be "a free good", let alone timber products.

3.7 Choice of sample

Sampling was used to obtain primary data through questionnaire administered through face-to-face contacts with household heads in the Ashanti Region. A simple random sample of 2 forest districts was selected from among the seven forestry districts of the Ashanti Region for the administration of questionnaire. This comes to about 30% of the forestry districts in the region.

The sample selection procedure involved a choice from a bowl of seven folded pieces of paper each bearing the name of one forestry district. The selection was done one at a time

without replacement. The sampled districts were the Kumawu forest district and the Nkawie forest district. Figure 3.2 shows a map of the Ashanti Region indicating the sampled areas. The survey covered forest communities within the two forest districts. These two forest districts together had 99 settlements out of which 19 were sampled following a random sampling selection procedure of selecting from a well-mixed set of folded papers bearing the numbers 1 to 99, one at a time without replacement. This provided a sample of about 20% of the number of settlements. The communities thus sampled were Kumawu, Dadease, Bodomase, Asakyerewa, Akrokyere, Bodwoase, Oyoko, Wonoo, Akotosu, Nkawie, NkawiePanin, NkawieKuma, Nkawie-Toase, Toase, Ankobea, Nkawie New Site, Zongo, and Nkubem (Table 3.2).

A sample size of 200 household heads was selected, first based on the total population of about7564 households in the communities. In addition, a precision level of +/-10% where the confidence level is 95% and P = 0.5 was selected. Then, making room for a 50% non-response rate, the published table of sample sizes of Israel (2009) was used to obtain the sample size of 200 household heads.

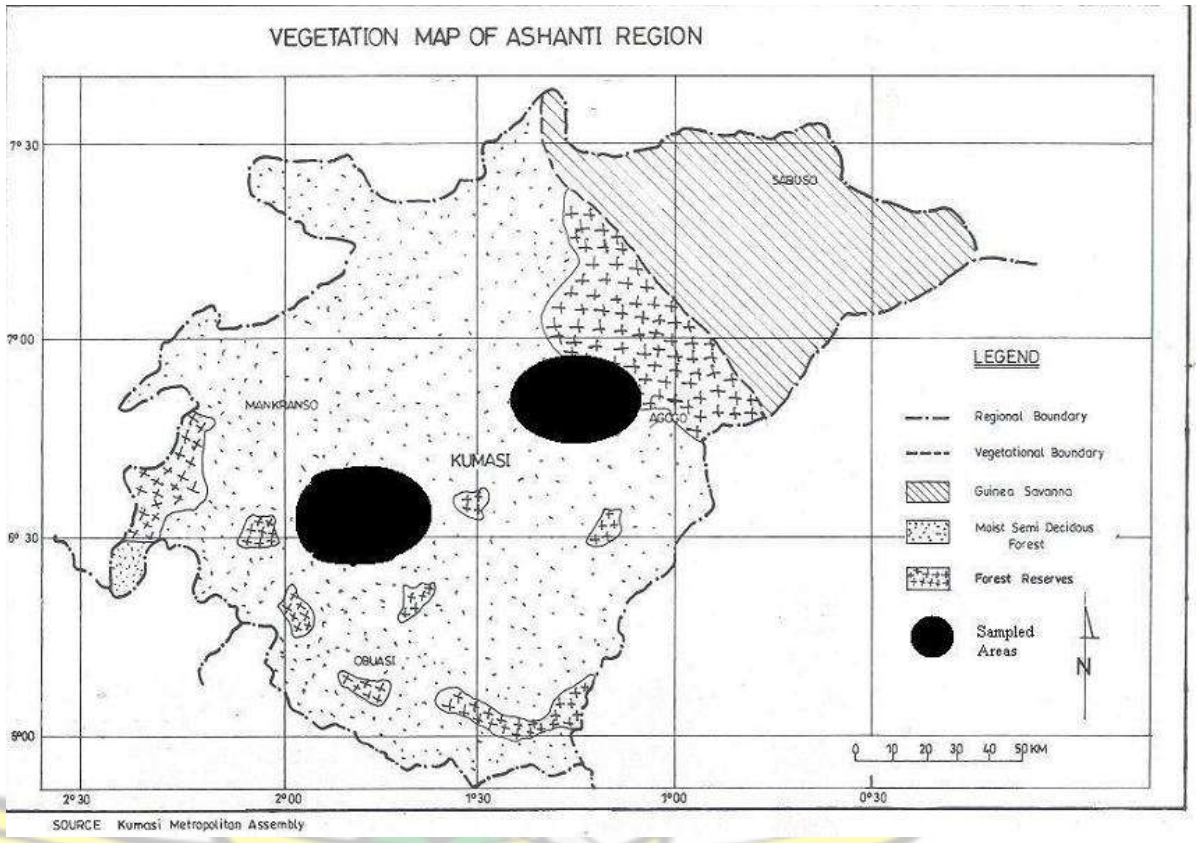


Figure 3.3: Vegetation Map of Ashanti Region showing Sampled Areas

The household heads selected from the communities responded to questionnaires, based on their availability, according to the systematic sampling procedure where after a first house the fourth house was next to be contacted. The second stage sampling procedure sought to include residents from as many suburbs of the districts as possible. Given the homogeneity of the communities regarding forestry activities, it was deemed sufficient to carry out random sampling across each community. Table 3.2 shows the communities and the corresponding number of households who provided responses to the questionnaires.

Table 3.2: Number of household heads (respondents) from various settlements

Location	Population	No. of Households	Households Sampled	Percentage of Sample
KUMAWU	15634	2384	20	12.7
DADEASE	3808	614	5	3.2
BODOMASE	8756	1096	10	6.3
ASEKYEREWA	1179	190	3	1.9
AKROKYERE	1206	229	4	2.5
BODWEASE	706	106	3	1.9
OYOKO	4678	692	5	3.2
WONOO	839	109	3	1.9
AKOTOSU	218	33	4	2.5
NKAWIE	110	22	4	2.5
NKAWIE PANIN	1519	326	13	8.2
NKAWIE KUMA	4836	795	22	13.9
NKAWIE NEW SITE	NA	250	5	3.2
ZONGO	NA	420	10	6.3
NKUBEM	NA	25	3	1.9
NKAWIE-TOASE	NA	296	10	6.3
ANKOBEA	NA	78	4	2.5
TOASE NEW SITE	NA	187	5	3.2
TOASE	4351	836	25	15.8

Source: Author's fieldwork; Population figures are based on the GSS Census (2000)

NA means the GSS did not capture community in its 2000 census report.

3.8 Data collection

The main primary data collection instruments were structured questionnaires administered to household heads within the study area, informal unstructured interviews with public forestry officials and searches from official documents. Primary data was collected from household heads on the benefits they derived from forests and forest revenues that accrue to the locality, mostly in the form of royalties. Biographical data were also obtained from the household heads. Both qualitative and quantitative data were obtained for analysis. This was to help assess the extent to which households benefited from forests, particularly those within their localities as a result of the various forestry policy regimes. Household heads were asked questions on:

- The goods and services they obtained from the forests
- How regularly they derived benefits from their respective forests
- The length of time they had stayed in the community
- The goods/services they used to obtain from the forest which they no longer obtained
- The type of education they had been given on sustainable forestry
- Their knowledge about government forest policy and its implementation
- Their knowledge about royalty payments from government to district assemblies and stools for trees harvested by holders of concessions.
- The use to which royalties were put by the district assemblies and stools and whether they benefited from such royalties and in what way they got such benefits. (Please see questionnaire in Appendix 2)

A two-day reconnaissance survey was carried out to map out the appropriate strategies for data collection based on conditions on the ground. Data was collected over a three week period from September 20, 2010 to October 13, 2010 between the hours of 8:00am and 5:00pm. Three trained research assistants were used: a graduate of KNUST who was an experienced professional data collection agent, a postgraduate Economics Student of KNUST and a teaching assistant from the Department of Economics of KNUST. These assistants were trained for two days on how to go about their tasks.

A pretest of the questionnaire was carried out prior to the main administration of the questionnaire, which confirmed that the questionnaire were well understood by

respondents and were going to elicit the desired responses for the equity analysis they were intended for. Respondents were required to respond to questionnaire after a brief introduction of the interviewer and the purpose for the study. Generally, respondents were very cooperative. Due to the high illiteracy rate within the communities, questions were posed in Twi, the commonest native language in the communities, in most of the cases. In all, 158 household heads, that is, about 79% of the 200respondents provided complete information.

3.9 Data processing

Steps were taken to address validity in the study. The collection of information from various sources was put to triangulation test by assessing whether convergence existed among them or not. Triangulation was used to authenticate the field data collected and documentary analysis as part of secondary data collection. For instance, primary data responses were compared with official forestry sector reports in which local forest community participants answered similar questions. Consistency of patterns within the data was also checked as well as agreement between the data and existing literature or documented evidence. All incomplete questionnaires were excluded. The next step was to feed the data into the PAM, cost-effectiveness, Statistical Package for Social Sciences (SPSS) and R analytical framework respectively, to generate outputs for analysis as described in the sections following.

3.10 Data Analysis

The data analysis consisted of examining, categorizing, aggregating and matching the evidence from data to address the main research questions and objectives of the thesis. The main analytical framework was based on economic welfare assessments of forestry policy implemented in the Ashanti region. Four main analytical techniques were employed- efficiency analysis (based on PAM analysis), cost-effectiveness analysis, efficacy analysis and equity analysis. The main indicators for analysis were the profitability, divergence, summary ratios, cost of avoidable deforestation per cubic meter of forest, the Gini-index and the extent of net deforestation in the Ashanti region. Each indicator was assessed based on whether it enhanced or limited economic welfare improvement in Ghana.

3.11 Framework of Analysis

The framework of analysis for describing the state of forestry policy in Ghana after one century of policy implementation was descriptive. This is because the state of forestry policy needed to be understood as it pertained on the ground. The descriptive framework provided a vivid explanation of the main characteristics of forestry policy existing in Ghana as a consequence of a century of forestry activity.

The framework of analysis for evaluating the efficiency of forestry policy implementation was based on an assessment of marginal social costs and marginal social benefits of forestry policy implementation. Efficient policy moves society to a point where marginal

social forestry policy costs and benefits are equal. This required knowledge of both marginal social forestry policy costs and benefits.

With respect to evaluating the net economic benefit of forestry policy, the framework of analysis was based on an examination of the real costs of acquiring forestry policy benefits over time. This entailed an assessment of whether it was progressively cheaper to maintain one unit of forest than previously with the implementation of forestry policy. A progressively higher cost meant a decreasing net economic benefit, while a progressively lower cost meant increasing net economic benefit with respect to forestry policy implementation.

To determine the equity effect of forestry policy in the Ashanti Region of Ghana, a framework of analysis based on the distribution of costs and benefits among stakeholders was used. The fairer the distribution of benefits and costs was, the better the equity effect was. The equity effect assessed this way provided a direct assessment of whether forestry policy implemented was leading to welfare improvements or not.

3.12 Techniques of Analysis

3.12.1 Scenario Building

The description of the state of forestry policy in Ghana after more than one century of forestry policy implementation used a scenario building technique of analysis. This involved a discussion of the main occurrences within Ghana's forestry sector which served as focal points that explain policy practices in the sector. Such a technique

provides a vivid mental picture of the state of forestry policy. The scenarios described forestry policy in Ghana under the following coordinates: policy type, policy areas, policy content, policy instruments, policy actors and policy effects.

3.12.2 The Policy Analysis Matrix (PAM)

The analytical technique for assessing the efficiency of forestry policy implementation in the Ashanti Region was the Policy Analysis Matrix (PAM). Theoretically, it captures the evaluation criterion 1 derived in section 2.2 of this thesis. This technique was selected because of its unique capacity to assess the efficiency of implemented natural resource policy. Its application in literature has been mainly for agricultural policy purposes (Seini, 2002), which were considered quite close to forestry policy, hence its adoption with some modification for the study.

3.12.2.1 Identities of the Policy Analysis Matrix

The main functions of the PAM methodology are to furnish policy makers with information and analysis to help in three main spheres of forestry policy. These areas are private profitability, social profitability and the transfer effect of forestry policy. The PAM for a forestry system facilitates the computation of the competitiveness of the system in the form of private profitability, obtained through the top row of the matrix (Table 3.3). Social profitability which estimates the social opportunity costs of inputs are computed from the second (middle) row, while the transfer effect of policy implementation are computed from the third row of the matrix.

These measures are obtained through identifying the rows and columns as composed of two sets of relationships or identities – the profitability identity and the divergence identity. Such identification shows the profitability identity as a relationship across the columns of the matrix (profits equal revenues minus costs), while the divergence identity is a relationship down the rows of the matrix, being the causes of the differences between private and social prices and costs.

Table 3.3: Entries in the Policy Analysis Matrix

	Revenues	Costs	Profits
Private	R_p	C_p	P_p
Social	R_s	C_s	P_s
Effects of Divergences	D_r	D_c	D_p

Source: Monke and Pearson (1989)

3.12.2.2 Research Inputs and Outputs in the Policy Analysis Matrix

Four groups of entries in the PAM constitute the research inputs for empirical analysis. These are R_p, C_p, R_s and C_s whose values are obtained from activity budgets, government documents or industry sources of the sector of the economy concerned. Due to the fact that the PAM is based on two identities, the entry of the research inputs will lead to the generation of the remaining inputs, referred to as research outputs.

The research results of the PAM approach, also called the revenue outputs are obtained through either the profitability or divergence identity by subtraction among the corresponding entries of the research inputs as discussed earlier. The net transfer, described as either the net effect of all divergences or difference between private and

social profitability, is a single measure which can show the extent to which policy has been efficient.

3.12.3 The Cost-Effectiveness Analysis

To evaluate the net economic benefit of forestry policy in the Ashanti region, the Cost-Effectiveness Analysis technique was used. Cost-effectiveness analysis (CEA), an economic study design in which consequences of different policies are measured using a single outcome, usually in 'natural' units (NICE, 2008) was employed to augment the decision making capacity of the PAM. This became necessary because of the generally difficult and seemingly unquantifiable costs associated with the growth and maintenance of natural forests as well as the real cost of natural forest land. As with all economic evaluation techniques, the aim of cost-effectiveness analysis is to maximize the level of benefits relative to the level of resources available. An ex-post CEA addresses the question of how far objectives have been achieved, and at what cost. In either case, the cost-effectiveness of a policy option is calculated by dividing the annualized cost of the option by a quantified measure of the physical effect, such as hectares of forest cover recovered.

Cost was modeled as the annual expenditure for forestry policy implementation through the Forestry Commission. The computation for cost was then done on annual basis from the Bank transaction records of the Forestry Commission of Ghana. Thus the real cost of forestry policy to the economy of Ghana, in the Ashanti Region was obtained from the

end of 2003 to the beginning of 2009. This covered 182 different transactions through the Bank of Ghana.

The effectiveness of forestry policy in this thesis was modeled on the concept of avoidable deforestation. Avoidable deforestation here refers to the deforestation which should not have occurred over and above the annual allowable cut (AAC) of timber, the AAC being the Statutory Policy Limit for harvests. Here the AAC for Ghana was obtained for various years; 1 million m^3 for 1997 to 2001 and 2 million m^3 from 2002. Since this AAC is for the entire country, a proportionate AAC for the Ashanti Region was computed. This computation was based on the fact that the Ashanti Region has about 20% of the country's forest reserves. This gave a regional AAC of 200,000 m^3 for 1997 to 2001 and a regional AAC of 400,000 m^3 for 2002 onwards. Timber was used because a disproportionate loss of forest resources through timber from forests amounts to a distortion of the forest ecosystem resulting in the loss of other forest resources. The harvest of non-timber forest resources (NTFRs) though largely ignored or not well accounted for in most official documents, does not seem to pose any serious threat to the forest resource stock.

To obtain the avoidable deforestation for any given year the real timber harvest for that year was deducted from the ACC for that year. The excess of the harvest over and above the AAC was the avoidable deforestation. To derive the cost-effectiveness, the cost-effectiveness ratio (CER) was computed. This is the ratio between the cost of forestry policy and avoidable deforestation, which is the ratio of the forestry policy expenditure per cubic meter of forestry cover which was preserved or lost.

3.12.4 Lorenz Curve and Gini-index

To evaluate the equity effect of forestry policy in the Ashanti Region of Ghana, Lorenz curve and its accompanying Gini-index was used. This was to ascertain the extent of distribution of benefits through forestry policy. It is essential to explain the potential of forestry policy to generate a workable scale of local benefits both in terms of livelihood contribution and as an incentive for communities to make long-term investments in economically sustainable forest management. This potential is to a large extent dependent on the relative strengths of benefits that households and other economic units encounter in the forestry sector through implemented policy.

The potential benefits of forestry policy for local people are three fold: social, economic and environmental. The Social dimension has to do with the strengthening of existing coordination and governance mechanisms and development of new mechanisms (collectively referred to as institutional enhancement); improved relationships and networks (social capital); political empowerment; strengthened tenure, capacities, welfare and security. The economic dimension is in terms of access to non-timber forest products (NTFPs) and timber for direct household use; income from the sale of NTFPs, agro-forest yields, timber and environmental service markets and employment in forestry policy activities.

Finally, the environmental aspect of the benefits of forestry policy includes the maintenance of environmental services (biodiversity, soil health, agricultural

productivity, carbon sequestration, and air and water quality). The frameworks draws on relevant commons research, which has established that, the benefits or otherwise of resource management systems emerge through an interplay of governance arrangement at various levels, resource conditions, and socio-economic conditions, amongst other factors (Agrawal and Gupta 2005, WRI *et al*., 2005).

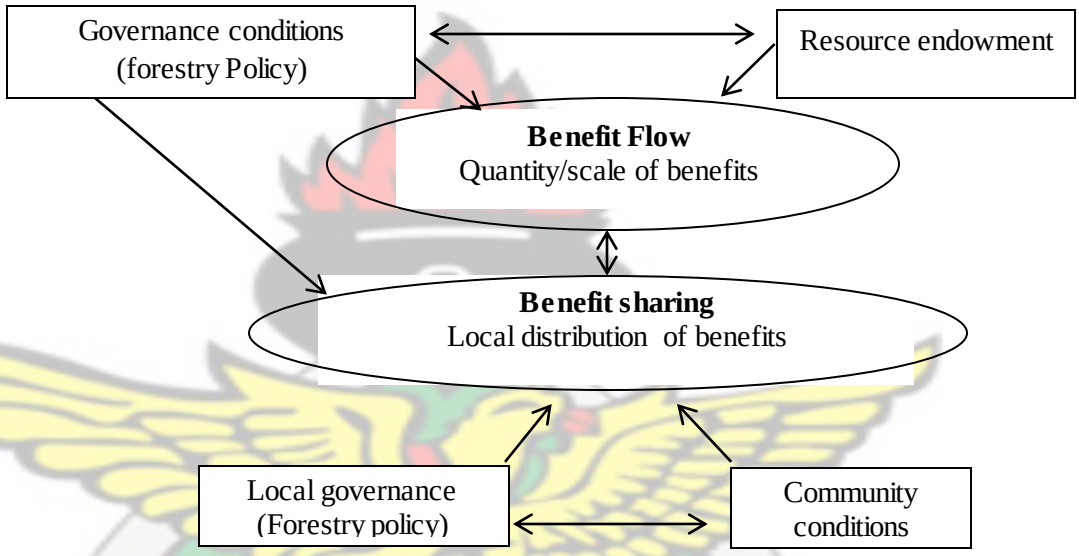


Figure 3.4: Analytical framework for benefits sharing through forestry policy
Source: Adapted and modified from Mahanty *et al*. (2009).

The analysis of benefit flow particularly examined the role played by two key aspects of resource governance (property rights and royalties) as well as the resource endowment (condition and productivity) in shaping the scale and timing of benefit flow. These form the first tier of Figure 3.4. In terms of community-level distribution of benefits, shown as the second tier of figure 3.4, analysis focused on the influence of local governance (e.g. processes and participation) and community conditions (e.g. social rules and norms,

internal differentiation within communities) in mediating who gained what from forestry policy.

The two-tiered approach outlined in Figure 3.4 assumes that distributional inequities resulting from implementing forestry policy are reinforced by local as well as wider societal processes (Hobley, 2007). Generally equity concerns argue for a careful identification of impacts and their incidence on different groups and people (gainers and losers), which for this thesis was captured through the Lorenz curve.

CHAPTER FOUR

THE STATE OF FORESTRY AND FORESTRY POLICY IN GHANA

4.1 Introduction

An analysis of the trajectory of forestry policy in Ghana provides clues to explain the current state of affairs in the forestry sector. Following the events over the past one and a half centuries, it is evident that the several decisions that have been implemented in the forestry sector have influenced the past and have implications for the present and future welfare of Ghanaians and their forests. This chapter describes the state of forestry policy in Ghana after one century of forestry. The descriptive analysis helps to appreciate the context in which forestry policy has operated and also serves as a baseline scenario. It begins with a brief discussion of the forestry sector in Ghana. It then spells out the areas, goals and objectives, instruments utilized, the actors and the implementation activities and effects of forestry policy in Ghana.

