

UNIVERSITY OF CAPE COAST

COMMUNITY BASED NATURAL RESOURCE MANAGEMENT FOR
DEVELOPMENT: A STUDY OF SELECTED SITES IN THE NZEMA EAST
DISTRICT.

BY

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IN ENVIROMENTAL MANAGEMENT AND POLICY

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DECLARATION

Candidate's Declaration

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

Candidate's Signature:..... Date.....

Name: Richmond Antwi-Bediako

Supervisors' Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Principal Supervisor's Signature: Date.....

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ABSTRACT

The last two decades have witnessed a ‘paradigm shift’ in conservation and natural resource Management away from costly state-centered control towards approaches in which local people play a much more active role. The inefficiency of state control over natural resources use, has partly led to poverty, forest degradation and lack of participation by local actors in resource management. The purpose of this study therefore was to analyse the emergence and development of Community Based Natural Resource Management (CBNRM) and how it affects the livelihood of farmers practicing CBNRM in Ghana. A total sample of 100 household members and 20 key CBNRM stakeholders were covered in five communities in the Nzema East District. The methodology of the study was conducted with qualitative and quantitative approach. There were two interviews; one at the household level and the other at key CBNRM stakeholder level. The data was analysed quantitatively using SPSS with functions such as simple frequency distributions, cross tabulations, percentages and graphs, and qualitatively using the descriptive method. The CBNRM Path Way Model, the literature and evidence from empirical studies were used for the interpretation and discussion of the findings. The study revealed that farmers practicing CBNRM fell high above the Ghana statistical poverty line of per adult expenditure per year. The study concludes that the use of CBNRM is an effective tool for livelihood improvement of the farmers for the short, medium and long term development needs of farmers practicing CBNRM. Therefore, it is recommended that government should review its policies on CBNRM in relation to poverty alleviation and professional skill development of the youth in training and tertiary institutions for efficient and effective pro-poor programmes.

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I wish to submit mostly sincerely, that I take full responsibility for any short-comings in this work.

DEDICATION

To my wife, Faustina Amemo Antwi-Bediako and my children,
Nostradamus, Richard and Richmond.

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LIST OF ACRONYMS

AIDS	-	Acquired Immune Deficiency Syndrome
CBLA	-	Community Based Land Administration
CBNRM	-	Community Based Natural Resource Management
CECT	-	Chobe Enclave Conservation Trust
CRMU	-	Collaborative Resource Management Unit
FC	-	Forestry Commission
FSD	-	Forestry Service Division
GDP	-	Gross Domestic Product
GNI	-	Gross National Income
IDS	-	Institute of Development Studies
IFDA	-	International Foundation for Development Alternatives
LEDC	-	Less Economically-Developed Countries
MDC	-	Millennium Development Corporation
MEDC	-	More Economically-Developed Countries
MOFA	-	Ministry of Food and Agriculture
UNDP	-	United National Development Programme

CHAPTER ONE

INTRODUCTION

Background to the study

The concept of communities managing forest resources and other natural resources is not new. In Ghana as in the rest of Africa communities have managed forest resources for thousands of years and for the greater part of this long period this use of wildlife and natural resources has been “sustainable”. However, economic and political changes that arose initially with the advent of colonization and more recently human and environmental factors have placed natural resources in an increasingly precarious position.

During the 1980s and 90s government in the developing world (including Ghana), donor agencies and civil society organizations became increasingly concerned about environmental issues in developing countries (Collaborative Resource Management Unit, 2004). It was recognized that in many cases rural communities play a pivotal role in securing natural resources and that any long-term conservation strategy required their active involvement. The result of this was the development of a range of Community Based Natural Resource Management (CBNRM) programmes across Africa (Chobe Enclave Conservation Trust (CECT) 1993). In its simple terms, the underlying philosophy of CBNRM is that – when government provides the right conditions and incentives, people will manage their

natural resources sustainably. The “right conditions” are established through policy and legislations, while “incentives” tend to be financial or economic.

In the last two decades there have been a ‘paradigm shift’ in conservation and natural resource management away from costly state-centred control towards approaches in which local people play a much more active role. The inefficiency of state control over land and forest resources, has partly led to the enactment of decentralization policies to facilitate participation of local actors in resource management. Within the decentralization discourse, there is a renewed debate on the role of institutions in community based natural resource management (CBNRM). The question is, is it really working amidst all the political interests and interference in policy reviews on CBNRM?

The document ‘Our Common Future’ (the Brudtland Report in 1987); a report which has set the benchmark for all future discussions of sustainable development defines sustainable development as: Development that meets the needs of the present without compromising the ability of the future generations to meet their needs (Soussan, n.d). In short, development that can be continued -either indefinitely or for the implicit time period of concern. In Ghana, there has been the introduction of different concepts, policies, and strategies all in the name of sustainable development (e.g. the Economic Recovery Programme (ERP), the Village Infrastructure Project –VIP etc) which have all not worked on the ground as expected by the governments.

One major reason for these failures is that, most of the projects and programmes implemented by government for poverty reduction in the rural areas of

the country were not human-centred and eco-oriented, and the benefits are not equitably shared. Majority who are the rural folks lose out in benefit sharing. Economic development is skewed towards the provision of infrastructure such as roads, hospitals, schools etc and secondly towards increases in the GDP and GNI per capita.

Another reason assigned why most environmental conservation and poverty alleviation programmes had not worked for about 70% of Ghanaian rural poor farmers in Ghana is, the decision about the management of resources. A typical example is that the management of both “off” and “on” forest reserves has been the sole responsibility of the government through its accredited agency, the Forestry Commission (FC).

Government through its decisions to come out with developmental policies and programmes for poverty reduction, has failed to come up with programmes that will favour the rural poor who form majority of the population. The government through the Forestry Commission came up with policies that support indigenous involvement in the protection and sharing of benefit of the resources, hence, the introduction of the new concept, Community Based Natural Resource Management (CBNRM).

The concept of Community Based Natural Resource Management (CBNRM) is a system in which Natural Resource dependent communities make decisions and take responsibility for the sustainable management of the natural resources on their lands in return for benefits they get from the resources. It is about communities being able to develop their own rules and regulations around

sustainable resource management with benefit sharing scheme, monitoring systems and sanction mechanisms which eventually become part of the District Assembly bye law.

The process for setting up Community-based natural resources management may be broken into the following steps:

- 1) Community Entry
- 2) Awareness Creation In Communities
- 3) Identify the Forest Area
 - a. Community Forest Management
 - b. Individual Forest/Land use Planning
- 4) Decide the Resource Function
- 5) Develop The Management Plan
- 6) Implement the Management Plan
- 7) Review

CBNRM thrives on the building of relationships among all stakeholders. Thus, the involvement of such institutions as the District Assembly, Ministry of Food and Agriculture, Forestry Commission and other service providers right from the beginning of the system is very crucial to ensure sustainability.

Community members and stakeholders' rights of access to the resources must be assured. In order to serve as incentive, they must have direct benefits from the resources such as income while they also are assured of indirect benefits such as environmental regulation.

Communities, CBOs and other stakeholders' capacity must be built to perform all necessary functions as well as be able to make informed decisions.

It is recognised that adults would learn only when they are convinced of the benefits of what they need to learn. Once they are convinced, they are internally motivated to act without any more push. Facilitators therefore need to know the skills and tools that will induce the need to learn and act in the target groups who are invariably adults.

The underlying philosophy of CBNRM approach is that -If natural resources are given "value" and communities are given the "authority" to "manage" then they will have the "incentive" to sustainably manage and conserve these natural resources. This philosophy complement the thinking of the International Foundation for Development Alternatives (IFDA) whose thinking runs as "Development is lived by people where they are, where they live, work, play- and die. The primary community, whether geographical or organizational, is the immediate space open to most people. It is the village, the neighbourhood, the town and the factory... that personal and societal development first and best interact" (IFDA, 1980:12). This statement holds for CBNRM concept.

It is important to note that if poverty is still prevalent in Ghana, over 70% of people living below the poverty line in the rural area are into agriculture and depending mainly on our forest resources; which means most of these people in their frustrated struggle to survive overuse the forest and land resource, which is detrimental to the society, the environment and the economy of the Ghana. Our

kind of agriculture practices (with small communal land) is cutting all forest resources through 'slash and burn practices' for farming activities, with our forest and natural resource suffering at the expense of Government revenue and economic development of Ghana. Ghana has been making commendable efforts to address the problem of poverty. The government has signed a Memorandum of Understanding with USA (Millennium Development Corporation, MDC), to pilot alleviation of poverty within five years. The use of the Grant (Millennium Development Account, MCA) will focus on agriculture with all implementation strategies driven by Ghana Government initiative. Even with this initiative, the question is how CBNRM will inform participation and management of all key actors, from the vulnerable, marginalized to the Land owners. The consequence of not looking at concepts that enhances rural development of over 70% of Ghanaians has led to

1. Dependency on Government for all development agendas.
2. Increase in social vices (Armed Robbery, prostitution, drug peddling) as a result of the high drop-out rate in schools.
3. Increased illiteracy rate in the country.
4. Loss of skilled labour
5. Environmental Degradation

Statement of the problem

Forest resources constitute the source of livelihood for over 70% of Ghanaians but Ghana's forest resources are dwindling at an extremely faster rate of 65,000 ha per annum (Wong, 1997). According to ODA Consultancy Report,

(1997), Ghana's 8.2 million hectares of high forest cover (34% of Ghana's land area) has shrunk to less than 1.5 million hectares in less than a century. Forest resources in the off-reserve areas are doomed to "extinction" as they are seen as land banks for expansion of cocoa farms. Forest resource loss in the last 2 decades has been extremely alarming with some forest reserves like the Pamu Berekum Forest reserve in the Brong Ahafo region losing almost its entire forest cover through encroachment. Statistic shows that 36% of all forest reserves are engaged in timber production while 17% are permanently protected as wildlife/nature reserves. 6% of forest reserves are degraded and under recuperation while 19% are being converted into plantation forest after being degraded. Loss of forest resources in addition to entrenching poor forest dependent communities into further poverty also results in loss of biodiversity and wildlife. Available information indicates that Non Timber Forest Products contribute more than 452 million dollars per annum to the informal sector (Hamilton, 2005). This income is threatened with loss of forest resources.

CBNRM's concept dwells on forest conservation objectives and rural economic development, yet after 30 years of NGO donor driven agenda to push for Nations to adopt this concept and with millions of dollars invested in this conservation model, the adoption of CBNRM is stalled by other economic interest. According to 2006 Development Survey (Salifu, 2007), the economic structures, that is, primary (agriculture), secondary (manufacturing and construction) and tertiary (service-Banking, telecommunication) respectively account for 70%, 25% and 5% of the labour force in the three sectors. The interest of policy makers and

politicians is thus skewed toward mainly to the tertiary and the secondary sectors, forgetting about the primary sector which contributes higher percentages to the Gross Domestic Product (GDP) of Ghana as compared to the other sectors. Indeed the various sector contributions to GDP are Agriculture-38.8%, Industry -24.6% and Services-36.6% (Debrah, 2007). This indicates that agriculture makes highest percentage contribution and yet little attention is paid to it. Economic Growth through 'people's output' has not been looked at as key to realistic economic growth in Ghana which the CBNRM concept also supports.

Denial of forest owning communities ownership over their forest resources and the will to initiate CBNRM concept in these communities has led to a number of consequences:

- Rapid clearing of the forest resources for cocoa cultivation
- Apathy towards forest resource management
- Environmental Degradation
- Poverty

Some Non-Governmental Organization NGO's have started the process of implementing CBNRM systems and documenting best practices for adoption in Ghana, but policy and decision makers have not given it a priority to facilitate its adoption, to enhance rural poverty alleviation and forest conservation.

Objective of the study

This Dissertation seeks to analyse the emergence and development of Community Based Natural Resource Management (CBNRM) in Ghana, it focuses on the activities of the Gwira Bansa Forest Management Project in the Nzema East District, of the Western Region of Ghana, which over the past eight years has facilitated rural development and forest Conservation, through sustainable agriculture and natural resource management. It seeks to establish scientifically why CBNRM as a recent development concept can facilitate improvement forest conservation and alleviate poverty.

The overall goal is to advocate for the promotion of a national framework for CBNRM towards the improvement of community ownership of forest resources with fair and equitable benefit sharing schemes and reduction of poverty.

Specific objectives

- To examine how natural resources are *used* and Managed by Gwira Bansa in the context of CBNRM.
- To analyse the effects of CBNRM on livelihood of the community members and how it affects decision making on the environment
- To analyse the extent to which natural resource management has influenced development trends in Gwira Bansa.
- To analyse the levels of encroachment of forest reserves in the areas where CBNRM is practiced and where it is not practiced.

Rationale for the study

Common Understanding:

Development trends in natural resource management around the world now point to the adoption of CBNRM systems as a sure way to achieve a more sustainable natural resource management. There are many practitioners implementing some aspects of CBNRM systems in various places and yielding varying results. For example, there is a notion that communities are pool of labour to be used for maintaining boundaries of forest reserves and replanting degraded forest reserves. This cannot be equated to community participation in forest resource management. There is need therefore to develop a common understanding of CBNRM to facilitate design of systems, implementation, documentation of processes and information sharing on best practices and lessons learnt among various levels of stakeholder groups.

Process Development:

This dissertation seeks to come out with an outcome of the analysis of the various efforts and attempts at CBNRM practice in Ghana. Based on this, experience in Gwira Bansa, would be used as bases to provide evidence for developing CBNRM systems.

CBNRM represents a shift from a centralised and top down decision-making process, which excludes the poor forest dependant communities. Most officials are therefore not used to the facilitation skills that take into account poor people's views and interests.

This dissertation would therefore share the outcome from the research analysis to facilitate the establishment of CBNRM systems that takes adult learning characteristics into consideration.

Advocacy Tool for Audience:

This dissertation is meant as a resource/reference material for all persons who intend to advocate to achieving community participation in natural resources management and poverty reduction.

It would be helpful to community leaders, District Assemblies, NGOs, private sector institutions and Government Agencies working in partnership with communities to establish CBNRM systems for sustainable natural resources management in this country. It would guide community leaders to establish credible points for advocacy and linkages for community-based natural resources management. Communities would therefore avoid going through the mistakes of others before engaging for pro-poor policies on CBNRM.

Government agencies, District Assemblies, NGOs and Private Sector Institutions would also build their capacity to facilitate the establishment of CBNRM with a common understanding and purpose.

Research question

The Dissertation seeks to answer the following question.

- How is natural resources used and Managed by Gwira Bansa in the context of CBNRM?

- What is the effect of CBNRM on livelihood of the community members and how does it affect decision making on environment?
- How is natural resource management influencing development trend in Gwira Banso?
- How is CBNRM influencing levels of encroachment in the areas where CBNRM is practiced?

Significance of the study

The study would point out value of CBNRM for pro-poor economic growth. It would also serve as helpful information to students, teachers, researchers, policy makers, Ministry of Agriculture and other organizations that may need some salient information on CBNRM Concepts and other poverty alleviations directions.

Scope of the study

The study focuses on CBNRM Site in the Western Region of Ghana, namely Gwira Banso as case study. In comparing the levels of encroachment in the forest reserve six forest reserves will be analysed, namely, Draw river forest reserve where Gwira Banso is, Ndunfirim, Noeugn North, Noeugn South, Ebi shelter belt, Ben west and Nkonben

Chapter organization

Chapter one covers the background of the study, statement of the problem, objective of study, rational behind the study, research questions, significance of the study, scope and limitations of the study. Chapter two considers the review of

literature of the topic. Review literature on CBNRM. Chapter three describes the research methodology employed in collecting Data and analysing data for study. Data collection will focus on CBNRM site (Gwira Bansa).

