

**EVALUATION OF THE POTENTIAL IMPACTS OF THE RIPARIAN  
BUFFER ZONE POLICY ON THE LIVELIHOODS OF PEOPLE IN  
COMMUNITIES ALONG THE BLACK VOLTA IN WA WEST DISTRICT,  
GHANA.**

**BY**

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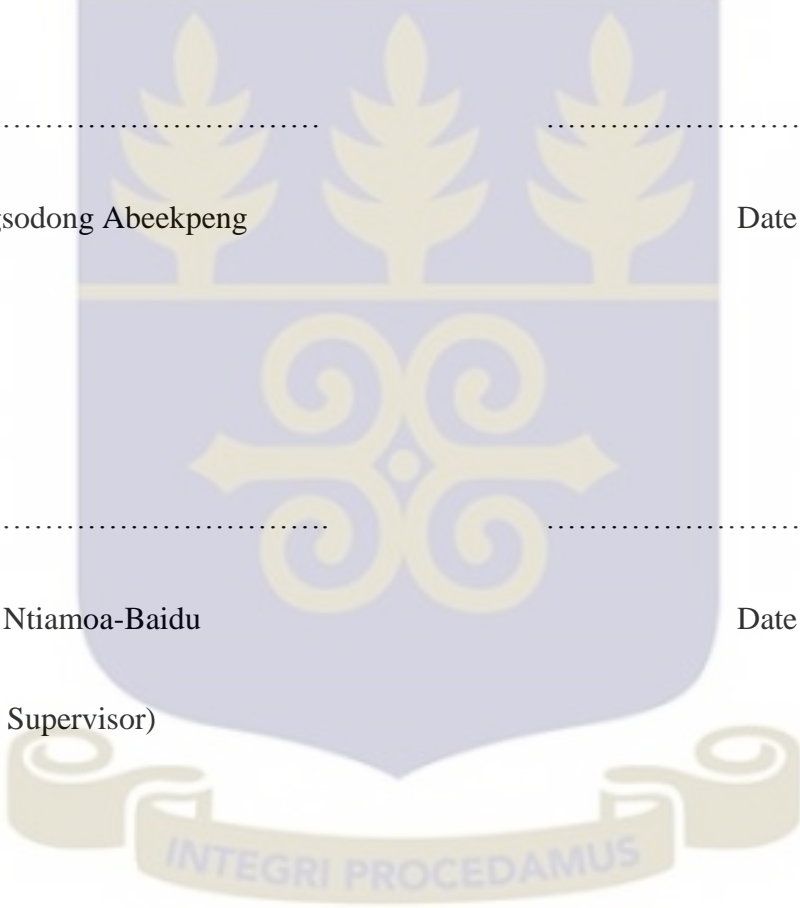
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**LEGON**

**DECEMBER, 2015**

## DECLARATION

I hereby declare that this thesis does not incorporate, without acknowledgement, any material previously submitted for a degree in any University. To the best of my knowledge and belief, this thesis contains no material published or written by another person except where due reference is made in this thesis.



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## **DEDICATION**

This study is dedicated to my family.



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## LIST OF ABBREVIATIONS

DFID	Department for International Development
DMTDP	District Medium Term Development Plan
EPA	Environmental Protection Agency
GLSS	Ghana Living Standard Survey
GSOP	Ghana Social Opportunity Project
GSS	Ghana Statistical Service
IDS	Institute of Development Studies
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union on Conservation and Nature
km	Kilometers
MOFA	Ministry of Food and Agriculture
MWRWH	Ministry of Water Resources Works and Housing
NADMO	National Disaster Management Organization
OECD	Organization for Economic Cooperation and Development
PAS	Policy Advisory Series
PHC	Population and Housing Census
RBZP	Riparian Buffer Zone Policy

SLF	Sustainable Livelihood Framework
UWR	Upper West Region
WCED	World Commission on Environment and Development
WRC	Water Resources Commission
WWDA	Wa West District Assembly



## ABSTRACT

Environmental and climate change/variability have become challenges to meeting development goals globally. Human activities have contributed to the ongoing environmental changes. Policies have emerged globally and locally to protect, conserve and manage the environment (ecosystems) for their continuous functioning. In 2013, the Riparian Buffer Zone Policy (RBZP) to manage freshwater resources in Ghana was launched. The policy aims at regulating human activities along freshwater bodies through sustainable practices. This study evaluates the impacts of the implementation of the policy on livelihoods of people in three communities (Kantu, Kpanfaa and Toulle) along the Black Volta River in the Wa West District. The main objectives were to determine the socio-economic status of the people in the communities; to assess the awareness of the people about the policy and to assess the dependence of the people on the Black Volta River and the implications of the policy implementation on their livelihoods. Primary data were collected through the administration of structured and semi structured questionnaire to households (n= 193) in the study communities and through interviews with key informants. Secondary data were taken from relevant published government documents. Respondents in the three communities depended on the Black Volta River for livelihood activities including, domestic water supply (43%), oyster harvesting (20%) and animal watering (27%). Respondents in the three communities depended highly on natural resources as their income sources. The main income sources of respondents in the communities included: crop production, livestock production, charcoal production, fishing, and trading; with majority (63.7%) depending on crop production as their primary income source. Majority of the respondents, (64.2%) did not have savings either

at home or in a financial institution and the remaining 36% had savings. The main source of drinking water in all three communities was machine drilled boreholes. About 80% of respondents in the three communities depend on the water resources from the Black Volta for several livelihood activities, while 20% did not depend on the river for any livelihood activity. Besides crop cultivation, forest lands along the Black Volta served as grazing fields for livestock in all three communities. Respondents (93%) of the three communities were not aware of the Riparian Buffer Zone Policy and only one out of five key informants was aware of the policy. However, about half (51%) of respondents stated they would comply with the policy while, 27% of respondents stated they would demand compensation from implementers before they comply. The remaining (15%) indicated they would do as told by their Chiefs. Majority of respondents (64%) predicted the implementation of the policy would impact on food availability and on incomes in the three communities. From this study, the implementation of the Riparian Buffer Zone Policy will highly affect food availability, mostly crops and livestock due to loss of grazing and farmlands in the three communities. The low awareness of the Riparian Buffer Zone Policy by respondents indicates the need for intensive public awareness creation, especially in riparian communities.

## CHAPTER ONE

### 1.0 Introduction

#### 1.1 Background

Environmental and climate change/variability have become challenges to meeting development goals globally (Assan & Kumar, 2009). Although the evidence of these changes, for example, global warming, erratic rainfall patterns, rising sea levels, among others, have been well documented (IPCC, 2007), it is sometimes difficult to predict the trends and how they impact on livelihoods and development of people and nations (Assan & Kumar, 2009; Dudgeon *et al.*, 2007). In order to find sustainable measures for adjusting to these changes, states and institutions are incorporating environmental/climate smart schemes and approaches into their development planning and goals (Abernethy & Rutherford, 2000; Palmer *et al.* 2008).

Human activities have contributed to the ongoing environmental changes. Poor people are agents and victims of environmental change (Assan & Kumar, 2009); they are vulnerable to environmental changes and suffer the most because they rely on natural and common resources for their livelihoods and at the same time become agents of environmental change through unsustainable practices in the use of these resources (Bebbington, 1999). The maintenance of the natural qualities and characteristics of the environment is necessary to enable continuous provision of functions and services to people for their livelihoods (Ekins, *et al.*, 2003). According to Davies and Bennet (2007) and Bebbington (1999) changing environments are influencing, reshaping and limiting livelihood options among the poor.

The Brundtland Commission Report of 1987 stated and predicted that poverty will reduce people's ability to use resources in a sustainable manner and this will intensify pressures on the environment (Mebratu, 1998). Healthy ecosystems however are necessary for human survival and that of other organisms and need to be managed and protected for sustainability. Natural resources and rural people are variables that impact on each other and change when their environments change (Lovette & Ockwell, 2010). Some of the natural and common resources that rural people depend on are land, water, and forest (Bene, 2003; Charkaborty, 2001). Ecological sustainability is therefore essential for the maintenance of the resource base for the survival of such people.

There are efforts globally and locally to protect, conserve and manage ecosystems for their continuous functioning (Schelles & Pfeffer, 2009). These include policies to guide and regulate resource use at all levels for sustainability (Adams, 2006). However, the livelihood sources of the poor may become less as the policy stimulates conservation of these resources leading to social challenges and in some places hardship for some rural people. As efforts are being made towards sustainability in resources use more social challenges are encountered (Okunola & Ikuomola, 2010).

The Riparian Buffer Zone Policy (RBZP) is one of such measures to protect, manage and conserve water resources in Ghana. It was developed between 2004 and 2012; and launched in 2013 by the Ministry of Water Resources Works and Housing in collaboration with the Water Resources Commission and other stakeholders for sustainable management of freshwater bodies in the country. The policy aims at regulating human activities along freshwater bodies through sustainable practices. To achieve this, it outlines five (5) major areas of focus for which it sets out specific

objectives and measures within the context of national development goals (MWRWH, 2013). These areas are; (i) Maintaining the ecological and life-supporting functions of buffer zones; (ii) Sustaining the multi-functionality of buffer zones; (iii) Riparian buffer zones specific to urban and peri-urban areas; (iv) Building capacity through research and education , training and empowerment of communities on conservation of buffer zones and (iv) Coordinating and harmonizing existing policies and traditional bye-laws.

Water is a basic human need and a very important natural resource. In Ghana like other African countries, besides the domestic uses, some major sectors of the national economy, for example energy and agricultural production have direct relationships or dependence on water and therefore will be affected by any changes in terms of quantity (availability) and quality (Maze- Hausken, 2000). The Black Volta is an important water resource and serves rural people living in communities along its banks, including those in the Wa West District. They depend on the water resource for several livelihood activities including fishing, animal watering, harvesting of oysters, transportation, and domestic water uses among others (WWDA, 2010). Therefore, the research seeks to find out residents' awareness of the Buffer Zone Policy and evaluate the likely impacts of the implementation on their daily activities. The key research questions include;

- What are the main sources of income for the people in the District?
- What basic amenities are available and accessible to the people?
- To what extend were the communities' involvement in the policy formulation and how much education has been done by the implementers?
- What are the main activities of people living along the Black Volta River?

- How much do people depend on the Black Volta for potable water and for other domestic uses?
- What are potential impacts of the implementation of the Buffer Zone Policy on livelihoods in the District; and what are the implications for livelihoods?

### **1.2 Aim and objectives of study**

The aim of the study is to evaluate the potential impacts of implementing the Riparian Buffer Zone Policy on the livelihoods of rural people living along the Black Volta in the Wa West District.

The research has four specific objectives. These are;

- To determine the socio-economic status of the people in three communities along the Black Volta.
- To assess awareness of the riparian buffer zone policy among the three selected communities.
- To assess the dependence of the communities on the Black Volta for their livelihoods.
- To analyze the implications of implementing the Riparian Buffer Zone Policy for the livelihoods of people in the selected communities.

### **1.3 Justification of Study**

According to the Policy Advice Series (PAS) of the Environmental Protection Agency (EPA), there has been remarkable decrease in poverty in Ghana from 39.5% to 18.2% from 1998 to 2006, yet poverty in the Northern Regions, Upper West inclusive, has not decreased as expected (EPA, 2012). Poverty is a major problem or obstacle to achieving

sustainability and national development. The rural poor degrade the environment as they harness resources for their livelihood (Carr & McCusker, 2009).

The study explores the potential impacts of the implementation of the Riparian Buffer Zone Policy on the people who live along the Black Volta and depend on its water resources for their livelihoods and basic needs. The findings of the study could serve as a reference point for the Wa West district's future development plans in relation to water resource. The Water Resources Commission (WRC) and other stakeholder institutions collaborating in the policy implementation would derive insights from the findings particularly as they relate to community participation and compliance.

#### **1.4 Outline of thesis**

This research work is set out in six chapters. Chapter one provides the general introduction to the study. It identifies the problem and also indicates the significance of the study. Chapter two presents a review of literature, focusing on sustainability and related concepts, with emphasis on the Sustainable Livelihood Framework (SLF) as a tool for evaluation of impacts of policies or programs on people. It also examines policy development processes and implementation. Chapter three presents the materials and methods used in the research as well as a brief profile of the Wa West district. It also spells out the types of data collected for the study and how data were analyzed and presented. Chapter four presents the results of the research. Chapter five discusses the findings from the data analysis, field observation and focus groups discussions and finally the conclusions and the recommendations of the study are presented in chapter six.

### 1.5 Limitations of study

Some limitations were encountered during the study; namely,

- The refusal of some key community elders to grant interviews as key informants due to discontent with existing bye-laws restricting the use of the water resources of the Black Volta
- Since policy implementation had just begun, some respondents had difficulty indicating whether or not it would have some impacts or not, due to very little or no knowledge of the policy. According to them, they would rather wait and see what comes with the policy implementation with time; they would therefore not contribute to the research.
- Also, some data about the district that could have contributed to the research were unavailable; for example, current data on crop yields and livestock production in the communities.



## CHAPTER TWO

### 2.0 Literature Review

#### 2.1 Introduction

The chapter presents the theories and concepts that form the basis of this research work. These include: water resources management, integrated water resources management, dependence of communities on water resources and sustainability. Finally, a sustainable livelihood framework which serves as a tool in impact evaluation in relation to livelihoods is reviewed and its relevance to the study is explained.

#### 2.2 Water Resources Management

Water resources management is a purposeful activity with various goals to maintain and improve upon the state of water resources (Pahl-Wostl, 2007). Water is a renewable but finite natural resource that is needed by humans for their survival (Postel, 2000). All over the world, fresh water bodies serve several benefits including; serving as spiritual symbols, play very important roles in global water recycling between the sea, air and land, they also serve as a principle source of water for domestic uses, especially in rural areas (Postel & Richter, 2003; Postel, 2000). Water development and management is therefore very important to keep the resource available for continuous availability. The resources is a fundamental necessity for human life and also seen as a pre-requisite for economic development as it is also seen as a very important commodity (Postel, 2000; Grigg, 2005). Water resources management involves the control of water systems; this may include the land and water resources to meet the demands of society (Ritcher *et al.*, 2003. This may include a combination of constructed water control facilities and

environmental elements that work together to achieve the broader aim of water availability for end users (Pahl-Wostl, 2007). Management of water resources to meet demands may also include; control of water flow and water quality, construction of facilities for water supply, wastewater management, control of drainage systems, control of floods and manipulations of rivers, reservoirs, and aquifers (Ritcher *et al.*, 2003).

### **2.2.1 Water Resource Management Approaches**

The demand for water for various uses has increased over the years (Postel, 2000). Satisfying this increasing demand of water is evident in many ways due to expanding forces (from population) urbanization, economic growth, climate change and climate variability (Postel & Richter, 2003). Finding ways to meet this demand while at the same time protect the resources base of fresh water systems has become one of the most challenges in the 21<sup>st</sup> century (Postel, 2000).

Originally, the management of fresh water resources was more of subsector management (Al Radif, 1999). It was mostly related to the supply of water to meet its demand by people and industries (Savenije & Van der Zaag, 2008). The demand of water for domestic and industrial uses was predicted by engineers and planners, and projections made to meet the demands by society. The trend over the past three centuries was therefore more on development of water resources to meet growing populations. This trend of approaches to water resources management can be divided into various stages (Savenije & Van der Zaag, 2008; Jonch-Clasen & Fugl, 2001). These are;

- i. During the 1960s – 1970s: Water resources development was driven by demand and supply for the direct uses. Technical experts developed ways of making the

resource available to meet its demand. It was mainly characterized by maximizing the quantity of water for direct uses (Savenije & Van der Zaag, 2008).