4.2 The Forestry Sector of Ghana

Ghana's forests are made up largely of high or humid forests and savanna. The high forests were about 8.2 million hectares around the early parts of the 20th century. By 1950, the country had lost around 50% of it, followed by a further loss of almost 79% by 1980. It is estimated that Ghana's total forest area now stands as 1.62 million hectares which is about 20% of the original stock about a century ago (Ghana Forestry Commission, 2010). This implies Ghana has used up 80% of its forest resources within 100 years. Figure 4.1 shows the condition of Ghana's forest resources.

Ghana's timber export earnings have been around US$170 million per annum, providing just about US$2 million annually in stumpage revenue to local communities. This represents about 18% of Ghana's export revenue and 5-6% of total Gross Domestic Product. The export of timber is ranked the fourth largest foreign exchange earner for Ghana (10.4%) after minerals (36%), cocoa (35%) and tourism (12%) (Ghana Forestry Commission, 2010).

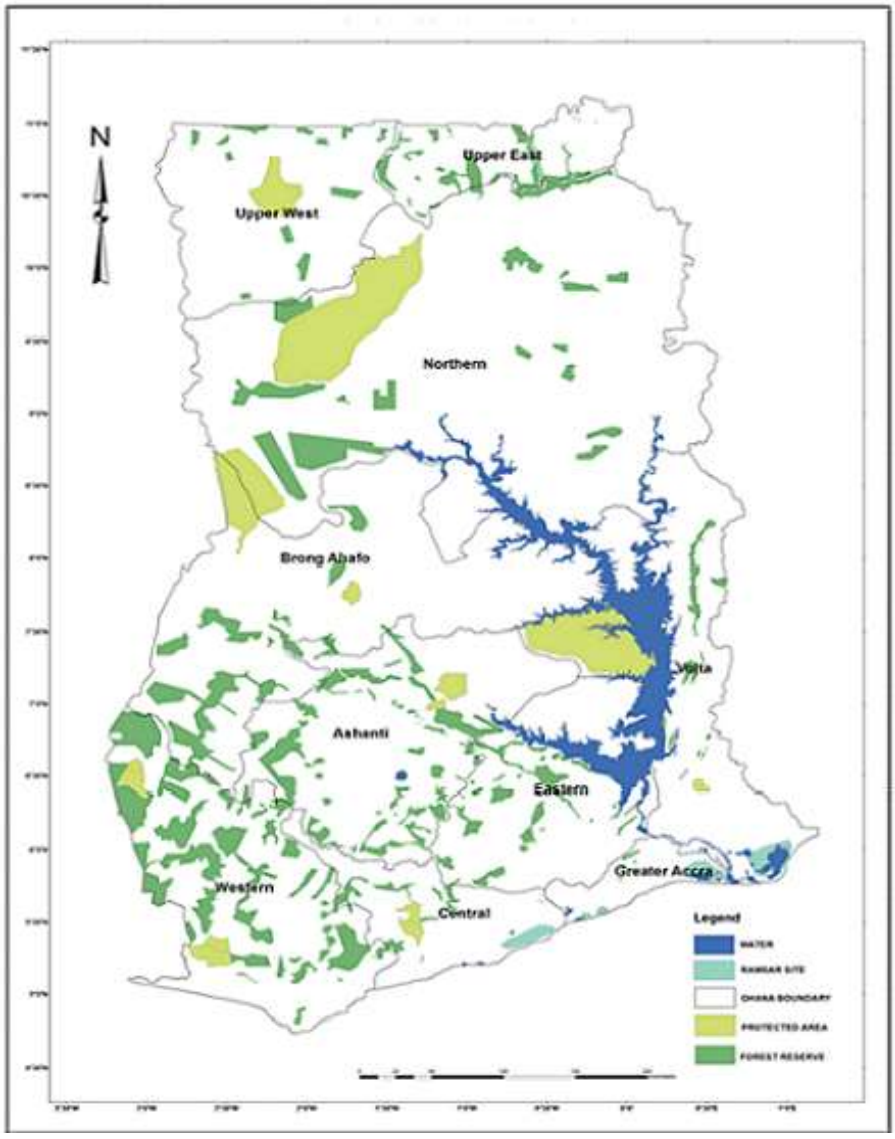


Figure 4.1: Map of Ghana Showing Forest Reserves and Protected Areas
Source: Forestry Commission (2013)

In terms of employment, the sector provides about 120,000 people with jobs directly while also indirectly providing jobs and supplementary income to more than 2.5 million people. Also, Ghana's forestry sector has been its main supplier of energy, providing up to 16 million m^3 of wood fuels worth about US $200 million per annum. This represents over 75% of all energy sources consumed in the country. In rural communities, dependency on wood-fuel exceeds 95% of energy consumption (Ghana Energy Commission, 2010).

Annual domestic consumption of bush meat from Ghanaian forests is valued at about US$350 million. Also, animal and plant products for traditional medicine and cultural practices were estimated to be worth US$13 million (Ankudey, 2002).

The administration and development of Ghana's forestry sector is a shared responsibility between private and public stakeholders. The main public stakeholders are the ministry of Lands and Natural Resources (MLNR) which performs policy and monitoring roles, the Forestry Commission (FC) made up of three main divisions, advices government on policy and resource management. The main private sector stakeholders are traditional leaders, households and timber firms.

It is estimated that about 11 million of Ghana's population lives in forest areas; about two thirds of whose livelihoods are supported by forest activities (Birikorang and Rhein, 2005). To ensure economic progress forest dependent people in Ghana will have to derive the same or better services from forests than previously, particularly in the wake of

Ghana's high population growth rate. Such progress, to a large extent depends on implemented policy in the forestry sector. The following section enumerates and discusses the components of such policy and how they were implemented.

4.3 Forestry policy in Ghana

4.3.1 Forestry Policy Types

There is generally insufficient understanding regarding the formation and implementation of forestry policies in pre-colonial Africa due to scanty documentation (Teye, 2011).Ghana's forest cover by the beginning of the nineteenth century included a large portion of intact forested areas. The existence of a considerable forest cover probably showed that forestry and forestry policy could possibly not have begun with the colonial administration who established a Forestry Department in the Gold Coast(now Ghana) in 1909 (Kotey *et al.*, 1998). Local communities had some implicit policy on forests which resulted in the extent of forest cover before the onset of colonialism. It may however be argued that the smallness of the population of Ghana coupled with the limited harvests relative to existing stocks did not seem to pose any threats to forests at that time.

The policies of central government on Ghana's forests started during the late 1880s through the colonial authorities (World Bank, 2006). Kotey *et al.* (1998) argued that the period 1874 to 1939 was the consultative phase of forestry policy in Ghana. This period among other things witnessed the introduction of colonialism, the formal trade in timber, and increase in cocoa production through forestry activities and the formation of a

forestry department. Subsequently, from 1908 to 1993 the various phases of Ghana's colonial era forestry policy were formulated and implemented.

Ghana's first formal colonial forestry policy was adopted in 1948. Between 1948 and 1993, several legal instruments seeking to complement the provisions of the 1948 policy were put in place. However, it is worth noting that not until after 1994, Ghana was essentially still operating the colonial forestry policy. This thesis classifies this era in Ghana's forestry policy as the late colonial era.

Kotey *et al.* (1998) revealed that post World War II activities in Europe led to higher demand for timber from the Gold Coast. Also, local demands had increased, coupled with vigorous expansion of cocoa farms. These developments in forestry necessitated the formulation of a formal forestry policy in 1948 which was meant to introduce more modern ideas and experiences in the nearly 100 years of existence of the industry. The 1948 Forestry Policy of Ghana had the following as its main objectives:

- To conserve and protect the forest environment.
- To manage the permanent forest estate on a sustained yield basis.
- To promote research in all areas of scientific forestry.

The objective of conservation and protection was based on the consolidation of the earlier notion expressed by the 1927 ordinance for the protection of major water catchment areas and the maintenance of the appropriate micro-climatic conditions for cash crop production. This policy expected the ultimate liquidation of all off-reserve areas of forest.

Kotey *et al*. (1998) reported of growing discontent twith forestry policy in the 1980s and early 1990s. This dissatisfaction arose from the fact that:

1. There was excessive state control of forestry resources to the neglect of owners of the resources and other stakeholders.
2. The practice of forestry at the expense of local economies leading to unnecessary rivalry and confrontation between local communities and the forestry Department
3. The legalization of the total ultimate conversion of the off-reserve forest resources to other uses.
4. There was conflict between forestry and wildlife conservation as a result of the absence of an integrated approach towards them.
5. There were no guidelines that spelt out specifically how the aims and objectives of existing policies

From the issues listed above, it was not surprising that in the 1980s the World Bank observed that the 1948 forestry policy was inadequate for dealing with Ghana's dwindling forest resource, inadequate revenue and weak institutional arrangements. The PNDC Law 42 established Ghana's Forestry Commission initially as an advisory body on policies with members appointed by Government. The initial difficulties of the commission came from the fact that it was not representative enough of all the stakeholders in the forestry sector. It was also seen as only an advisory body which had to recognize efforts by other public institutions in the sector in order to avoid duplication and conflict.

4.3.2 Forestry Policy Areas

Traditional set ups in pre-colonial Gold Coast (Ghana) managed forests on conservation, religious and exploitation basis, which resulted in the protection of vital forests in the form of sacred groves and by the banks of rivers (Teye, 2011). By the early 1890s, log exports had reached 600, 000 cubic feet per annum (Gold Coast Forestry Department, 1924). The timber industry during this period was beset with difficulties in land tenure, the systems of agriculture (shifting cultivation and land rotation) and the attraction of income from cultivating cash crops for exports and gold mining.

The most prominent policy areas were policy concerning the environment and religious observances. These were followed by agriculture and non-timber forest products for subsistence, with timber attracting the least attention of policy. The forests in Ghana, before foreign trade in wood, performed functions which were quite different from their modern role. Like the Black Forest of Germany, the tropical high forests of Ghana served as sanctuaries for the communities in those years when the people of the different regions were at war. For example, the forest concealed the Ashantis from British attacks. The forests were also seen as a source of fuel wood, building materials, game, fruits and herbs among other resources. Forested lands were also the sources of minerals and major agricultural crops such as oil palm (Boateng, 1960).

Bilijo (2005) asserts that the first formal forestry policy of the Gold Coast was promulgated in 1908. Bennuah (1987) found that this first policy was in only one clause and stated as its objective and focus the conservation of a sufficient area of forest suitably

distributed throughout the country in order to protect water supply, prevent erosion and to ensure the maintenance of the climatic conditions existing in the high forest zones, which were essential factors in the cultivation of cocoa, cola and other crops on which the prosperity of the colony largely depended. Wilson (2007) stated that this was the first formal initiative to protect Ghana's forests and to also regulate the use of the resource. It is quite clear that the focus of this policy was on reservation of forests for the protection of cash crops to ensure economic prosperity. Thus the reservation policy had an economic motive.

Most of the policy instruments of the late colonial era were concerned with timber production. As indicated in Table 4.2, the major formal policies and legislative instruments numbered 13, all of which could be classified under 3 main themes; land administration, timber rights and preservation. Of particular significance were clauses 1 and 4 of the 1948 forestry policy of Ghana. Clause 1 spelt out a role of the policy for reservation of forests for protective and productive reasons through the colonial administration or local authority. The fourth Clause required the implementation of a system to allow local administration of forests as well as providing education to local authorities and communities in general to understand clearly the need and benefits of forest reservation (World Bank, 2006).

The 1994 forestry and wildlife policy aimed at conserving and sustaining the development of Ghana's forest resources for maintenance of environmental quality and perpetual flow of optimum benefits to all segments of society. These objectives show that

the ultimate aim of the 1994 forestry and wildlife policy was to enhance the social and economic welfare of Ghanaians. The specific objectives included:

1. Managing and enhancing the permanent estate of forest and wildlife resources for preservation of vital soil and water resources, conservation of biological diversity and the environment and sustainable production of domestic and commercial produce;
2. Promoting the development of viable and efficient forest-based industries, particularly in secondary and tertiary processing, so as to fully utilize timber and other products from forest and wildlife resources and satisfy domestic and international demand for competitively-priced forestry products;
3. Promoting public awareness and involvement of rural people in forestry and wildlife conservation so as to maintain life sustaining systems, preserve scenic areas and enhance the potential of opportunities;
4. Promoting research-based and technology-led forestry and wildlife management, utilization and development to ensure resource sustainability, socio-economic growth and environmental stability;
5. Developing effective capacity at national, regional and district levels for sustainable management of forest and wildlife resources.

One guiding principle of the policy formulated to serve as yardstick for implementation was the retention of a share of financial benefits from resource utilization to fund the maintenance of resource production capacity and for the benefit of local communities. It is worth noting that key among all the aims of the 1994 policy just as its predecessor as

well as the 1996 FDMP is the economic development of Ghana through forestry resource management and utilization. This forms the basis of the analysis which follows in the succeeding chapters of this thesis.

4.3.3 Forestry Policy Content

Prior to the establishment of the Forestry Department in 1909, the development of the universal forest conservation policy by the British colonial administration was meant to ensure that the economic benefits of deforestation was not going to threaten the survival of the colonial administration (Smith, 1996). In 1909 a report submitted by H.N. Thompson to the colonial administration of the Gold Coast on the forestry sector led to the establishment of a forestry department and the passing of a Timber Protection Ordinance.

The first Forestry Ordinance to ensure the enforcement of the reservation and protection of forests was enacted in 1911. This Ordinance however faced serious opposition from the local chiefs who did not accept the reservation programme of the colonial authorities (World Bank, 2006).Table 4.1 provides a summary of the policies before 1948, when a more comprehensive policy was enacted for the Gold Coast.

Table 4.1: Forestry Policy and Legislation in Ghana before 1948

Year	Policy/Ordinance/Legislation
1874	Universal Forest Policy by British Colonial Office
1908	H. N. Thompson's Report on Forestry in the Gold Coast
1909	Establishment of Forestry Department based on 1908 Report
1909	Timber Protection Ordinance
1911	Forest Ordinance
1927	Native Authorities Ordinance No. 18,1927 (Cap 111)
1927	Forests Ordinance, 1927 (Cap 157)
1939	Concessions Ordinance, 1937 (Cap, 136)

Sources: Kotey *et al*. (1998); World Bank (2006) and Bilijo (2005)

In 1993, after the 4th Republican constitution had been promulgated, Act 453 established the Forestry Commission. The following descriptions (in Table 4.2) provide some details of what the policies sought to achieve.

Table 4.2: Description of forestry policy in Ghana between 1948 and 1994

Year	Policy	Description
1948	Forest Policy	Ghana's first formal forestry policy.
1949	Trees and Timber Ordinance No. 20 (Cap 158)	Repealed by the Trees and Timber Decree of 1974
1959	Protected Resources Management Act (Cap 34)	Repealed by the Trees and Timber Decree of 1974
1962	Administration of Lands Act (Act 123)	Gives the President power to acquire stool lands that will be held in trust (in the public interest) and vest the management of all stool lands revenue.
1962	Concessions Act (Act 124)	Repealed by the Timber Resource Management Act of 1997, with the exception of sections 1 and 16.
1974	Trees and Timber Decree (NRCD 273)	Continues the operation of the system of property marks and makes it a criminal offence to fell timber for export without a valid property mark.
1974	Forest Protection Decree (NRCD 243)	Attempts to protect the integrity of forest reserves by prohibiting virtually all activities therein if done without the written authorization of the Forestry Department.
1979	Economic Plant Protection Act	Abolishes the grant of timber felling rights in farms having trees, such as cocoa, with economic value.
1983	Trees and Timber (Amendment) Law (PNDCL 70)	Impose harsher penalties for violation of the Trees and Timber Decree.
1983	Control of Bush Fires Law (PNDCL 46)	Seeks to control the setting of bush fires.
1986	Land Title Regulation Law of (PNDCL) 153	Provides for the registration of title to lands.
1986	Forest Protection (Amendment) Act, (PNDCL 142)	Imposes harsher penalties for violation of the Forest Protection Decree.
1992	Constitution, Section 269	Provides for the establishment and functions of the present Forestry Commission and gives the President control over all mineral resources of Ghana.
1993	Forestry Commission Act, (Act 453)	Repealed by the Forestry Commission Act of 1999 established the former Forestry Commission.

Source: Agidee (2011)

In 1996, the Ministry of Lands and Forestry launched the Forestry Development Master Plan (FDMP) as a sound basis for the implementation of the aims of the 1994 policy to maximize the rate of social and economic development of the country and secure optimum welfare and adequate means of livelihood for all Ghanaians. Table 4.3 provides a brief summary of what each of the policies from 1994 sought to do.

Table 4.3: Forestry policy of the post-colonial era

Year	Policy	Description
1994	Forest and Wildlife Policy	Ghana's second formal policy on forests.
1994	Trees and Timber Amendment Act, (Act 493)	This provides for the biannual renewal of property marks and the use of levies and other forest fees in timber trade regulation.
1995	Interim Measures for Controlling Illegal Harvesting Outside Forest Reserves	Introduces a new system for harvesting off-reserve timber that includes the farmer's right to veto proposed harvesting and to receive compensations on lands suitable for commercial timber production.
1997	Timber Resources Management Act, (Act 547)	Introduces Timber Utilization Contracts (TUCs) for timber harvesting and enhanced benefits for landowners and farmers for harvesting of trees on their land, and payment of royalties in respect of timber operations.
1999	Forestry Commission Act, (Act 453)	Repealed the Forestry Commission Act of 1993 and established the present Forestry Commission.
2000	Forest Plantation Development Fund Act, (Act 583)	Provides for the grant of financial assistance for the development of private forest plantations on lands suitable for commercial timber production.
2002	Forest Protection Amendment Act, (Act 624)	Amends the Forest Protection Decree of 1974 and provides higher penalties for offences.
2006	Mining and Minerals Act, (Act 706)	Repealed Minerals Act of 1962 vests the ownership of all natural resources upon lands in Ghana in the President in trust for the people.
2012	Forest and Wildlife Policy	Ghana's third formal forestry policy.

Source: Agidee (2011), Ghana Forestry Commission (2012).

4.3.4 Forestry Policy Instruments

The acceptance of small parcels of 'mahogany' exported to the United Kingdom changed the functions of forests as a resource in Ghana. They ceased to be of use only as a sanctuary; they became an item of commerce. Thus pre-colonial forestry policy supported conservation and exploitation of forests for both religious and economic reasons. Owubah *et al.* (2001) have observed that laws which governed conservation and exploitation of

forests were not written, but emanated from traditional religious observances. The various taboos and sacred groove observances could be classified as public policy instruments helping to conserve the forest. Again, enforcing such laws depended on religious beliefs, where offenders were expected to be punished by the ancestral gods.

The problem of over exploitation of timber was not evident before the early 1900s in the Gold Coast. This probably resulted in the neglect of any control whatsoever of timber exploitation. Thus the first policy dwelt on economic motives to the neglect of the control of exploitation. The issue of economic motives was not out of place. It is the neglect of the control of exploitation that was problematic. Douglas (1955) asserted that in 1907, it became necessary to pass the Timber Protection Ordinance (Cap. 96) with the aim of controlling the activities of timber contractors and at the same time enforce the control of government over forest resources. The Forest Ordinance of 1927 (Cap 157) is the principal statute governing the constitution and management of forest reserves in Ghana. The ordinance vests in the central government the power to create forest and protected area reserves. The focus of policy prior to the 1948 forestry policy was basically for the reservation of forests for the protection of cash crops to ensure economic progress and prosperity in the colony which ultimately served the interest of the colonial administration. The goal, according to Wilson (2007), was to encourage the reservation of 20-25 percent of the high forest zone. The reserves were suitably located throughout the country for the purpose of protecting lakes and rivers, preventing soil erosion, protecting crops from winds, ensuring that timber supplies were guaranteed and

maintaining the rainfall and relative humidity which were appropriate for the cultivation of cocoa, palm nuts, cola and other economic crops.

One other reason for policies prior to the 1948 Forestry Policy was to ensure direct state control over timber resources (Douglas, 1955). This purpose was however vigorously opposed by local communities because it was seen as interfering with the rights of the chiefs and people of the Gold Coast. These protests also made way for local authorities to exercise some powers of administration with respect to forest reservation under the Forest Ordinance of 1927 (World Bank, 2007). However, the colonial authorities still had their way. Having obtained some considerable level of success, the gains of the 1927 Forest Ordinance had to be consolidated with the formulation in 1948 of Ghana's first formal forestry policy.