Chapter four presents the analysis and discussion of data that focus on the household livelihood analysis, CBNRM enterprises, some farm Forest Systems, Gains made from the farm forest and conservations forest reserves through CBNRM. Chapter five comprises the summary of results, conclusion and recommendation.

CHAPTER TWO

LITERATURE REVIEW

Introduction

In this Chapter a number of fundamental Concepts used in this dissertation have been defined in order to give clarity and also review literature based on the CBNRM concept. The relevant concept include, development, CBNRM, commons, reaction to the tragedy of the commons, Natural resource and Natural products, Community Based property rights, institutions-oriented approaches to common pool resource management, conflict analysis of CBNRM and the conceptual framework. This chapter also sets the foundation for exploring the nature of interaction of various actors in the management of common pool resources. Power relations and situated practices of different actors such as women and men, rich and poor and people from different ethnic backgrounds.

Natural resource

Schwab (2007) defined natural resource as material source of wealth, such as timber, fresh water, or a mineral deposit, that occurs in a natural state and has economic value or as resources occurring in nature that can be used to create wealth. Examples include oil, coal, water, and land. (Investorweb.com) Charles Schwab (2007) (<http://www.answers.com/topic/natural-resource>)

Garraty et al (1991) defined and explained natural resource as, actual and potential forms of wealth supplied by nature, such as coal, oil, wood, water power, and arable land. Many natural resources may be subject to depletion and thus eligible for a depletion deduction.

Natural resources are thus, naturally occurring substances that are considered valuable in their relatively unmodified (natural) form. A natural resource's value rests in the amount of the material available and the demand for the certain material. The latter is determined by its usefulness to production. A commodity is generally considered a natural resource when the primary activities associated with it are extraction and purification, as opposed to creation. Thus, mining, petroleum extraction, fishing, and forestry are generally considered natural-resource industries, while agriculture is not. The term was introduced by E.F. Schumacher in his 1970s book *Small is Beautiful*.

Natural resources are often classified into renewable, flow, and non-renewable resources. Renewable resources are generally living resources (fish and forests, for example), which can restock (renew) themselves if they are not over-harvested. Renewable resources can restock themselves and be used indefinitely if they are used sustainably. Once renewable resources are consumed at a rate that exceeds their natural rate of replacement, the standing stock will diminish and eventually run out. The rate of sustainable use of a renewable resource is determined by the replacement rate and amount of standing stock of that particular resource. Non-living renewable natural resources include soil and water (Garraty et al, 1991).

Flow renewable resources are very much like renewable resources, only they do not need regeneration, unlike renewable resources. Flow renewable resources include wind, tides and solar radiation (Garraty et al, 1991).

Resources can also be classified on the basis of their origin as biotic and abiotic. Biotic resources are derived from animals and plants (i.e., the living world). Abiotic resources are derived from the non-living world (e.g., land, water, and air). Mineral and power resources are also abiotic resources some of which are derived from nature. Both extraction of the basic resource and refining it into a purer, directly usable form, (e.g., metals, refined oils) are generally considered natural-resource activities, even though the latter may not necessarily occur near the former.

Natural resources are natural capital converted to commodity inputs to infrastructural capital processes. They include soil, timber, oil, minerals, and other goods taken more or less from the earth.

Natural resource and national economy

A nation's natural resources often determine its wealth and status in the world economic system, by determining its political influence. Developed nations are those which are less dependent on natural resources for wealth, due to their greater reliance on infrastructural capital for production. However, some see a resource curse whereby easily obtainable natural resources could actually hurt the prospects of a national economy by fostering political corruption (Garraty et al, 1991)

In recent years, the depletion of natural capital and attempts to move to sustainable development has been a major focus of development agencies. This is of particular concern in rainforest regions, which hold most of the earth's natural biodiversity – irreplaceable genetic natural capital. Conservation of natural resources is the major focus of natural capitalism, environmentalism, the ecology movement, and Green Parties. Some view this depletion as a major source of social unrest and conflicts in developing nations. However, proper institutionalization of Natural resources sectors and structure, strict enforcement of Conventions and protocols signed by the nation and collaborative participation of all actors in natural resource especially indigenous traditional owners of the resources, policy redirection of Natural resource ownership and access, redirection of attention creation of other sectors like agriculture, community based ecotourism and mining, and benefit sharing scheme of the resource that is pro-poor, which can however reduce conflict and dependency on National Resource Base.

Development

For the purpose of reviewing Development, definitions and some development indicators need to be clarified. Development means "improvement in a country's economic and social conditions". More specifically, it refers to improvements in ways of managing an area's natural and human resources in order to create wealth and improve people's lives.

Development analysts often compare levels of development in between different countries or regions and the people who live in them - talking about more

economically-developed countries (MEDCs) and less economically-developed countries (LEDCs). Development can be considered in terms of either economic or human development, and levels development measured using development indicators.

Measuring development:

Studying development is essentially about measuring how developed one country is compared to other countries or to the same country in the past. There are many different ways of considering development, but the two most important are economic development and human development.

Economic development is a measure of how wealthy a country is - and of how this wealth is generated (for example agriculture is considered less economically advanced than banking).

Human development:

It measures the extent to which people have access to wealth, jobs, knowledge, nutrition, health, leisure and safety - as well as political and cultural freedom. The more material elements in this list, such as wealth and nutrition, are often grouped together under the heading standard of living. The less material elements, such as health and leisure, are often referred to as quality of life.

Do we then know what “development” really means with respect to different countries? And can you determine which countries are more developed and which are less? It is somewhat easier to say which countries are richer and

which are poorer. But indicators of wealth which reflect the quantity of resources available to a society provide no information about the allocation of those resources. Thus it is no wonder that countries with similar average incomes can differ substantially when it comes to people's quality of life: access to education and health care, employment opportunities, availability of clean air and safe drinking water, the threat of crime, and so on. With that in mind, how do we determine which countries are more developed and which are less developed?

Goals and Means of Development:

Different countries have different priorities in their development policies, to enhance their potential for reducing poverty and solving other social problems. But history offers a number of examples where economic growth was not followed by similar progress in human development. Instead growth was achieved at the cost of greater inequity, higher unemployment, weakened democracy, loss of cultural identity, or over consumption of resources needed by future generations. As the links between economic growth and social and environmental issues are better understood, experts including economists tend to agree that this kind of growth is inevitably unsustainable—that is, it cannot continue along the same line for long.

To be sustainable, economic growth must be constantly nourished by the fruits of human development such as improvements in workers' knowledge and skills along with opportunities for their efficient use: more and better jobs, better conditions for new businesses to grow, and greater democracy at all levels of decision making (Figure 1).

Conversely, slow human development can put an end to fast economic growth. According to Human Development Report (1996), “during 1960–1992 not a single country succeeded in moving from lopsided development with slow human development and rapid growth to a virtuous circle in which human development and growth can become mutually reinforcing.” Since slower human development has invariably been followed by slower economic growth, this growth pattern was labelled a “dead end.”

Sustainable Development

Sustainable development is a term widely used by politicians all over the world even though the notion is still rather new and lacks a uniform interpretation. Important as it is, the concept of sustainable development is still being developed and the definition of the term is constantly being revised, extended, and refined. According to the classical definition, given by the United Nations World Commission on Environment and Development in 1987, development is sustainable if it “meets the needs of the present without compromising the ability of future generations to meet their own needs.” It is usually understood that this “intergenerational” justice would be impossible to achieve in the absence of present-day social justice, if the economic activities of some groups of people continue to jeopardize the well-being of people belonging to other groups or living

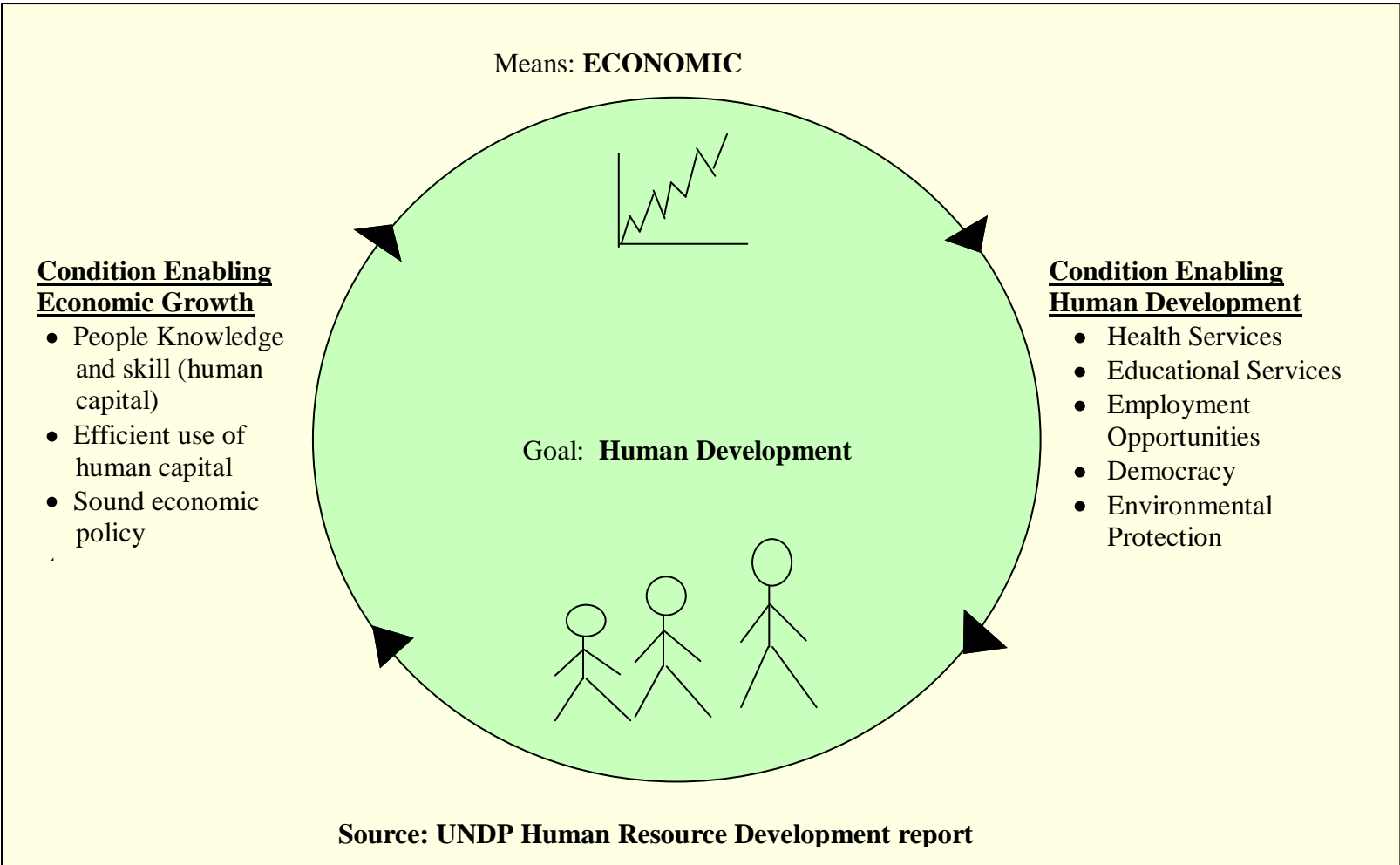


Figure 1: Economic Growth Development Model (World Bank Concept)

in other parts of the world. Imagine, for example, that continuing deforestation of the Amazon basin, known for its outstanding biodiversity, leads to the extinction of an unresearched plant species that could help cure acquired immune deficiency syndrome (AIDS), a lethal disease threatening people all over the world. Or consider emissions of greenhouse gases, generated mainly by industrial countries, which can lead to global warming and flooding of certain low-lying islands resulting in the displacement and impoverishment of entire nations.

Social justice defined as equality of opportunities for well-being, both within and among generations of people, can be seen as having at least three aspects: economic, social, and environmental. Only development that manages to balance these three groups of objectives can be sustained for long (Figure 2). Conversely, ignoring one of the aspects can threaten economic growth as well as the entire development process.

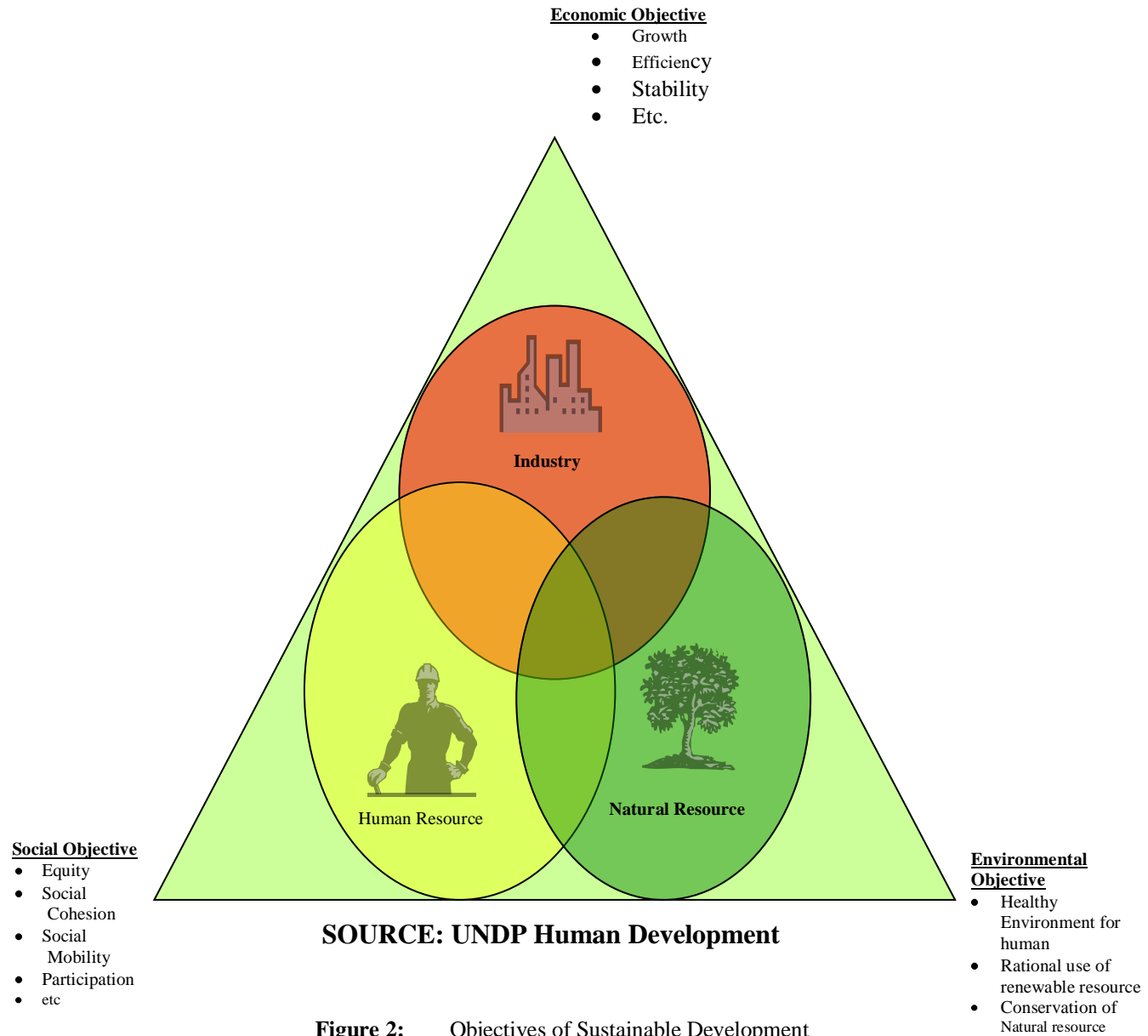


Figure 2: Objectives of Sustainable Development (World Bank Concept)

The underlying philosophy of CBNRM

According to Johnson and Erdmann (2006), CBNRM is the local management of natural resources to achieve local and national economic development and long-term conservation of those resources. CBNRM developed in the early 1970s as a response to evidence that “command-and-control” methodologies for natural resource conservation were politically, socially, economically, and environmentally unsustainable. Simply put many governments were too poorly resourced—in financial and human terms—to tackle ecosystem degradation. Empowering local people to manage their natural resources emerged as a superior approach. CBNRM’s underlying concepts had disparate sources. In Asia, social forestry in Nepal, India, the Philippines, and elsewhere gradually became more widespread and participatory. In Africa, wildlife and forest management involving communities took root. In Latin America, fragmented protected areas were consolidated into landscape-level corridors including inhabited lands.