- ii. During the 1980s – 1990s: Water resources management was the practice to help meet population demands. Here management was by policy makers and water resources managers, including water engineers (Jonch-Clasen & Fugl, 2001). The direct and indirect uses of water at the domestic and industrial levels were the driving force for the management approach. A solution was needed for the fast rising demand for water leading to crises in the water supply chain (Jonch-Clasen & Fugl, 2001). A more integrated approach to fresh water management was therefore called for to meet the demands for the continuously increasing population and uses of fresh water.
- iii. During the 1990s until date: Integrated water resource management: This was a transition of water resources management (Al Radif, 1999). Economic development and population growth increased the demands for water (Postel, 2000). Water allocation, management of the resources base, improved benefits and involvement of many other people in decision making was needed to meet the continuously increasing demand (Al Radif, 1999) of the resource, while its availability remained constant, if not reduced due to climate change and human pressures. There was the need for new approaches to using and managing fresh water resources to satisfy the demand (Jonch-Clasen & Fugl, 2001).

### **2.3 Integrated Water Resources Management (IWRM)**

Global water demands has been observed to have tripled in the past decades (Al Radif, 1999) – making this demand lead to engineered structures to help keep and maintain the needed quantity and quality of the resource for both domestic and industrial uses (Postel, 2000; Jonch-Clasen & Fugl, 2001). Global efforts are encouraged towards ensuring that fresh water ecosystems keep the quantity, quality and timing of flows needed to enable them perform their functions (Al Radif, 1999). Efforts are made towards doubling water productivity –that is to get twice as much satisfaction and service from a particular unit of water extracted – from rivers and streams (Postel, 2000). If this among other efforts are not considered and worked for, the health of fresh water systems will deteriorate and fail to provide the expected goods and services for its different users (Al Radif, 1999), especially basic human needs for food and safe water for livelihoods (Yang *et al.*, 2003).

Meeting the demands of the 21<sup>st</sup> century will demand new ways of thinking in approaches to water use and water management (Postel, 2000). It will require the increasing need to involve more and different professions as well as different stakeholders. This will include knowledge from science, technology, policy and politics to give some form of new partnerships and collaborations in water resource management, cutting across disciplinary boundaries (Postel, 2000). This new approach will enable the resource to satisfy human demands while simultaneously protecting the ecological support functions of fresh water systems.

The most called for approach globally, is the Integrated Water Resources Management approach to fresh water resources management (Postel, 2000; Jonch-Clasen & Fugl, 2001; Savenije & Van der Zaag, 2008). It is defined as a sustainable approach to water

resource management that recognizes the multidimensional characteristics of managing fresh water systems – time scale, spatial scale, multi disciplines and multi stakeholder – and the need to relate and address these characteristics/dimensions holistically to meet sustainable solutions to water resources management (Jean-Sebastian & Durban, 2003: pp 24). This approach to water resource management ensures sustainability and takes into account, both development and management of water resources to meet societal needs (Postel, 2000).

It takes into consideration, the true complex nature of water resources – land and water; surface water and ground water; blue water and green water – at different scales and time along with uncertainties (climate change), the interest of water users, and the different sectors into complex measures or steps needed in water resource management (Pahl-Wostl, 2007). It moves from a more technical management of water to an integrating of the human dimension (Pahl-Wostl *et al.*, 2007) in water resources management. It also incorporates a more adaptive and flexible operational processes in water management to meet fast changing and growing social and economic demands (Pahl-Wostl *et al.*, 2007).

### **2.3.1 Principles of Integrated Water Resources Management (IWRM)**

The principles of the IWRM approach to water resources management is also known as the “Dublin Principles” (Rahaman & Varis, 2005). These principles were presented at the International Conference on Water and the Environment (ICWE), held in Dublin, Ireland in 1992. The principles are;

- i. Principle 1: Fresh water is a finite resource which is vulnerable. It is very essential to the sustenance of life, development and environment (Savenije & Van der Zaag, 2008).
- ii. Principle 2: The development and management of water resources should be done in a participatory approach, bringing all users and stakeholders into planning and decision making at all levels. At this point of the process, it is important to think of what combination and degree of coordination is needed to meet the goals of the management instrument (Savenije & Van der Zaag, 2008).
- iii. Principle 3: Gender is key to water management as women play a key role in the provision management of water (Savenije & Van der Zaag, 2008).
- iv. Principle 4: There is a high economic value placed on water by all users and therefore, the resources should be seen as an economic good as well as a social good. The resource is becoming scarce resulting in the rise of its value (Savenije & Van der Zaag, 2008).

The Dublin principles were recommended to guide water resources development and management efforts globally to help meet the demands of humans. The four Dublin principles have been incorporated into the Agenda 21 recommendations (Xie, 2006) from the United Nations (UN) Conference on Environment and Development (UNCED), and together they formed another set of principles (four) to guide water management to meet desirable and socio-economic development. Since then, the principles have strongly influenced the development of IWRM (Xie, 2006).

These principles advocates for the following: Principle 1 – IWRM should be Ecological. Here the attention is on the catchment area or river basin on which management plans are

being made (Xie, 2006). It recognizes the role ecology plays and calls for a holistic approach to IWRM, linking social and economic development with protection of natural systems; Principle 2– Institutional involvement. This advocates for a participatory approach to help raise awareness of water issues among decision makers and the general public (Xie, 2006). It emphasizes that decisions on water management should be taken at the lowest level (Xie, 2006), with central government retaining regulatory and support roles; Principle 3– Gender approach. This third approach to water management emphasizes the need for combined efforts between gender equity and sustainable water management. Women play key roles in water resource management; Principle 4 – Economic approach: Also known as the “instrument principle”, emphasizes on the need to have economic tools that would help to achieve efficient and equitable use of water resources at all levels for sustainability (Xie, 2006).

### **2.3.2 Dimensions of Integrated Water Resource Management**

The process of an integrated management to water resources has been seen to be complex (Savenije & Van der Zaag, 2008; Postel, 2000). Due to this complexity to the management of water resources, some perspectives to decision making have been suggested which when taken into account, will help in the process. These are termed as the dimensions of Integrated Water Resources Management (Jean-Sabastein & Durham, 2003; Savenije & Van der Zaag, 2008). They are;

- i. Equity: Water as a basic need to human survival needs to be protected and defended with public interest. Humans should be given access to it to help meet their livelihood needs (Savenije & Van der Zaag, 2008).

- ii. Efficiency: Water is an important commodity for development and should be seen as a scarce resource. It should therefore be used efficiently.
- iii. Ecological integrity: Water as a renewable but finite resource needs to replenish itself to meet the needs of development. To do this, it needs natural environment to have the capacity to regenerate itself (Savenije & Van der Zaag, 2008).

To help in the design of an IWRM plan, these dimensions when applied as tools supports the development and application of the approach at all levels. Integrated Water Resource Management is a broad approach which requires a multiple-sector and at multiple-level approach to water use, development and management (Savenije & Van der Zaag, 2008).

Seeking to adopt the Dublin Principles and put them into practice, IWRM emphasizes on some key concepts; these concepts are discussed below.

- i. Integration: Earlier before the introduction of IWRM, sub-sectoral planning and decision-making to water resources management was practiced. An integrated water resource management approach however, advocates for a holistic approach that emphasizes the combination of economic development, social welfare, and environmental protection and that integrates management of all horizontal sectors that use and affect water (Savenije & Van der Zaag, 2008). IWRM also integrates many disciplines including biology, ecology, economics and demography among other necessary disciplines. It draws expertise from all disciplines to help take the best of decisions, considering all water uses and users (Savenije & Van der Zaag, 2008).

- ii. Decentralization: This calls for managers to place some responsibility for water resource management at the lowest effective administrative level. Local level institutions are important and critical to achieving IWRM (Postel, 2000) and should form the foundation of catchment or basin wide attempts to water resource management. The appropriate level of decentralization depends on the nature of the specific water management problem in question; however, IWRM should seek to strike a balance between top-down and bottom-up management (Savenije & Van der Zaag, 2008).
- iii. Participation: Giving a chance to all the different users and user-groups of water as well as all affected populations, ensures that social welfare considerations are given proper attention in IWRM approaches (Savenije & Van der Zaag, 2008). An effective participation requires gender awareness and special efforts to allow women and other vulnerable groups to participate in decision for management.
- iv. Economic and Financial Sustainability: Water should be seen as a scarce natural resources and a very important commodity for economic development which must be given an economic value. This is because; there is increasing costs in water development, management and supply to meet demands. There is the need for widespread efficiencies in water service delivery in many parts of the world to meet this demand (Savenije & Van der Zaag, 2008).

To achieve any long-term economic sustainability in water resource management, water must be priced at its full cost, accounting for the cost of withdrawing and delivering the water, as well as the opportunity cost (Xie, 2006; Savenije & Van der Zaag, 2008).

## **2.4 Integrated Water Resource Management practice in Ghana**

Ghana is well endowed with water resources, distributed around the country. The main consumptive uses of fresh water in Ghana are water supply for domestic and industrial use (37%) and irrigation and livestock watering (48%) (Odame- Ababio, 2003). The Volta river basin system which constitutes about 70% of the nation's fresh water bodies consist of the Oti, Daka, Pru, Sene and Afram rivers as well as the white and black Volta rivers (Agyenim & Gupta, 2012; Odame- Ababio, 2003). Other fresh water bodies include Bia, Tano, Ankobra and Pra rivers.

Water management in Ghana has been by the Ministry of Water Resources and Works and Housing (MWRWH) as the parent ministry having the overall responsibility for the water development, management and supply (Odame- Ababio, 2003). The Water Resources Commission (WRC), which is the leading institution involved in water resources management in the country has been the institution involved in the management, use and protection of fresh water resources in the country (Odame- Ababio, 2003). Various related institutions; Hydrological Services Division, Environmental Protection Agency, Water Resources Research Institute among others have been set up since the post-colonial era to manage and develop fresh water resources in Ghana (Agyenim & Gupta, 2012; Odame-Ababio, 2003).

Integrated Water Resource Management in Ghana has been interpreted to mean managing surface and underground water with more attention given to the environment from a multidisciplinary and participatory perspective; by delegating power and competencies to the local people to plan and implement decisions; by focus management on hydrological boundaries; and by the integration of the different uses and users of water

and the sectors controlling the use (Agyenim & Gupta, 2012). Implementation is focused on aspects like public education (Agyenim & Gupta, 2012) by implementing a public awareness and education programme with different focus areas through developed public awareness and education programmes at the District levels, coordinated by the Water Resources Commission (WRC). This includes also the promotion and facilitation of water education in schools at the district levels (Agyenim & Gupta, 2012). Besides education, decentralization has also been given attention (Agyenim & Gupta, 2012) as the practice of IWRM has been staged at the basin level. The intention is to decentralize IWRM and develop a basin management plan for each of the five prioritized basins; Densu, White Volta, Ankobra, Tano and Pra – in Ghana. The implementation process is also collaborative as research institutions have been involved to conduct various researches for and on behalf of the WRC. These include research in identifying major trends in the socio-economic development in the various basins which is relevant for IWRM (Agyenim & Gupta, 2012).

There have also been reforms in water supply (Agyenim & Gupta, 2012), particularly in the rural areas which is aimed to increase water services to the rural population. These reforms included the formation of committees, boards, policies and legislative instruments to help in the management of fresh water at all levels (Agyenim & Gupta, 2012). Some of these policies to water resources management include; the Ghana Water and Sanitation Policy, National Water Policy and the most recent Riparian Buffer Zone Policy (Agyenim & Gupta, 2012).

### **2.4.1 Challenges of implementing IWRM in Ghana**

Integrated Water Resource Management is not an end product, but a means to an end in the management of water (Postel, 2000). It is a process that evolves and improves with time (Savenije & Van der Zaag, 2008) to meet the desired goals in water management. The implementation process of IWRM in Ghana is still evolving with all sectors and stakeholders getting involved (Agyenim & Gupta, 2012). In Ghana IWRM is based on the basin-scale approach with basin boards managing their respective basins whilst the WRC coordinates at the national level (Agyenim & Gupta, 2012; Odame-Ababio, 2003). However, there are some challenges in the implementation process and evolution of IWRM in Ghana, as seen in many developing countries (Agyenim & Gupta, 2012). These include;

- The complex nature of IWRM confuses the work of the WRC, as the only central national management body and makes them experiment and get involved in so many things at a time leading to loss of focus in some cases (Agyenim & Gupta, 2012).
- Also, there are operational inefficiencies in the implementation of IWRM due to conflicting issues such as norms in the country, for example, equity and the human right to water versus cost recovery; water as a social good and water as an economic good (Agyenim & Gupta, 2012).
- Another challenge in the implementation process of IWRM is due to conflicting water sector regulations and laws due to its multi-discipline nature for planning and implementation (Agyenim & Gupta, 2012).

- Financial constraints are another challenge to the implementation of IWRM in Ghana (Agyenim & Gupta, 2012). Budgetary allocations have hindered some processes in this approach to water management.

These are a few of the many challenges (Agyenim & Gupta, 2012) of implementing IWRM in Ghana and the trend is similar in other developing countries. Studies conducted on some successful implementation of IWRM, it was realised that none of the countries was set out to achieve an integrated approach to water management from the start; but rather, they set out to solve particular water-related problems in their setting to help achieve development goals. Most countries started by looking at water management holistically within larger physical and development paths specific to their contexts over time (Savenije & Van der Zaag, 2008).

## **2.5 Communities dependence on water resources**

Water is one of a number of vital natural resources that contributes to human development (Postel, 2000). It is a key driver of economic and social development while at the same time has a basic function in maintaining the integrity of the natural environment (Postel, 2000; Savenije & Van der Zaag, 2008). Stream, lakes and rivers have always been and still remain a central feature in the economic environment of rural people (Kangalawe & Liwenga, 2005). Human settlements have always been close to water resources, particularly because of the essential role water plays in human life.

The uses of water can be grouped into consumptive and productive uses (Postel, 2000). Productive uses are particularly related to industrial uses of water for production process, while consumptive uses largely refer to domestic uses. Domestic uses would include livelihoods that are directly linked to water resources (Kangalawe & Liwenga, 2005),

such as for drinking water, sanitation, hygiene, farming, navigation, industry and livestock care.

Fresh natural water resource systems comprise sets of environmental or hydrologic elements in nature that include the atmosphere, watersheds, stream channels, wetlands, floodplains, aquifers and groundwater systems, and lakes (Postel & Thompson, 2005).

People especially rural communities that live close to the water resource systems depend on them for their livelihoods (Kangalawe & Liwenga, 2005).

There are many users and many functions of fresh water (Savenije & Van der Zaag, 2008). Water users can be grouped into consumptive and non-consumptive (often in-stream) users. Consumptive users will include households at different levels for different activities (Postel, 2000). Consumptive uses include: domestic, industries, agriculture, fisheries, ecosystems, hydropower, navigation, recreation, among others.

### **2.5.1 Dependence on water resources for agricultural activities**

Globally, it is estimated that on the average, agriculture uses about 70% of the total water withdrawals from natural sources, making it by far the largest water user among all sectors (Yang *et al.*, 2003). This includes irrigation for crop production at periods when rainfall is insufficient. It is estimated that, irrigated agriculture alone accounts for two-thirds of all the water removed from rivers, lakes, and aquifers for human activities (Shiklomanov 1996 cited in Postel, 2000). Livestock rearing, especially in Africa and Asia are highly dependent on water from natural flows like rivers, lakes and streams. Some agricultural activities like inland fishing also takes place without necessarily withdrawing water for food and for incomes (Yang *et al.*, 2003). Wetlands and flood plains are seen as fertile grounds (Kangalawe & Liwenga, 2005) for the cultivation of

crops to help meet global food demand. Growing the food needed to feed the ever expanding population will then require more water for irrigation (Postel, 2000). Agriculture is therefore very dependent on fresh water, especially in Africa and Asia, to meet food demands and provide jobs for income (Yang *et al.*, 2003).

### **2.5.2 Dependence of communities on water resources for domestic uses**

People depend on fresh water sources such as streams, rivers, lakes, and wetlands for a variety of purposes (Sadoff & Grey, 2002) such as drinking, fishing, livestock watering and recreational purposes. Fresh water systems have always been and remain a central feature of the economic environment of many settlements, cities and states. Human settlement has almost always been close to water bodies, because of the essential role water plays in human life and economic endeavor (Sadoff & Grey, 2002).