4.3.4.1 Implementation of forestry policy in the post-colonial era

The Forest Development Master Plan (FDMP) for 1996-2020 was the framework for the implementation of the 1994 Forest and Wildlife Policy. However, both the FWP and its FDMP provided only general guidelines without details for effective implementation. Also, Government provision of the required funding for implementation measures was very irregular. Therefore the strategies have either not been implemented or proved ineffective, resulting in a weak and demoralized forestry sector (World Bank, 2006). In seeking to link forestry policy to economic development in Ghana, it is imperative to examine the principal policy issues that produced the above outcome. These include the rationale for government to formulate and execute these policies, the revenue or income

that is supposed to accrue to the nation through these policies, timber policy and the legal and institutional frameworks within which the policies were implemented.

4.3.5 Forestry Policy Actors

In most pre-colonial Ghanaian societies, the traditional ruler, regarded as a representative of the ancestors saw to the enforcement of forest laws (Ledyaev, 1997; Landa, 1981).Parren and De Graaf (1995) wrote that pre-colonial forest exploitation started around the coast of the Gold Coast between Chiefs and European merchants. This trade which started around 1471 brought several benefits to chiefs to strengthen their political and economic standing (Reynolds, 1974). It is documented that before the onset of colonialism large quantities of West African timber was used for ship building in Liverpool (Adeyoju, 1976; Parren and De Graaf, 1995). The most prominent of these actors were the chiefs and native authorities followed by the local communities and then timber merchants who were actually partners of the chiefs in trade.

To have a formal control over forests, the colonial administration in 1874 passed the Crown Lands Ordinance which intended to put waste and forest lands and minerals under the authority and control of the local colonial administration. Traditional rulers teamed up with their local communities to resist the ordinance, claiming that it did not respect the fact that their lands were handed down to them by their ancestors and ownership was therefore non-negotiable (DeGrassi, 2003). Even though exploitation of timber was done by both traditional rulers and the colonial administration, the control over revenue was contested between them.

The colonial authorities, led by the individuals who accepted conservation practices, decided to take steps to conserve forests which were being ''threatened" by farmers, mining companies and loggers. McPhee (1926) mentioned that, in 1882-83, Administrator Moloney issued a warning against deforestation and emphasized the importance of conservation. His warning, which was published in a British newspaper, led to the enactment in Ghana of the Native Jurisdiction Ordinance (No. 5 of 1883). The ordinance provided that by-laws could be enacted "taking care of unoccupied land and conserving forests." No by-laws were enacted and the ordinance remained a dead letter. Such by-laws would have been made by the communal chiefs and not the colonial government because Britain accepted the fact that land belonged to the people and was not crown property. But when the principle of forest conservation came to be applied to Ghana, the people, led by the Aborigines' Right Protection Society, opposed the first forest ordinance. Their plea was that all lands were privately owned, therefore forest reserves could only be declared after compensating the owners. They added that should forest reserves really be essential to the welfare of the country, they should be created by the people under the supervision of the government. Under these conditions no forest reserves could be created. The early foresters' duties were thus limited to inspection of forests, earmarking areas suitable for reservation against the time when authority would be given to designate such areas "Reserved Forests." In addition to the inspection of forest the early foresters were responsible for detecting and prosecuting offenders under the Timber Protection Ordinance of 1907.

During the Second World War, the Forestry Department was run by a caretaker staff, the majority of officers having been drafted into the army. The department organized the supply of forest products for use by the British and American armies. It stimulated production of lumber by pit sawyers, who, in 1944-1945, produced one million cubic feet of lumber for the department. Before 1939, the country depended on imported softwoods for its major lumber requirements. After 1939, imports were quickly curtailed and soon ceased. The internal demands for lumber, augmented by the needs of the armies, increase rapidly so, apart from organizing pit-sawing, the department put together derelict sawmill machinery and started lumber production in Kumasi (Miller, 1947).

Between August 1942 and when the mill was sold in February 1947, a total of 813, 277 cubic feet of lumber was produced. Almost 50 percent of this production was sold to the armed forces. According to Miller (1948), the mill gave the department experience in the utilization of 'weed' species, 37 different species having been sawn in the mill; it provided the department with knowledge of sawing practice, seasoning and properties of the species sawn. It also gave skills to African operators. The Concessions Ordinance of 1939 (Cap 136) (*repealed by the Concessions Act of 1962*), along with earlier similar legislation, provided for a system for traditional and forest-holding authorities to grant timber harvesting rights, and determine and collect revenue in both reserve and off-reserve forests.

The relevance of the activities of the department, as well as the timber firms, during the war years lies in the fact that the experience during the time gave birth to the first formal

forest policy in 1946. Meanwhile, it is worth noting that the war brought a boom to the logging industry and made Ghana and the rest of West Africa a source of supply for hardwoods (Latham, 1960). A summary of the extent of actors' involvement in early colonial forestry policy would view it as one dominated by the colonial government and the Forestry Department. Local communities and their governments were the least important actors during the colonial government era.

The existence of the structures of colonial Indirect Rule was a key contributing factor to the smooth operation of the 1948 forest policy. The colonial administration exercised its authority through traditional chiefs who were empowered through their traditional councils to see to the maintenance of law and order and to sometimes also ensure the payment of taxes for onward transmission to the colonial authorities.

A second factor was the issue of cocoa gaining popularity among local farmers as a cash crop. The successful cultivation of cocoa in the high forest zone had some implications for forest land use. If land was going to be used for the expanded cocoa industry, then forest lands were in danger of being used leading to the loss of substantial forested land to cocoa production. As at this period, land ownership still rested in the hands of the local people who resisted every attempt to use forestry legislation to deny them access to their land (World Bank, 2006).

4.3.5.1 Actors in the 1994 forestry policy framework

The Ghana Forestry Commission's work began publicly with a symposium in 1989. There were in attendance 92 registered participants from 30 institutions about 40 per cent of whom came from public institutions namely FD,FC, FRI and TEDD. Forest industries, the academia, the Ministries of Agriculture and Local Government, Lands Commission, Fire Services, The Investment Centre, The Tourist Board, The National Energy Board, Environmental Protection Council, The National Bank, a mining company, several local and foreign NGOs and donors were also in attendance (Kotey *et al.*, 1998). It is worth noting that of the invited traditional rulers and land owners only one turned up. No farmer and/or forest fringe community representative was in attendance. Essentially, apart from this first effort the policy document that emerged was produced by only selected technocrats. Thus for the five years it took to revise the 1948 forestry policy, no farmer or forest dependent citizen was involved. The policy can therefore be described as a top-down policy. Figure 4.3 shows the policy formulation process and the actors involved.

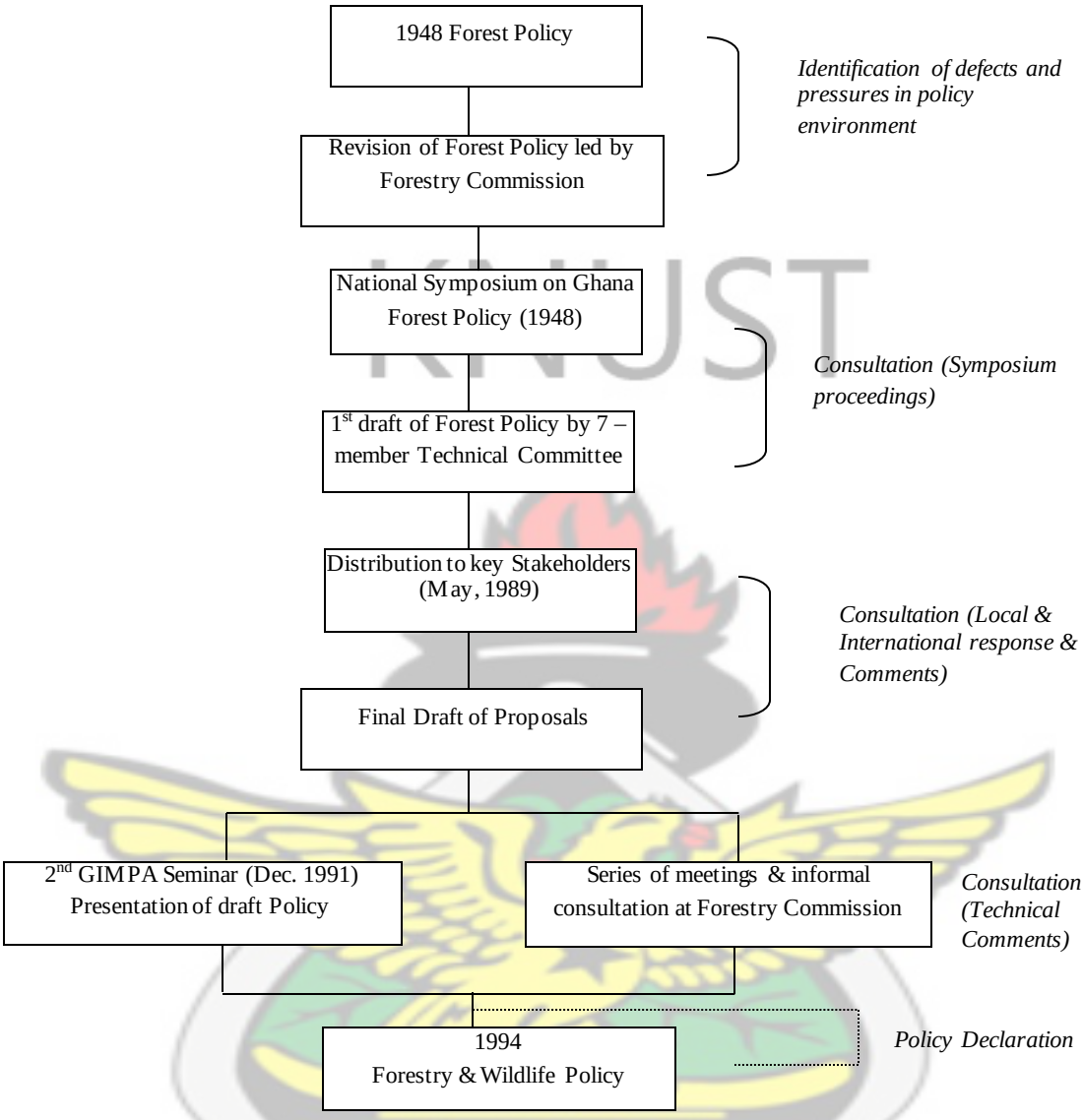


Figure 4.2 A summary of the 1994 forestry Policy formulation process
Source: Marfo (2005)

To ensure the liquidation of the off-reserve forests stopped, Interim Measures were adopted to involve farmers and the forestry authorities in the management of these areas. Stakeholder involvement in developing the Interim Measures was broader than any previous forest specific policy instrument. It however appeared to have deliberately

excluded some others many of whom had been beneficiaries of the former state of the sector.

4.3.6 Forestry Policy Effects

Under the view of forestry policy, cocoa production, shifting cultivation, land rotation, gold mining and commercial logging resulted in wasteful practices in the forestry sector (Boateng, 1960).

Varied views exist on the extent of Ghana's forest before colonialism. Some of the most serious breaches of forestry policy came from cocoa production, gold mining and timber exploitation, since these were the main sources of foreign exchange to the country (Fairhead and Leach, 1996).

The desire of people to trade in forest products had an adverse effect on forests since administrative and legal measures were not in place to control overexploitation of timber. Local forestry officials thus had to devise means of limiting the extent of damage to forests (La Anyane, 1961).

Opposition to forestry policy, particularly reservation was mainly from southern Ghana. However, an ultimatum from governor Guggisberg on reservation seemed to have yielded much effect. The main objective of forestry policy was the preservation of the forest to ensure the constant high atmospheric humidity necessary for the cocoa industry, however, the harmattan was the main threat of obtaining these conditions (Boateng, 1961).

The 1948 policy facilitated the eventual conversion of unreserved forests into farmlands, a move which was later seen as inappropriate. It is argued that the 1948 policy had a significant impact on forestry in Ghana, especially since it was in operation for nearly half a century. As indicated earlier, this policy sought to reinforce some achievements that had been obtained before its formulation (Kotey *et al.*, 1998).

The failure of the 1948 forestry policy came from two main areas. The first source of failure was based on the reinforcement of forced reservation without local communities' express support. These pushed communities to deforest before their forests were forcibly taken over. Secondly, the local management policy put in place collapsed due to lack of expertise from the local management teams (Francois, 1987).

One description the first formal policy of forestry in Ghana was that, it was autocratic and protectionist. Principally, the Forest Protection Decree of 1974 and its amendment, the Forest Protection (Amendment) Law of 1986 tended to exclude the local populace from benefiting directly from forest products except in cases where written permission was obtained from the Forestry Department. This gave local residents the impression that forest reserves were a means of denying them their rights to land and livelihood.

Smith *et al.* (1995), Tufuor (1986) and Kotey *et al.* (1998) expressed concerns about the state neglecting of major stakeholders like chiefs, the timber industry, farmers and forest fringe communities in forestry policy before 1995. There was also alienation of forestry and the Forestry Department from the rest of society, generating animosity towards the Forestry Department. Then, the policy to eventually liquidate the off-reserve forests

caused high rate of deforestation. There was also no room for collaboration between forestry and wildlife management.

The absence of well thought out steps towards the realization of the aims and objectives of all the policy instruments was a major setback for forestry policy prior to 1995. Apart from the local concerns raised, the World Bank (2006) also described the 1948 Forestry Policy as one which lacked the capacity to address the issues of high deforestation and degradation coupled with scanty revenue generation from forestry as well as weak institutions by the end of the last century.

4.3.6.1 Profit from forestry policy

The Economic Recovery Programme (ERP) implemented in the 1980s was very instrumental in the creation of the current forestry industry structure. The liberal nature of credit provided under the ERP created over capacity alongside very low conversion rates for timber.

Thus in the tertiary sector of forestry, policy made it profitable for inefficient firms to continue to operate.

Birikorang and Rhein (2005) found that residual forest rent not collected by government was worth US$10 to $45 million per year. Policy was to blame for this lost revenue, such policy also assisted efficient firms to retain residual rent as super profits. In addition, it was found that over 50% of revenue in the sector was mostly generated from trade and not from the value of forest resources (World Bank, 2006).

In 2004, the main charges to the industry (around US$ 22million) accounted for 4.5 percent of the industry's turnover of US$500 million. Only 26 percent of the total charges were related to timber harvesting/throughput, while about 54 percent of the total charges were related to trade (World Bank, 2006). Thus, forest revenues were mostly generated through taxes on the value added to forest resources by processing, not through the value (that is, the economic rent) of the resources themselves (Birikorang and Rhein, 2005).

Table 4.4: Falling stumpage value with time in Ghana

Year	Average Stumpage Value	Source
1989	US$ 108/m^3	Grut (1989)
1995	US $98/$m^3$	Richards (1995)
1999	US $87/$m^3$	Awudi (1999)
2004	US 75m^3$	Brikorang (2004)
2005	US $50/$m^3$	World Bank (2005)
2012	US$ 12/m^3	Ghana FC (2012)

Furthermore, Ghana's timber has been harvested at increasing opportunity costs as viewed from Table 4.4, showing a downward trend for timber rent. It is worth noting that between 1997 and 2002, stumpage rates were not indexed to inflation. As a result of this stumpage fees depreciated from an average of $11.7/$m^3$ in 1997 to less than $3.0 in 2002 which was less than 3% of export prices in real terms. In such a case, the opportunity cost was over 95% of the internationally competitive rent of $102.03 (World Bank, 2006), providing very little profit to resource owning communities.

4.3.6.2 Deforestation

Ghana's excessive and consistent rate of deforestation indicates that its forests have been under intense pressure for a long time. The country's Growth and Poverty Reduction Strategy I and II (GPRS I, II) were to ensure holistic growth and development in all sectors of the Ghanaian economy. This development policy framework specifically tackled the forestry sector apart from the remedies and approaches employed by the 1994 forestry and wildlife policy and others before it. The GPRS I& II had extensive donor support and targeted GDP growth rates of between 8% and 10% to get Ghana into a middle income status by 2015. One goal of the GPRS was to ensure that Ghana's forestry sector policy became efficient and equitable in its allocation of the scarce forest resources available. To ensure this happened, the GPRS selected a number of key indicators to assess performance in the forestry sector. These indicators were mainly the following:

- The annual rate of deforestation.
- The number of Timber Utilization Contracts (TUCs) awarded.
- The number of Social Responsibility Contracts (SRC) signed.
- Percentage change in resource spent on CSR, including alternative livelihood programmes.
- Hectares of degraded forest lands rehabilitated/ restored.
- Proportion of timber royalties going to resource owners.

Reviewing its performance in 2007, the GPRS report indicated that little progress had been made in most of the indicators. It recognized the increasing cost of environmental degradation to GDP ratio while hectare of degraded forests rehabilitated or restored did

not hit the desired target. The number of TUCs awarded was not only lower than the target but also lower than the 2005 level. The signed Social Responsibility Agreements (SRA) followed the same trend as the TUCs.

The only indicator that made improvement was the proportion of timber royalties going to resource owners (NDPC, 2007). The trend for 2007 and beyond was no better. Since this trend dates as far back as the past two decades, it goes without saying that economic development on account of forestry policy had eluded Ghana based on GPRS assessment of achievements in the forestry sector. This also confirmed the inability of forestry policy to meet its intended goals.

Ghana's growth has depended principally on the exploitation of forests, mineral and land resources (ISSER, 2011) resulting in a net loss of natural capital. However, the depletion and degradation of these resources has not been recognized as a set-back to economic development. It is worth noting that not much attention has been paid to issues about whether the exploitation of natural resources have been really beneficial to the citizenry economically, socially and environmentally. The Institute of Economic Affairs (IEA, 2011) confirmed that within a period of 100 years, Ghana had depleted over 82% of its forest resources, leaving only a meager 18% for future generations.

4.3.6.3 Rights to forest benefits

Rights of forest community households to forest benefits have gone through alterations for the worse through forest policy. Over the years, farmers have suffered alienation and

deprivation as far as forest revenue is concerned (Hansen and Treue, 2009). This has been further reinforced through the regulation of 1962, vesting all trees in the presidency of Ghana. The Ghanaian Constitution of 1992 further affirmed this state of affairs. The imbalance comes from the fact that while the farmer is virtually the one who takes care of the trees on his farm, he is excluded from any share of revenue accruing from the tree. The only way farmers may benefit indirectly is through Social Responsibility Agreements which go to his entire community (Hansen & Treue, 2009).

4.3.6.4 Distribution of benefits

The Forest Commission (FC) and Administrator of Stool Lands (OASL) manage forest revenue by way of collection and disbursement to ensure fairness to stool and landowners. Some revenue is retained by the FC for the financing of staff remuneration, administrative services, and capital expenditure (OASL/FC, 2011). Table 4.5 shows the current percentage shares.

Table 4.5: Current shares of forestry revenue among stakeholders in Ghana

Type of forest	FC's share (%)	Stool/land Owners and Other Stakeholders' share (%)
On-reserve	50	50
Off-reserve	50	50

Source: OASL/FC (2011)

Following the 50% share between the FC and the remaining stakeholders, the distribution by the OASL to stakeholders, whose 50% share is now considered 100% for the stakeholders, has been based on the following proportions: 25% to Stool, 55% to District Assembly and 20% to the Traditional Council.

Payments made so far indicate that given the large number of stools, district assemblies and traditional councils, the amounts involved are most of the times not enough for any socially significant development projects to benefit forest communities. Another big issue is the perpetual indebtedness of contractors to the recipients of the money. It appears as if each time, the contractors decide to withhold some of the payments and may even decide sometimes to pay about half of their total debts. This leads to the already small payments getting devalued in the face of inflation. It also makes it difficult for the recipients to plan how to use the money since they may not be sure of how much will be paid from the amounts they are owed.

Another difficulty which goes with revenue sharing is created by illegal operations which are mainly done by chainsaw operators. Even though they harvest more than half of the annual harvest of timber, little is known about the distribution of benefits, since it is illegal business.

Also, timber companies usually retain a substantial proportion of timber value in Ghana. It is reported that there is under declaration of harvests by some firms, meaning they would not pay stumpage fees on the unrecorded harvest. Also, excessive willingness to pay for timber over the actual payment testifies to the retention of excessive value by timber firms. This deprives the other stakeholders of their portion of what is retained by firms (Birikorang et al., 2007; Richards, 1995 and Treue, 2001). Thus, the existing sharing structure distributes less than 50% of what should have been shared annually (Hansen and Treue, 2009).

4.3.6.5 Use of forest benefits

The Forestry Commission, Traditional Councils and District Assemblies categorize their share of forest benefits as internally generated funds (IGF). Such funds are largely used for recurrent expenditure, including allowances of officials and payments of bills and festival expenses thus not directly going for the benefit of forest communities to a large extent (Hansen & Treue, 2009).