According to the Collaborative Resource Management Unit (CRMU) of Forestry Commission (FC) the underlying philosophy of CBNRM in creating a win-win scenario is

1. That if natural Resources are given “value” and communities are given the “authority” to “manage” then they will have the “incentive” to sustainably manage and conserve natural resources.
2. From a rural development perspective it results in improved livelihood and human well being.

3. From conservation perspective it secures habitats, protects endangered species and may enhance the security of protected areas.
4. From land tenure security view point, it enhance the establishment of Community based land administration (CBLA)
5. From political perspective it strengthens democratization and accountability at local levels.
6. From an economic perspective it strengthens local economies and diversify income at community and house hold levels.
7. it establish congruency of socio-political, economic and political interest
8. Law/Policy + incentive (Gh¢) = sustainable use and poverty reduction

This philosophy gained more precedence in the donor driven CBNRM projects, which this dissertation seeks to evaluate.

The Commons problem with natural resource management

Interest in the relationship between property and common pool resource management emerged in the 1950s through for instance, Gordon's work on fisheries (1954). Hardin (1968) drew the attention of scholars and development practitioners to the issues of population and natural resource use through his paper entitled 'The Tragedy of the Commons' (Hardin, 1968). In this paper, Hardin warned against unrestrained freedom of resource use in a world of finite natural resources and he had two prescriptions, coercive regulation of resource use by the state and/or privatization. The tragedy of the commons thesis was used to support

arguments for the state to play a central role in the management of natural resources and the privatization of common property resources (*ibid*). Hardin used a metaphor of common pasture users who have privately owned animals. The argument in his thesis goes like this.

“Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. Ruin is the destination towards which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons’. In vying with each other to benefit individually from the commons, each one of the users keeps increasing the number of animals he brings into the common pasture even if he realizes that this in the long run will lead to the destruction of the common pasture through overgrazing and bring ruin to all. Each user concludes that abstinence on his part, if he chose it, would only incur private losses without significantly altering the long-term outcome, as others in any case will continue to bring additional animals into the common pasture. Each user therefore decides upon a course that is rational from his or her individual point of view but which leads to the irrational over-exploitation of the common pool resource and its ultimate and unavoidable destruction’ (Hardin 1968: 1244-45).”

From this metaphor, Hardin draws the conclusion that common ownership of pasture and private ownership of animals leads to a conflict between the group’s interest and that of the individual, and it is the group’s interest that is overridden. From this argument follows the conclusion that the only way out of such a paradox lies in privatization of common resources or instituting rules and regulations backed by external coercive sanctions (*ibid*: 1245-47).

Reactions to the tragedy of the commons thesis

Hardin's thesis aroused strong criticism, one of which maintained that the characterization of common property as a system that necessarily leads to competitive over-exploitation and the unavoidable destruction of resources is based on unfounded assumptions and dubious conceptual grounds (McCay & Acheson, 1987; Acheson, 1989). The critiques present counter arguments to Hardin's thesis, such as pointing to the fact that privatization, one of the solutions proposed by Hardin, has not solved the problem of overgrazing in countries such as the United States and Australia where the prevalence of private ownership is high (Admassie, 1995). Hardin's thesis has also been criticized on the basis of logic emanating from the notion of *rational choice*, which is rooted in the philosophy of rationality employed in economics. The rationality principle is based on the notion that human actors attribute different utility to different actions and goods and is accompanied by the principle that actors choose actions that maximise their utility (Coleman, 1994).

From a rational choice perspective, *social interaction* is essentially an economic transaction that is guided by the actors' rational choices between alternative outcomes of their actions in terms of their costs and benefits (Coleman, 1994; Steins, 1999). Since each actor aims to maximize his own private values, cooperation towards collective objectives becomes problematic. The rational choice theory has been subject to criticism. First, it has been criticized for being a normative theory, since it assumes implicitly that rational choices are the correct choices (Etzioni, 1992). Second, many rational choice theorists tend to place

human behaviour within a framework of *calculated rationality* rather than *bounded rationality* and this does not do justice to the dynamics of people's actions in a changing environment (Steins, 1999, Etzioni, 1992). Third, in the more traditional rational choice approaches, the rational individual is studied in isolation from his/her social and cultural context and society (Shepsle, 1989). Another prominent criticism on the tragedy of the common's thesis is levelled at the very assumption on which its logic is grounded. Hardin's failure to distinguish between 'common property' and 'open access' regimes is taken to task as a crucial conceptual imperfection. Four broad categories of management regimes are delineated in the literature on common pool resource management: state, private, common property and non-property or open access (Table 1).

Woodland and water resources can be held under any one of the four property rights regimes and theoretically these property rights regimes should formally determine how the resources should be managed or who the managers are (Murphree, 1993). However what is formal and what actually happens may be different. Therefore, the four property rights regimes may be seen as an analytic typology because in practice, natural resources are rarely managed solely within any one of these types. Property rights regimes often constitute a terrain of struggle, which is not surprising given that 'property' is not an object, but is rather a social relation that defines the property holder with respect to something of value (the benefit stream) against all others (Bromley, 1991). Because there are no social authorities that define and enforce the rights of individuals or groups to use open access resources, each resource user therefore ignores the consequences of his

behaviour on others (Bromley, 1992). The open access condition is therefore neither a property rights regime, nor is it a management regime since people use, opportunistically, the resources, but do not manage them. On the contrary, in a common property regime, an identifiable group controls use rights for the resource and there exist rules concerning who may use the resource, who is excluded from the resource and how the resource should be used (Berkes & Farvar, 1989). A common property regime therefore signifies *exclusivity of rights for a bounded group*, which it exercises over a well-delineated resource, to the exclusion of all outsiders, saves for its invitees and therefore no single individual has exclusive rights to the use of the resource (Admassie, 1995). Group members have secure expectations that they can gain access to future use of the resource and there are functioning membership criteria. The bounded group has a social mechanism for regulating the use of the common pool resources and for sanctioning its regulations (Acheson, 1989; Bromley & Cernea, 1989; Ostrom, 1990; Runge, 1981). This view of common pool resource users as *a bounded group having a social mechanism* for regulating use of common pool resources is here referred to as the institution oriented approach and is discussed in the following section.

Table 1: Types of property rights regimes in common pool resource use

Property Rights Regime	Characteristics/Features
State property	The state has the <i>right</i> to determine use and access rules. Individuals have a <i>duty</i> to observe use and access rules that are determined by the state or its managing agency.
Private property	Individuals have the <i>right</i> to undertake socially acceptable uses and have the <i>duty</i> to refrain from socially unacceptable uses. The individual or corporate property owner has the right to control, lease, rent and transfer ownership rights.
Common property	A clearly defined group (owners) has the <i>right</i> to exclude non-members and the non-members have the <i>duty</i> to abide by the exclusion. Individual members of the management group have both the <i>rights</i> and <i>duties</i> with respect to use and maintenance of the resource owned. There is regulated utilization by, for example, some institutional framework to ensure that overexploitation of the resource does not occur and there is some enforcement mechanism for punishing deviant behaviour. The property rights are held by an identifiable group of interdependent users.
Non-property or open access	There is no specific group of users or ‘owners’ and thus the benefit stream is available to anyone. Individuals have both privilege and no right or duty with respect to use and maintenance of the resource. The resource is therefore an open access resource. There is no social authority that defines and enforces the rights of the individuals or groups to use the resources.

Source: adapted from Cousins, 1992:16.

In assessing the attributes of the property regimes found in the communal areas of Ghana, it has been argued that the systems are not strictly common property resource systems but mixes of state, common property and private property (MLF, 2004). For instance, in Ghana even though state lands are freehold and are not to be tempered with, yet in practical terms, communities have traditional freehold tenure over residential and arable plots and usufructuary rights over the surrounding commons. These resource systems also have multiple rules (state and local) with multiple legitimation bases (*e.g.* legal and customary) and different enforcement structures and processes, often resulting in conflict (Mandondo, 2000a). Thus rather than being referred to as resources held as common property, they are referred to as ‘common pool’ resources.

The design principles for institutions

The critical theme in the Common Property Resource (CPR) literature, which focuses on the formulation of conditions or design principles underlying ‘successful’ collective resource management rejects the prescription of coercion (*i.e.* management by the state or a bureaucracy) or privatisation that is contained in Hardin’s thesis (Ostrom, 1990). While there is common usage of the term ‘successful’ in collective resource management contexts, what is exactly meant by success is rarely made explicit. A question that comes to mind in relation to definition of common pool resource management initiatives as ‘successful’ or ‘not successful’ is from whose perspective is this definition drawn *i.e.* resource management practitioners versus local communities and what criteria are used to

define ‘success’? In the Zimbabwean context for instance, CAMPFIRE has been hailed as a success story of CBNRM and this has been based on the economic and other material benefits that communities participating in the programme realize. Because the success of CAMPFIRE has been attributed to the high economic value of wildlife resources, this has raised questions on the transferability of the model to low economic value products such as woodlands (Campbell *et al.*, 1999). Ostrom (1990) is in favour of agreements by the users that can be enforced by many mechanisms, such as external agencies, members of the user community as monitors or users themselves as monitors (Ostrom,1990:18). Ostrom’s design principles approach has its underpinnings in the ‘collective choice theory’ described above. In this line of thinking, Ostrom (*ibid*) offers some design principles for an effective common pool resource management regime that have some relevance for this study (Table 2). A design principle is ‘an element or condition that helps account for the success of these institutions in sustaining the common pool resource and gaining the compliance of generation after generation of appropriators to rules in use’ (Ostrom, 1990:90). Ostrom argues that robust, long term institutions are characterised by most of the design principles. Fragile institutions tend to be characterised by only some of these design principles. Failed institutions are characterised by very few of these principles.

Table 2: The Design Principles for CBNRM Institutions

Design Principle	Rules	Boundaries
Design principle one	Rules that clearly define who has rights to use a resource	Boundaries of that resource ensure that appropriators can clearly identify legitimate resource users.
Design principle two	Congruence between the rules that assign benefits and costs	Difficulties to judge rule compliance of those outside the boundaries as resources such as wildlife and water are transient.
Design principle three	Modifying the rules	The locale is not a closed unit as external authorities enforce broader agreements.
Design principle four	Monitoring of conformance to the rules	Level of monitoring is significantly related to the extent of the resource in question as well as its form and structure.
Design principle five	Graduated sanctions	Ambiguous rules within catchment
Design principle six	Conflict resolution mechanisms using clearly defined rules	Third part mediation of conflicts beyond catchment.
Design principle seven	Recognition of rules by external authorities	Boundaries must be recognized by outsiders including the state.
Design principle eight	Application of rules horizontally and vertically	Multiple layers of nested enterprises (appropriation, provision, monitoring, enforcement, and conflict resolution) Involving resource sharing.

Source: Adapted from Ostrom, 1990.

Conflict analysis in CBNRM

The interaction of various actors with diverse interests in a particular resource may result in conflict regardless of the institutional framework guiding the actions of various actors with regards to natural resource use. Rubin *et al.*, define conflict as ‘perceived divergence of interest or a belief that the parties current aspirations cannot be achieved simultaneously’ (1994 quoted in Matondi, 2001). Matondi (*ibid*) notes that this definition is important in that it puts emphasis on the strategic choice and outcome of negotiations in the context of natural resource management. However the definition does not offer much insight into conflict between individual actors and institutions that should cater for their interests. A more relevant definition is that used by Grimble and Wellard (1997) who view conflicts as situations of competition and potential disagreements between and among actors and related resource management institutions. More often disagreements may be due to competition over scarce resources. Conflict is not always negative in natural resource management contexts as it can be an important feedback mechanism revealing how past efforts or projected future efforts affect the interests and behaviours of different participants (Ostrom, 1992). Institutional structures vary to the extent to which they use conflict creatively for gaining information about problems perceived by different actors. If conflict is suppressed, key information about the effects of past action is lost. From this proposition, conflict is often seen from a positive point of view in natural resource management contexts. On the contrary, if conflict is encouraged, valuable resources may be spent in potentially harmful disputes. Thus development of effective conflict

resolution or management mechanisms is an important aspect of its capacity to achieve efficient and equitable performance of resource management institutions. Conflicts are expressed in a variety of ways such as confrontational, 'hidden transcripts' or 'the everyday forms of peasant resistance' (Scott, 1985 & 1990) and social tension that is played out in gossip and witchcraft accusations. Confrontational conflict is often violent (Matondi, 2001; Matose, 2002). Examples include encroachment of certain individuals into grazing areas, land occupations, for instance in the case of commercial land occupations and settlement in state forest reserves in Zimbabwe, and closing off people's access to a resource such as woodland or water sources.

Witchcraft and related accusations have also been conceptualised as expressions of social tension or conflict in a given society. The belief in supernatural forces is still deeply rooted in many African societies regardless of education, religion and social class (Kohnert, 1996). The incidents of witchcraft accusations are said to be increasing due to social stress caused by resource scarcity and harsh macro-economic and political environments. Most often witchcraft accusations work to the disadvantage of the poor and deprived. However, under particular circumstances, they may become a means for the poor in the struggle to gain access to natural resources or a counter weight against oppression by the existing institutional framework (*ibid*: 1347). Development interventions, which constitute arenas for strategic groups in their struggle for power and control over project resources, are likely to further endanger a precarious balance of power, causing witchcraft accusations to flourish. Common to the belief in witchcraft is the

perception that certain community members may harm their fellow women or men illicitly by recourse to supernatural means (Abrahams, 1985).

Theories of witchcraft that have been implicitly or explicitly put forward fall into three main categories:

- a) Historical or ethnological
- b) Psychological and
- c) Sociological – which may be divided into:
 - (i) Those theories that emphasize normative aspects of social organization and
 - (ii) Those centering on tension and social change.

These are summarized in Table 3

In any group sharing a common pool resource such as woodlands and water, conflicts are often inevitable as actors may have different views on authority, institutions, and interpretation of rules, trust and reciprocity. In general, managing communal landscapes is a complex process because within these landscapes, there are multiple resources, with multiple uses and users. The analysis of conflicts as they relate to institutional issues would be incomplete if conflict mediation mechanisms are overlooked. Thus conflict mediation or management mechanisms in place are analyzed as well as institutional synergies from the community members', and other relevant actors' perspective.