Because of this dependence any environmental imbalance by mismanagement of water in development paths can have major social and economic impacts on people (Sadoff & Grey, 2002; Bebbington, 1999). The rural poor rely on river basin headwaters, lakes, ponds, streams as sources of water for their livelihoods. About 1.1 billion people worldwide lack access to improved drinking water supplies and use unsafe surface and ground-water sources (Sobsey *et al.*, 2008; Scherr, 2000). In Africa, rural communities rely on fresh water systems for home use because they live close to natural water sources which are readily available to them for use. Also, due to the non-existence of improved and treated water in the rural areas in most instances (Dapaah-Siakwan & Gyau-Boakye, 2000; Gyau-Boakye, 2001; Matse *et al.*, 2013). In Ghana, rural communities have traditionally relied on surface and groundwater sources for their water supply needs (Gyau-Boakye, 2001). Besides the collection of rain, the non-existence of improved

water sources in some rural areas compels households to the use of water from surface sources including rivers and streams for all domestic uses. In rural settings where there exist drilled boreholes—as it is the most common improved water sources in rural areas – may have high or excessive iron concentrations, thus the refusal of households to use such sources (Gyau-Boakye, 2001). Surface water sources are therefore very important for livelihoods to rural households in Ghana (Gyau-Boakye, 2001).

## **2.6 Policy development and Implementation paradigms**

Policy is defined as a declaration that defines the intention of a community, organization or government goals and priorities (Graham *et al.* 2003). It can also refer to the plans, positions and guidelines that influence decision making by a government or organization. It outlines the roles, rules and procedures and creates frameworks within which an administration and/or staff can perform their assigned duties to achieve the objective of the policy (Dukeshire & Thurlow, 2002).

### **2.6.1 Importance of Policies**

Policies are developed and apply to many levels of society (Adam, 2006). They may range from formal documentation in the form of legislature to informal rules which may be formed and accepted by an organization to guide their purpose or objectives. Whichever the category or form, policies are formed for specific functions (Dukeshire & Thurlow, 2002). Some of these are;

- They reflect the ideas and values a particular organization or group holds;
- They may also be used to set rules and regulations that provide guidance for decision making for a group; and

- They may also help in evaluation processes, where they provide room for accountability for funding agencies and donors.

### **2.6.2 Policy Development Process**

Policies may come in different forms depending on the organization that formulates them and their expected functions (Adams, 2006; Lafferty & Hovden, 2003). In this regard policies may take three major forms; broad policies which are mostly governments' broad direction in developmental plans; specific policies which relate to a particular sector, department or agency for guidance in development paths; and operational policies which guide decisions on programs and projects that an organization intends to carry out (Rondinelli, 2013).

Government policies usually come in different forms and are mostly reflected in legislature, regulations and programs (Travis *et al.*, 2004). This is termed the policy instruments. Public policies, which are mostly created at different levels of government, are aimed at the whole population or may be targeted at a specific group within the larger group. The development process for policy generally involves research, data collection, analysis of findings, consultation leading to recommendations and plans (Fraser *et al.*, 2006; Rondinelli, 20013). The development of a public policy is a non-linear process which is mostly characterized by the following steps; issue identification, issue analysis, generating solutions consultation and monitoring of performance.

### **2.6.3 Policy Implementation Paradigms**

#### **2.6.3.1 Top-down approach to policy implementation (Matland, 1995)**

The theory sees the designers of policies as the central actors and their concentration as key actors is on how to manipulate factors at the central levels (O'Brien & Li, 1999). They adopt an authoritative approach to decision making, and consider themselves to be most relevant actors to achieving policy objective. The approach is seen as highly prescriptive with emphasis on identifying factors that can be manipulated at the central level (Matland, 1995). Policy goals are made clear and the affected are expected to obey. Additionally, implementation responsibility is placed on an agency or institution with authority to meet policy goals. This approach has attracted three criticisms (O'Brien & Li, 1999). These are;

- (i) The approach fails to consider the significance of some actors during the policy development. For instance, consultation of stakeholders at the lower levels is not given the necessary attention. It only appears as a formality during processing, but ignored during implementation.
- (ii) It has also been criticized as seeing the implementation process to be purely administrative and bureaucratic. The implementer states clearly the rules governing the policy (based on merit and technical criteria), also when and how they apply without political or public influences. The point here is that, politics or the public cannot be a separate entity from administration, (Matland, 1995), but the approach attempts to separate them. Monitoring is later done to evaluate success of policy (Lafferty & Hovden, 2003).

- (iii) The third criticism is the emphasis on exclusiveness placed on the statutory bodies as key actors. Also locals are seen as people whose behavior only needs to be controlled to meet policy goals or objectives (O'Brien & Li, 1999; Lafferty & Hovden, 2003). The concern is that, some locals may have expert knowledge on the subject matter and may be in a better position to propose solutions or options for implementation.

### **2.6.3.2 Bottom-up approach to policy implementation**

This approach argues that, a more realistic implementation can be done when the development and implementation processes look at things from the view of the target population (O'Toole, 2000). In other words, the processes consider the views, concerns and inputs of the local people in developing the policy and its implementation as well. This form of policy implementation can be done at two levels; macro implementation and micro implementation (Sabatier, 1986).

At the macro implementation level, a centrally located actor or government institution devises a program and implements it, with little or no control. With the micro level implementation, local organizations react to a macro level action and constitute their own plan accordingly and implement it. When this happens, a single national policy may be implemented differently according to local level actions. It is at the micro level that policy directly affects people it is targeted on (Lafferty & Hovden, 2003).

Bottom-up approach to policy implementation has been criticized by some in two ways;

- (i) The first concern is that, in a democratic setting, policy control should be by actors from the central level. These actors are usually those that have power,

bestowed upon them by authorities to whom they owe accountability. Decentralization when happening should be allowed but in a controlled and accepted context (Sabatier, 1986).

- (ii) Another concern is that, the approach over emphasizes local autonomy. When local authorities are given too much authority and freedom to decide implementation paths, policy goals may not be met. Some form of authority from the central actors should guide local planning for implementation (O'Brien & Li, 1999).

## **2.7 Sustainability**

The definition of sustainability varies depending on the sector and/or purpose. In ecology and related areas, sustainability refers to how biological systems remain diverse and productive. In social terms, it refers to the endurance of people in systems and processes for growth and development both in present and future generations (Magee *et al.* 2013). In more general terms however, sustainability applies to all sectors of human life and its interaction with systems around them. Harris (2000) defines sustainability as more than just limits on population or restraints in consumption. It is more of choices of goods, services and technology that people make depending on ecosystem integrity or ecosystem diversity. In other words, the choices made by people (growing populations) should be what species diversity and ecosystems can support and withstand; implying further that, biological and economic systems are interdependent (Edusah, 2011; Harris, 2000).

Sustainability is sometimes explained as something/anything that improves the quality of human life within the carrying capacity of supporting ecosystems (Kates *et al.*, 2005). A healthy and balanced society can be said to have achieved sustainability (Harris, 2000) if

the society is one that can endure shocks and disasters and also recover from them at the present time into the future. This endurance gives the society the ability to provide decent ways of life, through all necessary systems, for its people. This definition is further reinforced by Bromley (2008) who explains sustainability to be the specification of a set of actions to be taken by present generations that will not diminish the prospects of future generations to enjoy levels of consumptions, wealth, utility or welfare comparable to those enjoyed by the present generations.

On the term “sustainable development”, Stables (2013) argues that, the conceptualization and definition of sustainability is far less problematic compared to sustainable development. He explains that “sustainability” means lack of change while development means change in a state for the better. When these two separate contradicting words are put together, they form a relevant terminology in the concept of sustainability- “sustainable development”. Sustainable development is therefore explained as “the organizing principle” which puts the idea of sustainability into practical terms on all scales of development. It includes four connected domains that define the practicality of the sustainability principle or concept. These domains include ecology, economics, politics and culture (Magee *et al.*, 2013).

Sustainable development focuses on the needs of the present generation without compromising the ability of the future generation to meet their own goals (UN, 1987). This view of sustainability is sometimes interpreted as “sustained growth” or “successful development” (Robinson, 2004). Governments and Non-Governmental Organizations prefer to use the term sustainable development in place of sustainability in most instances. This as explained by Robinson (2004), is due to the tendency to perceive

development to be synonymous with sustainability, therefore the term sustainable development sounds appealing and suits a more “political” agenda than the use of the term “sustainability”.

### 2.7.1 The pillars and circles of Sustainability

In the year 2005 at the world summit on Social Development, some goals of Social development were identified and defined (Robert *et al.*, 2005). These Social development goals include; economic growth, human development and environmental protection representing three systems namely social, ecological and economic systems. These systems interact continuously to achieve societal development goals or objectives at all levels (Kates *et al.*, 2005). The three systems in the literature have been illustrated for simplification and ease of understanding using circles (Figure 2.1) and referred to as the three pillars of sustainability. The circles are not exclusive mutually, meaning one circle cannot function alone but with the interaction of the other circles to achieve development. (Bilbao- Ubillos, 2013).



**Figure 2.1: Interaction of the three sustainability systems illustrated with three overlapping circles (Source: Adams, 2006)**

The diagram illustrates how the economic and social systems are constrained by the environment system in development. The environment limits and shapes development choices in societies. The diagram (Figure 2.1) also indicates the relationship among the three strings and how decisions in development are dependent on the environmental system due to their influences on each other (Scott, 2009). The theory of sustainable development encourages the balancing of local, regional, national and international efforts to help meet basic needs of people without destruction of the natural environment (Dally, 1994; Lafferty & Hovden, 2003; Kotler, 2011).

The sustainable development concept advocates for policies or initiatives that fully consider all the three components of sustainability to ensure that no one systems is affected adversely by the other in any given development process. The idea is to ensure the inseparable link between people, the natural environment and wealth creation. This idea is mostly diagrammatically represented by three circles overlapping (Figure 2.1) (Adam, 2006; Krueger *et. al*, 2011).

### **2.7.2 Principles of sustainability**

The broad objective that the sustainability concept tries to achieve is development without environmental degradation (Dally, 1994). The concept of sustainability in a way reveals the main challenge of humanity and has become a global issue extending into relation of human activities to nature in development paths (Christen & Schmidt, 2012). The sustainability theory guides and defines the sustainability principles. The theory concerns the use of resources and how economies can grow without incurring corresponding increases in environmental pressures.

The sustainability concept includes the idea that every community is made up of systems that interact constantly and need to be harmonized for proper and continuous functioning for the community's inhabitants both in current times and in the future (Berkes, 2004). To be able to achieve this, some guiding principles have been suggested through sustainability studies and/or sustainability science to help communities achieve the sustainable development goals (Mebratu, 1998). Generally, the theory seeks to adopt broader perspectives and practices at all levels of development in societies (Robinson, 2004; Mebratu 1998).

The principles of sustainability have been organized into six broad areas (Roseland, 2000). These are;

- (i) The principle to maintain and if possible enhance the quality of life of residents.

There are components that make up a community; income sources, healthcare, housing, educational system, employment, legal system and others (Richard & Hall, 2009). These systems are all vulnerable to external exposures such as crime, pollution, disasters and other risks. Every community therefore defines the life it seeks to achieve for its people by the manipulation of these components and their corresponding risks for its own benefit. The quality of life a community lives depends on the choices made from these interacting components that build the community (Khanna, 2011).

- (ii) The principle to enhance local economic vitality

The economic system of a community includes job opportunities, sufficient tax base and revenue support with little or no support from central governments to achieve infrastructural and service development (Rondinelli *et al.*, 1989). A

sustainable economy does not rely on population shifts and non-renewable sources of resources for development. It is rather diversified and not easily disrupted by external factors such as disasters and shocks (Harris, 2000).

(iii) The principle to promote social integration and social equity

Resources for development are made available to everyone on equal terms in communities that strive to achieve sustainability (Richard & Hall, 2009). Opportunities are equal irrespective of gender, age, and ethnicity, cultural and religious backgrounds. A good social relationship among community inhabitants is encouraged and common resources are not easily depleted but rather collectively managed for a common goal (Berkes *et al.*, 2000).

(iv) The principle to maintain and if possible enhance the quality of the environment

Every society depends largely on the physical and natural systems surrounding it for its development (Magee *et al.*, 2013). The natural systems largely involve ecosystems which need to be enhanced to enable good support and provision of services. A sustainable society tries to seek ways to co-exist with these natural systems. To do this, inhabitants try to use resources wisely and not degrade them (Valazquez & Stringer, 2011). These natural systems include oceans, fresh water systems, soils, vegetation and also the air we breathe. Through actions and inactions, the people of the society attempt to reclaim, restore or rehabilitate the parts of the natural systems that have been damaged through development activities (Magee *et al.* 2013: Stables, 2013). Examples of such include forest reclamation, watershed protection and wetland rehabilitation.

- (v) The principle of incorporating disaster resilience and mitigation into decisions and actions

A society that wants to achieve sustainable development tries to build resilience in relation to disasters that are inevitable. Measures are put in place to minimize the negative effects that may come with such disasters and hamper or disrupt productivity or development activities (Vlek & Steg, 2007). Also, the society may even strive to prevent such occurrences from happening if they can. Sustainability scientists say that, a resilient society is a sustainable society (Holling *et al.* 1998). It is one that can take responsibility for all the risks and disasters it faces and does not rely on outside interventions to recover from shocks. It attempts to mitigate or prevent hazards that it is exposed to. This is possible through the setup of institutions and the appropriate policies and personnel with technical know-how for effective governance.

- (vi) The Principle of using consensus-building, participatory process in decision making

In community development or societal development, participatory processes in taking decisions are encouraged. It involves the engagement of stakeholders to decide on the outcomes of planned projects or development activities. This process encourages a sense of ownership for community members and therefore promotes sustainability (Magee *et al.* 2013).

### **2.7.3 Dimensions of sustainability**

Sustainable development represents a balance of efforts from all levels: local, national regional and global to meet basic human needs and growth without degrading the environment (Kates *et al.*, 2005).

#### **2.7.3.1 Environmental Dimension of sustainability**

From a human viewpoint, what matters about the environment is not particularly its importance in achieving development goals, but its continuous availability for development and growth (Christen & Schmidh, 2012). Indeed, for a resource to remain available depends on how the resource is being managed by its current users. A healthy ecosystem is important in the continuous production of goods and services for growth and development (Valazquez & Stringer, 2011). For ecosystems to be healthy, the negative impacts from humans must be reduced (Ekins *et al.* 2003; Colby, 1991). This can be done in two (2) ways; Environmental management and Human Consumption Management.

##### **2.7.3.1.1 Environmental Management**

In relation to sustainability, environmental management can be defined as an approach that involves planning; design, coordination and control of activities in relation to a natural resource to achieve desired outcomes of environmental quality (Born & Sonzogni, 1995). This is basically a direct approach to resources management because processes are focused on natural resource allocation. Environmental management (as a direct approach) relies on information from earth science, environmental science, conservation biology and other related subject areas for planning and design of management schemes (Carpenter *et al.* 2009). It involves management of resources such as water, land use,

food, energy, material, toxic substances and waste in a comprehensive, planned and systematic and documented manner.

#### **2.7.3.1.2 Management of Human Consumption**

This is an indirect approach to environmental sustainability. It refers to the ability to manage human activities in relation to consumption for sustainability (Moran *et. al*, 2008). The ability to manage human consumption depends largely on economics that is on the demand of resources for development. It is more of balancing the social and environmental systems through responsible behavior (Born & Sonzogni, 1995).