4.4 Problems of the first formal Forestry Policy

The 1948 policy ignored the economics of a common property resource which in this case is soil fertility. Without a careful analysis of the economic consequences of the pattern of land ownership in practice, the policymakers set out to secure 25 percent of the land in the forest zone as a permanent forest estate. This area comes to about 6,000 square miles, and at the time the reservation policy was being implemented, as Chipp (1923) pointed out, 14, 000 square miles out of 31,760 square miles of the forest zone were carrying "merchantable forests." The decision to select 25 percent of the area of the forest zone for the purpose of preserving water supplies, climatic conditions favorable to the growth of the principal agricultural crops, to minimize erosion, and to organize sustained yield forestry immediately gave the people the impression that the remaining area of the zone would be for uses other than forestry. This led to the greatest problem said to face the forestry department; threat from farming and the destruction of timber during farming.

The decision to base the reservation of 25 percent of the forest on the "secondary benefits" that forests may or may not bestow on other plants and the environment led to the selection of some of the poorest areas of the zone as forest reserves. The location of the

reserves did not optimize the returns from the use of any network of roads that might have been present (World Bank, 2006). The location was not to benefit industrial forestry as such; it was to satisfy the requirements of agriculture and other forms of land use. Those hilltops, scarps, headwaters and similar areas which were reserved, were, in many cases, far removed from the vicinity of agriculture activities. Studies of vegetation maps of the state of the forests in the 1960s reveal that agriculture activities got closer to the reserved forests in only recent years, and that the areas set aside as forest reserves were removed from population centers.

In the circumstances, as the unreserved forests become exhausted and the reserved forests become the only source of timber supplies, cost of logging increased. This is because of the need to link the distantly located reserves to the existing roads and other means of transportation. Having chosen what might relatively be the worst sites, in order to satisfy the presumed requirements of agriculture, the Forestry Department then decided that it had no other alternative but to try possible silvicultural and management systems on these costly sites (World Bank, 2006).

The decision to have unreserved forests exploited due to demands of the market for timber, and the rate of expansion of farming, was misguided. Another policy requirement was that the rate of exploitation of these unreserved forests should be such that when it came to the turn of the reserved forests, their exploitation would be accompanied by successful regeneration. The history and development of forestry policy is seen to have moved from being autocratic and protectionist around the early 1900s to more people

friendly policies in the 1990s. The change in approach and focus is said to have started when in 1989, there arose the bold attempt to review forestry policy objectives and strategies for attaining them at a symposium of stakeholders (World Bank, 2006). This move eventually resulted in the second formal forestry policy of Ghana–the 1994 Forest and Wildlife Policy.

4.5 Government Intervention in forestry policy implementation

The World Bank (2006) observed that for most of the last century government had played an interventionist and centralized role in the forestry sector in Ghana. Reasons for such a role were varied. For the 1920s and 1930s, the reason was watershed protection while during the war years military prerogatives were cited. The need for urgent structural reform was cited for the interventions during the ERP period in the 1980s. De Grassi (2003) observes that for about a century, forestry officials have not found it easy to relinquish their hold on forestry resources, especially timber. The main motive for government intervention has been seen to be its desire to deal with market failure in the forestry sector. This intention is valid since it is a theoretical and practical fact that the market is not able to allocate natural and environmental resource efficiently. This rationale appears consistent with the policy objectives stated above.

The World Bank (2006) notes that despite the stated rationale for government intervention, it has not been able to practically deal with market failure. What rather prevails has been favours to some segments of society like loggers and formalized workers at the expense of sustainable development. It further notes that the ability of

government to control the behavior of either the market or rural populations no longer holds since there is enough evidence that there is uncontrolled exploitation, illegal logging and degradation under the very nose of government.

4.6 Income and Revenue

To generate appropriate income commensurate with the resource base, the Forestry Commission introduced market based concession bidding to improve upon transparency and revenue collection from timber utilization contracts (Ghana Forestry Commission, 2010). These are tenets of efficiency which is in line with the main objective of the 1994 forestry policy. After a review of the timber utilization contract situation the World Bank (2006) asserts that despite the fact that this move started well, severe revenue shortfalls have become the norm. Interestingly, in 2007 the NDPC recorded no gain to the state from these bids (NDPC, 2008).

Another means of revenue generation is taxation. Initial assessments indicated that tax exemption policies and tax avoidance further eroded revenue receipts to the extent that Birikorang and Rhein (2005) estimate a loss of revenue to the tune of $4 million per annum. It was also observed that tax policies favoured wood processing industries rather than the high value-added tertiary processing. They also contend that this led to the dampening of investment in higher value-added tertiary processing.

To consolidate the gains from growth and to attain economic development through forestry policy, Ghana's forestry policy gave recognition to the distribution of forest

revenues as a means to higher human welfare. At the time of the formulation of the 1992 constitution, it was agreed that revenue be shared in the percentage ratios of 25:20:55 among stools, traditional authorities and district assemblies respectively. Some contentions regarding the final beneficiaries of such revenues have arisen. Recently, there has been a revision of the ratio to ensure that the poorer members of the communities get more. Another means of ensuring benefits reached the local communities was through the Social Responsibility Agreements (SRA). This is mainly tied to the number of concessions that go through the bidding process. The more concessions are awarded, the more SRAs there will be to enhance the welfare of local communities.

4.7 Timber Policy

Because of the "timberization" of forestry in Ghana, timber tends to attract so much attention sometimes to the detriment of the other forest resources that are non- timber. It is therefore useful to undertake a brief analysis of timber policy on its own since it is possible that once so much attention has gone in to that area the outcome will proportionately be encouraging. Timber legislation was introduced by the colonial administration of the Gold Coast to ensure the source of revenue from timber was sustained (World Bank, 2006).

The law prohibiting felling of immature commercial value trees was passed in 1907. This was followed by the Timber Ordinance of 1949 that regulated exportable timber harvests. Since these beginnings, several legislations have been enacted and amended to regulate the timber industry. The latest, the Timber Resource Management Act and its Regulation were brought on board to allow:

(i) Competitive bidding in the allocation and utilization of timber resources;

(ii) Implementation of Social Responsibility Agreements

(iii) The ministry of Lands and Forestry to regulate new investments in the forest sector, ensuring that only the required plants and equipment for the country's needs are installed in the wood-processing sector (World Bank, 2006).

Even though the above efforts have been made to regulate the timber industry, these measures have coexisted with a very high level of illegal activities. This however seems to work in favour of domestic wood supply. Birikorang *et al*. (2003) estimated that in 1999 out of the 3.7 million m^3 of timber harvested, illegal chainsaw activities accounted for 46 percent (1.7 million m^3) while illegal industrial logging accounted for a further 24 percent (0.9 million m^3). Otoo (2003) estimated that about 50,000 people were directly and indirectly involved in chainsaw milling in Ghana.

The World Bank (2006) asserted that one reason for which chainsaw milling has persisted so widely is its capacity to distribute benefits to the poor. By transporting illegal lumber individuals earned daily rates more than five times the daily minimum wage. Farmers often preferred instant payments for trees from illegal chainsaw millers than promises from the forest sector institutions for benefits that were eventually distributed in an unfair manner. Rural dwellers were virtually denied quick access to wood because of harvesting regulations. Also, chiefs, who were the landowners, were not directly involved in decision making by the local government system and the FC which made them indifferent to the illegal logging enterprise (Birikorang *et al*., 2003).There have been some (ad hoc) measures to control illegal timber harvesting, namely

1. Registering of chainsaw operators
2. Establishing mobile forest protection action groups with strict felling controls.
3. Joint actions by both the military and police to stop and arrest operators
4. Confiscating lumber, equipment and vehicles used in illegal timber harvesting operations.
5. Forest Law Enforcement, Governance and Trade (FLEGT).

The effects of these control measures have been minimal mainly because of the high domestic demand for wood as well as the non-deterrent penalties involved. It is believed that the under resourced nature of the district forest offices has been the reason for their inability to track down illegal timber operators.

4.8 The Legal Framework

The legal framework for the forest sector is a blend of old and new legislation. The 1927 Forest Ordinance currently works in conjunction with more modern primary legislation (Acts) and regulations (Legislative Instruments (LIs)). Table 4.6 shows the principal current legislation in force, each of which has been discussed earlier in this chapter.

Table 4.6 shows the emphasis of the legal framework is towards timber. An initial attempt to improve the legal framework failed in 1996. Stakeholder expectations have been high concerning a change but the situation that necessitated the change still persists (World Bank, 2006). Certainly the unnecessarily high rates of deforestation, degradation and misuse of the forests need more legal attention than there currently is.

Table 4.6 Principal Forest Legislation Currently in Force in Ghana

Year	Forestry Legislation
1927	The Forest Ordinance (Cap 157)
1994	Trees and Timber Amendment Act, Act 493
1997	Timber Resources Management Act – Act 547
1998	L.I. 1649 – Timber Resource Management Regulation
1999	Forestry Commission Act 571
2000	Forest Plantation Development Fund, Act 583
2002	Forest Plantation Development Fund (Amendment), Act 623
2002	Timber Resources Management Act 617 (Amendment) Act [Amends Act 547 of 1997]
2003	L.I. 1721 – Timber Resources Management Regulations [Amends L.I. 1649 of 1998]

Source: World Bank (2006)

4.9 Forestry Policy Institutions

The traditional forestry policy institutions in Ghana are the Ministry of Lands, Forestry and Mines (MLFM), the Forestry Commission (FC), the Environmental Protection Agency (EPA) and Parliament. This section provides a brief overview of each institution as a contributor to the performance of forestry policy in Ghana.

(i) Ministry of Lands, Forestry and Mines (MLFM)

Constitutionally the Ministry of Lands, Forestry and Mines (MLFM) has overall sector responsibility on forestry policy. A World Bank (2006) assessment indicates that over the last decade, the ministry had exhibited a lack of capacity for evidence-based policy. A range of options have been tried, including:

1. Drawing on external projects.
2. Posting expatriate forest policy advisers within the Ministry.
3. Commissioning policy reports.
4. Forming special policy committees.

5. Creating policy-funding facilities.
6. Obtaining policy inputs from the Forestry Commission.

The assessment asserts that none of the measures above was particularly successful, making the ministry a relatively weak institution in both policy analysis and policy-monitoring capacity relying too much on a few key individuals.

(ii) The Forestry Commission

The Forestry Commission is designated as the principal regulator and implementing agency in the forestry and wildlife sectors. The current structure of the Commission was formed by Act 571 of 1999 from the merger of five organizations – the Forestry Department of the Ministry of Lands and Forestry, the Timber Export Development Board, the Forest Products Inspection Bureau and the Department of Game and Wildlife of the Ministry of Lands and Forestry, and the former Forestry Commission.

Some observations of the cultural differences between the Wildlife Division (WD) and FSD seem to suggest the presence of some suspicion that closer integration will lead to timber interests being exerted on the commission to the detriment of wildlife. The decentralization of the operations of the FC has not been carried out as directed by the local government act. Forest "districts" still remain different from administrative districts, with the FC controlling the assets in the district offices. The establishment of Community Forestry Committees (CFCs) and the introduction of Customer Service Officers were however seen as welcome improvements. Community Forest Committees were

established by the Forestry Commission as a mechanism to engage forest fringe communities in local forest management planning, although authority for the forest remains with the FC (World Bank, 2006).

Financially, the Commission has been under resourced, resulting in its inability to perform its core functions. Although salaries of staff have been paid consistently, operational fund have not been regular thereby impairing its ability to function as well as plan towards achieving its mission (World Bank, 2006).

(iii) The Environmental Protection Agency

The Environmental Protection Agency has relatively little engagement on forest, wildlife, or biodiversity issues. The main points of interaction relate to Environmental Impact Assessments (EIAs) within forest reserves. Current interest of EPA in the sector seems to bother very much on climate change.

(iv) Parliament

Under the 1992 4th Republican Constitution of Ghana, parliament has ratified a number of contracts for the forestry sector of the economy. The Constitution placed a specific role for Parliament in regard to the regulation of natural resources, by providing for parliamentary ratification of contracts relating to the exploitation of natural resources. The Parliamentary Select Committee on Lands and Forestry is relatively well informed on policy matters within government. However, legislation for holistic approach to forestry is still lacking.

The brief review of the policy institutions reveals that the ministerial, Forestry Commission and legislative mechanisms for appropriate forestry policy formulation and implementation are inadequate. Lambini and Nguyen (2013) confirm that Ghana's forest institutional structure has led to a rapid loss of forest and forestry policy failure. This generally means that all has not been well with the forestry sector of Ghana. Also, despite the fact that forestry policy was said to have evolved from undemocratic to a more democratic dispensation, there had been virtually no paradigm shift in forestry policy formulation and implementation in Ghana. The following four chapters show specifically how implemented forestry policy has fared with respect to economic development in the Ashanti Region of Ghana.

CHAPTER FIVE

EMPIRICAL RESULTS AND DISCUSSION ON EFFICIENCY OF FORESTRY POLICY IMPLEMENTATION IN GHANA

5.1 Introduction

Forestry policies have been implemented in Ghana over the past one hundred years with varying degrees of outcomes. These outcomes to a large extent depended on how efficiently the policies were implemented. The current chapter assesses how efficiently forestry policy has been implemented in the Ashanti Region of Ghana. It undertakes a Policy Analysis Matrix (PAM) assessment of the economic efficiency of the implementation of forestry policy in Ghana through profitability, divergence, ratio and sensitivity analyses.

5.2 Cost of forest management and regulation

The PAM table is constructed with data on costs of forestry management and regulation and revenue obtained through incurring the costs. Various costs of forestry management and regulatory functions in Ghana used for the analysis are provided in Appendix 1. The figures are based on interviews with the Forestry Commission's Forest Management Committee and the RMSC as discussed in the methodology. These cost values and revenue values (budget) obtained from ISSER (2007) served as the initial inputs for the PAM table discussed in chapter three. The costs are categorized under two broad areas namely, Forest Reserves (FR) and Off-Forest Reserves (OFR). For each area, costs involved in forest management regulation are captured under pre-harvesting activities, harvesting activities and RMSC activities (as overhead costs). It is worth noting that the

data for costs and revenue used for the PAM analysis are based on US dollar per cubic meter of forest product, which in each case is identical for both the regional(Ashanti Region) and the national level. The computations of private and social costs are as indicated in the column titles of the table.

5.3 Entries in the Policy Analysis Matrix

In the PAM analysis, based on entries in the PAM matrix (Table 5.1), revenue in private prices (that is 465.8) was revenue per cubic meter of timber for Ghana (ISSER, 2007), to conform to the period of enumeration for the FC and RMSC cost data. The average revenue for the past decade was 456.4, suggesting stable annual revenue for the decade. Similarly, cost estimates of the Forestry Commission with regard to natural forests have been very stable over the past decade. Thus the data provides a good picture of costs of management and regulation of natural forests. The revenue in social prices (prices that would result in the best allocation of resources and thus highest generation of income) (511) was obtained by adding the tax based on Ghana's log export ban (US$ 35 m^{-3}) and stumpage and export levies (US10.2m^{-3}$) to private revenue (465.8). Private and social costs were obtained from data in Appendix 1.

The inputs cost in private prices (15.3) is based on the data from the last row of the private costs column of Appendix 1. Private profit (450.5) was obtained by subtracting private input costs from private revenue. The costs in social prices (20.9) were obtained from the last row of the social costs column of Appendix 1. Profit in social prices (490.1) was found by subtracting social costs (20.9) from social revenue (511).The effects of

divergences (third row of PAM matrix) are identically equal to the differences between entries in the first row (measured in private prices) and entries in the second row (measured in social prices). These are with respect to revenue (-45.2), costs (-5.6) and profit (-39.6).

Table 5.1: The Policy Analysis Matrix (PAM) for forestry in Ghana

Natural Forest (Production)	Revenue ($)/$m^3$	Input costs ($)/$m^3$	Profits ($)/$m^3$
Private Prices	465.8	15.3	450.5
Social Prices	511	20.9	490.1
Divergence effects	-45.2	-5.6	-39.6

Source: Author's computation based on data in Appendix 1

5.4 Results from the Policy Analysis Matrix

Five categories of research results in empirical PAM analysis emerge from the PAM matrix. These results flow directly from applying either the profitability identity or the divergence identity as shown in the previous section. These are private profits (450.5), social profits (490.1), output transfers (-45.2), input transfers (-5.6), and net transfers (-39.6).

5.4.1 Private and Social profits

Table 5.1 shows private profits of US$450.50 per cubic meter of forest output. Profits in PAM are excess profits or the returns to management. That is, the residual after all costs of production have been accounted for including a normal return to capital (Pearson *et al.*, 2003). When a commodity system earns positive private profits, the system is able to compete at current market prices, which include the effects of all policies and market failures. Competiveness is a result of interest to forestry sector producers (loggers,

traders, and processors) and to policy makers concerned with forestry. But competiveness (positive private profitability) also is a concern of policy makers concerned with promoting investments to accelerate economic growth, because new investment must increase (or at least not reduce) private profitability if forestry sector producers are to expand their production activities. The derived extent of private profitability indicates that investors will continue to be attracted to the forestry sector in Ghana to benefit from existing profits.

From Table 5.1, the social profitability is US$490.10 per cubic meter of output. Efficiency is a measure of how the country might best allocate its scarce resources to provide the most output and incomes. When a commodity system earns positive social profits as is the case above, the system is able to compete at international prices without any assistance from government. Social profits are thus supposed to be of interest mainly to government officials concerned with promoting rapid economic growth. New investments have to be socially profitable if they are to maximize growth opportunities. Hence the positive social profits for Ghana are an indication that growth opportunities exist through the forestry sector.

5.4.2 Divergence

The divergence effect of both revenue and costs are shown to be -45.2 and -5.6 US dollars per cubic meter respectively in Table 5.1. This means that forestry policy implementation has had adverse impacts on both revenues and costs within Ghana's forestry sector. Table 5.1 shows that the net divergence for forestry policy in Ghana is US$ -39.60 per cubic

meter of forestry output. Private valuations of output and inputs differ from social valuations because something gets in the way to make the observed market valuation (the private price) diverge from the efficient valuation or social opportunity cost (the social price). The government might have decided to raise or lower the market price by introducing tax or subsidy policies, trade restrictions, or other policy interventions – collectively called distorting policies. Or the market might be imperfect and failed to provide efficient valuations because of market failures like monopolies, externalities, or underdeveloped factor markets. Hence, if the observed market price differs from the desired efficient level, the divergence must be caused either by a distorting policy or by a market failure. This therefore means that forestry policy in Ghana significantly distorts economic welfare. The summary ratios discussed in the next section provide another set of measures to ascertain the efficiency of forestry policy implementation in Ghana.

5.4.3 Summary Ratios

Another set of indicators for policy analysis obtained from the PAM framework are summary ratios. These are presented in Table 5.2.

Table 5.2: Summary Ratios for forestry sector PAM in Ghana.

Ratio	Formula from PAM table	Value	Implication for forestry policy
EPC	$\frac{R_P - C_P}{R_S - C_S}$	0.92	This Effective Ratio of Protection implies producers are not protected through policy interventions.
NPC	$\frac{C_P}{C_S}$	0.73	Domestic prices are relatively higher than the comparable world prices and the forestry sector is not protected by policy
SRP	$\frac{D_P}{R_S}$	-0.08	Shows the extent to which the system's revenues are decreased because of transfers.

Source: Author's computations based on Table 5.1

The Nominal Protection Coefficient (NPC) is a ratio that contrasts the observed (private) forestry price with a comparable world (social) price. This ratio shows the impact of forestry policy that causes a divergence between the two prices (Monke *et al.*, 1989). If NPC is less than one, it implies that forestry policy is reducing private revenue or market prices, and making them lower than the world price for forest resources. For the case of Forestry Policy in Ghana, the NPC of 0.73 means that Forestry Policy in Ghana reduces the private revenue or market prices by 27% per cubic meter. This means that domestic operators in the forestry sector are not protected by forestry policy and are making losses or being taxed through forestry policy, thus reducing their welfare.

The Effective Protection Coefficient (EPC) is the ratio of value added in private prices to value added in world prices. The coefficient measures the degree of policy transfer from product market policies. An EPC < 1 implies the system has lost almost all the protection, mainly in the form of subsidies that existed on inputs before policy reforms. Thus through forestry policy in Ghana, subsidies are lost to the world and hence welfare is reduced for residents.

The third computed incentive indicator from the PAM is the Subsidy Ratio to Producers (SRP). This is the net policy transfer as a proportion of total social revenue. It shows the proportion of revenue in world prices that would be required if a single subsidy or tax were substituted for the entire set of commodity and macroeconomic policies (Monke *et al.*, 1989). The SRP permits comparisons of the extent to which all policy subsidizes the

forestry system. From Table 5.1, the negative SRP means that forestry policy taxes the forestry sector, thus reducing the welfare of workers in the sector.