Table 3: Factors that may contribute to institutional conflict

Colonial Policies	Resource scarcity	Institutional overlaps	Fuzzy resource use boundaries	Nature of relations Between actors
<ul style="list-style-type: none"> - Colonial Land alienation - Insecure natural Resource tenure - Population pressure in communal lands - Resettlement leading to mixed ethnic groupings 	<ul style="list-style-type: none"> - Shortage of arable land (both in quantity and quality) - Shortage of settlement land - Low agricultural productivity - Limited livelihood sources <i>e.g.</i> following retrenchments partly attributed to Economic Structural Adjustment Program (ESAP) 	<ul style="list-style-type: none"> - Formal versus Informal institutions - Modern versus traditional - Contested institutions - NGO and externally engineered versus other community institutions - Legal control vested in institutions that are upwardly and not downwardly accountable 	<ul style="list-style-type: none"> - Cross village resource sharing - Fuzzy definition of ‘legitimate’ resource users - Multiple users of multiple resources in the same landscape 	<ul style="list-style-type: none"> - Lack of trust - Social tension (often expressed in Witchcraft accusations) - Socioeconomic Differentiation by gender age, and wealth - Skewed power relations - Differential access to natural resources

Source: Adapted from Abraham, 1985.

CONCEPTUAL FRAMEWORK

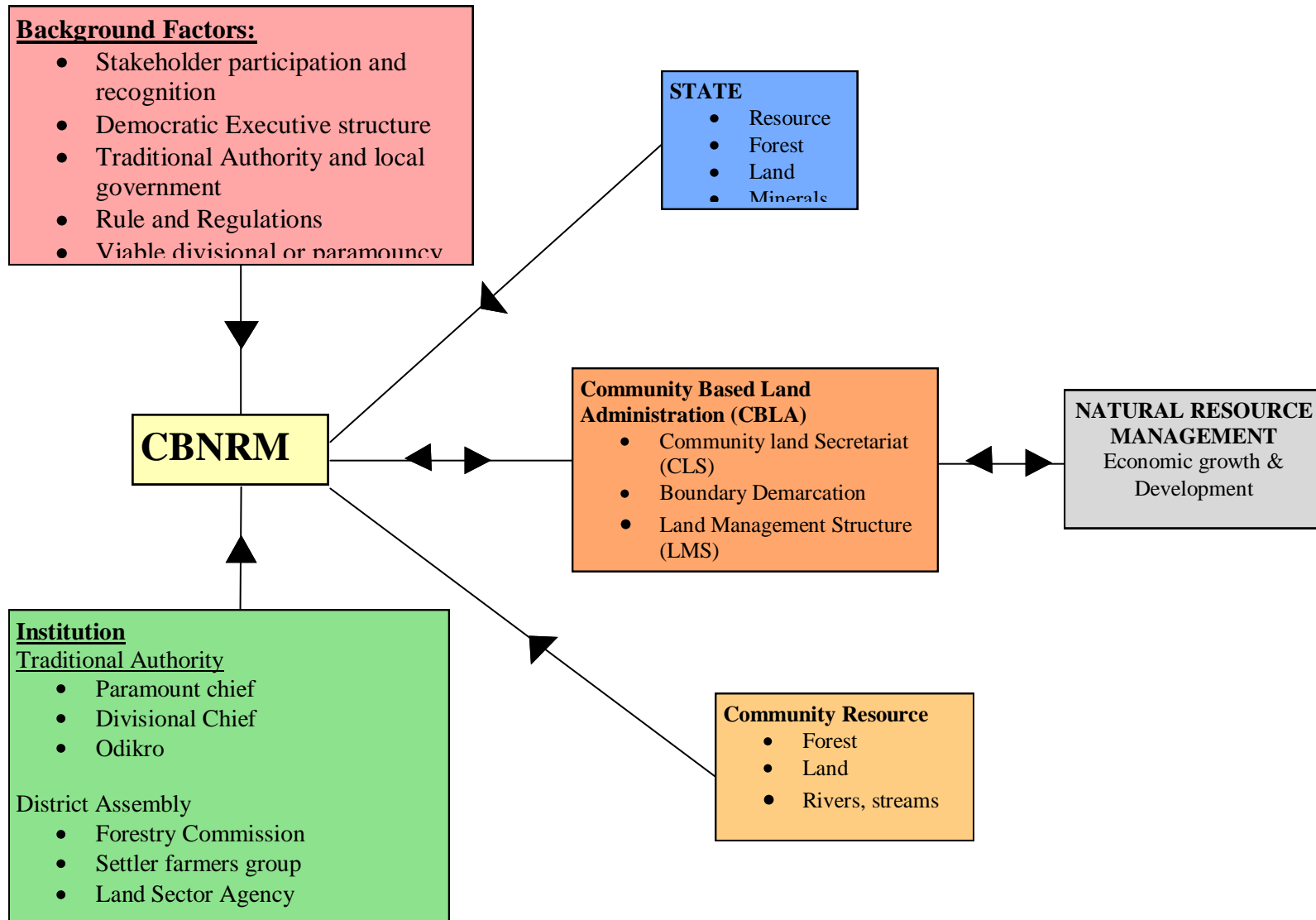


Figure 3: CBNRM path way model

Source: Authors construct (2007)

Development of conceptual framework

In order to address the critical research question above, it is has become absolutely necessary to apply an appropriate conceptual framework to respond fully to four critical tasks, namely:

- to facilitate brief synthesis of the review of literature (i.e. Chapter two);
- to give this qualitative inquiry form and shape by guiding the development of data collection instruments as well as the data collection processes in the chapter three (research design and methodology);
- to facilitate the organization and data analysis process (Chapter4) and
- finally, the interface between theory and practice in chapter five. (i.e. theorising and practicalizing CBNRM) implementation in Ghana.

A CBNRM pathways model and framework are therefore chosen as a lens for this study because: *CBNRM is not so much implemented as a concept but an initiative to influence policy and development thinking at each level of the system. What ultimately happens in the Communities and indigenous societies is less related to the intensions of policy makers than Economic growth motivations that operate in local context (Fiona et al, 2005).*

The choice and use of the CBNRM conceptual framework is informed by several factors. Four are worth mentioning: Firstly, policies in general are not only socially oriented, they are also the products of a political system such as parliament, the decentralized systems such the Local Government and the local level community based structures and tradition. For example, to develop an effective CBNRM all institutions (Government and Non-government) and Local actors play key role in its establishment. Without these actors, formal recognition and effective participation is minimal. From the model, there should be the political

will from the state to accept CBNRM concept and the needs for a policy environment that enhances recognition of interest of all key players (Traditional authorities, Local Government, Community member). In this system there should be the understanding of management all resources (from the state and the community) as common pool of resources.

Secondly, the CBNRM framework gives recognition to the presence of power and fear in the process of managing change. For example, people refuse to share resources equitably; those who claim to be liberal often display this behavioural tendency. CBNRM concept promotes synergies which are people centred and dependent on local institutions. This for example promotes development which is people centred and support environmental conservation. When a concept are accepted and abided by the people and backed by all relevant institutions, it is rooted and backed by the state (Murombedzi, 1992).

Thirdly, the use of the CBNRM concept is also meant to explain the rationalization of equity in natural resource management at the community level. For example, no one person is left out in policing the resource, sharing of benefits reflect in community development and no one person becomes a sole custodian of the land and other resource. A management system is place to see total equity measures.

Fourthly, CBNRM concept addresses the all land issues by regularizing all community based land administration (CBLA) process at the local level. Documentation, demarcation, formation of customary land secretariat (CLS) as part of CBNRM ensures security of tenure. From the model, CBLA is the link between Natural resource management for economic growth /development and realisation of

CBNRM. Without the institutionalization of CBLA where structures like community land secretariat (CLS), proper demarcations/documentation and a management structure CBNRM will not be realised. There is there for a triangulated congruency of interest for CBNRM Model to thrive toward economic growth and development, you need institutions (local and Government), natural resource (state and/or local owned) and community based land administration.

Although the conceptual framework for this study is a new model, there are cross cutting themes with other CBNRM models. These crosscutting range from the exercise of power, through authority to recognition to environmental factors. Of significant to this study is the fact that the framework is used to guide the policy implementation and local community development process in Ghana, which has a different context to the ones in the developed countries.

Summary

This chapter has discussed the conceptual framework that guides the study. The literature review began by discussing the CBNRM concept, Hardin's (1968) tragedy of the commons thesis that has been applied in the analysis of the 'problem of commons'. Criticisms levelled against Hardin's thesis were discussed leading to the analysis of the institutions-oriented approaches for analyzing common pool resource management situations. Categories of institutional analysis approaches were identified which were all found more relevant to this study and were therefore discussed in greater detail. The chapter went on to define and discuss key concepts that can be used as analytical tools in the analysis of common pool resource

management institutions and conflict. The next chapter discussed the methodological framework adopted for the study and the description of the study site.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter seeks to present the methodology procedure employed in the design, population sampling procedure, the instrument used for the study, data collection procedure, method of analysis and methodological limitations.

Research design

The design of study is an evaluative design, employing both qualitative and quantitative methods (using semi-structured and structured questionnaires) to elicit information from the respondent. The data from the qualitative method is to complement the quantitative information. This approach may appear to be a departure from convention, but has been recommended by researchers in the field of evaluating community based programmes. (Gauratron et al, 1996).

Identification of the study site

The case study site was selected within the confines of a broader Gwira Bansa CBNRM research project of common property resources management and conservation practices on individual farms. Apart from Ankasa, it is the projects area that practices all aspect of the CBNRM model. The broader question for the Gwira Bansa CBNRM project was on whether the Integrated Resource Management approach is a means to eliminating rural poverty. Beginning in July

1998, together with a non-governmental organization, CARE International, and community members have been exploring the role of an integrated approach to the management of micro-catchments of Gwira Banso forest resource with one of the primary goal as reducing poverty.

A question that often arises in relation to case studies is their representativeness Gwira Banso catchment is typical of communal areas in the Nzema East District in many respects: it has a history of population movements, has a relatively progressive increase in population density (Fiona et al, 2005), tropical rain forest and fertile soils that are characterized by high agricultural productivity, an influx of researchers and development organizations where case studies can be realized based on evidence.

Population

The target population are all farmers in Gwira Bansu traditional area involved in the CBNRM programme:- Staff members of the Community Rural Development office of the Nzema East District Assembly, Extension officers of Ministry of Agriculture (MOFA), range supervisors and forest guards from Forestry Service Division (FSD), and key bodies that facilitated the implementation of the project. (i.e., Care International and Wildlife division of the Forestry Commission [FC]) in Gwira Banso.

Sample

Samples were taken based on households to give the researcher the economic implications on households practicing CBNRM and those who are not. A household includes all the persons who occupy a housing unit. A housing unit is

a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters. Separate living quarters are those in which the occupants live and eat separately from any other persons in the building and which have direct access from the outside of the building or through a common hall. The occupants may be a single family, one person living alone, two or more families living together, or any other group of related or unrelated persons who share living arrangements. (<http://factfinder.census.gov>.)

Out of the about six hundred 600 households in Gwira Bansa traditional area, hundred (100) households were selected with at least 5 respondents from each household, being the average of the total number of persons in each household. 500 respondents from a hundred household were interviewed. The respondents in each household included, the household head, wife of the household head, two adult dependents, and one dependent in school. The following characteristics were employed for key respondents: five (5) staff members from Care International, five (5) staff members from Forestry Division, five (5) staff members from MOFA and five (5) staff members from District Assemblies.

Sampling procedure

The CBNRM project was implemented in Gwira Bansa Traditional area in ten (10) key communities, namely, Jampera, Tebakrom (Krofrofi), Sikanasem, Draw village, Asiedu, Bekoasi, Wadiase, Deeball asi, Akakuma and Besuasan.

Figure 4: Nzema east accessibility

Table 4: Major Communities in Gwira Bansa Traditional area, population size and the number of household per community

Name of Community	Population size of the communities	Total number of house hold
Sikaneasem	423	60
Akakuma	630	90
Tabakrom (119)	1021	143
▪ Attakrom (2)		
▪ Opokukrom (17)		
▪ Ofosukrom (5)		
Deebolase	189	27
Draw village (60)	420	60
Jampere I (16)	560	80
▪ Jampere II (48)		
▪ Ampro (16)		
Bekuase I (8)	168	24
Bekuase II (16)		
Besuasa	224	32
Asiedu	168	24
Wadiasie (60)	424	60
Total	4227	600

Source: Adapted from Abraham, 1985.

Due to constraint of resources, data was collected from five out of ten communities. The lottery method was used to select 5 communities out of the ten major communities; the researcher wrote the names of each of community, folded them and put all in a bowl, shook and asked someone to pick five (5) at random.

Selected community

Table 5: Selected communities and number of household respondent out per community

Selected Community	Number Household respondent per community
Tebekrom	20
Sikaniasem	20
Jempere	20
Draw Village	20
Bekuase	20

Source: Adopted from Annual report of Care International, 2007.

A household register was obtained from the Gwira Bansu customary land secretariat (CLS) in Banso palace. This was used as the sampling frame, the systematic random sampling was then used to select household in each of the five communities using the CLS register. The sample units were selected systematically from the fifth position in the community register. The fifth names were picked in series (5th sample unit, 10th sample unit, 15th sample unit...etc) until each of community sample size (20) for the study is achieved. An average of 12 occupants per household was realised.

For the key informants, (i.e. Care International, FSD, DA, MOFA), the method for selection was the purposive sampling technique since they served the purpose of the study they were automatic included in the sample.

Instrument (Description)

The principal techniques used for the data collection were interviews, questionnaires and observations. The researcher used interviews for the community households since most of the household heads were illiterate and semi-illiterate. A local language (i.e. Twi) was used during the interview by researcher. This enabled the respondents to express themselves freely and also understood the purpose of the study. Questionnaire were rather used for the Key respondents, from FSD, Care International, MOFA and the District Assembly.

According to Kerlinge (1973) the use of a questionnaire as a data collection technique has a lot of advantages. The questionnaire is widely used for collecting data in educational research because it is a very effective instrument for securing factual information about practices and condition. According to Agbesinyale (2000), the use of questionnaire is very common in the social sciences because they provide an efficient means by which statistically quantifiable information can be collected. Secondly, the questionnaire is an efficient method in the sense that many respondents could be reached within a short space of time (Agbesinyale, 2000).

Two sets of instrument were prepared and administered; one was the household checklist (appendix A) and the other a questionnaire for the key informant (Appendix B). The Checklist and the Questionnaire items were adopted from the manual Guidelines for conducting monitoring and self-assessment of community – based rehabilitation programmes (Gautron et al. 1996). The other items of the questionnaire merely reflected the objectives of this study.

The questionnaire was divided in three key sections:

- (a) Background information of the respondent.
- (b) Impact assessment of CBNRM on livelihood
- (c) Impact assessment of CBNRM on Environment (Forest conservation).

Livelihood impact and environmental impact reflected on all the four objectives and research questions of the study.

Instrument (Administration)

Permission to carry out the field visit or the data collection was sent in writing to the project manager of Care International at Takoradi office, Nzema East District and Planning and Development officer, the FSD manager at Nzema East, the MOFA director of Nzema East and the Paramount chief of Gwira Bansu traditional area. Data collection took place between July, 20th and August, 10th 2007.

Initial visit to various household and institutions were done to seek their consent and schedule a specific date to administer questionnaire. Direct interview was undertaken by the researcher and his research assistants through visits to the communities and households.

The questionnaire was administered personally to the respondents by the Researcher and three research assistants. This was because the researcher wanted to avoid the problem of “no-contacts”. The staff and personnel of CARE International, Forestry Services Division (FSD), MOFA and the District Assembly (DA) according to a pre-survey conducted by the Researcher confirmed that they

were literates. Therefore, the staff and personnel of Care International, FSD, DA, and MOFA provided answers to the questionnaires on their own.

On the other hand, majority of the local folks were illiterates and semi-literates. The researcher and his research assistants therefore had to translate the questions in the checklist into the local language (Twi) for the local folks in the chosen communities. After the local residents have provided answers to the questions, the researcher then recorded it against the checklist on their behalf.