#### **2.7.4 Social Dimensions of sustainability**

Social sustainability can be defined as “a life-enhancing condition within communities and a process within communities that can achieve that condition” (McKenzie, 2004). It includes equity of access to resources and services. In implementing change to achieve economic and environmental sustainability, interferences in social setting happen, leading to social change. Some of these changes may include challenges that entail internal systems and planning, local individual or household lifestyles, and ethical beliefs and rights (Ashley & Hussein, 2000). To achieve sustainability in the social dimension, some strategies may include improved education, poverty alleviation, a high regard for social justice for natural equity and people empowerment (DFID, 2000; Okunola & Ikuomola 2010).

##### **2.7.4.1 Poverty and sustainability**

Poverty is a major problem in trying to achieve sustainability (Carr & Mc Cusker, 2009; Assan and Kumar, 2009). As the rural poor over harness resources for their livelihoods,

they may degrade the environment. The rates of resources exploitation may exceed the rate the resource replenishes itself (Carr & Mc Cusker, 2009). It is in this regard that Environmental degradation is widely acknowledged to correlate with poverty (Benayas *etal.*, 2009; Wunder, 2001). Therefore, in dealing with environmental problems, the approach must be broadened to encompass factors underlying poverty. To reduce environmental degradation, poverty alleviation is necessary.

#### **2.7.4.2 Human Relationship with Nature**

As human population continues to expand, natural resource consumption intensifies for production to meet the population demand (Wunder, 2001). Also, production and technology expand to meet human needs. The consequences are reduction in environmental quality and resource quantity (Vleck & Steg, 2007). In less industrialized places on the globe, this situation is worse as many communities, like Sub-Saharan Africa, Southern Asia and Southern America strongly depend on natural ecosystems for their daily survival (Hanmer *et al.*, 1999; Vlek & Steg, 2007). The survival needs of the people make it difficult to have long term vision towards environmental protection (Kellert *et al.* 2000). They may choose survival/livelihood over environmental protection.

#### **2.8 Sustainable Livelihood Framework (DFID, 1999)**

The concept of Sustainable Livelihoods (SL) was first introduced by an advisory committee of the World Commission on the Environment and Development (WCED) in 1987. As a framework, it serves as a tool to understanding livelihoods especially that of the poor. Since its introduction, several institutions and departments have formalized and come up with theories to explain relationships among factors that affect sustainability and

livelihoods. One of them is the United Kingdom's Department for International Development (DFID) sustainable livelihood framework.

The Sustainable Livelihood Framework (SLF) (Figure 2.3) presents the major factors affecting people's livelihoods, and how these factors interact to determine people's livelihoods. As a tool, it is adopted for purposes such as development planning, poverty alleviation, evaluation of projects and assessment of livelihoods under sustainable development approaches (Nicol, 2000). It also describes the many interactions between the various factors that determine people's livelihood options and therefore how they achieve their livelihood goals. The SLF is people-centered and therefore concentrates on the interest of people in its approaches at all development levels (Ashley & Carney, 1999). It also takes into consideration, the effects of development decisions by organizations/ institutions on distinct groups of people, focusing on the linkages that exist between policy decisions and activities of households in terms of livelihoods. The approach can also be effective in helping the poor improve their opportunities to achieving livelihood objectives (Krantz, 2001).

The framework as an assessment approach summarizes the main components, which are shaped by different dynamic forces to influence livelihoods. This therefore gives the chance for an analysis of development projects which investigate people's assets, options and objectives in totality at a given time. The framework offers a way of simplifying the complexities that make up, and affect the factors influencing livelihoods of people, especially the poor (Krantz, 2001; DFID, 1999).

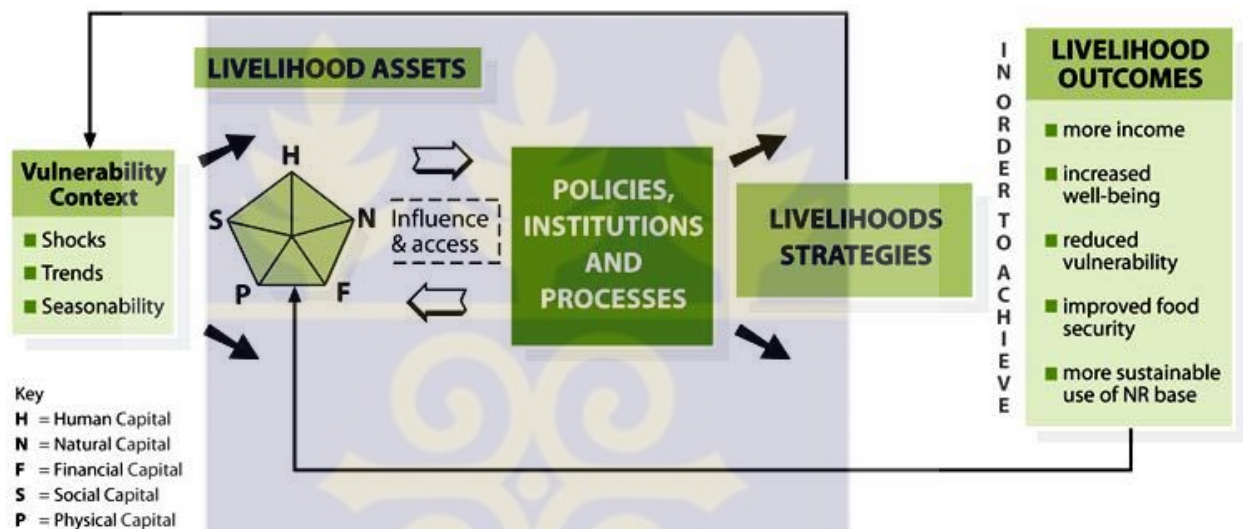
The DFID believes the approach is the most appropriate way of thinking about people's livelihoods and an effective tool in understanding and managing the poor to improve their opportunities and escape from poverty. The framework in itself does not measure impacts on livelihood and therefore needs a combination of methods to achieve impact evaluation (Ashley & Carney, 1999). Its common use in studies however, is as a point of departure and a guidance tool. The framework is used by others to help organize the main work and research questions. It helps broaden the understanding of poverty and draws together the various economic and social perspectives that influence and determine people's livelihood choices, and therefore livelihood outcomes (Ashley & Hussein, 2000; Krantz, 2001; Van der Berg & Jiggins, 2007). It also helps to decide on what factors to use as variables for livelihood research. Some particular components within the framework may also be chosen to narrow the objectives of a researcher (De Haan & Zoomers, 2005).

The Sustainable Livelihood Framework (SLF) has five (5) core components that relate to each other to determine the livelihood objectives of people (DFID, 1999). The relationships among these components (Figure 2.2) help to understand livelihoods in terms of their construction and how they may change with time. These components as indicated in Figure 2.2 below are; Vulnerability context, Livelihood assets, Policies-institutions-processes, Livelihood strategies, and Livelihood outcomes. In the next sections, the various components are explained as single factors and their relationship with other components (factors).

### **2.8.1 Vulnerability Context**

This component of the framework represents the external environment or factors that influence people's livelihoods. It also includes the factors of vulnerability people are

exposed to. These affect the wider availability of resources of which they have little or no control over. This component is very important because it determines how much access people may have to resources/assets that may be beneficial to their livelihood outcomes/objectives. The component has three (3) factors that define it; Trends, Shocks and Seasonality (DFID, 1999; Krantz, 2001).



**Figure 2.2: Sustainable Livelihood Framework** (Source: Department for International Development, 1999)

Trends in this context simply refer to population dynamics, resources and economic changes that may exist and influence livelihoods of people. Trends may or may not be life threatening. They are sometimes predictable and have the ability to influence the availability of a resource at a time. Shocks here represent human health, natural and economic shocks (Ashley & Hussein, 2000; DFID, 1999). They can destroy assets or resources and therefore influence the overall livelihood outcomes of people. Seasonality here refers to the shifts in employment opportunities, food availability and resources availability (DFID, 1999).

The different components that make up the vulnerability context affect people differently depending on the availability of other factors. This part of the framework lies beyond the control of people and very little direct alterations to it are possible (DFID, 1999).

### **2.8.2 Livelihood Assets**

Like the vulnerability context, various factors make up the assets component of the SLF. This component is sometimes referred to as the strengths of people that enable achievement of livelihood goals (Mahalaya, 2010; DFID, 1999). This is because people seek to achieve their livelihood goals by accessing a range of assets that may be available to them. Assets can be created and destroyed by the vulnerability context component of the framework. If a household or community has more assets, it means they have a larger range of options and can easily switch or combine them to secure their livelihoods. Different assets are required to achieve different outcomes (DFID, 1999). The different factors that form the assets component of the SLF are; human, physical, social, natural and financial. All five (5) forms of assets may be required at different amounts/levels at a particular time, depending on the strategies of the individual, household or community.

### **2.8.4 Transforming structures and processes**

This component represents the institutions, organizations, policies and legislation that influence and shape livelihoods. Organizations, institutions and policies and legislation can be formed and operated at all levels: ranging from household levels to national and international levels. Transforming structures and processes component determines access to the various assets discussed above, and in turn influences the strategies people may use to meet their livelihood needs (DFID, 1999; Ashley & Carney, 1999).

**Structures:** These refer to the organizations that exist and influence the livelihood activities of a people. They include public sector organizations, private sector organizations and the civil society groups (DFID, 1999).

**Processes:** These refer to the various ways or forms in which these established organizations work to influence livelihoods. This can be through legislature/law or through policies. These policies or laws may be in existence to regulate the use of resources for sustainability. This in turn influences how much access people may have to resources or to assets (Mahalaya, 2010; DFID, 2000).

### **2.8.5 Livelihood Strategies**

This component of the framework describes the choices, opportunities, activities and diverse plans people combine in order to achieve their livelihood goals (DFID, 1999). It is a dynamic process and is the part of the framework that can easily be influenced to help the poor achieve their livelihood goals. Development efforts are sometimes targeted at this component of the SLF to improve the services and opportunities available to such groups of people. It is said that, people's access to a particular group of assets influences their choice and for that matter, strategies (DFID, 2000; Rakodi, 2000; Ashley & Carney, 1999).

### **2.8.6 Livelihood Outcomes**

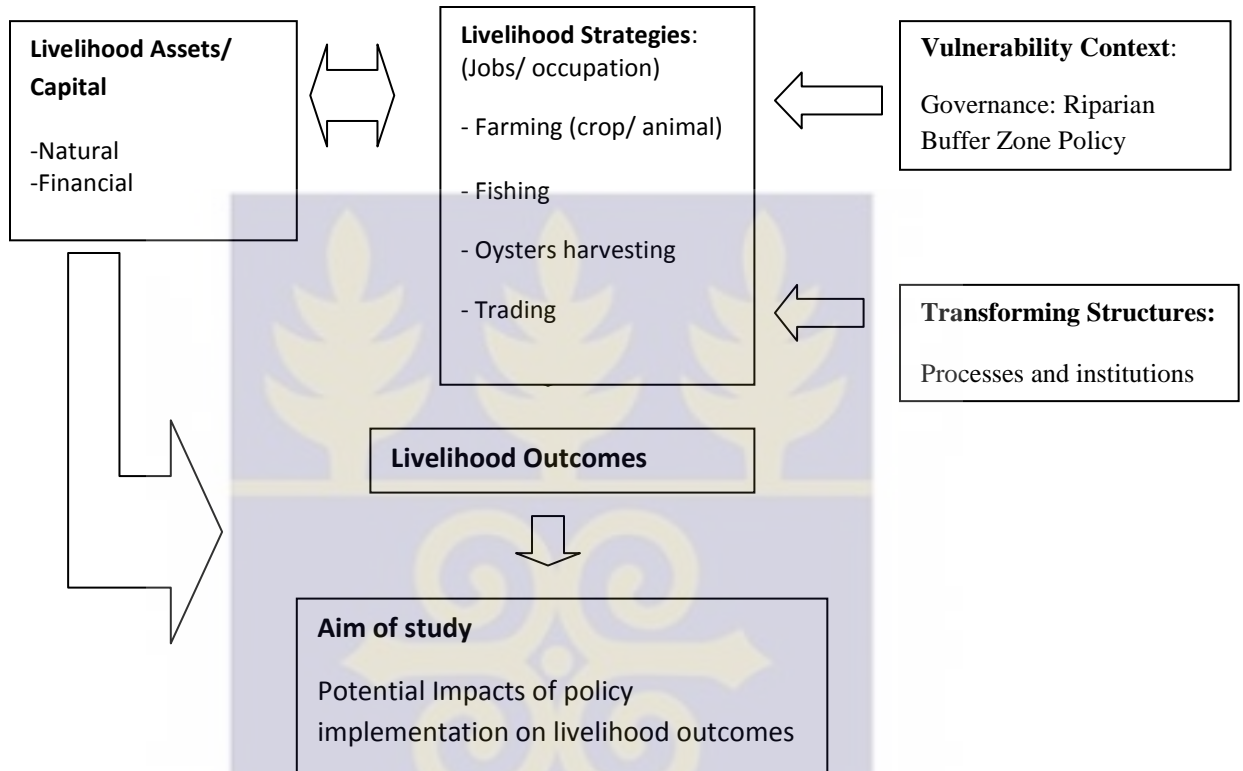
This is the fifth component and final result of all the other components put together (DFID, 1999). It is the product of the combination of the other four components in the process of livelihood determination. It is the outcome of the livelihood strategies that are chosen and carried out by the individual, household or community to meet their

livelihood needs. Livelihood outcomes do not necessarily depend on the livelihood objective/goal of an individual; rather, the outcomes depend on the strategies chosen and the assets combined by an individual, household or community at large (Ashley & Carney, 1999). The SLF gives a clear picture of understanding livelihoods. Institutions can restrict the choices of people in choosing assets to meet their livelihood goals. The SLF with all its five (5) core livelihood components provide a model for the understanding of the many related factors that influence livelihoods.

However, for the purposes of this study, some components of the SLF were selected. The components; are the livelihood assets, livelihood strategies, changes in vulnerability context (governance) and transforming structures. Below (Figure 2.3) is a diagrammatic representation of the selected components. The study focuses on the livelihood assets related to the water resources which help communities meet their livelihood goals/needs. The impacts of the Riparian Buffer Zone Policy (RBZP) implementation would be assessed in terms of the potential changes in the assets that people rely on for their livelihoods in the selected communities. And also, what is likely to change by assessing their activities before the implementation and after policy implementation. Having been guided by a review of the DFID's Sustainable Livelihood framework, the conceptual framework was developed. The conceptual framework, Figure 2.3, explains the relationship between the assets and strategies people use, as well as the vulnerability context of communities along the river in relation to the policy implementation.

An appropriate research methodology has been developed to help collect data on the likely impacts of the Riparian Buffer Zone Policy on people's livelihoods. While policies

are in place, it is important to understand what effects they may have on livelihoods, especially on the poor (Andam, 2008).