5.4.4 Sensitivity analysis

Sensitivity analysis was intended to find out the levels of factors and investments that could result in more efficient allocation of forestry resources due to forestry policy. The use of sensitivity analysis thus provides an analytical technique which tests systematically what happens to the earning capacity of Ghana's forestry sector if events differ from the estimates made about them in planning (Gittinger, 1982). The sensitivity analysis also addresses uncertainty about future events. The analysis is done by varying one element and determining the effect of that change on the outcome of policy.

For forestry policy in Ghana, the sensitivity is captured by elasticity of forestry policy divergences with respect to factor parameters – cost of inputs. The effect of 5 percent and 10 percent rises and falls respectively of costs of inputs were obtained to ascertain the influence of small changes on the transfer of benefits due to forestry policy in Ghana. Table 5.3 shows the results of the sensitivity analysis.

Table 5.3: Sensitivity analysis of net divergence to changes in input prices

Parameter	Change in value			
Percentage change in input price	5% increase	10% increase	5% decrease	10% decrease
Elasticity of net divergence	0.02	0.04	0.02	0.04

Source: Author's computation based on Table 5.2.

The sensitivity analysis from Table 5.3 shows that a 5 percent change in the price of inputs due to forestry policy, will produce a corresponding change in net divergence of 0.02, which is 2 percent. This implies inelasticity, indicating that divergence is generally not responsive to changes in input prices in Ghana. This is reinforced by the effect of the 10 percent change in input prices, which produces only a 4 percent change in net divergence. The derived net divergence elasticity suggests a relatively high degree of stability in input costs. Thus in each case of the change, there was a worsening of net divergence.

5.5 Discussion of Policy Analysis Matrix results

5.5.1 Profitability

The excessively high private and social profits within the forestry sector in Ghana revealed by the PAM analysis have largely been due to low stumpage prices and over exploitation of timber with accompanying externalities for the rest of the economy. This shows a seeming competitiveness exists which benefits mostly rich timber merchants and leads to strengthening the existing overcapacity in the sector.

Thus despite the seeming favourable PAM profitability values, the underlying factors show that the figures are due to a distorted pricing system. Policies affecting pricing of Ghana's timber have consistently worked in favour of international profitability interests to the detriment of local interests, giving the false impression of profitability in the industry. This means that implemented forestry policy has disorganized the sector to the extent of providing unrealistic information on private and social profitability. Hence, in

real terms, the implementation of forestry policy has been both privately and socially inefficient. This result is supported by the World Bank (2006) assertion that profitability in Ghana's forestry sector only serves to enrich the rich merchants to the disadvantage of the ordinary people in the industry.

5.5.2 Divergence

Efficient policy is government intervention to correct market failure and thus offset a divergence. For example, if monopoly is efficiently regulated through forestry policy, seller prices would cause private and social costs to become equal, which will result in an increase in incomes for forestry sector stakeholders. The essence of forestry policy in Ghana has been to eliminate both distortions and market failure in the sector. From the PAM analysis, both the divergence in revenue and costs were negative. This shows that forestry policy increasingly distorts the sector's revenue and costs. The net divergence being negative simply goes to reaffirm the distorting effects of forestry policy in Ghana. Thus, since the implementation of forestry policy in Ghana exerts a distorting influence on the sector, it cannot be efficient.

5.5.3 Summary ratios

The three computed summary ratios for forestry policy implementation in Ghana all showed that forestry policy implemented led to a lower level of welfare for the Ghanaian economy. A Nominal Protection Coefficient (NPC) of less than one means implemented forestry policy in Ghana leads to a reduction in revenue or real prices compared to the

international sector. Thus forestry policy does not protect the domestic economy from losses resulting in welfare reduction.

The Effective Protection Coefficient (EPC) of less than one also implies that implemented forestry policy in Ghana leads to a loss of subsidies to the world economy. Thus forestry policy subsidizes the consumption of Ghanaian forestry products by the world economy to the detriment of the local economy resulting in a loss of local welfare.

The Subsidy Ratio to Producers (SRP) being negative means that all policy together taxes the Ghanaian forestry sector. This confirms the fact that the effect of forestry policy implemented in the Ashanti Region of Ghana has been welfare reducing and hence inefficient.

5.5.4 Sensitivity analysis

The inelasticity of changes in net divergence relative to changes in input prices indicates a worsening of net divergence with changing input prices within the Ghanaian forestry sector. Worsening divergence implies more distortions and greater externalities, which will result in lower welfare for the Ghanaian economy. Thus, the sensitivity analysis shows that implemented forestry policy has not been efficient in the Ashanti Region of Ghana.

Therefore forestry policy implementation in the Ashanti Region has resulted in distortions in private and social profitability to the detriment of local communities, a distorting

influence on revenues and costs, taxing the forestry sector and subsidizing external consumption of timber as against local consumption. It has also worsened distortions and externalities in the forestry sector. Hence, based on the profitability, divergence, summary ratio and sensitivity analyses, this evaluation concludes that the implementation of forestry policy in the Ashanti Region of Ghana has not been efficient.

CHAPTER SIX

EMPIRICAL RESULTS AND DISCUSSION ON NET ECONOMIC BENEFIT OF FORESTRY POLICY IN THE ASHANTI REGION

6.1 Introduction

The net economic benefit of any implemented policy shows whether it made a positive contribution or otherwise to the welfare of the target group for the policy. This chapter assesses the net economic benefit of implemented forestry policy in the Ashanti Region of Ghana by examining the real cost and effectiveness of forestry policy implemented in the region. It also assesses the efficacy of implemented forestry policy in the region as a way of confirming the results of the net benefit assessment.

6.2 Cost of Forestry Policy in the Ashanti Region

The cost of forestry policy in the Ashanti Region was obtained from the government subvention received by the Ashanti Regional Office of the Forestry Commission as discussed in chapter three. These remittances were documented in the Bank Account of the Commission through the Bank of Ghana. The Accounts provided monthly remittances for the Commission's operations. These included salaries and personal emoluments of staff as well as money for projects and programmes of the Commission. The accounts covered the end of 2003 to the beginning of 2009, that is, the closing Balance for 2003 and the opening Balance for 2009.

The computation for cost was done on annual basis from the Bank transaction records. Thus the real cost of forestry policy to the economy of Ghana, in the Ashanti Region was

obtained from the end of 2003 to the beginning of 2009. This covered 182 different transactions through the Bank of Ghana. A summary of items of government expenditure made to run the sector are presented in Figure 6.1 while the statements of accounts are presented in Appendix 5.

- Salaries and personal emoluments
- Educational grants
- Salary top up for staff not paid through Controller and Accountant General's office
- Quarterly Allocations of funds
- Special loans
- Overcast releases
- Wildfire LGMT funds
- LGMT-Monitoring funds
- Biodiversity funds
- Wildfire Project funds
- Vehicle maintenance funds
- Stock survey funds
- Plantation monitoring funds
- Green Ghana allocation funds
- NREG funds

Figure 6.1: Summary of Items of forestry policy Expenditure for Ashanti Region from January 2004 to December 2008
Source: Forestry Commission, 2010.

The annual payment totals are shown in Figure 6.2. The figure indicates a consistent increase in payments from government to the Ashanti regional FC from 343,719.05 Ghana cedis in 2004 to 684,248.66 Ghana cedis in 2007. There was however an unusually large drop in payments to less than half of the average annual payments in 2008. Such a drop in funding would not help forestry policy implementation in the region.

Figure 6.3 shows the trend of monthly payments to the Ashanti regional FC for forestry activities in the region. The inconsistent nature of the payments can be a big challenge for forestry policy implementation. Since these payments do not follow a systematic

pattern in terms of timing and quantum, a planned and consistent intervention programme in the forestry sector will be very difficult to follow. Thus even though payments are made, because they are not made in good time and in consistent amounts their use do not provide the most desired results for the sector and also the economy.

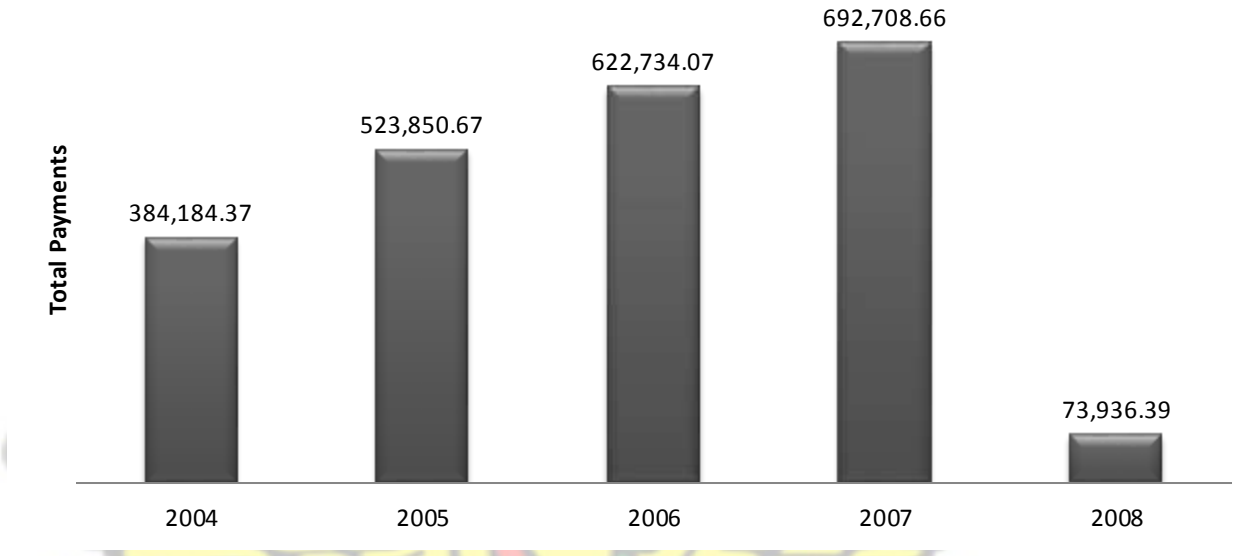


Figure 6.2: Total annual payments from government to Ashanti regional FC in Ghana cedis from 2004 to 2008

Source: Author's construction from FC data.

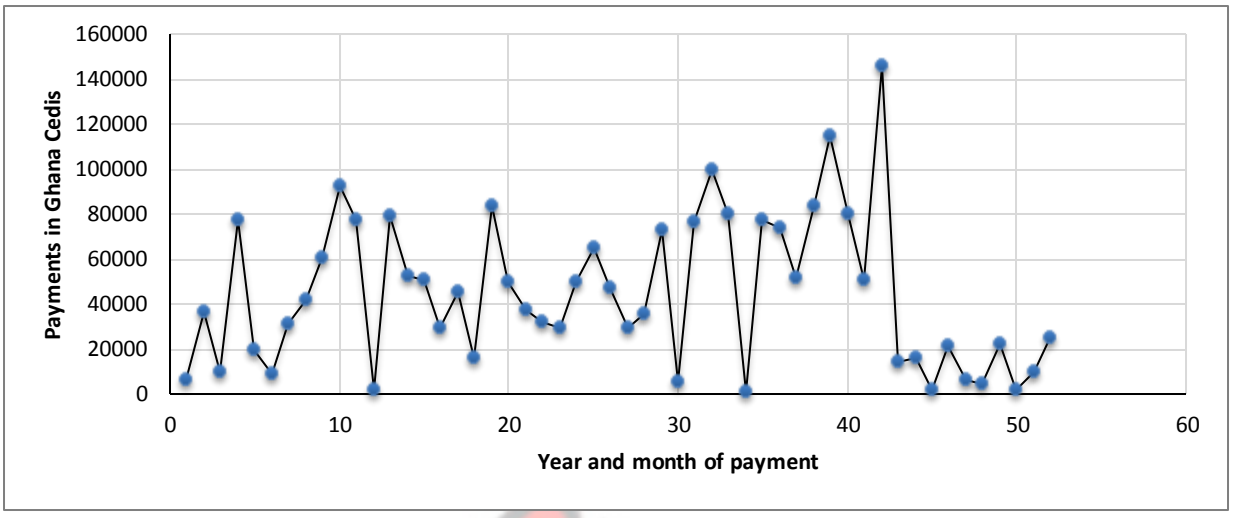


Figure 6.3: Trend of monthly payments from government to Ashanti regional FC in Ghana cedis

Source: Author's construction from FC data

Figure 6.4 shows the trend of annual payments to the Ashanti regional FC from government. The trend generally gives an impression of cosistent payment which is true if considered on annual basis. However, the monthly and day to day requirements which are not met due to inconsistent monthly funding releases could cause delays and sometimes wastages in forestry practice. For instance, if money needed to procure chemicals for spraying of seedlines arrives late, even though when the money arrives later the chemicals could be secured, the timing of the spraying exercised would be wrong and the results of the spraying would not be the best possible.

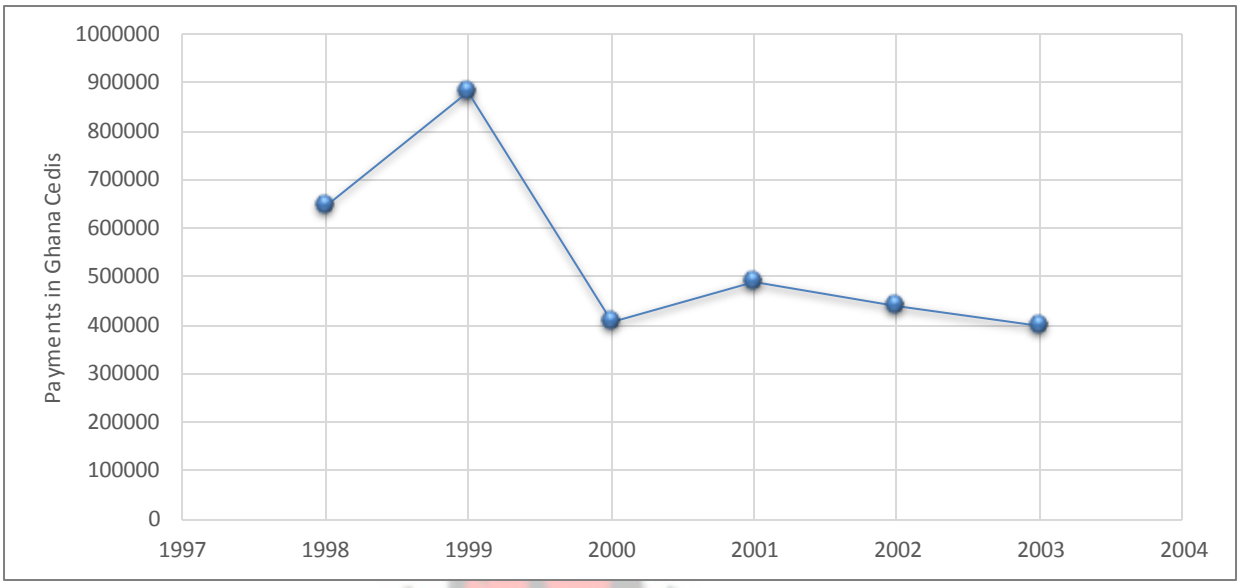


Figure 6.4: Trend of annual payments to Ashanti regional FC in Ghana cedis

Source: Author's construct from FC data.

Figure 6.5 above shows the percentage of payments to Ashanti regional FC which was designated for salaries. In 2004 there was virtually no payment designated for salaries. This means salaries might have been paid from some other payments not specifically meant for salaries. From 2005 to 2007 the percentage of payments allocated for salaries increased from about 39% to about 62%. This means the component of payments that went directly to undertake forestry activities kept dwindling.

Figure 6.5: Percentage of payments to Ashanti Regional FC designated for salaries

Source: Author's construction from FC data.

6.3 Cost-Effectiveness of Forestry Policy in the Ashanti Region

The effectiveness of forestry policy in this thesis was modeled on the concept of avoidable deforestation. Avoidable deforestation here refers to the deforestation which should not have occurred over and above the annual allowable cut (AAC) of timber, the AAC being the Statutory Policy Limit for harvests. Here the AAC for Ghana was obtained for various years; 1 million m^3 for 1997 to 2001 and 2 million m^3 from 2002. Since this AAC is for the entire country, a proportionate AAC for the Ashanti Region was computed. This computation was based on the fact that the Ashanti Region has about 20% of the country's forest reserves. This gave a regional AAC of 200,000 m^3 for 1997 to 2001 and a regional AAC of 400,000 m^3 for 2002 onwards. Timber was used because a disproportionate loss of tress from the forest amounts to a distortion of the forest ecosystem resulting in the loss of other forest resources, while the harvest of non-timber forest resources (NTFRs) does not pose any threat to the forest resource stock.

The real annual harvest volumes of timber in the region for the various years were obtained from 1998 to 2008 from the RMSC of the Forestry Commission through forestry district raw data. To obtain the avoidable deforestation for any given year the real timber harvest for that year was deducted from the ACC for that year. The excess of the harvest over and above the AAC was the avoidable deforestation. To derive the cost-effectiveness, the cost-effectiveness ratio (CER) was computed. This is the ratio between the cost of forestry policy implementation and avoidable deforestation, which is the ratio of the forestry policy expenditure per cubic meter of forestry cover which was preserved or lost. Graphing the cost-effectiveness values produces a "cost-effectiveness frontier" (Omi *et al.*, 1999). This shows the trajectory of avoidable deforestation annually in the region, based on the AAC.

6.3.1 Results from cost-effectiveness study

For the period from the end of 2003 to the beginning of 2009, the computed cost per m^3 of avoidable deforestation (cost-effectiveness ratios) were GH¢1.7340 for 2004, GH¢2.3574 for 2005, GH¢2.4631 for 2006, GH¢2.7248 for 2007 and GH¢0.4469 for 2008. These figures shown in Table 6.1 indicate that from 2004 to 2007, the cost per m^3 of avoidable deforestation despite the implementation of forestry policy was on a consistent rise. The ratio however fell drastically in 2008. Thus forestry policy since 2004 showed signs of consistent and persistent decreasing cost-effectiveness until 2008.

Table 6.1: Computation of Cost-effectiveness ratios for forestry policy in Ashanti Region

Year (a)	Official Volume harvested (m^3) (b)	Regional AAC (m^3) (c)	Avoidable deforestation(m^3) d=(c) – (b)	Annual cost of policy GH¢ (e)	Cost per m^3 of Avoidable Deforestation f=e÷d
1998	429,580.302	200,000	-229,580.302	NA	-
1999	588,321.265	200,000	-388,321.265	NA	-
2000	270,908.645	200,000	-70,908.645	NA	-
2001	325,549.297	200,000	-125,549.297	NA	-
2002	291,834.155	400,000	+108,165.845	NA	-
2003	265,937.634	400,000	+134,062.366	NA	-
2004	201,774.990	400,000	+198,225.01	343,719.05	1.7340
2005	161,062.571	400,000	+238,937.429	563,221.58	2.3574
2006	147,171.808	400,000	+252,828.192	622,734.07	2.4631
2007	148,899.735	400,000	+251,100.265	684,248.66	2.7248
2008	156,806.627	400,000	+243,193.373	108,678.59	0.4469

Source: Author's construct from Forestry Commission data.

The smallness of the expenditure for 2008 however was very unusual and definitely stifled the Commission of necessary funding. Following the assumption that the average annual expenditure is maintained for 2008, there will still be a high incidence of cost–ineffectiveness for 2008 also. The unduly low funding for 2008 could mean more reliance on internally generated funds for the running of forestry activities in the region. This is the case because it would be practically impossible for the Commission to have run on the about 20% of its average funding needs which was provided for 2008. Such an arrangement has the capacity to distort forestry policy implementation.

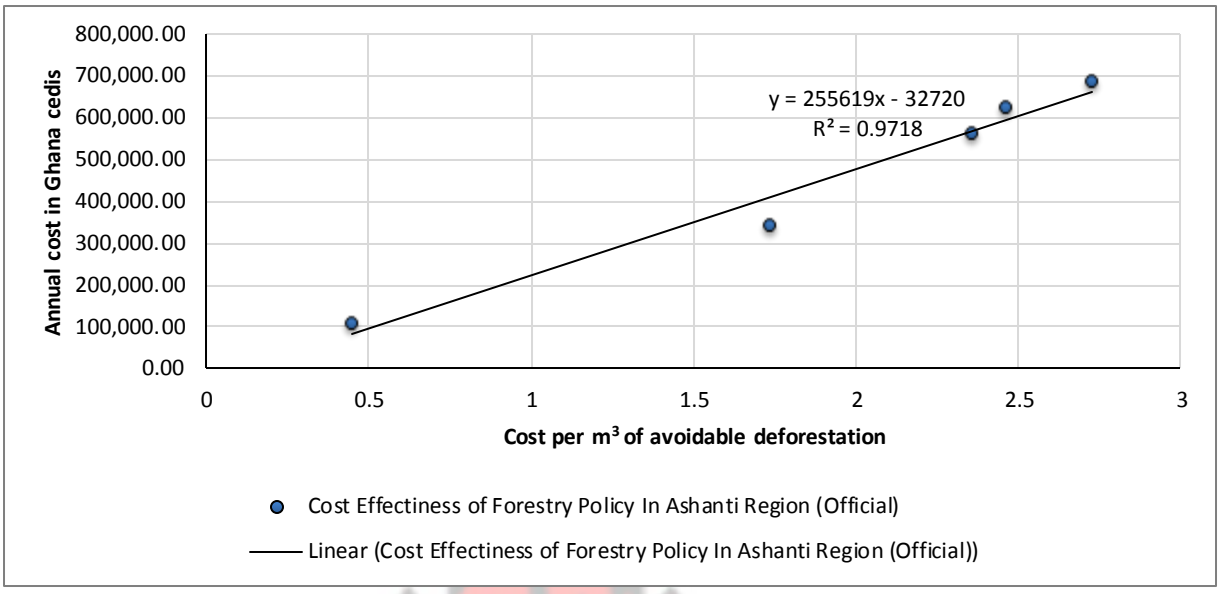


Figure 6.6: Cost-effectiveness frontier for Ashanti Region based on official estimates from 2004 to 2008.