Data analysis

The analysis was done on the basis of the primary data collected from the field by the researcher and his research assistants. Since the study employed a survey method of gathering data, the analysis of the data gathered took the form of compiling respondent contributions on each item/question. Marginal tabulation was then established through the use of simple average and percentages through the use of SPSS. The quantitative and qualitative information was complemented by personal observation of the researcher and his research assistants during the data collection period. Results were then used as bases for either negating or validating whether a particular objective was being achieved.

Methodology limitations

One major problem the researcher encountered during the data collection was with the questionnaire. Majority of the respondents in the chosen case study were illiterates and semi-literate. The researcher therefore had to translate all the

questions in the questionnaire into the “Twi” language that the local residents could understand best. The researcher again had to record the responses they gave to the questions in the questionnaire. This actually delayed the whole research process.

Secondly, because of the nature of the research, the researcher found it very difficult to operationalize the variables in the research questions. Two major methodological concerns regarding the questionnaire and its administration were directly related to reliability. Specifically, the operationalization of the variables of the research questions and the translation of the data collection instrument into “Twi” (local language) may have issues of reliability (e.g. consistency and dependability) and validity (e.g. measuring what one intends to measure).

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

Overview

In this chapter, the researcher also presents assessment of the research question and purpose and objective of the study. The assessments of the results were presented, beginning with a description of respondents' demographics, followed by the results supporting the four broad research questions guiding the study.

Demographic data of the households/respondents from the selected communities

This section discusses the bio-data of the households/respondents from Tebekrom, Sikantiasem, Jempere, Draw Village and Bekuase. The study indicated that 83.0 percent of the residents from the five communities reside 4km from the main towns in their various communities in the district. This actually shows the extent to which these villages are distanced from each other in the district.

Table 6: Distance to main town

Distance to main town	Frequency	Percent	Cumulative Percent
<1.0km	24	24.0	24.0
1.1km- 2.0km	28	28.0	52.0
2.1km - 3.0km	17	17.0	69.0
3.1km - 4.0km	14	14.0	83.0
4.1km - 5.0km	12	12.0	95.0
5.1km - 6.0km	5	5.0	100.0
Total	100	100.0	

Source: Distances Adopted from Nzema East District Development Planning Document

Most of the settlements are hamlets. The study also indicated that 95 percent of the respondents interviewed travel between <1km – 3km before they get access to a major road. Cost of transporting farm produce to market centres can be a disincentive to farmers to embrace interventions such as the CBNRM project. Therefore, for the majority of the farmers to indicate that the distance to the main towns from their settlement is between <1km – 3km can be an incentive for the farmers to sell their produce from the CBNRM project since the distances to the main towns from the settlement appear to be too short to attract high transportation charges especially for farm produce. Indeed, Table 6 suggests that the communities have a geo-economic advantage. However, peripherality and distance from the main towns do not inevitably or necessarily mean poorer economic development of the communities. Neither do better natural resources – especially for agriculture – and a more favourable location (proximity to the main towns) guarantee poverty alleviation. Rather, this means that the beneficiaries of the CBNRM project would

no longer enter into the forest for protected forest products for their livelihoods and therefore the CBNRM project is more likely than not to be sustained.

Table 7: Distance to track road

Distance to track road	Frequency	Percent	Cumulative Percent
<1.0km	41	41.0	41.0
1.1km - 2.0km	39	39.0	80.0
2.1km - 3.0km	15	15.0	95.0
>4.0km	5	5.0	100.0
Total	100	100.0	

Source: Distances Adopted from Nzema East District Development Planning Document

In terms of the household compound clustering, the study indicated that 34.0 percent of the households live in less than 3 household compound cluster-dwellings, 34.0 percent are also between 3 – 10 household compound cluster-dwellings and the remaining 32.0 percent abode in household compound cluster-dwellings that are more than 10 compound cluster-dwellings.

Table 8: Compound clustering

Compound clustering	Frequency	Percent	Cumulative Percent
<3 houses	34	34.0	34.0
3 - 10 houses	34	34.0	68.0
>10 houses	32	32.0	100.0
Total	100	100.0	

Source: Author's Fieldwork, 2008

With regards to household size, 70% of the respondent reported having 1-5 people. The remaining 30% of the respondent had 16 to 20 members. This is an indication that there were considerable differences in the respective structures of the communities studied under the CBNRM project. This has implications for resource conservation in that there would be the capacity to develop indigenous knowledge based innovations including enterprises such as community based farms that rely on access to human capital, infrastructure support services and innovation networks. Additionally, in the context of the CBNRM project, at the community level the high degree of cluster settlements in contrast to a more dispersed one hold major implications with respect to poverty alleviation in general and specifically the attraction of investment in the affected communities given that the advantages of clustering are advocated in terms of providing high support services and innovation networks.

Table 9: People living in Households

People living in HH	Frequency	Percent	Cumulative Percent
1 – 5 people	19	19.0	19.0
6 - 10people	28	28.0	47.0
11 - 15people	23	23.0	70.0
16 - 20people	30	30.0	100.0
Total	100	100.0	

Source: Author's Fieldwork, 2008

The households' heads interviewed were all farmers. It was also evident that although all the household heads were all farmers not all the household members were farmers. Also, 24 of the household members were farmers. In the remaining 76 households not all the members were farmers. This attested to the fact that there were different sources of income generating activities in some households to compliment the income from the household head's occupation. Some of the households' members were farming along side trading, small scale mining (galamsey), fishing, hunting, etc. This reflects the fact that in Ghana, where poverty rates remain high, especially in the rural areas, gold extraction and processing often becomes the best earning opportunity for economically active population (Heintz, 2004). This means that traditional occupations are still being practiced in Gwira Bansa alongside the CBNRM concept. In deed, the engagement in income generating activities alongside farming is a possible way of adding bargaining power in the household (Canagarajah et al, 2001),

Table 10 demonstrates that the communities under the CBNRM project are characterised by traditional sector enterprises of low productivity and low value added with a higher dependence on agriculture and associated processing activities. This has implications for natural resource conservation especially in directing new and external innovations such as the CBNRM project in rural communities. Indeed, a natural resource conservation strategy such as the CBNRM project based on an agricultural economy can be said to be too limited a strategy to ensure development of a rural community such as Gwira Bansa. On the other hand, expansion in the non-agricultural economy of Gwira Bansa, however, would not occur without

significant implications for the farming sector. A change in the agricultural structures would mean a decline in the number of full-time farmers, a higher rate of increase in land renting, a faster rate of growth in CBNRM interventions especially selected cash crops, a more rapid exit rate from use of the forest and forest products, and stronger support for forest conservation.

Table 10: Main economic activity

Main economic activity	Frequency	Percent	Cumulative Percent
farming only	53	53.0	53.0
farming & trading	34	34.0	87.0
farming & mining	5	5.0	92.0
farming & hunting/fishing	8	8.0	100.0
Total	100	100.0	

Source: Author's Fieldwork, 2008

Some of the major crops that are cultivated by the household members include Cash crops, tree crops and economic trees. Out of the total of hundred households that were interviewed, 94.0 percent were into agro forestry or the farm forest system, an indication of the adoption of participatory forest management under the CBNRM concept. This in turn can lead to poverty reduction among the farmers at Gwira Bansa in the long run.

Table 11: Agro-Forestry Farmer and Non-agro-forestry farmers

Farmers	Frequency	Percent	Cumulative Percent
Agro-Forestry Farmer	94	94.0	94.0
Non-agro-forestry farmers	6	6.0	100.0
Total	100	100.0	

Source: Author's Fieldwork, 2008

Out of the 94.0 percent that are into the farm forest or the agro forestry system, 78.0 percent entered into it based on the CBNRM project that was implemented by CARE international, 6.0 percent entered into it based on their own initiative and the remaining 10.0 percent entered into the farm forest system based on advice from friends. This attests to the fact that, if CBNRM is practiced with the 'people centered approach' there is a high tendency for rural farmers to get involve willingly.

Table 12 demonstrates that diffusion of innovation coupled with continued perceptions eventually leads to the adoption decision: an individual either adopts or rejects the innovation. Further more results in Table 12 reflects the fact that even though an individual does not immediately adopt some innovations, reinvention (i.e., degree to which the social system changes an innovation to better suit its needs) often provides an opportunity for the social system to adopt an initially rejected innovation (Rogers, 1995).

Additionally, Table 12 also reflects the importance of perceived attributes during innovation development. The results in Table 12 suggests that perceptions

continue to affect innovation diffusion during implementation and use of innovations; this is especially influential during the adoption decision phase as can be seen from the various medium of inspiration.

Table 12: Medium of inspiration

Medium of inspiration	Frequency	Percent	Cumulative Percent
Through CARE's Project	78	78.0	83.0
Through my own initiative	6	6.0	89.4
Advice from friends	10	10.0	100.0
Mixed System	6	6.0	
Total	100	100.0	

Source: Author's Fieldwork, 2008

Table 13: Types of crops cultivated

Types of crops cultivated	Frequency	Percent	Cumulative Percent
Cash crops, tree crops and economic trees	36	36.0	36.0
Cash crops and Tree crops	4	4.0	40.0
Cash crops and economic trees	57	57.0	97.0
Cash crops only	2	2.0	99.0
Others(specify)	1	1.0	100.0
Total	100	100.0	

Source: Author's Fieldwork, 2008

All the five communities that were part of the research were made up of different ethnic groups: 65.0 percent were Nzemas' (Ahanta), Wassas' composed 18.0 percent of the total households that were interviewed, Ashantis' were 10.0 percent of the total households, Fantes' were 6.0 percent while ethnic groups from the northern sector composed just 1.0 percent of the total respondents.

Table 14: Ethnicity

Ethnicity	Frequency	Percent
Wassa	18	18.0
Nzema	65	65.0
Ashante	10	10.0
Hausa/Dagomba (Northern tribes)	1	1.0
Fante	6	6.0
Total	100	100.0

Source: Author's Fieldwork, 2008

In this study, about 99.0 percent of the members from the interviewed households were Christians, while only 1.0 percent were Muslims. The assumption here is that religion undoubtedly plays a role in shaping people's values and influencing their decisions. Therefore, when trying to manage a natural resource, it is important to try to find out how and to what extent religion influences people's actions.

In a broader context, understanding how religion influences people's values and behaviour could be very important for natural resource conservation. Indeed, in many cases, communities' opposition to regulations in natural resource

conservation is based on a fundamentally different understanding of how natural resource conservation works and how natural resources should be managed, and the role of the community members in the management of natural resources such as the CBNRM concept. Communities' members' understandings of natural resource conservation are often based on powerful and sincerely held religious beliefs. Therefore, understanding the religious basis for how many communities' members (Christians) value the forest and forest management can help facilitate the management.

Table 15: Religion

Religion	Frequency	Percent
Christianity	99	99.0
Islamic	1	1.0
Total	100	100.0

Source: Author's Fieldwork, 2008

Also, it is important to identify the land ownership types within the study area in order to analyze their potential impacts to land use, and to ensure and encourage the protection of the forest and related resources in the future.

Table 16 shows that 99% of the households that were interviewed owned land in one way or the other. Only 1.0 percent of the household head do not own land. This suggests that ownership of land ascribes social status and privilege to the Gwira Banso people. In other words for many of the Gwira Banso people ownership of land specify what one can and cannot do, and what benefits one is entitled to. In addition, it also determines the long-term incentives to invest in,

sustain and improve resources. This, in turn, determines the collective or individual action around management of land. Indeed, for greater majority of the Gwira Bansa people to own land, the issue of common property can be a source of problems that can threaten their very existence. To avoid the tragedy, Hardin's theory suggests that there is the need for people to develop a criterion of judgment and system of weighting so that lands owned by individuals can be seen as common property and once this criterion of judgment is acceptable to all, coercion can be mutually agreed upon while the administrative system, supported by the criterion of judgment and access to coercion, should protect the people of Gwira Bansa.

Table 16: Do you own land?

Do you own land?	Frequency	Percent
Yes	99	99.0
No	1	1.0
Total	100	100.0

Source: Author's Fieldwork, 2008

Although 99.0 percent of the households owned land, 22.0 percent also farm on land they do not own, the remaining 78.0 percent farm on only land they own. This means that with the CBNRM concept in place, the affected people would have to move from subsistence-oriented shifting cultivation as well as dependence on the forest products to growing crops that are more market driven. This reflects Hardin's theory (The tragedy of the commons) with respect to the fact that common property management regimes (CPMRs) would breakdown under economic or demographic pressures. However this issue was not explored in this study.

Table 17: Do you farm on land you do not own?

Do you farm on land you do not own?	Frequency	Percent
Yes	22	22.0
No	78	78.0
Total	100	100.0

Source: Author's Fieldwork, 2008

Out of the 22.0 percent that farm on land they do not own, 18.0 percent practised the Ebunu system of ownership while 4.0 percent practised the Ebusa system of land ownership. All the households also farm on all the lands they own. These are not surprising because in the context of the CBNRM, natural resources including land in Gwira Bansa are assumed to be under some form of resource protection, meaning that ownership or management practices of the land are unlikely to change during the planning period.

Table 18: Under what agreement do you use this land?

Types of shared cropping	Frequency	Percent
“Ebunu” system	18	18.0
“Ebusa” system	4	4.0
Total	22	22.0
Both Ebunu & Ebusa	78	78.0
Shared cropping System		
Total	100	100.0

Source: Author's Fieldwork, 2008

Impact assessment of CBNRM on livelihood and promotion of economic development in Ghana

To answer research question 1 and 2 below

- How is natural resources used and Managed by Gwira Bansa in the context of CBNRM?
- What is the effect of CBNRM on livelihood of the community members and how it affects decision making on environment?

Using five indicators that focused on livelihood gains from CBNRM practice in the five communities studied, it was found out that in all, about 94 households practised CBNRM in the five communities that the research was conducted. The remaining 6 households, although appreciated the idea or the concept does not practised CBNRM. This is not surprising because during the implementation of the CBNRM in the communities CARE in particular provided incentives such as small loans or credit to motivate community members to embrace the CBNRM concept. Therefore, for more than 90% of the households to be practising the CBNRM implies the participatory and collaborative mode that CBNRM requires is being met while the need for a fund of knowledge that can inform the actions of decision makers and practitioners at any and all levels of the CBNRM system from the households and villages would be available.

Table 19: Percentage level of farmers in Agro-forestry/farm forest

Farmers	Frequency	Percent	Cumulative Percent
Farmers in Farm forest	94	94.0	94.0
Farmers not practicing Farm forest	6	6.0	100.0
Total	100	100.0	

Source: Author's Fieldwork, 2008

From Figure 4 and Figure 5, it was also found out that almost all those 94.0 percent household that practised CBNRM had their children in schools. With those practicing CBNRM, 41% of their children were in the Junior High School (JHS) as compare with those not practicing CBNRM having non in the JSS and the Tertiary. This implies that primary and Junior high school enrolment in the Gwira Bansa has increased with higher school attendance by children of CBNRM members compared to school attendance by children of non-CBNRM members. This suggests that paying school fees is also being practised especially by community members who practised CBNRM partly (if not all) due to benefits derived from the practice of CBNRM. Another implication here is that children spend most of their time at school and do not have many opportunities to learn from their parents. Traditional knowledge would no longer be transferred and traditional practices would face gradual extinction. Besides having less time to learn traditional practices children would not generally show any interest in learning from the past, hence making it even more difficult for parents to teach them.