**Figure 2.3: Conceptual Framework** (Source: author, 2015)



## CHAPTER THREE

### 3.0 Study Area and Methodology

#### 3.1 Introduction

The chapter presents the characteristics of the study area. It also explains the research design, data sources and types, sampling design used and processes used in data analysis

#### 3.2 Study area

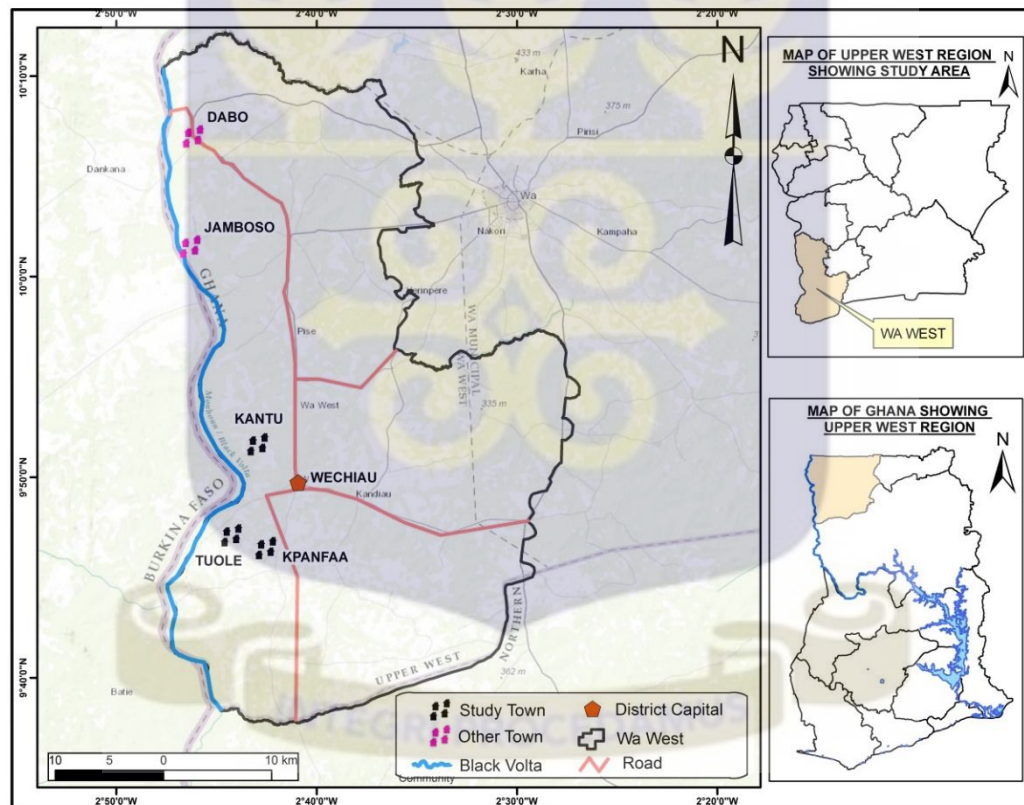
##### 3.2.1 District Location and Size

The study was conducted in communities along the bank of the Black Volta in the Wa West District in the Upper West Region of Ghana. Three communities, Kantu, Kpanfaa and Toulle, were selected for the purpose of this study, Figure 3.1 below. The communities are close to the River bank and were selected because their location made them relevant for the study objectives.

The Wa West District is one of the nine districts that make up the Upper West Region. It was part of the Wa District until 2004 when it was separated and became a district on its own, see Figure 3.1 below. The district is located in the South-western part of the Upper West Region, approximately between longitudes 9°40'N and 10°10'N and latitudes 2°20'W and 2°50'W. It shares common boundaries with Nadowli district to the North-West, Wa Municipal to the East, Northern region to the South and Burkina Faso to the West. The total land area of the district is approximately 1,856 km<sup>2</sup>, which is about 10 % of the total land area of the Region (WWDA, 2010).

### 3.2.2 Demographic Characteristics

According to the 2010 population and housing census (GSS, 2013), the district had a total population of 81, 348. This figure represents 11.6% of the total population of the Upper West Region. The population comprises 40, 227 males (49.4%) and 41, 121 (50.6%) females. The district recorded a dependency ratio of 105.6. This is higher than the regional dependency ratio of 91.0 which is also much higher than the national dependency ratio of 44.3 (GSS, 2013).



**Figure 3.1** Location of Wa West District and the study sites (*Source: Geographic Information System laboratory, University Of Ghana*)

The 2010 Population and Housing Census (PHC) also categorised the district to be 100% rural. It has an illiteracy rate of 70.6% which is higher than the regional illiteracy rate of 59.5% of people 15 years and above.

### **3.2.3 Climate and Vegetation**

The Wa West District lies in the Guinea Savannah Zone which is characterized mainly by short grasses and only few woody shrubs and trees. Trees found in the district are drought and fire resistant trees such as Baobab, Dawadawa, and Shea trees (Abdul- Korah, 2006). Lying within this zone, it has one of the most degraded environments characterized by poor soils (Konadu- Agyeman, 2000; Abdul- Korah, 2006). The district experiences a long dry season which extends from October to March each year. During this long dry season, temperatures are relatively low at night, ranging from 15°C to 22°C and higher during the day ranging from 38°C to as high as 45°C (Abdul-Korah, 2006; Aduah & Aabeyir, 2012; WWDA, 2010). Also during this dry period of the year, grasses become dry and lead to bush burning which leaves the ground bare and creates room for erosion. Rainfall in the UWR, and the District, varies between 950mm – 1050mm per year, occurring between May to December (Abdul-Korah, 2006).

## **3.3 The Institutional Environment of the District**

### **3.3.1 Local Governance**

The Wa West District Assembly constitutes the highest political authority in the district. It directs and co-ordinates all administrative proceedings in the district. The district has five area councils and a number of unit committees that make up the administrative body. The Assembly is made up of 28 members with 19 of them elected and nine appointed by the state. Table 3.1, provides the departments within the District administrating structure and their status in the district as at the time the research was being conducted.

### 3.3.2 Traditional Governance

Besides the decentralized governance system is a traditional governance system. The district has two paramount skins: Wechiau and Dorimon headed by Wechiau Naa and Dorimon Naa respectively. Beyond these, there are divisional and sub-divisional chiefs under the authority of the two paramount seats (WWDA, 2010).

**Table3.1 Departments functioning within the Wa West District administrating structure**

Department/ Agency	Division	Presence in District
Central Administration	General Administration	Present
	District Planning Co-ordinating Unit	Present
	Information Service Dept.	Present
Natural resource management and conservation	Forestry Services Division	Not present
	Wildlife Division	Not present
MOFA	Department of Animal Health & Production	Present
	Department of Fisheries	Present
	Department of Agricultural Extension Services	Present
	Department of Crop services	Present
Disaster Prevention	Fire Service Department	Not present
	National Disaster Management Organization	Present
Water, Works and Housing	Water sector Agencies	Not Present
	Works sector Agencies	Present

(Source: Wa West District Assembly, 2010)

### **3.4 Methods**

#### **3.4.1 Research Design**

A combination of qualitative and quantitative processes was employed in the data collection. A questionnaire was designed to capture quantitative data that relates to research objectives. Focus groups discussions and key informant interviews were held to capture the qualitative data needed to meet the objectives of the study.

#### **3.4.2 Primary Data**

The primary data collected were both qualitative and quantitative from various sources. The quantitative data were obtained through the design and administration of structured and semi structured questionnaire to households in the study communities and through interviews with key informants. Questionnaire was designed to extract data that were needed to achieve the objectives of the study. Stakeholder agencies/departments and institutions that relate to the implementation of the Riparian Buffer Zone Policy and would be collaborating in the process were also included in primary data collection. The questionnaire was first tested on a pilot basis in all three communities. Following the pilot study, modifications were done to ensure that the questionnaire elicited the responses relevant to the research objectives.

Livelihood impacts measurement can be characterized by measuring the changes that occur in the assets (capital) that people use to support their livelihood (Campo, 2011). For the purposes of this study, livelihood assets of the people in relation to the Black Volta are assessed and the changes that are likely to come with the policy implementation.

### **3.4.2.1 Indicators for questionnaire design to measure impacts**

With reference to the Sustainable Livelihood Framework (Figure 2.2), indicators for impact evaluation included natural, financial, physical, human and social capital/ assets available to the people. The theory (SLF) was seen to be the most appropriate for this research because other theories for impact evaluation, such as matching methods, randomized evaluation methods, double- difference method, distributional methods among others, are based on actual results or end results of policies or programs (Garbarino & Holland, 2009; White, 2006). They therefore do not qualify for forecasting as this study seeks to do. For this study, the focus was on the natural and financial capital/ assets components of the framework that are likely to change due to the policy implementation. Also, livelihood activities that relate to the river were assessed. This is due to the assumption that, the policy is likely to affect these two types of assets/capital the most. Also, they are seen as assets that mostly define the options for livelihood activities for rural people (Sunderlin *et al.* 2005).

### **3.4.3 Sampling Design**

The section of the population targeted for the survey was any person fifteen years and older in a household. Households were selected through a systematic process following the method used by Amoah and Wiafe (2012) in their livelihoods impact evaluation in the Kakum National Park (see page 48). Focus group discussions were organized and held in all three communities. Groups for discussions comprised male, female and mixed sexes. Participants had to satisfy the age limit of 15 years and older to take part in discussions. Groups formed for the discussion had members in the range 4 – 7.

### 3.4.3 Sample size

The sample size was determined mathematically using the population sample (15 years and above) and percentage error. The population size of 44,301 was used to calculate the sample size for the study (GSS, 2013). Below is the procedure that was used for sample size calculation adopted from similar work done by Puopiel (2010).

**Formula;**

$$n = \frac{N}{1 + N (\alpha)^2} \text{-----(1)}$$

where **n** is sample size

**N** is district population, 15+years

**α** is the margin of error

Here, **N= 44,301**     **α=** of 0.05 with confidence level of 95%. When these figures are substituted into the equation,

$$n = 44,301 / 1 + 44,301(0.05)^2, \quad \mathbf{n= 396.43}$$

The sample size from the calculation was 396; this was adjusted to 200 for the purpose of the study. This is because the stipulated time for the completion of the study was considered and a sample size of 200 would help to complete the research on time. The sample size of 200 was divided among the communities for the questionnaire survey. Thus, for the questionnaires distribution, the households were divided as follows: Tuolle 70, Kpanfaa 65 and Kantu 65.

### 3.4.4 Sampling Technique

A systematic process was used to select respondents (Amoah & Wiafe, 2012) for household questionnaire administration. This involved a step by step process as described below;

- a. Identify all houses in the community
- b. List and number all household heads in the community (serial numbering)
- c. Calculate a skip interval for respondent selection of households

Calculation of skip interval was based on the formula;

**Formula;**

$$I = \frac{S}{R} \text{-----(2)}$$

Where S = Total number of household heads in community

R= Required number of households to be selected in community

I= Skip interval

The various calculations for each community are summarized in the Table 3.1 below.

**Table 3.1 Calculation of skip interval for household selection in the study communities**

Community	Total Number of Household Heads used	Respondents Required	Interval calculation
Kantu	58	65	Not applicable
Kpanfaa	82	65	82/65=1.2, therefore 1
Toulle	91	70	91/70=1.3, therefore 1

*(Source: author, 2015)*

Intervals for all communities from the calculation were 1.2 and 1.3 for Kpanfaa and Tuolle respectively. The total number of household heads for Kantu community (58) was

less than number of respondents required (65), and the formula could not apply. All houses in Kantu therefore were sampled for household survey. Sampling in Kpanfaa and Tuolle was done by approximating the sampling interval to 2. The first household was selected by adding the interval, “2” to a randomly selected number from the list of household heads. Subsequent households were then selected by adding the interval to the last serial number (name) used. After a household head name was picked, respondents were chosen randomly from that household and questionnaire administered.

#### **3.4.5 Qualitative Data Sources**

Qualitative primary data were obtained through Focused groups discussions and interviews with some key informants, including the district agriculture extension officer, Assembly man for the communities, National Disaster Management Organization (NADMO) Officer for the district, the Wechioa Hippopotamus Sanctuary Manager and the human resource/information Officer at the district Assembly.

#### **3.4.6 Total Sample size for the study**

In total, 246 people participated by producing data for the research. One hundred and ninety-three (193) respondents belonging to 145 households participated in the survey. Specifically, 58, 65 and 70 respondents were interviewed from the communities Kantu, Kpanfaa and Tuolle respectively. Forty eight (48) people participated in the focus groups discussions (9 groups) and five (5) key informants were also interviewed (see Appendix D).

In each household, not more than four (4) respondents were interviewed. Out of the four respondents, one (1) was selected to give information on the household demography depending on his or her age and knowledge of the household.

### **3.5 Secondary Data**

Secondary data for the study were obtained from published works such as articles from journals, books, government policy documents, and other international agencies' documents. Internet sources were also used to obtain some of the secondary data. Data were also obtained from the Wa West District Medium Term Plan (DMTP), population data were also obtained from the Ghana Statistical Service (GSS, 2013). The Ghana Living Standard Survey report (GSS, 2014) was also used for some insights on what indicators or determinants to use in the measure of socio-economic status. These were factored into the questionnaire design to meet the research objectives.

### **3.6 Data Processing and Analysis**

After all the necessary data were collected from the field, they were sorted and examined to ensure completeness and accuracy of responses. Consistencies were also checked. Quantitative data were coded and entered into the Statistical Package for Social Sciences, SPSS 16.0 and Microsoft excel for processing. The entered data were cleaned and analyzed for results using descriptive statistical techniques such as percentages, frequencies, and means. Results of data analysis were presented in graphs, tables and charts.

Qualitative data from focus group discussions and key informant interviews were carefully transcribed into meaningful segments and discussed along with results from the quantitative analysis and interpretation.



## CHAPTER FOUR

### 4.0 Results

#### 4.1 Introduction

This chapter analyses the sampled data using various descriptive tools such as percentages, tables, graphs and charts.

#### 4.2 Demographic characteristics of respondents

Out of the total number of respondents who participated in the household, the proportion of male to female respondents was 52.3% (101) and 47.7% (92) respectively.

A high proportion (71.5%) of respondents had not received any formal education and could not read nor write in any language particularly in English. However, four percent (4%) of respondents indicated they had acquired post-secondary education (tertiary/A-O level). Literacy levels across the three communities were in the proportions 36.2%, 20% and 30% for Kantu, Kpanfaa and Toulle respectively.

Across the three communities, many of respondents were married 142 (73.6%). The proportion of respondents who were single was 37 (19.2%); the remaining 14 (7.3%) were widowed.

Household characteristics recorded included household size and ages of respondents. The numbers of people forming a household were grouped into three categories; 2–6 people, 7–10 people and “more than 10”. Many of respondents (54.4%) indicated their households were made up of more than 10 people. 66 of respondents (34.2%) indicated

7–10 people formed their households and only 22 (11.4%) of respondents indicated 2–6 people (Table 4.1).

### **4.3 Socio-economic status of people in study communities**

The social and economic status of people in this context refers to a measure of people's economic and social position in society. For the purposes of this study, indicators used for the Ghana Living Standard Survey report (GSS, 2014) were adopted. These included income, education, healthcare, employment and housing of respondents.

#### **4.3.1 Income sources of households**

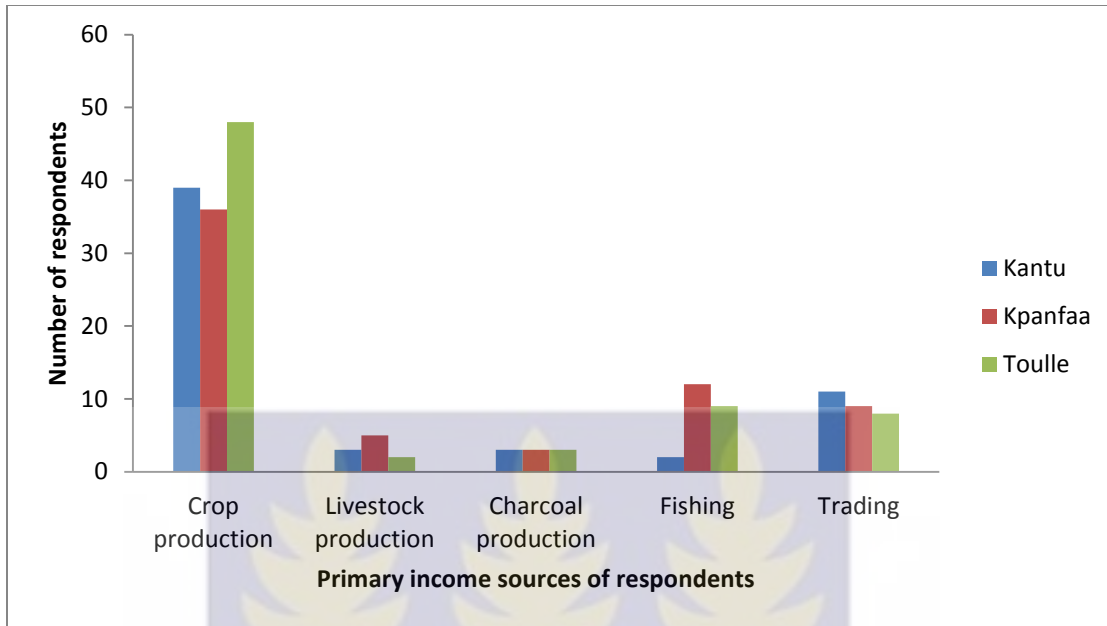
The main income sources of respondents in the communities included: crop production, livestock production, charcoal production, fishing, and trading. Majority of the respondents 123(63.7%) indicated crop production as their primary income source (Figure 4.1) while 77 (39.9%) of respondents indicated livestock production as their secondary source of income (Figure 4.2). Fishing was recorded as a secondary source of income for respondents in Toulle community only (Figure 4.1).