Source: Author's construct.

The trend depicted by the cost-effectiveness frontier shows that to obtain a lower cost per cubic meter of avoidable deforestation relatively less money will have to be expended on forestry policy implementation. This decrease should be at the rate of 255,619 Ghana cedis per annum, which represents the slope of the line of best fit. However, a mere reduction does not provide all the answers if inefficient practices are still in place. A clear case is the fact that in Ghana the recovery rate of harvested trees is about 30%, while 70% goes waste, and stumpage fees being almost about 20% of what they should really be.

One major issue about the slope of the frontier is that while cost-effectiveness seeks to minimize the cost per cubic meter of avoidable deforestation, the frontier, based on official forestry costs and effects rather exhibits cost maximization. This means forestry policy implementation has not resulted in better conditions for forest stock conservation

in Ghana. Thus the trend shows worsening cost-effectiveness with increasing expenditure on forestry policy implementation.

6.4 Adjusting for Illegality and Understatement

Illegal logging constitutes a serious challenge in the forestry sector in Ghana. Birikorang (2008) estimated that illegal timber harvesting was about 1.7 million m^3 in 2008. Generally it has been established that the difference between reported log consumption and the actual official consumption is about 30%, while milling capacity was more than twice the AAC (Bird et al, 2006). These show that true timber harvests (official and illegal) are within the vicinity of twice the AAC (that is about 4 million m^3).

With the above in view, it was necessary to compute the cost-effectiveness ratios as well as the avoidable deforestation again, taking into consideration illegal logging and official understatement of official harvests. The AAC was set at 1.0 million m^3 in 1996 (Planning Branch, 1999). This was based on data from the 1996 HFZ timber inventory (Treue, 2001) and assumptions about the productive capacity of forest reserves given that the gradual depletion of off-reserve resources was going to be controlled over 55 years. Such a scenario saw the 1.0 million m^3 threshold as the maximum the resource base could sustain (Lund *et al.*, 2012).With the rate of depletion that ensued after the setting of the AAC, it is evident that the resource could no longer sustain an AAC of 1.0 million m^3. It is worth noting that Bird *et al.* (2006) indicated that the AAC was later set at 2 million m^3 administratively, partly because the wood industry confirmed its consumption of 2 million m^3 of harvest when the AAC was 1 million m^3 in 2001. Since the new AAC of 2

million m^3 was not set as a result of increased stock of forests but for convenience, the analysis reverted back to 1 million m^3 as the scientific AAC based on resource scarcity.

The "AAC paradox" in this case for Ghana is that, while the resource gets scarcer the harvest limits rather increase. The economics here is simply unacceptable and a recipe for liquidation of the resource. The AAC of 2 million m^3 was inappropriately high; an assumption which probably has more credibility than the arbitrary adjustment. Thus in Table 6.2 the AAC was reduced back to the original value of 200,000 m^3 for the region from 2002 to 2008.Also, the harvest volumes were multiplied by 1.5 to take into consideration a very conservative increase (the least possible) in real logging due to illegal logging and understatement from official sources as stated by Bird *et al.* (2006).

Table 6.2: Cost-effectiveness of forestry policy in Ashanti Region (Adjusted for illegal logging and official understatements)

Year (a)	Volume harvested (m^3) corrected for illegal logging and understatement (Regional) (b)	Regional AAC(m^3) (c)	Avoidable Deforestation (m^3) d= (c-b)	Annual cost of policy (GH¢) (e)	Cost per m^3 of avoidable deforestation (f=e÷d)
1998	644,370.453	200,000	-444,370.453	NA	-
1999	882,481.898	200,000	-682,481.898	NA	-
2000	406,362.968	200,000	-206,362.968	NA	-
2001	488,323.946	200,000	-288,323.946	NA	-
2002	437,751.233	200,000	-237,751.233	NA	-
2003	398,906.451	200,000	-198,906.451	NA	-
2004	302,662.485	200,000	-102,662.485	343,719.05	-3.3480
2005	241,593.857	200,000	-41,593.857	563,221.58	-13.5410
2006	220,757.712	200,000	-20,757.712	622,734.07	-30.0001
2007	223,349.603	200,000	-23,349.603	684,248.66	-29.30
2008	235,209.941	200,000	-35,209.941	108,674.59	-3.0865

Source: Author's computation from Forestry Commission data.

A graphical presentation of the cost-effectiveness analysis is shown in Figure 6.7.

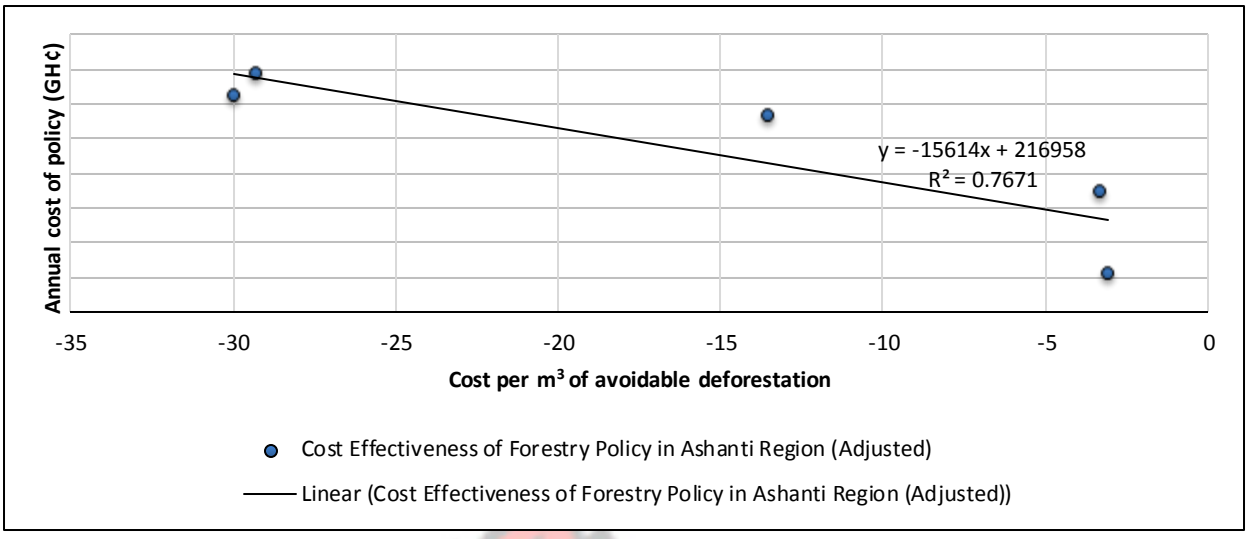


Figure 6.7:Cost-effectiveness frontier of forestry policy in Ashanti Region (Adjusted)
Source: Author's construct.

From Table 6.2, avoidable deforestation though improving has always been in the negative, despite the fact that the most recent forestry policy has been implemented for more than a decade. This occurs within the first quadrant of the cost-effectiveness plane and shows cost-ineffectiveness. The cost-effectiveness ratios have also worsened and indicate gross waste of state resources. Thus the cost of avoidable deforestation has been on the increase, depicting cost-ineffectiveness and hence economic loss through forestry policy implementation. Therefore forestry policy is not cost-effective and hence does not result in net economic benefit and therefore economic growth in the Ashanti region. This therefore means that even though forestry policy had been implemented in the region for decades, it has not enhanced economic growth.

The correlation between avoidable deforestation and annual cost of policy as indicated in Table 6.3 is 0.391. This is not high, while the p-value is 0.515. This p-value is above the critical value of 0.05 and thus is not significant at the 5% level. Thus there is no significant

relationship between the two variables and so we accept the null hypothesis that forestry policy has not generated net economic benefit in the Ashanti Region and reject the research hypothesis that forestry policy has generated net economic benefit in the Ashanti region.

Table 6.3: Correlation between avoidable deforestation and annual cost of policy

		Avoidable Deforestation	Annual Cost of Policy
Avoidable Deforestation	Pearson Correlation	1	0.391
	Sig. (2-tailed)		0.515
	N	11	5
Annual Cost of Policy	Pearson Correlation	0.391	1
	Sig. (2-tailed)	0.515	
	N	5	5

Source: Author's computation from FC data

6.5 Efficacy of Forestry Policy in the Ashanti Region

Efficacious forestry policy would result in economic benefit since it achieves the goal for which it was made. This means the expenditure incurred did not go waste but delivered the expected benefit to the economy. The importance of forestry policy achieving its objective for forest cover conservation and people cannot be overemphasized. It therefore makes sense for forestry policy to set a target for the level of deforestation it desires to achieve so as to eventually attain a sustainable forest resource stock which can cater for both present and future generations. The ability to achieve the set deforestation target of forestry policy in Ghana is an indicator of forestry policy efficacy. Attaining this goal sets the stage for other goals to be achieved for the attainment of economic development. Since numerical targets are most of the time informed estimates, efficacy may not necessarily imply achieving a numerical target but rather making significant progress in the direction of the set target.

Analysis for efficacy was based on the extent of avoidable deforestation. The larger and positive avoidable deforestation was, the better conserved the forest resource was and the higher the chances that would exist for economic growth to occur. On the other hand, the larger and negative avoidable deforestation was, the more depleted the resource was and therefore the less the chances of attaining economic growth.

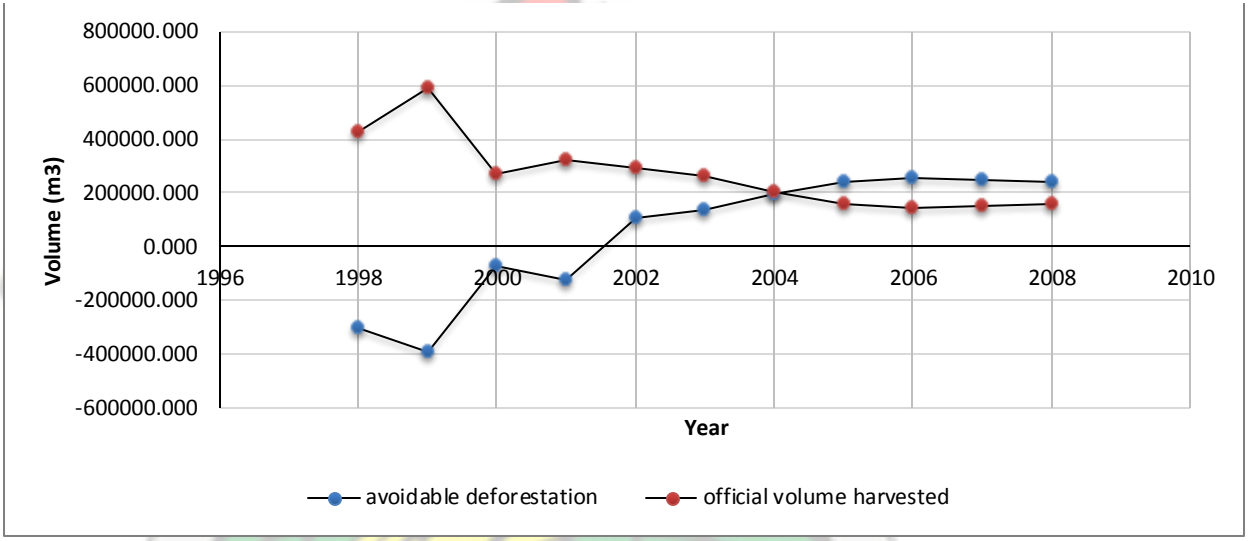


Figure 6.8: Official volume harvested and avoidable deforestation in Ashanti Region.

Without adjusting for illegality in forest harvest, the official records looked encouraging particularly after the AAC was adjusted from 1 million cubic meters to 2 million cubic meters. There was clearly a consistent positive increase in avoidable deforestation from about 108, 165 m^3 in 2002 to about 243,193 m^3 in 2008 as indicated in Table 6.1 and Figure 6.8.

However, knowing the consistent underestimation of harvest levels in official records, it was more realistic to adjust for underestimation as was done in the previous section. Also,

acknowledging the fact that the adjustment in the AAC was not based on scientific computation relative to stock levels but rather on administrative convenience, it was not worth dwelling on the analysis from Table 6.1. In Table 6.2, the reality on the ground is acknowledged based on the adjustments discussed above. The assumption here is that not until the scientific basis for the 2 million cubic meters AAC is established, the only scientific AAC is the 1 million cubic meters which was realistic based on dwindling stock levels of timber. Table 6.2 is also more acceptable because it accounts for illegal logging. An improving trend in avoidable deforestation is observed in Table 6.2 as illustrated in Figure 6.8, which is similar to the trend in Table 6.1.

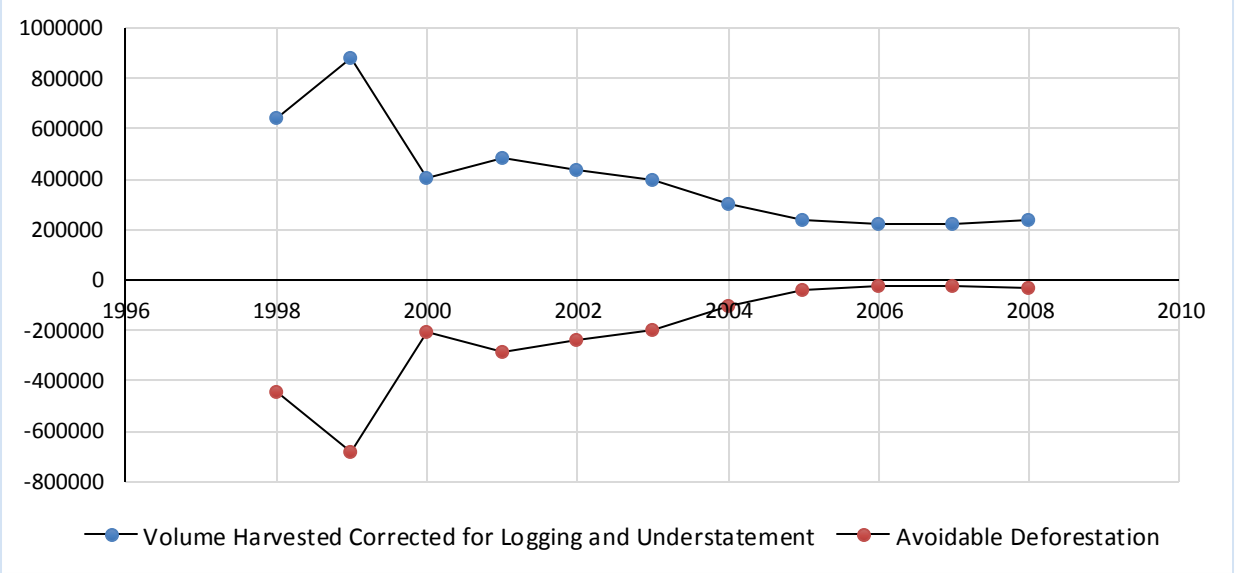


Figure 6.9: Avoidable deforestation adjusted for illegal logging and official underestimation

The difference however is that there is still public spending to deplete forest stocks decades after the implementation of forestry policy. This depletion is however at a decreasing rate, which may not mean wholly that policy is succeeding but could also

mean the greater difficulty of having access to timber, which can limit the rate of depletion of the forest resource in the region. The latter explanation carries more weight here due to the consistent increase of the national annual rate of deforestation from 22,000 ha in the 1980s to about 135,000 $m^3$by 2010 (EPA, 1991 and FAO, 2010). This rate of deforestation has resulted in several prime species of Ghana's timber being endangered. This is further confirmed by the fact that production areas in Ghana's forest reserves declined from 1.76 million ha in 1970 to 719,300 ha by 2001 (Oteng-Amoako, 2002).

The average rate of decline in the negative avoidable deforestation shows a possibility of a further decline and a final exit from the negative zone to make room for some natural capital formation and growth. The concern however is that within the last 4 years, as indicated in Table 6.3, the rate of change had been trapped within the neighborhood of negative 20,000 m^3 to negative 40,000 m^3. This means a stabilizing rate, which cannot lead to an exit, therefore depicting a cost-ineffective "equilibrium trap". Hence, there is no natural capital formation through the forestry sector of the Ashanti Region. This is a drag on natural capital investment and therefore economic growth and development.

Table 6.4: Test of hypothesis on efficacy of forestry policy in the Ashanti region

One-Sample Test	Test Value = 0					
	t	Df	Sig. (2tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Avoidable Deforestation	-3.332	10	0.008	-207433.6863	-346129.6273	-68737.7455

The test of hypothesis for forestry policy generating net economic benefit in the Ashanti Region is based on the univariate hypothesis test utilizing the t-Distribution since the

number of years observed was less than 30. The null hypothesis as derived from chapter one is H_O:$\mu \neq 0$ and the alternative hypothesis is H_1 :$\mu = 0$, where μ is the mean of the annual levels of avoidable deforestation in the Ashanti Region. The test results are indicated in Table 6.4. The sample mean, -207,433.68636 falls within the region of acceptance with lower and upper limit critical values of -346,129.6273 and -68,737.7455 respectively. We thus accept the null hypothesis that forestry policy in the Ashanti Region has not generated net economic benefit and reject the research hypothesis that forestry policy in the Ashanti Region has generated net economic benefit.

The discussion confirms the results of the test of hypothesis, indicating that forestry policy has not been efficacious in the Ashanti Region of Ghana. Thus, if forestry policy in the Ashanti Region has not been cost-effective and efficacious, then, it has been wasteful and off-target and not generated net economic benefits. Therefore, forestry policy has not resulted in economic development in the Ashanti Region of Ghana.

CHAPTER SEVEN

EMPIRICAL RESULTS AND DISCUSSION ON THE EQUITY EFFECT OF FORESTRY POLICY IN THE ASHANTI REGION

7.1 Introduction

The distribution of impacts of forestry policy can be assessed in three main ways. The first is to trace the distribution of costs and benefits with the assumption that they can be quantified and valued. The second way is to use weights to represent costs and benefits accruing to specific groups of people for the fear that market prices may be suboptimal in determining distributional inequities in the forestry sector. Finally, entitlements (use and access rights) of particular groups of people can be assessed based on certain legal requirements or standards which must necessarily be met (Bann, 1999).

A rights-based or entitlements approach to forestry policy impact assessment begins from allocated entitlements; for instance, the requirement that indigenous populations retain their traditional access rights to particular forest areas. Entitlements thus define the boundaries or parameters of the analysis. These rights or limits are for the forestry sector in Ghana, derived from the forestry policies implemented over the past 100 years. This chapter assesses the equity effect of implemented forestry policy in the Ashanti Region. It begins by presenting the socio-economic characteristics of respondents to questionnaire on forestry policy benefits in sampled areas. It then proceeds to carry out equity analysis to assess the equity effect of implemented forestry policy in the region.

7.2 Socioeconomic characteristics of forest communities

Of the 158 respondents, 62.7% were male and 37.3% female. The income distribution among the respondents showed that 75.9% had a monthly income less than 95.5 Ghana cedis, 19.0% had average monthly income of 150.5 Ghana cedis, 4.4% had average monthly income of 250.5 Ghana cedis and the remaining 0.6% had an average monthly income of 350.5 Ghana cedis. The modal income was 95.5 Ghana cedis, showing that over 75% of households had monthly incomes less than US$2.00 per day. Thus the forested communities generally had low incomes. Figure 7.1 shows a bar graph of the income distribution.