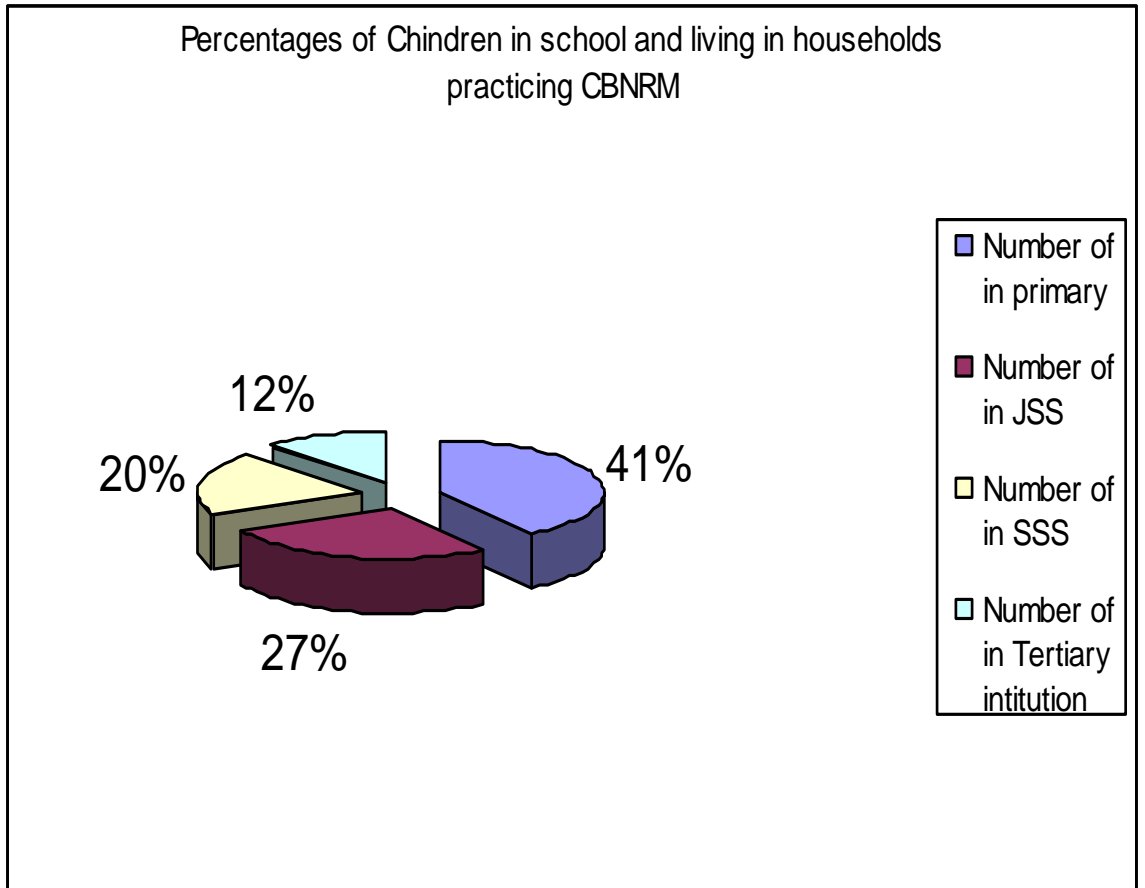
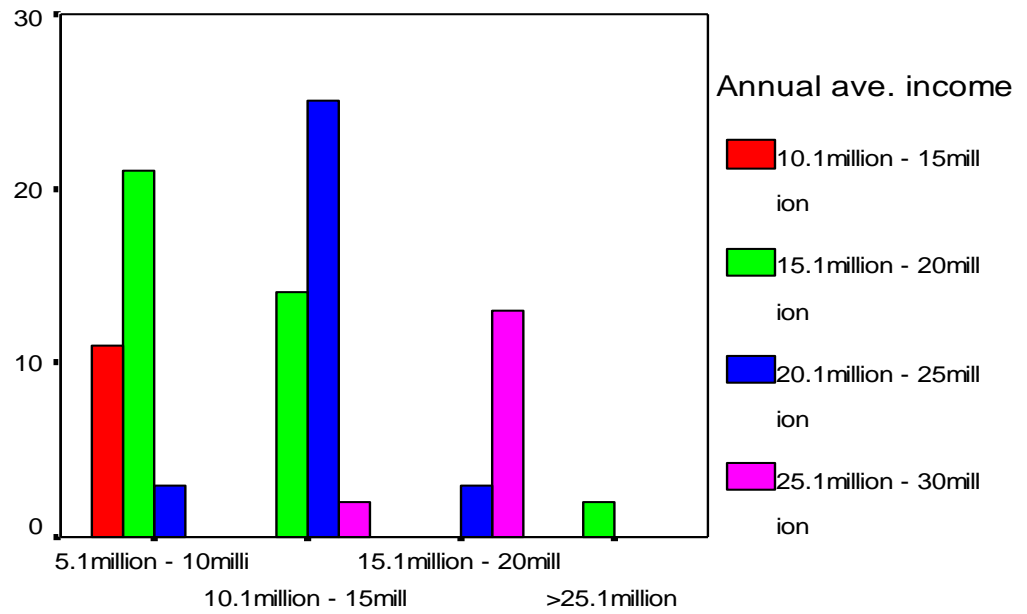


Figure 5: Percentages of children in school living in households practicing CBNRM

Table 20: A Cross tabulation of those who are practicing the CBNRM concept, their annual average income and their annual average expenditure

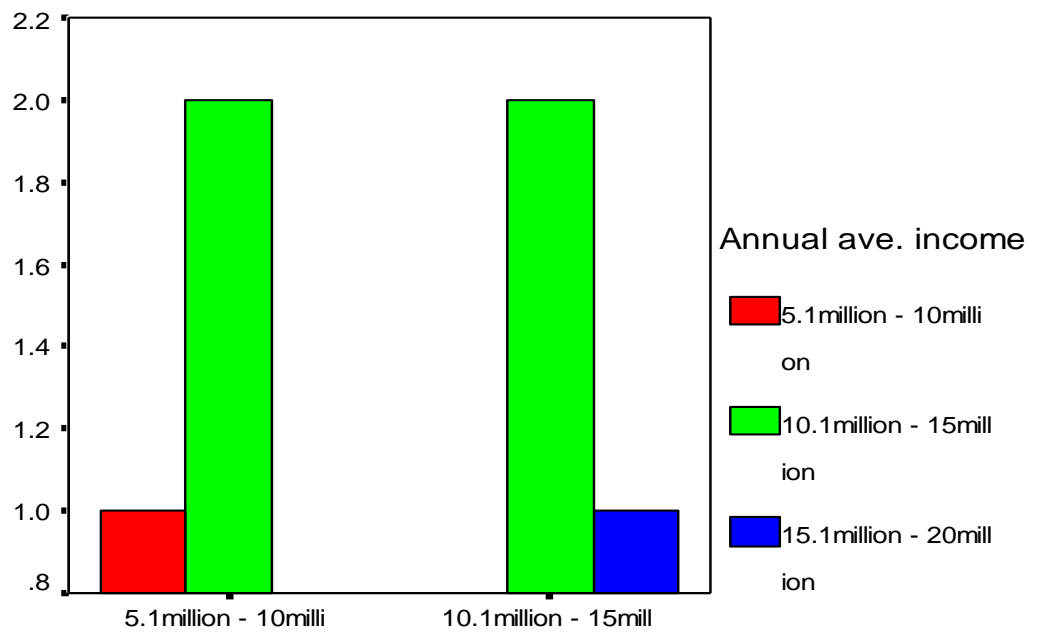
		Annual Average Crop Income					Total
		5.1million - 10million	10.1million - 15million	15.1million - 20million	20.1million - 25million	25.1million - 30million	
Agro-forestry/farm forest/CBNRM Practice	What is your annual average expenditure?	5.1million - 10million					
Farmers in Farm forest		10.1million - 15million	11	21	3		35
		15.1million - 20million		14	25	2	41
		More than 20.1million			3	13	16
	Total		11	37	31	15	94
Farmers not practicing Farm forest	What is your annual average expenditure?	5.1million - 10million	1	2			3
		10.1million - 15million		2	1		3
Total			1	4	1		6

Those in farm forest system/CBNRM.



What is your anual average expenditure

Those not in farm forest/CBNRM



What is your anual average expenditure

As discussed in the earlier chapter, seventy percent of Ghanaians live in the rural communities and are practicing traditional agriculture (GPSRS II Document). For sustainable economic development in Ghana, money should reflect in the pocket of the people through what they do and can do well. Data collected in a hundred household farms reflected incentives and economic sustenance for the farmer in the short term medium term and long term.

Out of the 100 people sample in 5 communities' 94 people undertake farm forest practices that support CBNRM while 9% of the economic trees planted were mainly mahogany, nyankom and cedrella, with black pepper. These three species have high demand in the market (TIDD, FC report, 2007). For the greater majority to undertake farm forest practices that support CBNRM suggests that the CBNRM system is meeting the conditions of the people of Gwira Bansa. Indeed, people will undertake natural resource management activities only when:

- .. They see clear tangible benefits (products, services or income).
- .. They have necessary competency (knowledge, technology).
- .. It is based on local indigenous knowledge.
- .. There is a guarantee of using products and services.
- .. There is unobstructed access, and property rights over resources.
- .. Individuals' interests are backed by strong local organizations.
- .. Increase people's claim is making capacities towards GOs and NGOs (Laban, 1993)

Projected economic gains from tree resources

To have tangible meaning in the economic values of the trees and other resources and how it will reflect on the livelihood of the farmer, the researcher analyzed the data collected using Formula for calculation of stumpage (timber) fee and analysing possible income levels in the short, medium and long term.

Formulae for Stumpage:

Stumpage fee (price of matured timber) = tree volume x timber price x stumpage

Where, tree volume is computed in cubic meters according to the measurements taken of each other tree felled, using Smalian's Formula as follows:

$$V = kL [(db_1 + db_2)^2 + (dt_1 + dt_2)^2]$$

Where V = the volume of the log, K = the constant 0.098, L = the length of the Log db₁, db₂ = the first and second diameters at the base end, measured at right angle to each other. dt₁, dt₂ = the first and second diameters at the top end, measured at right angles to each other.

Stumpage Value of standing trees in dollars/cubic metre – costs of harvesting and haulage may affect it. Volume Quantity of wood in the stem of a tree, measured in cubic metres (m³)

Table 21: Average price per species in Ghana Cedis

Species	Average Price per tree in Ghana Cedis
Mahogany (60meters x1metre) @	2,500
GHC50 per metre length	
Nyankom (60meters x 1metre) @ GHC	2,000
40 per meter length	
Cedrella	100
Black pepper (3 tonnes per acre per year)	31, 500

Source: Adopted from TIDD, FC report, 2007

Table 22: Harvesting period of tree species and periodic classification

Species	Number of year of harvest	Period for gains
Mahogany	20 to 25 years	Long term
Nyankom	20 to 25 years	Long term
Cedrella	12 to 15 years	Medium term
Black pepper	3 to 4 years	Short term

Source: Adopted from CARE International annual report, 2007

From Ministry of Agriculture report 2007, an acre of black pepper can produce 3 tonnes of black pepper. Local market price is GHC 10.50 per kilo, therefore, one tonne will be 10,500. The table 23 outlines the projected income levels from tree crops per farmer practicing CBNRM.

Table 23: A Cross tabulation of those who are practicing the CBNRM concept, their projected income from Timber products in the short, medium and long term

Number of Farmers assessed	Number of tree Species planted in July, 2000/harvest period (years-yrs)				Cumulative Amount to Gain after harvest				
	Mahogany	Nyankom	Cedrella	Black pepper (# of Acres)	Mahogany @ GHC2,500 per tree	Nyankom @ GHC2,000 per tree	Cedrella @ 100	Black pepper (# of Acres)	
90 farmers									
Number of expected years of Harvesting	20 to 25yrs	20 to 25yrs	13 to 15yrs	3 to 4 yrs					
Expected year of harvesting seasons for Earnings	2020 to 2025	2021 to 2025	2013 to 2015	Annually	one time earning	one time earning	one time earning	Annually	
Total number of trees planted by 90 farmers	15,113	11,057	24,099						
Total cumulative gains by 90 farmers (GH¢)					37,782,500	22,114,000	2,409,900	706,230	

Source: Data collected from farmers using the check list in appendix A & C

From table 23 analysis indicates that high income level are realized from blackpepper and cedrilla as a medium term crop and economic timer trees as long term crop projecting potential financial gains. This presupposes that, the future of the farmers practicing CBNRM is secure financially and Conservation obligation is observed as well.

Table 24: Cumulative total gains from the tree crops by farmers and traditional stool of Gwira Bansa

Types of economic trees	Cumulative total gains	Season for Earnings
Mahogany	37,782,500.00	One- Earnings
Nyankom	22,114,000.00	One- Earnings
Cedrella	2,409,900.00	One- Earnings
Black pepper	706,230.00	Annually
Total Gains	63,012,630.00	

20% for Community development and development of the stool = 12,602,526.00

Source: Adopted from TIDD, FC report, 2007

From the data collected on projected income after harvest of farm forest resources, 20% of the total harvest per farmer goes to community development and out of the 20%, 5% goes to the development of the traditional stool. This arrangement is made in their locally prepared indenture and site-plan. Therefore there are incentives for both the farmer and the traditional stool.

Table 25 measures level of impact of cumulative amount gained from tree species planted after harvest. This study sought to determine the level of impact of cumulative amount to gain from harvested tree species planted at Gwira Bansa. The statistical product and service solutions (SPSS) version 12, has an option, visual binder, under its transformation menu. This visual binder is a technique which can be used to collapse continuous variables into groups. In other words, it helps to identify suitable cut-off points to break continuous variables into approximately equal groups.(Pallant, 2005).

Therefore, using the SPSS version 12, the visual binder technique was employed to categorize the continuous variables, mahogany, nyankom, cedrilla and black pepper into three groups, that is, low, medium and high; according to the respondent cumulative amount to gain from the tree species planted after harvest (mahogany, nyankom, cedrilla and black pepper). Only one cut off point (that is, low and high) was however generated for black pepper because of granularity in the data. This means that SPSS put about 33.3 percent of the sample in each group (Pallant, 2005).

The tables below present the descriptive and functions of the new variables created to determine the number of cases in each category.

Table 25: Descriptive statistics

	N	Range	Minimum	Maximum	sum	Mean	std	variance	
	statistic	statistic	Statistic	Statistic	statistic	statistic	Std error	statistic	statistic
Mahogany @ GHC 2,500 per tree	90	1,350,000	25,000	1,375,000	37,782,500	419,805.56	28,367.908	269,121.60	7.2E+010
Nyankom @ GHC 2,000 per tree	90	980,000	20,000	1,000,000	22,114,000	24,5711.11	18,681.657	177,229.76	3.1E+010
Cedrilla @ GHC 100 per tree	90	98,000	2,000	100,000	2,409,900	26,776.67	1,844.458	17,498.064	3.1E+008
Black pepper per acre	90	12,600	3,150	15,750	706,230	7,847.00	193.652	1,837.141	3,375,087
Valid N (listwise)	90								

Source: Author's Fieldwork, 2008

Table 25 present a summary of the descriptive statistics on four variables information from the 90 respondents indicates that the range of mahogany at GHC2,500 PER tree is from GHC25,000 to GHC1,375,000, with a mean of GHC419,805.5 and a standard deviation of GHC269,121.60.

Table 25 also provides information concerning the distribution of amount in Ghana cedis on the four variables (ie is skewness and kurtosis). The Skweness values provide information on the symmetry of the distribution of the four variables unlike the kurtosis on the other hand, provides information about the 'peakness' of the distribution of the amount from the variable. If the distribution is perfectly normal a skewness and kutosis value of 0 is obtained (Pallant, 2001).