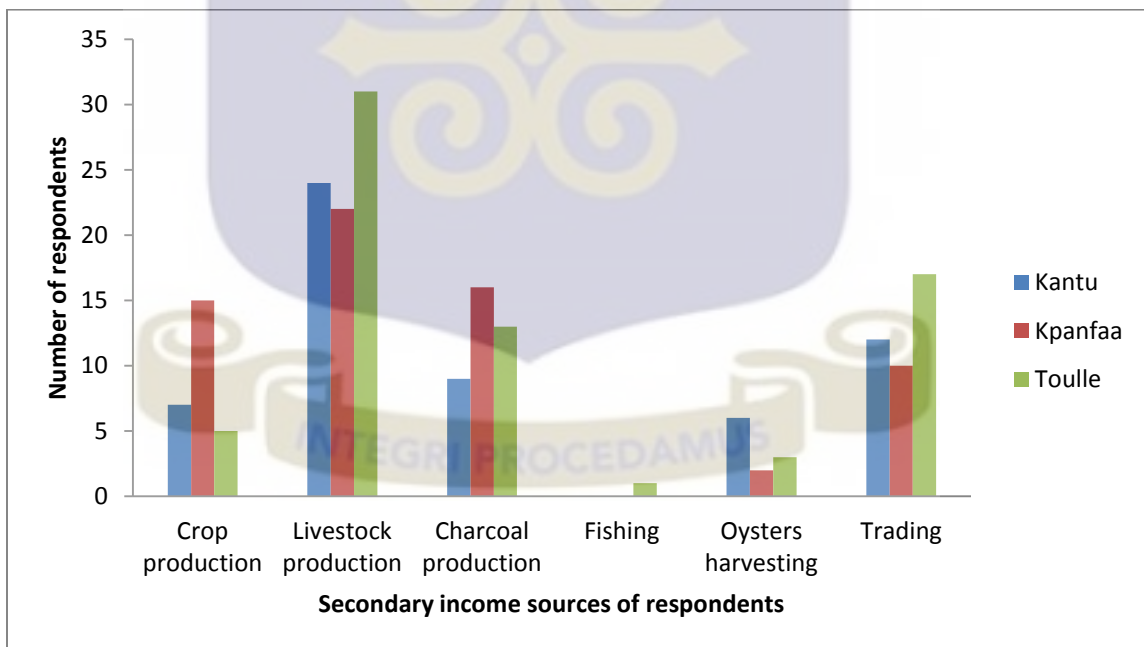
**Table 4.1: Demographic characteristics of respondents in the three communities**

Variable	Number of respondents from the three communities								
		Kantu(n=58)		Kpanfaa(n=65)		Toulle(n=70)		Total(N=193)	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)
<b>Sex</b>	Male	31	53.4	32	49.2	38	54.3	101	52.3
	Female	27	46.6	33	50.8	32	45.7	92	47.7
<b>Age distribution (years)</b>	15–25	18	31.0	15	23.1	18	25.7	51	26.4
	26–35	17	29.3	18	27.7	10	14.3	45	23.3
	36–45	13	22.4	21	32.3	19	27.1	53	27.5
	Above 45	10	17.2	11	16.9	23	32.9	44	22.8
<b>Level of Education</b>	None	37	63.8	52	80.0	49	70.0	138	71.5
	Primary	8	13.8	2	3.1	6	8.6	16	8.3
	JHS/Middle School	6	10.3	5	7.7	11	15.7	22	11.4
	SHS/Senior Secondary	4	6.9	3	4.6	2	2.9	9	4.7
	Tertiary/A-O Level	3	5.2	3	4.6	2	2.9	8	4.1
<b>Marital Status</b>	Single	13	22.4	11	16.9	13	18.6	37	19.2
	Married	44	75.9	50	76.9	48	68.6	142	73.6
	Widowed	1	1.7	4	6.2	9	12.9	14	7.3
<b>Household Size</b>	2– 6	11	19	9	13.8	2	11.4	22	11.4
	7– 10	20	34.5	22	33.8	24	34.3	66	34.2
	>10	27	46.6	34	52.3	44	62.9	105	54.4

*(Source: author, 2015)*



**Figure 4.1 Primary income sources of respondents in the three communities**  
(Source: author, 2015)



**Figure 4.2: Secondary income sources of respondents in the three communities**  
(Source: author, 2015)

### 4.3.2 Employment status of respondents

Employment status refers to the status of a person in the establishment where he/she currently works or previously worked (GSS, 2013). It also refers to the status of an economically active person with respect to his or her employment – that is the type of explicit or implicit contract of employment with other persons or organizations that the person has his or her job (OECD, 2003). The 2010 population and housing census report categorize employment status into eight types. However, for the purposes of this research, employment status was categorized into three; self-employed, not employed and government employed (Table 4.2).

**Table 4.2: Employment status of respondents in the three communities**

Employment Category (current)	Respondents in study communities							
	Kantu(n=58)		Kpanfaa(n=65)		Toulle(n=70)		Total(n=193)	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
<b>Self employed</b>	7	12.1	3	4.6	5	7.1	15	7.8
<b>Government employed</b>	4	6.9	4	6.2	2	2.0	10	5.2
<b>Not employed</b>	47	81.0	58	89.0	63	90.0	168	87.0

(Source: author, 2015)

More than 80% of the total respondents from each community were unemployed (Table 4.2). Out of the proportion of employed respondents, 7.8% were self-employed whereas 5.2% were employed by the government. The highest self-employed respondents were recorded at Kantu community (12%) followed by Toulle (7.1%). Kpanfaa community recorded the least numbers for self-employed respondents. The difference in the number of respondents among the three employment categories was statistically significant

( $\chi^2=250.767$ ,  $df=2$ ,  $P<0.05$ ) (Appendix F-I). The employment status depended on the age of the respondent ( $\chi^2=26.33$ ,  $df=6$ ,  $P<0.05$ ) (Appendix F-II). More than 90% of respondents that were employed were between the ages of 15-35 years while those above age 35 were mostly unemployed.

The employment status of respondents was also related to the level of education attained ( $\chi^2=1.281$ ,  $df=10$ ,  $P<0.05$ ) (Appendix F-III). More than 95% (132) of respondents with no formal education were unemployed (Table 4.3). About 83% of the respondents with Tertiary education were employed by the government and about 60% of respondents with primary and SHS/Secondary level education were self-employed (Table.4.3).

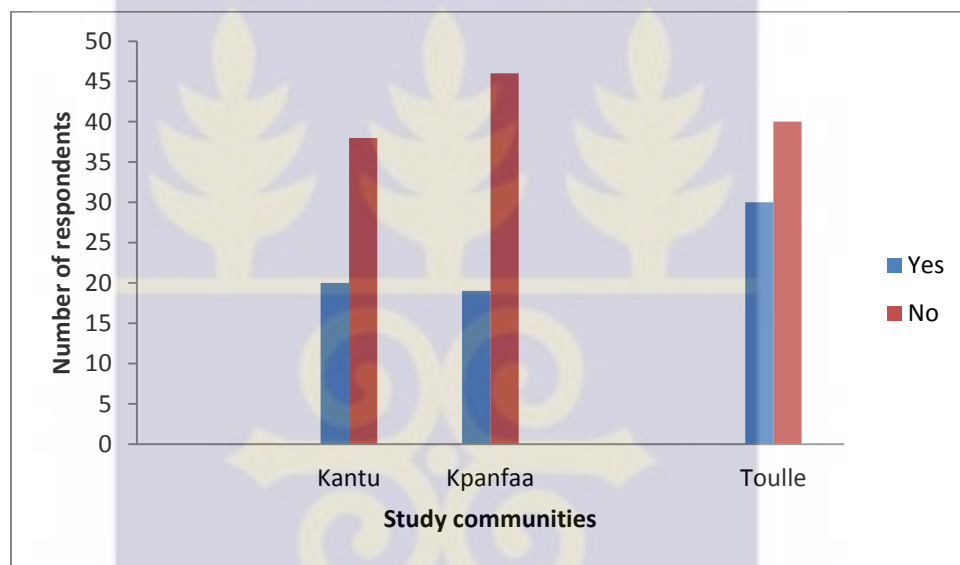
**Table 4.3: Level of education of respondents and employment status in the communities**

Variable	Employment status of respondents			Total	
	Self employed	Employed by government	Not employed		
Level of education	none	5	1	132	138
	primary	4	0	12	16
	JHS/ Middle school	5	0	17	22
	SHS/ Secondary school	1	4	4	9
	A/O Level	0	0	2	2
	Tertiary	0	5	1	6
Total		15	10	168	193

(Source: author, 2015)

### 4.3.3 Ability of respondents in the three communities to save money

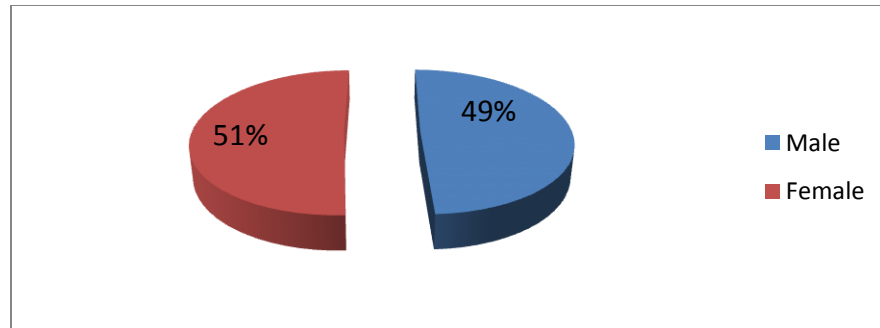
The indicator for financial capital availability used for the study was the ability of households to save money (DFID, 1999), either at home or in a financial institution. Majority of the respondents, 124 (64.2%) did not have savings either at home or in a financial institution and the remaining 69 representing 36% had savings (Figure 4.3).



**Figure 4.3: Money saving ability of respondents in the study communities (Source: author, 2015)**

#### 4.3.3.1 Relationship between gender and the ability to save money

Though the findings showed that females had more savings than males, this difference was not statistically significant ( $\chi^2=0.111$ ,  $df=1$ ,  $P>0.05$ ) (Appendix F-IV).



**Figure 4.4: Proportion of males to female respondents who had savings (Source: author, 2015)**

#### **4.3.4 Education**

The presence of schools and their general conditions in the three communities were assessed. The cases used included the main material for walls of school buildings and roofing material used.

All the three communities had primary and junior high schools. Kantu and Kpanfaa communities had Kindergartens also. There were no Senior high schools or Tertiary institutions in any of the three study communities. The main walls of schools in all the communities were partly mud and partly cement blocks. The school buildings were roofed partly with thatch and partly with aluminum sheets; except for Kpanfaa community where both primary and junior high school buildings had their main walls constructed hundred percent from cement blocks and completely roofed with aluminum sheets.

#### **4.3.5 Healthcare**

Two indicators were used to assess the healthcare situation of respondents: availability health centers in the communities and the treatment preferences of respondents during ill

health. As at the time this research was being conducted, there was no functioning health facility in any of the three communities. However, a shared clinic was under construction and on the verge of completion for the Kpanfaa and Toulle communities.

#### 4.3.5.1 Treatment Preferences of respondents during ill health

Respondents specified their treatment preferences during ill health. These included: traditional/herbal forms of treatment, modern (clinic) forms of treatment and a combination of the two (Table 4.4). Majority of respondents (42.5%) preferred traditional forms of treatment. Only 18% of respondents indicated they preferred to visit the clinic for treatment when they were ill (Table 4.4).

**Table 4.4: Treatment preferences of respondents during illness**

Treatment Preference	Respondents in study communities							
	Kantu(n=58)		Kpanfaa(n=65)		Toulle(n=70)		Total(n=193)	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Visit Clinic	24	41.4	5	7.7	6	8.6	35	18.1
Traditional Healing centre (Herbal)	14	24.1	22	33.8	46	65.7	82	42.5
Both clinic and traditional healing (herbal)	20	34.5	38	58.5	18	25.7	76	39.4

(Source: author, 2015)

#### 4.3.6 Housing

The indicators used to assess housing conditions of respondents in the communities were the types of material used for outer walls of their buildings (mud/cement blocks), the

types of roofing material and the types of houses (compound or detached) that respondents lived in (GSS, 2014).

#### **4.3.6.1 Material used for roofing**

Majority (56.5%) of respondents used mud for roofing (Table 4.5); with a few using a combination of mud and aluminum sheets (18.7%). Only 10% of respondents used only aluminum sheets for roofing, while 14.5% used only thatch for roofing (Table 4.5).

#### **4.3.6.2 Material for main walls of houses**

The material used for the main building (walls) included mud bricks, cement blocks and in some instances, a combination of the two. Overall, mud was the most common (97%) material used for the walls of houses in all three communities. Only 1.6% of houses were made of a combination of mud bricks and cement blocks while 1% was made of cement blocks (Table 4.5).

#### **4.3.6.3 Type of houses of respondents in the three communities**

Many of the respondents (71.5%) lived in compound houses and the remaining (28.5%) lived in detached houses. Among the three communities, detached houses were more (34.5%) in Kantu than in the other communities (Table 4.5).

#### **4.3.7 Access to basic Services/Utilities (Water, fuel and electricity)**

##### **4.3.7.1 Potable water availability in study communities**

The main source of drinking water in all three communities was machine drilled boreholes. Eighty-nine percent (89%) of respondents indicated boreholes as the main source of water for domestic use (Table 4.6) and the remaining (11.4%) depended on the river for water. Houses in close proximity to boreholes access their water from the

boreholes, while those who lived close to the river relied on the river for all domestic water needs, including for drinking. In Kpanfaa, 66% of respondents depended on the river for potable water (Table 4.6). No respondent in any of the three communities indicated pipe borne and well water as sources of potable water (Table 4.6).