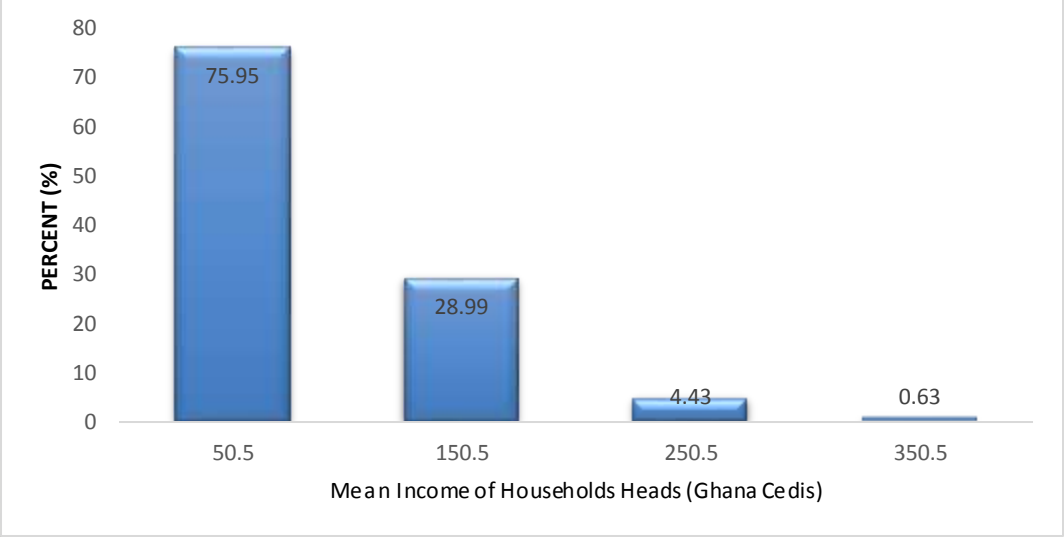


Figure 7.1: Income distribution of household heads in forestry communities

7.3 Forests as source of subsistence

Figure 7.2 shows the items households subsisted on from their forests. The most common source of subsistence was foodstuffs (31.2%) which they obtained through the forest. The next most important was wood (25.8%), followed by bush meat (15%) and rainfall (raw

water) (11%)and firewood (8.1%). Each of the remaining uses was below 3% with 0.5% indicating they had no benefits from the forests.

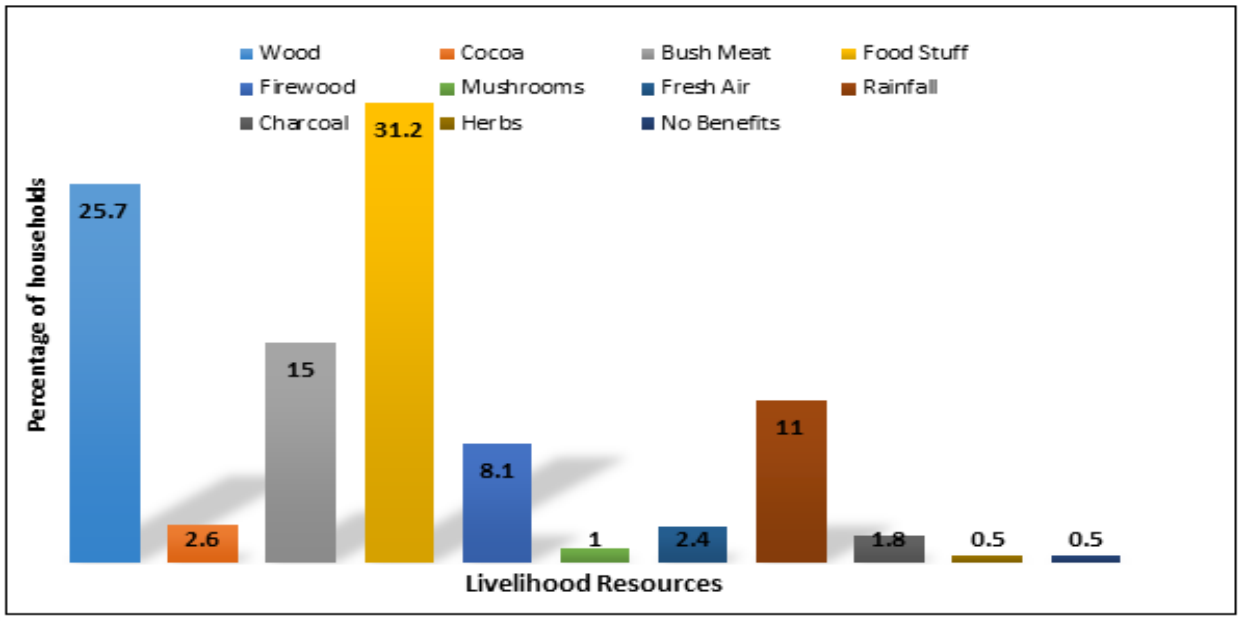


Figure 7.2: Items households subsisted on from forests (in percentage contribution to livelihood)
Source: Author's fieldwork.

Figure 7.3 shows how well-acquainted households were with the implementation of forestry policy on the ground. The most frequent activity they reported as practical implementation of forestry policy was tree planting (49%), followed by bushfire prevention (14.4%) and education on forest protection (9.2%). The regulation of timber harvesting (7.7%) and forest reservation (5.3%) also featured prominently among the activities they recognized as the implementation of forestry policy in their communities.

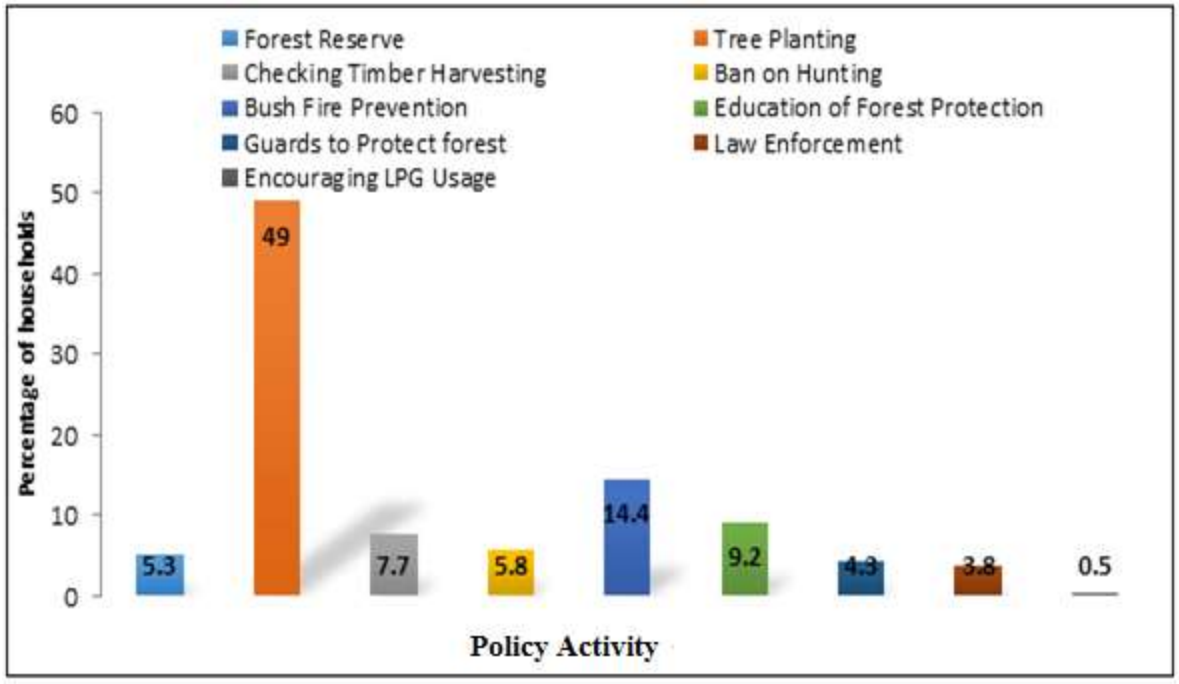


Figure 7.3: Forestry community knowledge of forestry policy implementation

7.4 Forest community benefits from forests

Table 7.1 presents a summary of the results from the survey on forestry benefits. From the total sample, 98.7% of households got regular sustenance from forests. This is an indication that the livelihoods of the communities depended almost entirely on forests and forest practices, signifying that policies on forests would be important determinants of the level of welfare of the people. Over 79% of the households had subsisted on forests over the past 9 years. More than 85% of these households had experienced some shortage in the availability of forest products which they had access to previously, while about 15% of households seemed not to have experienced any shortages.

Table 7.1: Sources of forest benefits for forest communities

Sources of Benefits		Yes	%	No.	%
Regular source of sustenance from forests (V)		156	98.7	2	1.3
Length of time benefits have been enjoyed (Lb)	<2yrs	5	3.2		
	3yrs	10	6.3		
	6yrs	18	11.4		
	9yrs	125	79.1		
Running out of some forest goods (Deg)		135	85.4	23	14.6
Education on sustainable forest use (U_{ed})		112	70.9	46	29.1
Education on government forestry policy (P_{ed})		140	88.6	18	11.4
Knowledge of government policy implementation on the ground (A_{ed})		134	84.8	24	15.2
Knowledge of the payment of forest royalties to district (B_{ed})		86	51.9	76	48.1
Knowledge of the use of royalties (Inf)		77	48.7	81	51.3
The household benefiting from royalties (B)		77	48.7	81	51.3

Source: Author's fieldwork.

In terms of households receiving education through the forestry commission or district assembly on the sustainable used of forests, about 71% of the households testified to having been given some education while 29% had not received any such education. This shows a clear case of policy implementation going on in the region.

Over 84% of households knew of government forest policy being practically implemented within their areas. While education on government policies had been very forthcoming, the same could not be said about education on benefits that accrued to the households. About 52% of households knew that royalties were being received by district authorities and stools, while the other 48% were ignorant of this fact. Also, about 49% of households knew what the royalties were used for, while over 51% did not know. In all,

about 49% of households acknowledged they benefited from royalties in direct or indirect ways; the majority (over 51%) indicated they did not benefit from royalties.

Thus, while in terms of passing on government policy and regulations to households there was high performance, with over 81% of households made aware of what their responsibilities were, the same had not been the case for providing knowledge on the rights of forest communities. On the average, while about 49.7% of households had enough knowledge about benefits, over 50% of households had no knowledge of benefits they could obtain through forestry policy. Therefore, there is inequity in the management of knowledge on forest benefits against the forest communities.

7.5 Income Distribution

The incomes of household heads were assessed to ascertain the distribution of income within households through a construction of the Lorenz curve for the communities sampled. Figure 7.4 shows the resulting Lorenz curve. The horizontal axis represents individuals (in percentage terms over the population) ordered from the one with the lowest income to the one with the highest income (in a left to right direction). The vertical axis represents the percentage of incomes of household heads in the forest communities. When the income accumulation curve, or Lorenz curve, coincides with the diagonal, it means that income is equally spread among the households. Reading it from bottom left to right, it would mean that the 20% of the poorest people accumulate 20% of the overall income; and likewise for any other percentage. However, the Lorenz curve in Figure 7.4 rests below the diagonal. It indicates that the 20% poorest part of society earns less than

20% of what the communities earn. In general, curves further away from the diagonal reflect society with income distributed less equally.

The Gini-index is a quantity calculated from a particular Lorenz curve. It is defined as an integral that summarizes how much the Lorenz curve in question deviates from perfect equitability (Farris, 2010). The Gini-index for the sampled households is 0.37, derived from the Lorenz curve. Based on the value of the Gini-index, the interpretation is that the lower of two of the forest households' incomes, chosen at random, is about 63% of the mean; on the average, the poorer of two families earns only about 63% of the forest community mean income.

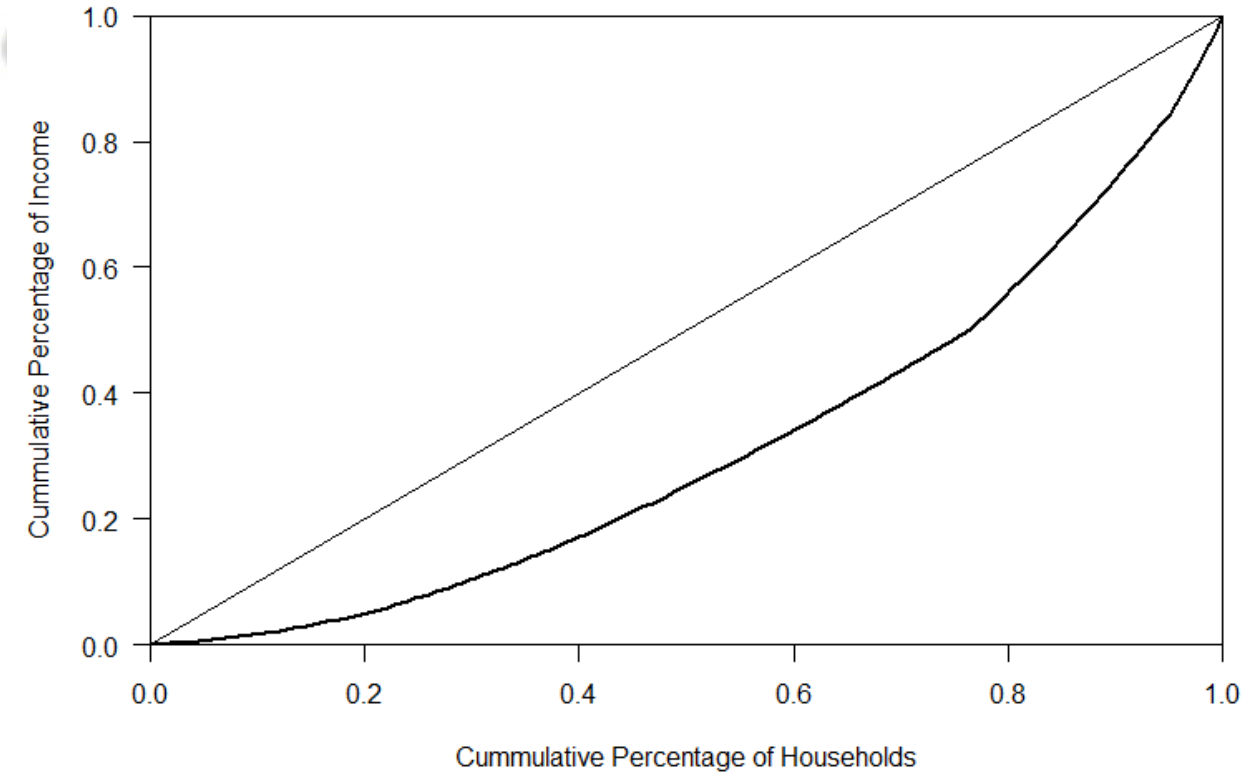


Figure 7.4: Lorenz curve for forest communities in Ashanti Region
Source: Author's construction

The curve provides evidence of inequality in the incomes of the households. However, unequal incomes per se do not explain the contribution of forestry policy to this inequality. This necessitated the use of the chi-square test of independence to ascertain the extent to which forestry policy had contributed to inequality. The chi-square test procedure is presented in the following section.

7.6 Factors influencing forestry income distribution

To test the hypothesis on the distribution of forestry policy benefits in the Ashanti Region in terms of equity, a chi-square test of independence was performed. The test was in relation to the distribution of forestry policy benefits in the Ashanti Region based on the sex of respondents. If the distribution of benefits was skewed towards the underprivileged in terms of sex, then, the distribution mechanism (forestry policy) was equitable; otherwise it was inequitable (Appendix 4 shows the detailed results).

Based on the requirement that the expected frequency count for each cell in the chi-square contingency table should be at least 5 for credible results, none of the direct tests on incomes was feasible with respect to the variables for equity assessment in Table 7.1. This explains the use of only sex instead of sex and income. For each of the tests in the following section, the expected frequency count requirement for the chi-square test of independence was satisfied. Thus for each test of hypothesis, the chi-square test of independence was used to determine whether there was a significant relationship between a forestry policy benefit and the sex of household head in the Ashanti Region of Ghana at 5% significance level. Each forestry policy benefit obtained based on sex was a

necessary condition for equity. If this condition was not met, then there could not be equitable distribution of the benefits of forestry policy. If this condition was met, then it had to be more favorable for women than men, since women were generally less privileged than men in the Ghanaian society (GSS, 2014).The test results for the chi-square test of independence are presented and discussed in the following section.

7.7 Presentation and discussion of Chi-Square Test results

(i) Education on forestry policy and sex of household head

Hypothesis:

H_0: Education on forestry policy and sex of household head are independent.

H_1: Education on forestry policy and sex of household head are not independent.

The probability of the chi-square test statistic (chi-square = 1.391) was $p = 0.238$ and greater than the alpha level of significance 0.05. The null hypothesis that differences in education on forestry policy are independent of differences in sex is not rejected. The research hypothesis that differences in education on forestry policy are related to differences in sex is not supported by this analysis. Since education on forestry policy is required for equity in handling forestry issues, this means the right to education on forest resources and policy should favor women more than men. This is because women have generally been less privileged than men in Ghanaian societies. The test result therefore shows that there is inequity in education on forestry policy in the Ashanti region.

(ii) Knowledge of forestry policy implementation and sex of household head.

Hypothesis:

H_0: Knowledge of forestry policy implementation in one's community and sex of household head are independent.

H_1: Knowledge of forestry policy implementation in one's community and sex of household head are not independent.

The probability of the chi-square test statistic (chi-square = 0.000) was $p = 0.986$ and greater than the alpha level of significance 0.05. The null hypothesis that differences in knowledge of policy implementation on the ground are independent of differences in sex is not rejected. The research hypothesis that differences in knowledge of forestry policy implementation on the ground are related to differences in sex is not supported by this analysis. Since knowledge of forestry policy implementation on the ground is required for equity in handling forestry issues, this means the right to knowledge of forestry policy implementation in one's community should favor women more than men. This is because women are generally less privileged than men in Ghanaian societies (GSS, 2014). The test result therefore shows that there is inequity in the provision of knowledge on forestry policy implementation on the ground in the Ashanti region.

(iii) Knowledge of payment of forest royalties to one's District Assembly and sex of household head

Hypothesis:

H_0: Knowledge of payment of forest royalties to one's District Assembly and sex of household head are independent.

H_1: Knowledge of payment of forest royalties to one's District Assembly and sex of household head are not independent.

The probability of the chi-square test statistic (chi-square = 1.420) was $p = 0.233$ and greater than the alpha level of significance 0.05. The null hypothesis that differences in knowledge of the payment of forest royalties to one's District Assembly are independent of differences in sex is not rejected. The research hypothesis that differences in knowledge of the payment of forest royalties to one's District Assembly are related to differences in sex is not supported by this analysis. Since the knowledge of the payment of forest royalties to one's District Assembly is essential for equity in forest resource decisions, it should favor women more than men. This is because women are less privileged than men in Ghanaian societies. The test result therefore shows that there is inequity in knowledge of the payment of forest royalties to one's District Assembly in the Ashanti region.

(iv) Knowledge of the use of forest royalties and sex of household head.

Hypothesis:

H_0: Knowledge of the use of forest royalties is independent of sex of household head.

H_1: Knowledge of the use of forest royalties is not independent of sex of household head.

The probability of the chi-square test statistic (chi-square = 1.525) was $p = 0.217$ and greater than the alpha level of significance 0.05. The null hypothesis that differences in knowledge of the use of forest royalties are independent of differences in sex of household head is not rejected. The research hypothesis that differences in knowledge of the use of forest royalties is related to differences in sex of household head is not supported by this analysis. Since the knowledge of the use of forest royalties is directly related to equity in the administration of forest royalty funds, it should have favoured women more than men, since women are less privileged than men in Ghanaian societies. The test result therefore shows that there is inequity in knowledge of the use of forest royalties in the Ashanti region.

(v) A household benefiting from forest royalties and sex of household head.

Hypothesis:

H_0: A household benefiting from forest royalties is independent of sex of household head.

H_1: A household benefiting from forest royalties is not independent of sex of household head.

The probability of the chi-square test statistic (chi-square = 0.821) was $p = 0.365$ and greater than the alpha level of significance 0.05. The null hypothesis that differences in the household benefiting from forest royalties are independent of differences in sex of household head is not rejected. The research hypothesis that differences in the household benefiting from forest royalties are related to differences in sex of household head is not supported by this analysis. Since the issue of household benefiting from forest royalties is an equity issue, it must favor women more than men. The test result therefore shows that there is inequity in households benefiting from forest royalties in the Ashanti Region.

The tests of hypotheses reveal inequity in the allocation of rights of households with respect to education on forestry policy and forestry policy implementation. Lambini and Nguyen (2013) also found that forest rights in Ghana had not improved livelihoods, thus agreeing with the finding of the thesis concerning the equity effect of forestry policy in the Ashanti Region of Ghana. Lambini and Nguyen (2013) further found that about 93% of forest communities do not obtain benefits realized through forestry policy implementation, hence also agreeing with the finding of this thesis on forestry policy benefits. The findings on the distribution of forestry policy benefits thus confirm the results of the tests of hypotheses. Therefore, there exists inequity in the distribution of forestry policy benefits in the Ashanti Region of Ghana.