From table 25, it can be seen that none of the four variables skewness and kurtosis values equal zero. This means that the amounts realized from each of the four economic species is not normally distributed.

Again each of the four economic species' skewness and kurtosis values are positive. Positive skewness values indicate that the distribution the amounts from each of the four economic species is clustered to left at the low values (ie if plotted on a graph). On other hand, positive kurtosis values indicate that the distribution of the amount for each economic species is rather clustered or peak at the centre.

Table 26: Descriptive statistics

Descriptive statistics	Skewness		Kurtosis	
	Statistics	Statistics	Statistics	Std error
Mahogany @ GHC 2,500 per tree	1.011	.254	1.426	.503
Nyankom @ GHC 2,000 per tree	1.668	.254	3.782	.503
Cedrilla @ GHC 100 per tree	1.814	.254	5.467	.503
Black pepper per acre	2.094	.254	10.786	.503
Valid N (listwise)				

Source: Author's Fieldwork, 2008

Economics gains from Mahogany

Economics gains from mahogany are presented in Table 27. Out of the total sample of 90 respondents, about 36% described the economic gains from mahogany as low with a value of less than 237,500, 33.3% describe it as medium with values ranging 237,501 to 500,000 while about 31% of the respondents put a value of more than 500,001 to describe the economic gains from mahogany as high.

These values suggest that there are not only short-term, medium term and long term economic gains to be derived from Mahogany under CBNRM but that CBNRM also combines elements of local resource use, economic benefits (income) as well as devolve control, access, and management authority over natural resources to communities such as the Gwira Banso.

Table 27: Mahogany @ GHC2,500 per tree

	Mahogany	Frequency	Percent	Valid percent	Cumulative percent
Valid	<=237,500 (low)	32	35.6	35.6	35.6
	237,501-500,000	30	33.3	33.3	68.9
	medium				
	500,001 + (high)	28	31.1	31.1	100.0
	Total	90	100.0	100.0	

Source: Author's Fieldwork, 2008

Economic gains from Nyankom

As regards Nyankom species about 34% out of the 90 respondents describe its economic gain as low with a value of less than 154,000, 32.3% of the total respondents assigned values ranging from 154,000 to 266,000, describing the gains as medium while with a value of more than 266,001, about 33.3% of the respondents associated with economic gains of Nyankom with a high.

Table 28: Nyankom @ GHC2,000 per tree

	Nyankom	Frequency	Percent	Valid percent	Cumulative percent
Valid	<=154,000 (low)	31	34.4	34.4	34.4
	154,001-266,000	29	32.2	32.2	66.7
	medium				
	266,001 + (high)	30	33.3	33.3	100.0
	Total	90	100.0	100.0	

Source: Author's Fieldwork, 2008

For most people to describe the Nyankom species as low is an indication that low economic gains can lead to people rejecting the use of Nyankom. Indeed, with low economic gains, some of the people would scale back their production of Nyankom species.

Economic gains of cedrella

Table 29 shows the economic gains from cedrella. About 33% of 90 respondents valued the economic gains from cedrella at less than GH¢19,000 as such labelled as low. This is to be compared with 36% of the 90 respondents who valued cedrella species with values ranging from 19,001 to 30,000 describing the economic gain as medium. While 30% of the sample valued the economic gain of cedrella as high with a value of more than GH¢30,001. For most of the respondents to describe the economic gains from Cedrella as medium or high suggests that Cedrella is more likely than not to continue to be cultivated or produced

Table 29: Cedrella @ GH¢100 per tree

	Cedrella	Frequency	Percent	Valid percent	Cumulative percent
Valid	<=19,000 (low)	30	33.3	33.3	33.3
	19,001-30,000 medium	33	36.7	36.7	70.0
	30,001 + (high)	27	30.0	30.0	100.0
Total		90	100.0	100.0	

Source: Author's Fieldwork, 2008

Economic gains from Black pepper

The result in Table 30 shows that the greater majority of the 90 respondents (94.4%) who valued the black pepper less than GH¢7,876 described its economic gains as low while fewer of the respondents (5.6%) who described as high put the economic gains from black pepper at a value of 7,876 or more.

In short most of the respondents (90) described economic gains from mahogany, Nyankom and black pepper vines as low when compared to those who describe them as average or high, while most respondents described the economic gains from cedrella tree species as average when compared with those respondents who put the economic gains of cedrella tree species who described its economic gains as low or high.

Table 30: Black pepper (# of acres)

	Black pepper	Frequency	Percent	Valid percent	Cumulative percent
Valid	<=7,875 (low)	85	94.4	94.4	94.4
	7,876+ High	5	5.6	5.6	100.0
	Total	90	100.0	100.0	

Source: Author's Fieldwork, 2008

To get a scientific indicator that will show change in poverty trend through CBNRM the projected income from resources like nyankom, mahogany, cedrella and black pepper was compared with patterns and trends of poverty in Ghana to set the poverty lines (Awumbila, 2006).

The approach taken here is to anchor such lines on Calories requirement that is to use nutritional based poverty lines. The principles used for doing this are:

1. A lower poverty line of GHC288.47 per adult per year. This focuses on what is needed to meet the nutrition requirements of household members, individuals whose total expenditure fall below this line are considered to be in extreme poverty, since, even if they allocate their entire budgets to food, they would not be able to meet their minimum nutrition requirements (that is, if they consume the average consumption budget). With an average of 1 member per household a lower poverty line will be GHC1442.40 per year.
2. An upper line of GHC 370.89 per adult per year. This incorporates both essential food and non-food consumption. Individual consuming at levels above this can be considered able to purchase enough food to meet their nutritional requirement, and to be able to meet their basic non-food need. With an average of 5 adult members per household the higher poverty line will be GHC1,854.5

In summary, these poverty lines are anchored on the nutrition need of the Ghanaian population. It derived two lines per adult equivalent of GHC 370.89 per adult equivalent per year.

From the descriptive statistics, all 90 farmers studied fell above the poverty line looking at their short, medium and long term earnings. From table 4.3.2 an average expenditure of GHC2,000 per household per year indicates that those practicing CBNRM fell above higher poverty line (GHC1, 854.5) indicating a sustainable expenditure through CBNRM and promoting development. This implies that if the price for natural resources is valuable, and if this value is captured by landholders (not stakeholders) and authority is not arrogated upwards

then there is a high likelihood that natural resources will be conserved by state, private and in particular community landholders (Child, 2003b).

Impact assessment of CBNRM on Environment (Forest conservation)

From the study, the researcher found out that out of the seven (7) forest reserves the only forest area that saw CBNRM practice was Draw forest reserve at Gwira Bansa. In Draw forest reserve, there were no encroachments in the reserve where 94% of the farmers practiced farm forest system and have bye-laws guiding forest conservation. Ndunfiri and Noeugn North saw the highest encroachments.

Table 31: Forest Reserve indicating levels of encroachment in CBNRM sites and non-CBNRM sites

Name of Forest Reserve	Level of Protection	Levels of Encroach in 2007	CBNRM practice area
Draw	<ul style="list-style-type: none"> • GSBA • Partially protected • Partially for production 	No Encroachment Community; regulations on Encroachment	CBNRM practice
Ndunfiri	<ul style="list-style-type: none"> • GSBA • Partially protected • Partially for production 	Galamsy practice -2 arrest, Illegal chainsaw- 217 Economic trees in the protected harvested illegally.	No CBNRM Practice
Noeugn North	<ul style="list-style-type: none"> • GSBA • Partially protected • Partially for production 	-Galamsy practice - no arrest but 500 youth in Dompim and simpa practice galamsy in the reserve. -Illegal chainsaw- 512 Economic trees in the	No CBNRM Practice

		protected harvested illegally.	
		-Over 100 bags lives the area in a day.	
Noeugn South	<ul style="list-style-type: none"> • GSBA • Partially protected • Partially for production 	<p>-Galamsey practice - no arrest but over 200 youth in New Techiman and Abumpunison practice galamsey in the reserve.</p> <p>-Illegal chainsaw- 97 Economic trees in the protected harvested illegally.</p> <p>Charcoal burning practices- --Over 100 bags lives the area in a day.</p>	No CBNRM Practice
Ebi shelter belt	<ul style="list-style-type: none"> • Fully protected 	High forest security but 90 economic trees harvested in the reserve illegally.	No CBNRM Practice
Ben West	<ul style="list-style-type: none"> • GSBA • Partially protected • Partially for production 	<p>-Illegal chainsaw- 115 Economic trees in the protected harvested illegally.</p> <p>Charcoal burning practices- --Over 100 bags lives the area in a day.</p>	No CBNRM Practice
Nkonben	<ul style="list-style-type: none"> • GSBA • Partially protected • Partially for production 	High forest security but 128 economic trees harvested in the reserve illegally.	No CBNRM Practice

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

In this chapter the summary, conclusions and are presented. These are followed by recommendations based on the findings of the study.

Summary of findings

On the analysis of these findings were realised,

1. 94% of target sample size practices CBNRM.
2. Those practicing CBNRM were above the Ghana statistical high level poverty expenditure line while the 6% who were not practicing fell below Ghana statistical low level poverty expenditure line.
3. Where CBNRM was practiced forest conservation was high and no encroachment in the Draw Forest reserve was recorded while the other six reserves recorded it.
4. Security in economic gains was part of the finding based the projection made on their medium and long term crops. Values of long term economic trees indicated future income.
5. There was constant annual cash flow from the medium term crop (black pepper) thus reducing poverty levels for those practicing CBNRM.

Conclusions

It is evident from the findings so far obtained that the use of CBNRM as a development tool is effective looking at how it embraces short term, medium term and long term development needs, which could bring about desirable change and improvement to majority of the populace of Ghanaians who are farmers.

Nevertheless, this conclusion should be accepted with caution for the following reasons.

- Market trend can affect pricing of unprocessed goods and still make them vulnerable to poverty. There could be possible changes in price of commodity in the world market and can affect projected income negatively or positively.
- Policy on ownership of economic tree by law (ACT 547, TRMA) can be influenced by change of government.

Recommendations

From the research findings, it appears CBNRM hold the key to poverty reduction in the rural poor community, the researcher therefore recommended that:

- Similar studies should be undertaken in other CBNRM practicing constituencies to achieve better results. Areas to be covered include; considering a wider data space in the Western Region and looking at government policies on CBNRM and possible area of engagement with government to facilitate pro-poor policy formulation on CBNRM.
- Civil society should use these findings to advocate for pro-poor policies and institutionalization of the use of the CBNRM concept to influence lives of the 70% of Ghanaian practicing agriculture.

- There is the need to make CBNRM a central part of training and teaching programmes in training/ tertiary institutions including diploma awarding institution. If this is done product of these institutions will be well-equipped with the necessary knowledge and profession. Skill needed for efficiency, effectiveness and edge to move CBNRM in the National agenda for development.

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APPENDIX A

Checklist – Livelihood Analysis of Rural Households in the

.....**Area**

Household no:.....

Name of HH head:

Type of dwelling:

Respondents:

Village:

Interviewer's name:

A) Location

(Give a description of the location of the compound/house, considering)

Itinerary (How to find the dwelling)

.....
.....
.....

Distance to main town (in meters/passes/km):

.....

Distance to track/road:

Compound clustering: <3 houses/ 310

B) Household Determination

Use the questions in a flexible way and take time to let the respondents explain the household situation. Draw a genealogical diagram on the flip side of the questionnaire.

1) How many people are living in this house/compound?
2) Do you cook together as household?
..... Yes/No
.....

3) If yes how many people form the household?
4) Household head occupation?
5) Are there any absent household members?
..... Yes/No

(Determine whether or not to consider them part of the HH, using question 6, 7 and 8)

6) Why are they absent (seasonal labour migration, education, staying with family elsewhere, start own household)?
.....
.....

7) Are they absent for a period longer than 6 months?
..... Yes/No

8) Do some present HH members stay in the house for less than 6 months in a year?..... Yes/No

(Determine whether or not to consider them part of the household, using Question 10 and 11)

9) Why do they leave the house (seasonal labour migration, education, staying with family elsewhere, split up household)?

.....
.....

10) How many people are part of this household?

(This will be the research unit for the rest of this questionnaire)

11) What are the main economic activities?

a. farming b. mining c. trading d. other

(Specify).....

12) If farming, are the whole household into farming?

.....

D) Household History

Use these questions in a flexible way to **describe** the settlement and family history of the household.

1. When did you migrate to your present place?

.....

From where did you migrate?

(If in present village: Go to 6; if not: Go to 3)

2. What were your main economic activities in that place?

.....
.....

3. Why did migrate?

.....
.....

4. Have you and your household also lived in any other place?

..... Yes/No

(If 'no': Go to section E)

5. Where was that?

.....

6. What were your main economic activities in that place?

.....
.....

E) Farm Characteristics and Land Tenure

1) Do you own a land?

..... Yes/No

2) Are you engaged in farming activities?

..... Yes/No

If 1 = 'yes' & 2 = 'yes'. Go to 3 if 1 = 'no' & 2 = 'yes': Go to 4

If 1 = 'yes' & 2 = 'no': Go to 6 If 1 = 'no' & 2 = 'no': Go to section F

3) Do you also farm land that you do not own? Yes/No

If 'no': Go to 5

4) Under what arrangement do you use this land?

.....
.....

5) Do you farm on all the land you own?

..... Yes/No *if*

'yes': Go to 7

6) What do you do with the land owned but not in use?

.....
.....

7) a. What types of crops do you cultivate (including cash crop, tree crop and economic trees)?

.....
.....

b. Are you into agro-forestry/farm forest? E.g. Pure plantation, intercrop, boundary plantation etc.

8) What inspired you to go into farm forest or integrating trees on your farm?

.....
.....

9) Have you regretted going into farm forest? Yes /No.....

10) If yes or no why?

.....
.....

11) Would you have gone into farm forest ten years ago? (To know their compunction or acceptance)

.....

F) Income Generating Activities

(a) Cash Income Generating Activities

Household member (who? Relation to Head, name,	Activity (source of income	Seasonality (when is activity carried out)	Estimate of income level per time unit (day, month, year)	Estimate of time/resources invested
	<ul style="list-style-type: none"> ▪ Pension ▪ Labour migration ▪ Crop sales (specific) ▪ Animal sales ▪ Farm labour (Care taker) ▪ Petty trading 			

(b)

Household		Types of Crops	Number of acres	Estimated yield per period	Estimated income per period
Short term (annual, perennial, biennial)					
Long term crop (10 years and above)					
				50 tree 8 year 15	

(b) Non-cash Income Generating Activities

1. Does any HH member belong to any farming group? Eg. ‘nnoboa’ group.
..... Yes /No
2. Do any of you work on other people’s farms in exchange for food/palmwine?
3. Do other people come to work on your farm for same purpose as question 2?
..... Yes /No
4. Do you get any food out of hunting/fishing (*specify*)?
..... Yes /No
5. Do you get any food out of gathering (*specify*)?
..... Yes /No
6. Do you get any food out of other activities (fruit trees, gardening)?
..... Yes /No
7. Do you get any goods (incl. foodstuff) by exchanging them for other goods (bartering)?
..... Yes /No
8. *If yes*: Which goods do you give an which goods do you receive?
.....
9. Do you receive any food aid (not only this year)?
.....
.....
.....

Trends in Income Generating Activities

Has your non-farm income increased, decreased or stayed the same over time (describe the trend)?.....
.....
.....

Has your **number** of income sources for your household increased, decreased or stayed the same over time (describe the trend)?.....
.....
.....