**Table 4.5: Characteristics of houses of respondents in the three communities**

Housing Characteristics		Number of respondents in study communities							
		Kantu (n=58)		Kpanfaa(n=65)		Toule (n=70)		Total (n=193)	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)
<b>Type</b>	<b>Compound</b>	38	65.5	47	72.3	53	75.7	138	71.5
	<b>Detached</b>	20	34.5	18	27.7	17	24.3	55	28.5
<b>Material for roofing</b>	<b>Aluminium</b>	8	6.9	6	9.2	6	8.6	20	10.4
	<b>Thatch/Grass</b>	4	48.3	13	20.0	11	15.7	28	14.5
	<b>Mud</b>	28	31.0	42	64.6	39	55.7	109	56.5
	<b>Mud and Aluminium</b>	18	31.0	4	6.2	14	20.0	36	18.7
<b>Material for main walls</b>	<b>Mud</b>	57	98.0	64	98.5	67	95.7	188	97.4
	<b>Cement blocks</b>	0	0.0	0	0.0	2	2.9	2	1.0
	<b>Mud and cement blocks</b>	1	1.7	1	1.5	1	1.4	3	1,6

*(Source: author, 2015)*

**Table 4.6: Sources of potable water of respondents in the three communities**

Sources of Potable water	Respondents in study communities							
	Kantu (n=58)		Kpanfaa(n=65)		Touille(n=70)		Total(N=193)	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
<b>Pipe borne</b>	0	0.0	0	0.0	0	0.0	0	0.0
<b>Borehole</b>	58	100	43	66.2	70	100	171	88.6
<b>Well</b>	0	0.0	0	0.0	0	0.0	00	0.0
<b>River/stream</b>	0	0.0	22	33.8	0	0.0	22	11.4

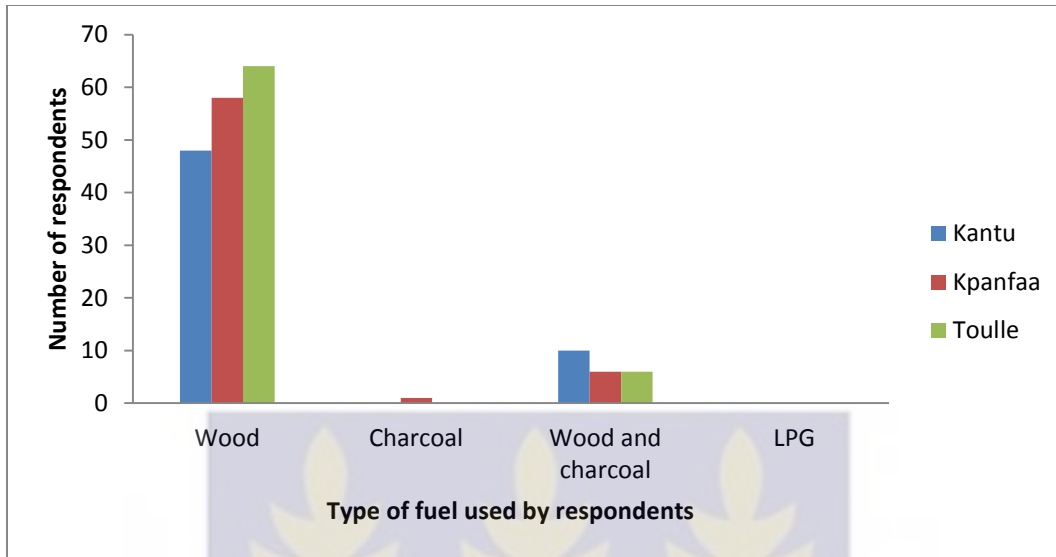
(Source: author, 2015)

#### 4.3.7.2 Electricity Supply

All the three study communities had no access to electricity (connected to the national grid) as at the time the study was being conducted. They relied on traditional lamps and flashlights for lighting.

#### 4.3.7.3 Fuel for cooking

One hundred and seventy (88%) used wood as main source fuel for cooking (Figure 4.5). Twenty-two respondents (11.4%) use both charcoal and wood as fuel sources for cooking. None of the respondents interviewed use Liquefied petroleum gas (LPG) as a main fuel source (Figure 4.5).

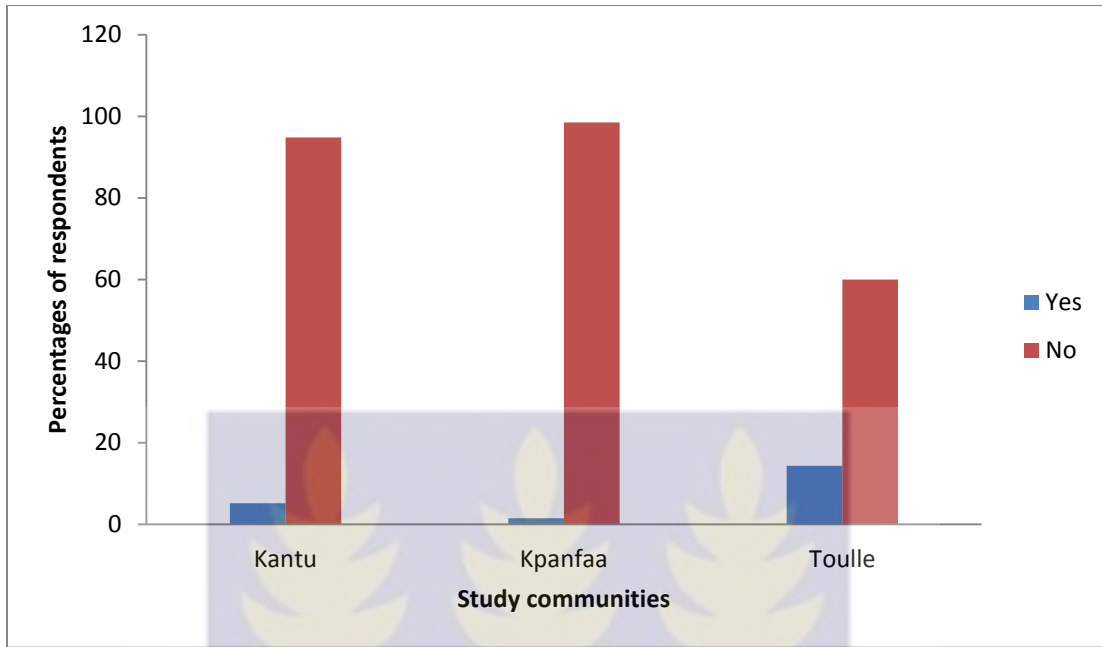


**Figure 4.5: Main fuels used by respondents in the three study communities (Source: author, 2015)**

#### **4.4 Awareness of the Riparian Buffer Zone Policy in the three study communities**

##### **4.4.1 Respondents' awareness of the Riparian Buffer Zone Policy**

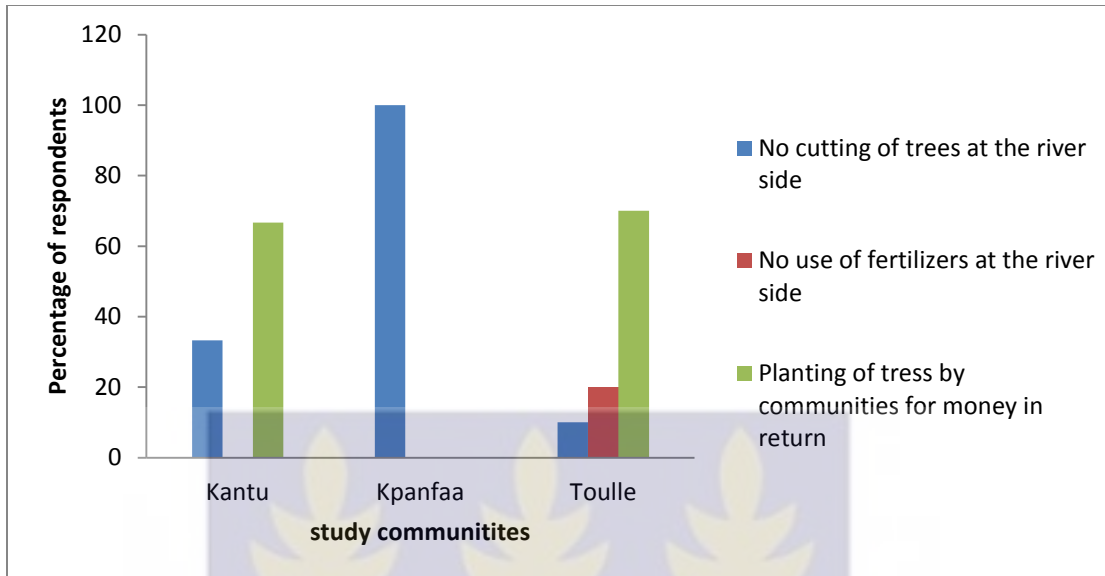
Only 14 respondents (7%) had knowledge about the policy and its implementation as at the period this study was being conducted (Figure 4.6). Furthermore, only one out of five key informants – that is the manager of the Wechiao Hippopotamus Sanctuary – was aware of the Riparian Buffer Zone Policy and its implementation. There was a statistically significant difference in the number of respondents who were aware of the Riparian Buffer Zone Policy among the three communities ( $\chi^2=141.062$ ,  $df =1$ ,  $P<0.05$ ) (Appendix F-V).



**Figure 4 6: Respondents’ awareness of the Riparian Buffer Zone Policy in the three communities (Source: author, 2015)**

#### **4.4.2 The understanding of respondents in the three communities about the Riparian Buffer Zone Policy**

The 14 respondents who indicated awareness of the policy gave their understanding of the Riparian Buffer Zone Policy. Two explanations dominated among the 14 respondents who were aware of the Riparian Buffer Zone Policy. These explanations were; (i) to promote planting of trees and (ii) to stop all forms of vegetation clearing at the river side. In Toulle community where awareness was highest among the three communities, most respondents (70%) indicated the policy implementation was about tree planting at the river side for cash in return for planters.

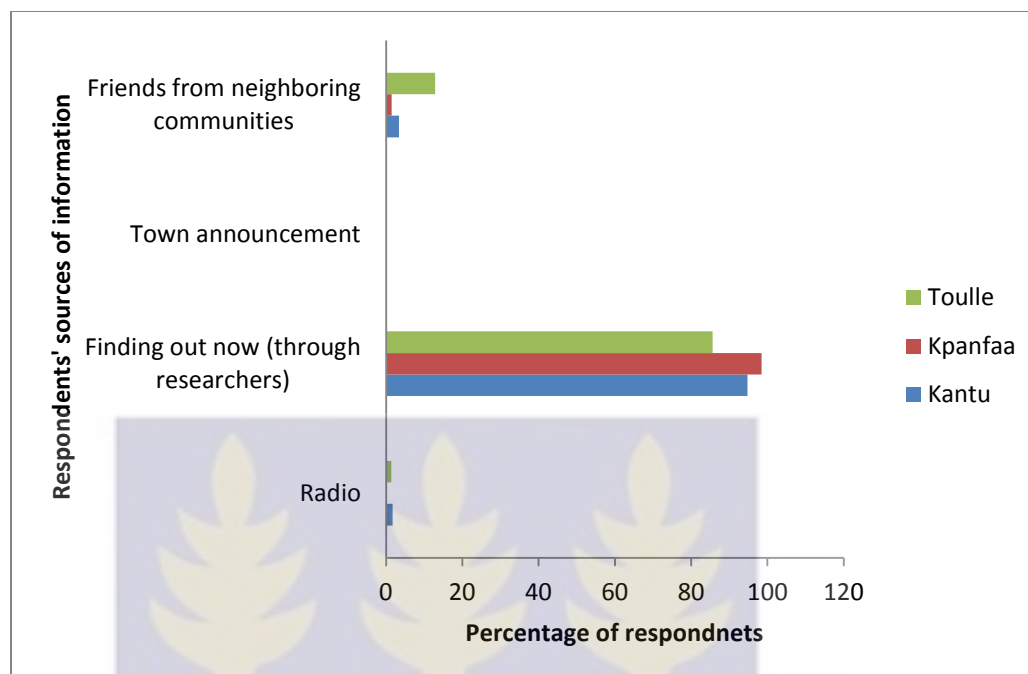


**Figure 4.7: Respondents’ understanding of the Riparian Buffer Zone Policy in the three communities (Source: author, 2015)**

Furthermore, all respondents who were aware of the Riparian Buffer Zone Policy gave the Wildlife Division of the Forestry Commission popularly termed as “*game people*” in the communities, as the implementers of the policy.

#### **4.4.3 Respondents’ sources of information about the Riparian Buffer Zone Policy**

Most of the respondents (92.7%) indicated they heard about the policy through this research (Figure 4.8). Thus, they only heard about the Riparian Buffer Zone Policy during the time the research was being conducted. Six percent (6%) of respondents also indicated that they heard about the policy through friends in neighboring communities. Only 1% of respondents indicated they heard about the policy through a radio program (Figure 4.8).

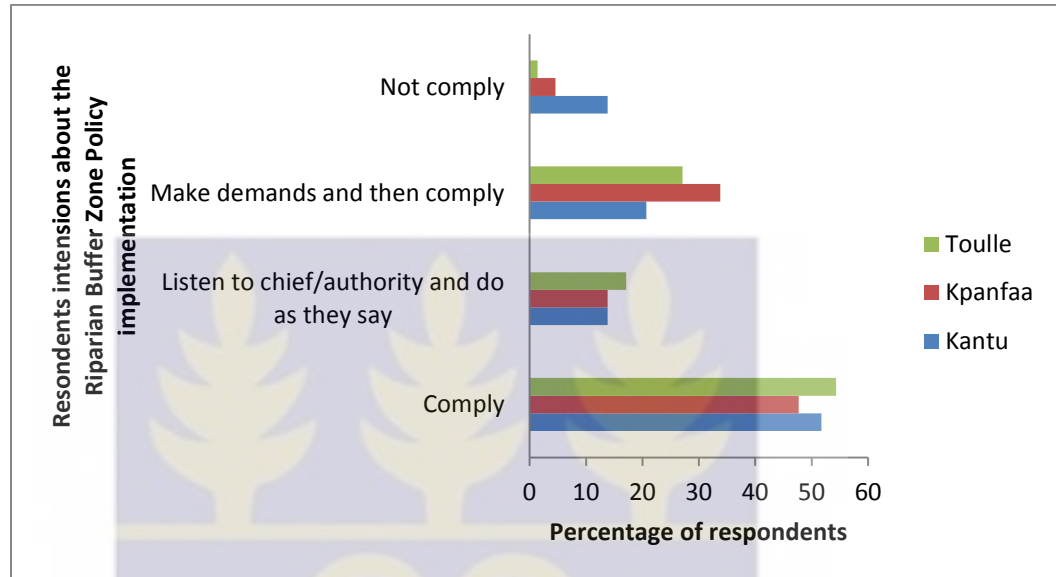


**Figure 4.8: Sources of respondents’ information about the Riparian Buffer Zone Policy in the three communities (Source: author, 2015)**

#### **4.4.4 Respondents’ readiness to comply with the Riparian Buffer Zone Policy implementation in the three communities**

When the researcher gave basic explanation about the policy to respondents, there were mixed reactions from respondents in the three communities. The difference in the number of respondents who stated they would comply and those who stated otherwise was statistically significant ( $\chi^2=88.762$ ,  $df=3$ ,  $P<0.05$ ) (Appendix F-VI). About half (51%) of respondents stated they would comply with the policy. 27% of respondents stated they would demand compensation from implementers before they comply, while 15% stated they would listen to their chiefs or the traditional authority in their various communities

and do as they say (Figure 4.9). A few of the respondents surveyed (6.7%) stated they would not comply.

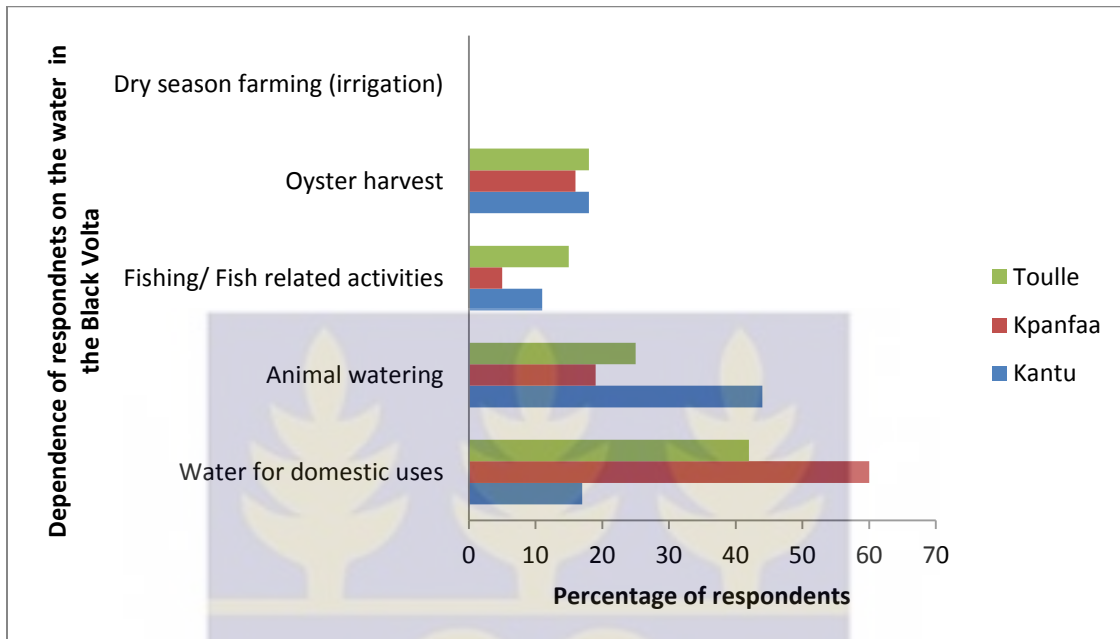


**Figure 4.9: Readiness of respondents to comply with the Riparian Buffer Zone Policy implementation in the three communities (Source: author, 2015)**

#### 4.5 Dependence of the three communities on the Black Volta for livelihoods

##### 4.5.1 Water related livelihood activities of respondents at the Black Volta

About 80% of respondents in the three communities depend on the water resources for several livelihood activities, while 20% did not depend on the river for any livelihood activity. Respondents' dependence on the river included activities such as fetching of water for domestic uses, animal watering, fishing, and oyster harvesting (Figure 4.10). The difference in the number of respondents who depended on the river and those who did not was statistically significant ( $\chi^2=68.523$ ,  $df=1$ ,  $P<0.05$ ) (Appendix F-VII).