CHAPTER EIGHT

MODALITIES FOR ACHIEVING ECONOMIC DEVELOPMENT THROUGH FORESTRY POLICY IMPLEMENTATION IN GHANA

8.1 Introduction

The results for this study show that forestry policy in the Ashanti Region has met neither the necessary nor sufficient conditions for economic welfare improvement. Therefore, forestry policy has not been a driver of economic development in the Ashanti Region of Ghana. Being the most resourced region in the forestry sector in Ghana, if the Ashanti Region's forestry sector does not promote economic growth and development, then, the same situation is likely to be true for the whole of Ghana. This chapter therefore applies the principles of sustainable economic development discussed in section 2.11.3 to propose a way of developing forestry policy for sustainable economic development in Ghana. This is based on the holistic model approach to economic development. It serves as a way forward, responding to the evaluation outcomes for chapters four, five, six and seven of this thesis. Together, the modalities amount to an application of the sustainable development concept to forestry policy implementation in Ghana, as discussed in section 2.11.3.

8.2 The new role of forestry policy

The fact that the focus of the driving force of forestry policy globally has changed significantly from the normative forest science approach to the analytical socio-economic-political approach requires a drastic and urgent change in approach to forestry policy in Ghana. In such a situation, the role of forestry policy should no longer be that

of providing advice to policy makers but as objective assessment of the sector and its dynamics, analysis of its decision making processes and tests of relevant theories. This means its findings should no longer be provided as the best professional option but as an alternative view towards democratic decision-making where human welfare issues are of paramount concern.

The almost absolute silvicultural approach to the formulation and implementation of forestry policy must cease to make room for a more holistic approach in all stages of the policy process. Such an approach should consider all the aspects of forestry policy necessary for economic development.

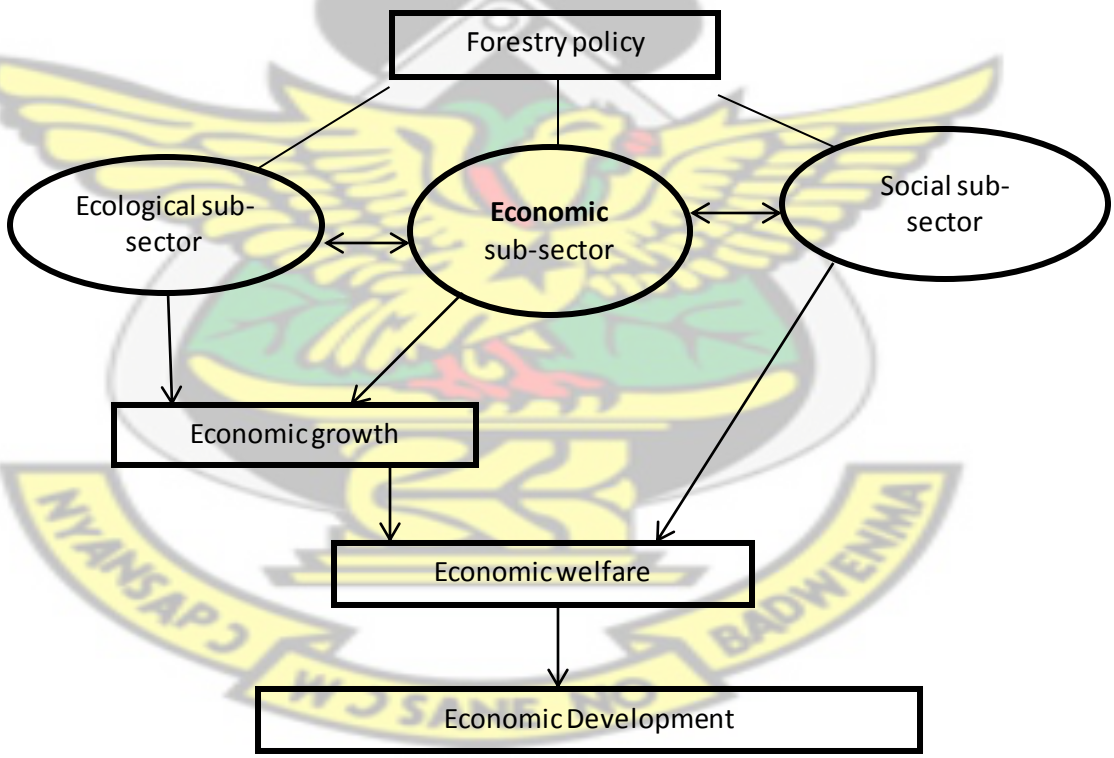


Figure 8.1: A holistic model for economic development oriented forestry policy for Ghana

Source: Author's construct.

The current control by silvicultural concepts has not produced the desired outcomes. The involvement of other stakeholders is essentially long overdue to stem the current policy failures in the sector. A detailed discussion of the approach of this model is provided and illustrated by Figure 8.1.

This will require a forestry policy framework which is built on three pillars of sustainable development – social development, economic development and ecological development. These three spheres of development belong to the social, economic and ecological sub-sectors respectively of the economy. The first step will thus be for policy to assign an equal role for each of these sub-sectors within the forestry policy framework of Ghana, as discussed in the sub-sections following.

8.2.1 The ecological sub-sector

The ecological sub-sector currently dominates the Ghanaian forestry sector in the formulation and implementation of forestry policy. Even then, an update of methods, equipment and technology is necessary to achieve technical efficiency particularly with the recovery rate of timber, which is quite low compared to several other countries. The inefficacy of forestry policy proves the inability of an almost wholly ecological approach to provide desired solutions to the formulation and implementation of forestry policy problem in Ghana. This showed up clearly in the efficiency evaluation in chapter five of this study. The domination must be done away with as quickly as possible to bring on board both the economic and social sub-sectors to salvage the current down turn for the better before the resource is liquidated.

8.2.2 The economic sub-sector

The economic sub-sector has received some amount of recognition in the forestry sector in Ghana. However, it has been relegated to the background and is probably only applied when issues about money arise. It is also worth noting that most of the times natural scientists have assumed the role of forestry economists and carried out superficial assessments to inform policy, instead of involving true economists. In effect, the involvement of economists has mostly been non-existent.

The issues of cost-effectiveness and efficiency of forestry policy belong to the economic sub-sector more than to the ecological sub-sector. The inability to correctly plan for cost-effective and efficient performance of forestry policy by the authorities also demonstrates the lack of a full scale participation of the economic sub-sector in forestry policy issues. To attain economic growth, both economists and foresters must play equally important roles from the beginning to the end of the various activities involved in the forestry policy process. Without this, it will be unlikely to attain real economic growth through the forestry sector. Thus the way forward in this regard is to engage forestry and resource economists and get them to actively participate in all stages of the forestry policy process on an equal level of importance as foresters.

8.2.3 The social sub-sector

The analysis of equity through the rights approach falls directly under the social sub-sector. The social subsector has been one of the most neglected subsectors of the forestry sector. Since forestry is eventually about human benefit not just for its own sake, leaving

out the social sub-sector produces a gap which will derail the efforts of both the ecological and economic activities as far as economic growth and development are concerned. Thus social scientists and particularly sociologists need to be brought on board to provide enough insight into the issues pertaining to forestry policy, not as invited guests but as equally relevant partners with ecologists and economists. So far, it is evident that the participation of forest communities is being elicited. However, the reality for sustainable development lies in the full participation of forest communities as equal partners for sustainable development, not on a selective participation basis directed from forestry authorities.

To get equitable based on the Rawlsian preference criterion, which underlines sustainable social development there is no way forestry policy can drive economic development without the full participation on equal terms of forestry communities. These communities have a major role to play as major stakeholders in the social subsector of the economy. Any attempt to undermine their role will only drawback the time-path to sustainable economic development.

8.3 Areas of forestry policy action

8.3.1 The annual allowable cut (AAC)

The arbitrary fixing of the current AAC at 2 million m^3 from the previous 1 million m^3 has created a false sense of success for the implementation of forestry policy. The level and trend of avoidable deforestation recorded by this thesis is evidence that the forest resource stock is not capable of supporting even the previous AAC of 1 million m^3.It is therefore recommended that a new AAC be computed based on the realistic resource

stocks resulting from the excessively high rates of deforestation that have plagued the Ghanaian forestry sector. Based on the negative 'avoidable deforestation equilibrium-trap' observed, there must be some urgency in the computation of a more realistic AAC to save the resource from too early liquidation. This AAC could be lower than 1million m^3.

8.3.2 Balancing Forestry policy education

The fact that educating forestry communities about forestry policies has been inequitable brings up the issue about some obnoxious colonial legacies still in place within the forestry sector. This legacy expects communities to know their responsibilities and abide by them without knowing what rights they had. Apart from being unfair and therefore an infringement on their liberties, such a system of education alienates the communities and deprives them of one of their main sources of livelihood. Under such circumstances they are deprived of some of their basic needs leading to a loss of the needed capabilities for welfare improvement. This contradicts the stated policy objective of using forest resources to improve the welfare of Ghanaians. It is therefore recommended that as much as forest communities would be told their responsibilities, Forestry Commission officials should also endeavor to disclose to these communities their rights alongside the responsibilities.

8.3.3 Illegal Activities

Illegality in the timber industry has been one of the main sources of the high rate of forest depletion in Ghana. For more than a decade, illegal harvests have exceeded legal harvests

of timber. The extent of illegality attests to the fact that only a few criminals are deriving so much benefit to the detriment of the entire economy. These illegal operators do not pay stumpage as well as taxes to the state. Thus the extent of illegality itself shows inequitable distribution of forest resources. Illegal operations also thwart policy objectives because they provide a parallel and unorganized forestry sector to the main and organized sector. Low remuneration, bribery and corruption among officials have been identified as some of the major causes of illegality in the sector. The poor working conditions of staff of the Forestry Commission and lack of logistics at the forest level creates avenues for corruption and complicity with illegality.

Also, the alienation of forest communities from forests in favour of large forest concession owners has been a disincentive for local communities to assist in tracking down illegal operators within the sector. It is therefore recommended that apart from restoring the rights of forest communities, the salaries and working conditions of officials who monitor forestry activities be enhanced to the extent that bribes from illegal operators will be unattractive. Punitive measures against offending officials must also be severe enough to deter others from corrupt practices in the sector.

Further, adequate and timely arrival of funds for forest policy activities must be made a priority of the sector. Late arrival of funding and equipment can derail various programmes planned in line with policy deliverables. A delay which for instance causes the transplanting of seedlings after twelve weeks instead of six weeks could derail a whole plan for intervention in a forest reserve and result in targets not being realized. Ghana

should also speed up processes to get on board the European Union Forest Law Enforcement Governance and Trade (EU-FLEGT) programme which promises to track timber and therefore has the tendency to discourage illegality to a substantial extent.

8.3.4 The Forestry Commission

The fact that Ghana has earned foreign exchange from timber trade does not make timber the most important forest resource. Forests are more valuable than the timber they provide. The fact however that the timber sector has had almost all the attention of the Forestry Commission calls for a review of the structure of the Commission to include a sector for non-timber forest resources with personnel specifically charged to see to the development of non-timber forest resources. A later development for the Commission should be a major restructuring to adequately address all the aspects of the proposed holistic model by operating as a three subsectors Commission. Such a commission should be headed by a three member team of commissioners, one selected from each of the three subsectors, with equal ranking on the team.

The need for an independent forestry authority in Ghana is long overdue. Current practice in the forestry sector has shown political interference from government functionaries. This leads to a dysfunction of some policy interventions. It will therefore be prudent to seek a constitutional amendment which would insulate the Forestry Commission from all such interference and at the same time institute a transparent system of management, which demands strict accountability to all stakeholders to fulfil the equity principle toward sustainable economic development.

CHAPTER NINE

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

9.1 Introduction

In this concluding chapter, the findings of the study are summarized. The implications of the findings for forestry policy in particular and national policy in general are also discussed. The chapter ends with some suggested implications for further research.

9.2 Summary of main findings

Forestry policy has been implemented in Ghana for over one century. The evolution of forestry policy in Ghana has progressed from pre-colonial to colonial and finally post-colonial dispensations. Policies of the pre-colonial era were generally unwritten and sought to attain exploitation and conservation of forests under the guidance of religious and environmental concerns. The most influential actors were the chiefs and native authorities.

The largely unregulated commercial exploitation of forests in this period resulted in wasteful practices. Even though the full state of Ghana's pre-colonial forests is contested in literature, there is no doubt that it was in better shape than the succeeding periods. Colonial forestry policies sought to conserve a sufficient area of forest to protect water supply, prevent erosion and ensure economic prosperity, making their motive mainly economic. The reaction of local people was mainly opposition to the policies.

The world wars which occurred during this period and the subsequent legalization of the liquidation of off-reserve forests caused a boom in the logging industry, resulting in uncontrolled over-logging and policy failure. The autocratic and protectionist policies of the early 1900s moved to more people friendly policies by the 1990s, culminating in the formulation of the 1994 Forestry and Wildlife Policy. This first post-colonial policy, the current one in use, was intended for conserving and sustaining the development of Ghana's forest resources for maintenance of environmental quality and perpetual flow of optimum benefits to all segments of society. On a general score, this policy was enacted without much involvement of non-technical stakeholders.

In addition, government intervention, weak institutional arrangements and legal framework have worked to undermine the once hailed forestry policy. One significant observation about forestry policy in Ghana for all the years of formulation and implementation has been that its approach has maintained the normative forest science paradigm, which has been phased out at the global scene in favour of the more analytic science approach.

Assessing the efficiency of forestry policy through the Policy Analysis Matrix (PAM) indicates that investors will continue to be attracted to Ghana's forestry sector due to existing super normal profitability. However, the divergence effect of policy showed that forestry policy in Ghana significantly distorts benefits distribution against the domestic economy. Summary ratios of the PAM (the Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC) and Subsidy Ratio to Producers (SRP)) also

showed that forestry policy reduced private revenue by more than 23 per cent, implying that domestic operators in the forestry sector were not protected by forestry policy and were making losses or being taxed through forestry policy implementation, thus reducing their welfare.

Sensitivity analysis showed a worsening of net divergence confirming that the profitability was not due to efficient practice in the sector and not sustainable. Thus, in real terms forestry policy in Ghana has been both privately and socially inefficient, giving super normal profits to inefficient big investors. Therefore, forestry policy implementation in the Ashanti Region has resulted in distortions in private and social profitability to the detriment of local communities' welfare and has hence not been efficient.

Also, forestry policy had delivered negative net economic benefit to the Ashanti region. The inconsistent nature of the payments to the regional forestry commission was a big challenge for forestry policy implementation. Since these payments did not follow a systematic pattern in terms of timing and quantum, a planned and consistent intervention programme in the forestry sector would be very difficult to follow. Thus even though payments were made, because they were not made in good time and in consistent amounts their use did not provide the most desired results for the sector and also the economy.

In addition, the percentage of payments that went into the payment of salaries was on the rise and on the average about 49 percent per annum. The cost per cubic meter of avoidable deforestation (cost-effectiveness ratio) in spite of the implementation of forestry policy

was consistently on the increase. The trend showed worsening cost-effectiveness with increasing expenditure on forestry policy implementation, resulting in net economic loss. The consistent increase in avoidable deforestation showed there was still public spending to deplete forest stocks decades after the implementation of forestry policy in the region. The stabilizing rate of negative avoidable deforestation depicts a "cost-ineffective equilibrium trap", indicating the absence of natural capital formation through forestry policy in the region. The fact that forestry policy implementation has not been both cost-effective and efficacious in the Ashanti region, confirms the fact that it has been wasteful, off-target and therefore not generated net economic benefits in the region.

Finally, the study showed that the distribution of forestry benefits through forestry policy was inequitable in the Ashanti region. About 75 percent of household heads in the forest communities had incomes less than US$2 per day. The most important sources of subsistence from the forests for these communities were foodstuffs, wood, bush meat, water and fuelwood. Over 98 percent of households obtained their regular daily subsistence from their forests, while about 84 percent were aware of forestry policy implementation in their areas, yet, over 50 percent of these households had no idea of the benefits they were entitled to through forestry policy implementation in their areas. This showed inequity in the management of knowledge on forestry policy benefits against forestry communities.

The Lorenz curve for the forestry communities also showed inequity existed in the communities with respect to the distribution of forestry benefits. A Gini-index of 0.37

meant that on the average, the poorer of two forest community households earned about 63 percent of the forest community mean income. An application of the Chi-square test of independence confirmed the existence of inequity in the forest communities through forestry policy implementation. The allocation of rights to forest resources revealed that the average household in the forest community had suffered inequity through forestry policy implementation. The distribution of benefits of forests also showed a *de facto* distribution which was different from the *de jure* distribution against the forest community household. The use of benefits from forests also revealed a benefit system that discriminated against forest community households. Thus the equity effect of forestry policy in the Ashanti Region of Ghana has been negative.

9.3 Conclusion

This thesis sought to evaluate natural capital policy as a driver of economic development in Ghana, with particular reference to forestry policy implemented in the Ashanti Region. It identified a knowledge gap that thrived on the absence of evaluation studies on natural capital policies in Ghana, the existence of a social challenge and uncertainty about the appropriateness of forestry policy to drive economic development in Ghana. Specifically, the study first ascertained the state of forestry policy in Ghana by scenario building through a descriptive analysis, to establish a baseline to help appreciate the framework within which forestry policy operated. It also assessed how efficiently forestry policy had been implemented in the Ashanti Region, determined the cost-effectiveness of forestry policy implementation in the Ashanti Region and examined the equity effect of forestry policy implemented in the Region from primary and secondary data. Three natural capital

policy evaluation criteria namely; efficiency, cost-effectiveness and equity were used to test for economic development. These were executed through the application of three analytical techniques- the Policy Analysis Matrix (PAM), cost-effectiveness analysis and Lorenz curve. The study concludes that forestry policy has not promoted economic development in the Ashanti Region of Ghana, since it failed to satisfy the necessary and sufficient conditions.

9.4 Policy Implications

To promote economic development through forestry policy in Ghana, some policy measures different from what has been employed in the Ashanti Region must be used. Thus:

- Forestry policy formulation and implementation need a paradigm shift from the normative forest science to the analytical socio-economic-political approach.
- The formulation and implementation of forestry policy needs to consciously pursue efficiency as a goal.
- Forestry policy formulation and implementation will need to get more and more cost-effective and
- A progressively more equitable distribution of forestry policy costs and benefits needs to be a priority of forestry policy formulation and implementation in Ghana.

9.5 Contribution of the research to knowledge

This thesis contributes to knowledge in two main ways; theoretically and methodologically. Previous studies on forestry policy in Ghana examined mainly

silvicultural and some fiscal policy effects on timber trade and forestry sector revenue (Birikorang and Rhein, (2005); Marfo (2009); Agyeman *et al*. (2003)). Existing literature has not documented any study on evaluation of natural forestry policy based solely on economic development goals. Thus, establishing the association between natural capital policy evaluation criteria and economic development goals in Ghana is a theoretical contribution of this thesis to knowledge. This thesis therefore contributes a standard toolkit for evaluating natural capital policy implementation applicable to developing countries. Such a toolkit answers the call for one by Collier and Laroche (2015), since the OECD does not have such a toolkit.

Natural capital policy evaluation based on inclusive wealth dynamics is a new way of assessing natural capital policy impact led by the United Nations University. This is an application of the systems approach to natural capital decision making. So far only two reports on the methodology exist, which were published in 2012 and 2014 respectively. The link derived between the Policy Analysis Matrix (PAM) and natural capital policy evaluation criteria is an addition to the methodology by this thesis. Also, the modification of the PAM framework to capture natural forestry policy is another addition to the policy evaluation methodology by this thesis, since the use of the PAM had until now been limited to agricultural plantations.

Another contribution of this thesis is on the way forestry policy should be conducted to attain economic development. This contribution is an application of the sustainable development concept for forestry policy implementation. Here, based on the evaluation

outcomes, various prescriptions have been provided to guide natural capital policy to drive economic development in Ghana. These prescriptions call for a holistic approach to forestry policy formulation and implementation, giving equal weight to the ecological, economic and social sub-systems respectively.

9.6 Implications of the study for further research

As a consequence of the findings of this thesis, a few issues are presented in this section for further research. Following the finding that forestry policy has not promoted economic development in the Ashanti Region of Ghana, it would be desirable to ascertain the extent to which this is the case in real monetary terms. Such concrete monetary cost computations would provide the real monetary loss incurred due to forestry policy being a drag on economic development in the Ashanti Region to inform policy.

Secondly, it would be desirable to replicate this study for the rest of Ghana, especially within the high forest zone, to carry out a full-scale evaluation of the consequence of forestry policy on economic development in Ghana. This will be a guide for future policy formulation and implementation in the forestry sector towards economic growth and development. Such research could show scientifically the relative comparative advantages of the various regions in Ghana with respect to natural capital policy implementation.

Another study of this type using a different natural capital resource policy, for example, water policy would be very insightful and show the nexus between another natural capital

resource and economic development in Ghana. It could also serve as a cross-check on the robustness of some of the analytical tools of this study.

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