G) Cash Expenditure (past year)

(Ask respondent(s) about their main cash needs and locate them in the form: use as checklist)

Type of expenditure		Estimate of costs	Seasonality of expenditure
Staple foods:	Maize		
	Rice		
Other food:	Prepared food		
	Soup ingredients		
Palm wine and /or beer/akpeteshie			
Education			
Health			
Consumer goods:	Clothes		
	Cosmetics		
Firewood/kerosene/charcoal			
Transport			
Weddings/funerals			
Gifts			
Housing repairs & improvements			
Productive investments			
Repay of loans			
Others:			

H) Possessions

Indicate whether the household possesses the following items and how many.

Car		Radio		Flashlight	Susu/House savings	
Lantern		Bicycle		Modern	Other	
Plough		Truck		Sewing machine		
Motorcycle		Iron-sheet roofing		Bank savings		

1. Are you sometimes forced to sell possessions because you need cash?

..... Yes/No

If no; Go to 3

.....

2. Have there been years that you were forced to sell much more possessions than usually? Yes / No

.....

3. Have your possessions increased, decreased or stayed the same over time?

..... Yes/No

I) Family Networks

1) Do you have relatives in the village?

..... Yes/No

If 'no': Go to 2

.....

.....

(a) Do you help each other with farm and/or other **work**?

..... Yes/No

.....

(b) Do you give or receive **food** to/from these relatives?

..... Yes/No

.....

(c) Do you give or receive **cash** to/from these relatives?

..... Yes/No

.....

(d) Have these forms of mutual aid increased, decreased or stayed the same over time?

..... Yes/No

.....

2) Do you have relatives **outside** the village (but in)?

..... Yes/No *If 'no': Go to 3*

.....

(a) Do you help each other with farm and/or **work**?

..... Yes/No

.....

(b) Do you give or receive **food** to/from these relatives?

..... Yes/No

.....

(c) Do you give or receive **cash** to/from these relatives

..... Yes/No

.....

(d) Have these forms of mutual aid increased, decreased or stayed the same over time?

..... Yes/No

.....

3) Do you have relatives **outside**.....(but in Ghana)?

Yes/No.....*If 'no': Go to 4*

.....

.....

(a) Do you help each other with farm and/or other **work**?

..... Yes/No

.....

(b) Do you give or receive **food** to/from these relatives?

..... Yes/No

.....

(c) Do you give or receive **cash** to/from these relatives?

..... Yes/No

.....

(d) Have these forms of mutual aid increased, decreased or stayed the same over time?

..... Yes/No

.....
4) Do you have relatives who live **outside Ghana**?

(a) Do you receive help from them (money, consumer goods, *explain trend*)?

.....
.....

APPENDIX B

Impact assessment of CBNRM project

Checklist for socio-economic impact assessment

1. Who are the stakeholders in the project?
 - What are the main groups involved?
 - What are their overall strategies and interests and what is their role in BNRM (internal and external stakeholder)?
 - What is their dependency on CBNRM?
 - Which groups have common interests (e.g. direct participants and facilitators)?
 - Which groups have conflicting interests (e.g. direct participants and facilitators)?

2. Is the project economically viable?
 - What is the economic potential?
 - What have been the economic results in the past, and what has been the trend?

3. What is the financial impact of the project on local communities and household?
 - What has been the financial impact on the community?

- What has been the financial impact on household?
 - Are the financial benefits increasing or decreasing?
4. What are the livelihood impacts of the project on communities and local households?
- What are thestrategies, security and levels?
 - What are the positive and negative impacts?
 - Are the benefits increasing or decreasing?
 - What are the impacts on livelihood security and resilience?
 - How are positive and negative impacts distributed within the community?
 - Is compensation provided for negative impacts?
 - What was the livelihood situation before the project?
5. What is the impact on non-participating local residents?
- What are the positive and negative impacts on non-participants?
6. What are the impacts of the project on commercial companies/Joint venture partners?
- Why did CBO link up (question for CBO only)?
 - What are the financial benefits and costs for the CBO formation?
 - What are the other benefits and costs for the CBO?
 - Are the benefits increasing or decreasing?

7. What is the impact of the joint venture partner on the project?
 - Which contributions does the JVP make?
 - Which long-term investments has the JVP made in the community?
 - Are the contributions increasing or decreasing in time?
 - Does the community have the capacity to negotiate with the JVP and monitor its

8. What is the impact of support organisations such as government, NGOs and donors on the project?
 - What has been the contribution of the supporting organisation to CBNRM?
 - What has been the impact of this contribution on the project implementation and impacts on local communities and people?
 - How has tendering assisted communities? What are the alternatives?
 - How do external stakeholders benefit or lose from the project (benefit distribution among internal and external stakeholders)?

9. What is the overall development impact?
 - Does the project contribute to income generation, employment creation economic growth and diversification, poverty reduction, food security and livelihood security?
 - Are revenues used to mitigate adverse drought impacts?
 - Does the project contribute to the development of tourism industry?
 - Does the project contribute to foreign exchange generation?

- Does the project lead to conservation and increases in national assets?

10. What is the likely contribution of the project to resource conservation?

- Have popular attitudes towards natural resources become more positive?
- Which resources are influenced by the project?
- How are the off-take levels determined? Who determines?
- How does the project contribute to their conservation (e.g. reduced poaching, sustainable harvesting methods, better local monitoring and management rules)?
- Has there been any restocking or replanting of degraded land?

11. Which 'shocks' have influenced the project's results?

- Which natural shocks have influenced the project's results positively?
- Which natural shocks have influenced the project's results negatively?
- Which 'man-made' shocks have adversely affected the project's results?
- Which 'man-made' shocks have positively influenced the project's results?
- Also indicate the impacts of the shocks.

12. Which alternatives exist for CBNRM to raise rural livelihoods and to protect natural resources?

- Which alternatives for resource conservation?
- Which alternative livelihood sources?

13. Future, lessons and improvements. What do you expect the LLH situation to be 5 years from now, and what role do you expect CBNRM to play?

- How could the project be improved/made viable (economically, socially and environmentally)?
- How can the contribution of the project to rural LH be increased?
- How can the project contribute more to natural resource conservation?
- How can external organization improve their support for direct stakeholders?
- How can the contribution of JVP to community development and LH be improved?
- How can the community improve the project?
- What alternatives exist for the CBNRM project?

Key questions for the environmental review are: (Key informant, DA, FSD, Implementing Agencies-NGO's, wildlife division fo FC.

- What was the resource base prior to CBNRM?
- What is the regeneration/carrying capacity of the resources?
- What have been the permitted and actual harvests? How have the permitted levels been determined and by who?
- Which resource management system, including resource monitoring, has been put in place and how effective is it?

- What has been the impact of CBNRM on natural resources (e.g. resource amount, illegal off-take, restocking/planting)?
- Which other environmental impacts result from CBNRM projects?

Key organizational performance themes are:

- How effective is the organization in moving towards the fulfilment of its CBNRM mission and objectives?
- How efficiently are resources used with respect to CBNRM support and implementation?
- Has the institution kept its relevance over time with respect to CBNRM (e.g. adaptive planning and sustainability)?
- How well is the organization performing?

APPENDIX C: A Cross tabulation of those who are practicing the CBNRM concept, their projected income from Timber products in the short, medium and long term

Labelled for each farmer	Number of tree Species planted in July, 2000/harvest period (years-yrs)				Cumulative Amount to Gain after harvest			
	Mahogany 20 to 25yrs	Nyankom 20 to 25yrs	Cedrella 13 to 15yrs	Black pepper (# of Acres 3 to 4 ys	Mahogany @ GHC2,500 per tree	Nyankom @ GHC2,000 per tree	Cedrella @ 100	Black pepper (# of Acres) per annum
90 farmers were Assessed								
1	180	130	500	0.22	450,000.00	260,000.00	50,000.00	6,930.00
2	150	187	300	0.25	375,000.00	374,000.00	30,000.00	7,875.00
3	220	190	1,000	0.25	550,000.00	380,000.00	100,000.00	7,875.00
4	200	262	120	0.25	500,000.00	524,000.00	12,000.00	7,875.00
5	90	150	360	0.25	225,000.00	300,000.00	36,000.00	7,875.00
6	176	277	300	0.25	440,000.00	554,000.00	30,000.00	7,875.00
7	311	150	700	0.25	777,500.00	300,000.00	70,000.00	7,875.00
8	180	100	300	0.25	450,000.00	200,000.00	30,000.00	7,875.00
9	270	150	300	0.25	675,000.00	300,000.00	30,000.00	7,875.00
10				0.50				

	500	500	1,000		1,250,000.00	1,000,000.00	100,000.00	15,750.00
11	270	200	350	0.25	675,000.00	400,000.00	35,000.00	7,875.00
12	90	105	200	0.25	225,000.00	210,000.00	20,000.00	7,875.00
13	550	100	350	0.25	1,375,000.00	200,000.00	35,000.00	7,875.00
14	340	120	340	0.25	850,000.00	240,000.00	34,000.00	7,875.00
15	220	106	330	0.25	550,000.00	212,000.00	33,000.00	7,875.00
16	142	170	300	0.50	355,000.00	340,000.00	30,000.00	15,750.00
17	95	20	90	0.25	237,500.00	40,000.00	9,000.00	7,875.00
18	290	400	450	0.25	725,000.00	800,000.00	45,000.00	7,875.00
19	250	300	300	0.25	625,000.00	600,000.00	30,000.00	7,875.00
20	120	145	290	0.25	300,000.00	290,000.00	29,000.00	7,875.00
21	180	160	330	0.25	450,000.00	320,000.00	33,000.00	7,875.00
22	202	100	20	0.25	505,000.00	200,000.00	2,000.00	7,875.00
23	200	124	600	0.25	500,000.00	248,000.00	60,000.00	7,875.00
24	10	20	385	0.25	25,000.00	40,000.00	38,500.00	7,875.00

25	56	150	100	0.25	140,000.00	300,000.00	10,000.00	7,875.00
26	200	98	220	0.25	500,000.00	196,000.00	22,000.00	7,875.00
27	180	66	330	0.32	450,000.00	132,000.00	33,000.00	10,080.00
28	220	120	149	0.25	550,000.00	240,000.00	14,900.00	7,875.00
29	180	139	290	0.25	450,000.00	278,000.00	29,000.00	7,875.00
30	290	144	450	0.25	725,000.00	288,000.00	45,000.00	7,875.00
31	350	70	300	0.25	875,000.00	140,000.00	30,000.00	7,875.00
32	290	340	230	0.25	725,000.00	680,000.00	23,000.00	7,875.00
33	220	120	315	0.32	550,000.00	240,000.00	31,500.00	10,080.00
34	30	50	120	0.25	75,000.00	100,000.00	12,000.00	7,875.00
35	140	106	120	0.25	350,000.00	212,000.00	12,000.00	7,875.00
36	180	85	70	0.25	450,000.00	170,000.00	7,000.00	7,875.00
37	450	90	450	0.25	1,125,000.00	180,000.00	45,000.00	7,875.00
38	200	200	350	0.25	500,000.00	400,000.00	35,000.00	7,875.00
39				0.25				

	45	97	100		112,500.00	194,000.00	10,000.00	7,875.00
40	200	150	380	0.25	500,000.00	300,000.00	38,000.00	7,875.00
41	170	150	190	0.25	425,000.00	300,000.00	19,000.00	7,875.00
42	200	180	290	0.25	500,000.00	360,000.00	29,000.00	7,875.00
43	300	40	500	0.25	750,000.00	80,000.00	50,000.00	7,875.00
44	221	125	311	0.25	552,500.00	250,000.00	31,100.00	7,875.00
45	78	25	134	0.25	195,000.00	50,000.00	13,400.00	7,875.00
46	178	220	200	0.50	445,000.00	440,000.00	20,000.00	15,750.00
47	68	70	270	0.25	170,000.00	140,000.00	27,000.00	7,875.00
48	300	300	500	0.25	750,000.00	600,000.00	50,000.00	7,875.00
49	20	40	40	0.25	50,000.00	80,000.00	4,000.00	7,875.00
50	190	251	270	0.25	475,000.00	502,000.00	27,000.00	7,875.00
51	89	77	100	0.25	222,500.00	154,000.00	10,000.00	7,875.00
52	55	80	120	0.25	137,500.00	160,000.00	12,000.00	7,875.00
53	230	140	170	0.25	575,000.00	280,000.00	17,000.00	7,875.00

54	340	119	285	0.25	850,000.00	238,000.00	28,500.00	7,875.00
55	125	50	300	0.25	312,500.00	100,000.00	30,000.00	7,875.00
56	88	75	300	0.25	220,000.00	150,000.00	30,000.00	7,875.00
57	120	65	90	0.15	300,000.00	130,000.00	9,000.00	4,725.00
58	60	40	70	0.25	150,000.00	80,000.00	7,000.00	7,875.00
59	200	19	300	0.13	500,000.00	38,000.00	30,000.00	4,095.00
60	78	25	200	0.25	195,000.00	50,000.00	20,000.00	7,875.00
61	115	210	315	0.25	287,500.00	420,000.00	31,500.00	7,875.00
62	90	90	200	0.25	225,000.00	180,000.00	20,000.00	7,875.00
63	41	200	300	0.25	102,500.00	400,000.00	30,000.00	7,875.00
64	253	98	90	0.25	632,500.00	196,000.00	9,000.00	7,875.00
65	50	131	243	0.25	125,000.00	262,000.00	24,300.00	7,875.00
66	127	130	150	0.10	317,500.00	260,000.00	15,000.00	3,150.00
67	300	10	400	0.25	750,000.00	20,000.00	40,000.00	7,875.00
68				0.25				

	56	70	500		140,000.00	140,000.00	50,000.00	7,875.00
69	44	60	200	0.25	110,000.00	120,000.00	20,000.00	7,875.00
70	300	133	145	0.25	750,000.00	266,000.00	14,500.00	7,875.00
71	210	333	290	0.25	525,000.00	666,000.00	29,000.00	7,875.00
72	45	30	100	0.17	112,500.00	60,000.00	10,000.00	5,355.00
73	95	90	100	0.25	237,500.00	180,000.00	10,000.00	7,875.00
74	57	60	50	0.25	142,500.00	120,000.00	5,000.00	7,875.00
75	150	97	200	0.25	375,000.00	194,000.00	20,000.00	7,875.00
76	50	170	250	0.25	125,000.00	340,000.00	25,000.00	7,875.00
77	85	120	260	0.25	212,500.00	240,000.00	26,000.00	7,875.00
78	69	77	300	0.13	172,500.00	154,000.00	30,000.00	4,095.00
79	29	70	315	0.25	72,500.00	140,000.00	31,500.00	7,875.00
80	45	35	510	0.25	112,500.00	70,000.00	51,000.00	7,875.00
81	200	40	200	0.25	500,000.00	80,000.00	20,000.00	7,875.00
82	70	70	100	0.15	175,000.00	140,000.00	10,000.00	4,725.00

83	250	90	127	0.25	625,000.00	180,000.00	12,700.00	7,875.00
84	95	20	205	0.25	237,500.00	40,000.00	20,500.00	7,875.00
85	100	103	100	0.25	250,000.00	206,000.00	10,000.00	7,875.00
86	210	50	90	0.25	525,000.00	100,000.00	9,000.00	7,875.00
87	56	50	100	0.25	140,000.00	100,000.00	10,000.00	7,875.00
88	70	20	80	0.15	175,000.00	40,000.00	8,000.00	4,725.00
89	103	34	150	0.13	257,500.00	68,000.00	15,000.00	4,095.00
90	171	84	200	0.20	427,500.00	168,000.00	20,000.00	6,300.00
Total	15,113	11,057	24,099		37,782,500.00	22,114,000.00	2,409,900.00	706,230.00