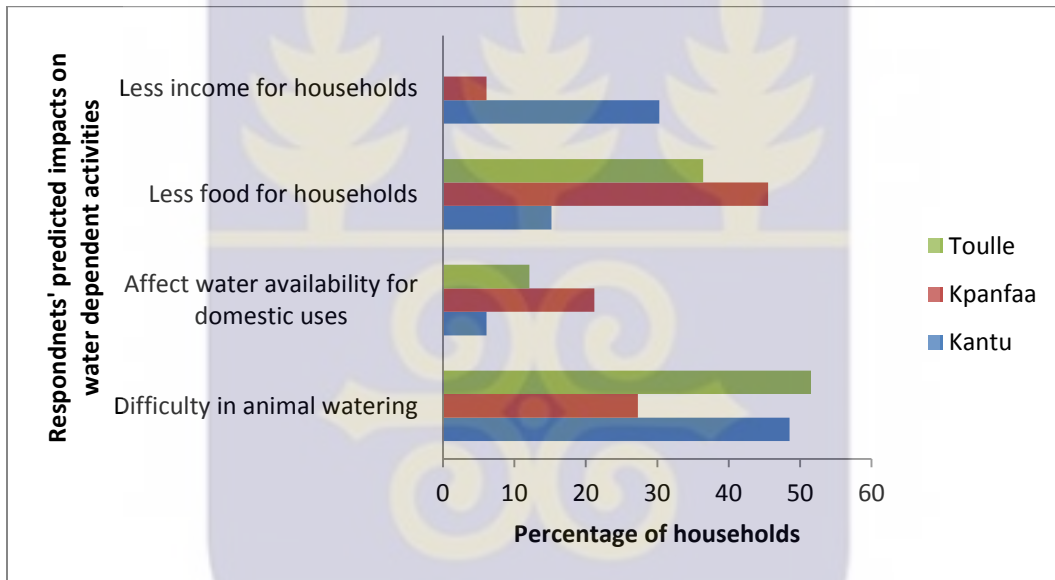
**Figure 4.10: Respondents’ dependence on the water resources of the Black Volta for livelihoods (Source: author, 2015)**

Forty-three per cent (43%) of respondents depended on the river for their domestic water needs (Figure 4.10), while 27% depended on it for animal watering. Ten percent (10%) of respondents reported fishing in the river while 20% harvested oysters for livelihoods. None of the respondents depended on the Black Volta for dry season (irrigation) farming in any of the communities (Figure 4.10).

#### **4.5.2 Policy implementation and water dependent activities at the Black Volta in the study communities**

About 51% of respondents in the three communities stated the policy would have some kind of impacts on their use of the river while the remaining 49% said the implementation process of the policy will not affect their activities. Some of the

perceived impacts stated by respondents include: difficulty in animal watering, limited access to water in the river for domestic purposes, less food for families and less income for families. Animal watering was perceived to be the activity that would be impacted most (43%) followed by food availability (32%). Another 13% perceived that implementation would impact on access to water for domestic activities and 12% also predicted a reduction in incomes if the policy is implemented (Figure 4.11).



**Figure 4.11: Respondents’ perception about the Riparian Buffer Zone Policy implementation on activities at the river in study communities (Source: author, 2015)**

#### **4.6 Implications of implementing the Riparian Buffer Zone Policy on the livelihoods of people in the communities**

The implications of the implementation of the policy were assessed through analysis of the livelihood capitals (natural resources) along the Black Volta available to respondents in the communities.

##### **4.6.1 The Black Volta as a Natural Capital for communities' livelihoods**

Natural capital refers to the natural resource stock available and accessible to people to give them choices to meet livelihood goals (DFID, 1999). The natural capitals at the Black Volta available to respondents in the three communities considered for this study are land resources (forest and agricultural lands) and the water.

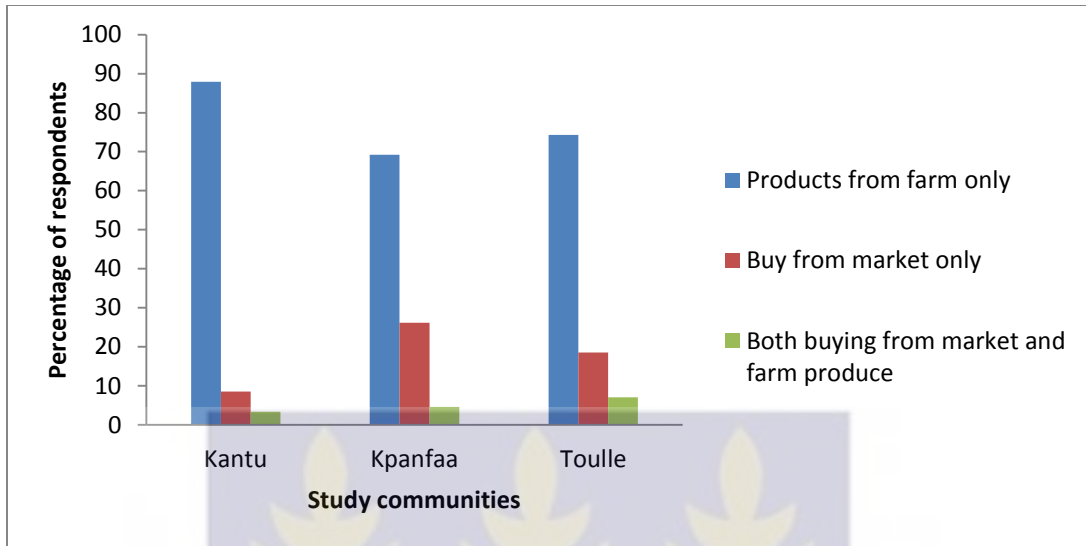
##### **4.6.1.1 Forest and Agricultural Land Uses by respondents along the Black Volta in the three communities**

Lands along the Black Volta belong to families and were used as agricultural lands. Farmlands of respondents were usually in pieces and respondents choose what to cultivate on each piece of land depending on the nutrient levels of the soils. On the whole, 60% of respondents in Kantu indicated they had more than one piece of farmland while proportions in Kpanfaa and Toulle were 52% and 63% each for Kantu, Kpanfaa respectively (Table 4.7).

Generally, the findings revealed that 25% of respondents owned lands at the riverside (Table 4.7). Farming by the riverside was low among respondents. Only 24% of respondents farmed by the riverside at the time this research was conducted (Table 4.10). The difference in the number of respondents who farmed at the river side compared

to those who did not was significant ( $\chi^2=52.855$ ,  $df=1$ ,  $P<0.05$ ) (Appendix F-VIII). Respondents' farmland sizes were also recorded. Majority of respondents (67%) owned farmlands between one and five acres. The Toulle community had the highest number of respondents (70%) with farmland sizes between one and five acres (Table 4.7) whereas for the same farmland size, Kantu and Kpanfaa recorded 69% and 62% respectively. The study also revealed that land ownership in the communities was in three forms: family land, land given as gifts and lease/partnership ownerships. Overall, 83% of respondents owned family lands as farmlands while 17% of respondents owned lands as gifts (Table 4.7). The difference in the number of respondents among the three forms of land ownership was significant ( $\chi^2=86.223$ ,  $df=1$ ,  $P<0.05$ ) (Appendix F-IX).

Majority of the respondents depended on what they produced in a farming season for sustenance. Seventy-seven percent (77%) of respondents depended largely on what they produced to feed themselves compared to 18% who depended only on food bought from the market (Figure 4.12). About 5% bought food stuff from the market to supplement what they produced when what they harvested was not sufficient (Figure 4.12). The major crops cultivated by respondents in the communities included guinea corn (sorghum), maize, millet, yam and cowpea (Table 4.11).



**Figure 4.12: Sources of food of respondents in the three communities (Source: author, 2015)**



**Table 4.7: Characteristics of agricultural lands used by respondents in the three communities**

Land characteristics of respondents		Respondents in study communities							
		Kantu(n=58)		Kpanfaa(n=65)		Toullé(n=70)		Total (n=193)	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)
<b>Land ownership at river side</b>	Yes	17	29.3	18	27.7	13	18.6	48	24.9
	No	41	70.7	47	72.3	57	81.4	145	75.1
<b>Farming at the river side</b>	Yes	17	29.3	16	24.6	13	18.6	46	23.8
	No	41	70.7	49	75.4	57	81.4	147	76.2
<b>Farmland size of respondents (acres)</b>	1- 5	40	69.0	40	61.5	49	70.0	129	66.8
	6-10	6	10.3	20	30.8	16	22.9	42	21.8
	11-15	2	3.4	2	3.1	2	21.9	6	3.1
	16-20	10	17.2	3	4.6	3	4.3	16	8.3
<b>Types of land ownership of respondents</b>	Family land	54	93.1	48	73.8	59	84.3	161	83.4
	Purchase/Lease	0	0.0	0	0.0	0	0.0	0	0.0
	Lands as gifts	4	6.9	17	26.2	11	15.7	33	17.1
<b>Respondents ownership of more than one piece of land</b>	Yes	30	51.7	41	63.1	44	62.9	115	59.6
	No	28	48.3	24	36.9	26	37.1	78	40.4

(Source: author, 2015)

Majority of respondents (47.7%) cultivated guinea corn, 20.7% cultivated maize and 17.6% cultivated millet, annually as major crops. The other crops cultivated were yam (13%) and cowpea (1%) (Table 4.8).

**Table 4.8: Major crops cultivated by respondents in the three communities**

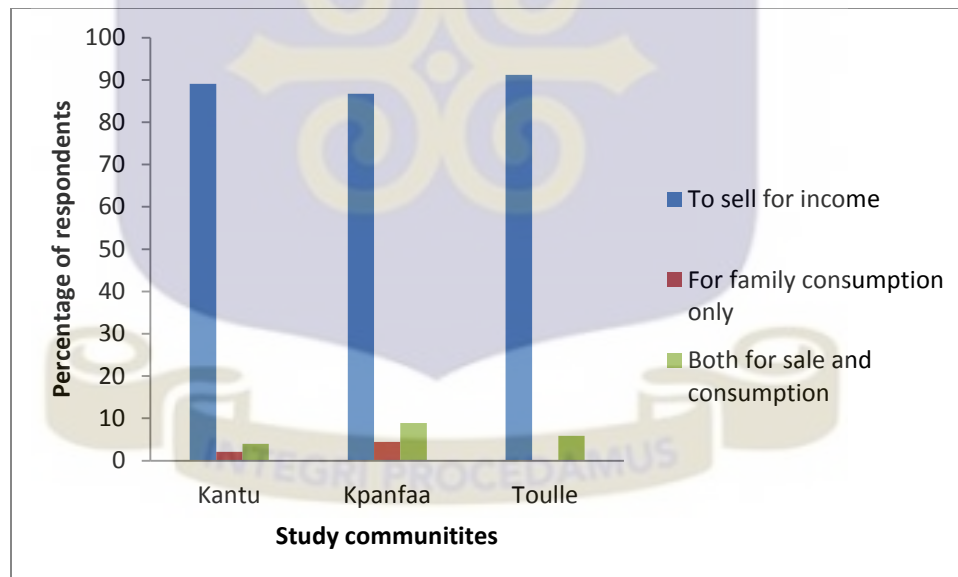
Major Crops cultivated	Number of respondents in communities who cultivated different crops							
	Kantu (n=58)		Kpanfaa(n=65)		Touille(n=70)		Total(n=193)	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
<b>Guinea corn</b>	30	51.7	28	43.1	34	48.6	92	47.7
<b>Maize</b>	8	13.8	16	24.6	16	22.9	40	20.7
<b>Yam</b>	11	19.0	10	15.7	4	5.7	25	13.0
<b>Millet</b>	9	15.5	9	13.8	16	22.9	34	17.6
<b>Cowpea</b>	0	0.0	2	3.1	0	0.0	2	1.0

*(Source: author, 2015)*

Besides agricultural lands, forest lands along the river also served as grazing fields for large sized livestock, especially in the dry season. 142 respondents (73.7%) in all three communities were into livestock production for various benefits. Respondents in the study communities reared livestock in small numbers; and practiced free range mode of feeding their livestock (Table 4.9). Livestock production was for sale, home consumption and in some instances both sale and home consumption according to respondents (Figure 4.13). 89% of respondents reared livestock mainly to sell for income in the study communities (Figure 4.13). Only 2% of respondents reared livestock mainly for their

families' consumption while 9% reared livestock for sale and at the same time for family consumption. The difference in the number of respondents among the given reasons for engaging in livestock production in the tree communities was significant ( $\chi^2=295.99$ ,  $df=4$ ,  $P<0.05$ ) (Appendix F-X).

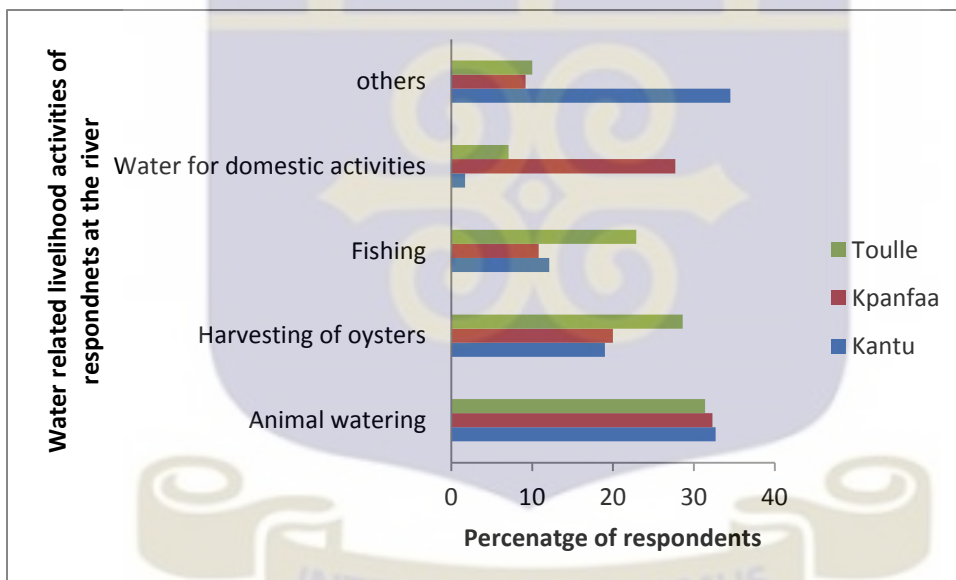
Forest lands along the river also served as sources of non-timber forest products for respondents in the three communities. Wild vegetables were collected for cooking and herbs for medicinal purposes from forests along the river in all the three communities. Also, respondents obtained their fuel for cooking which was mainly wood and charcoal, from forests along the river in the three communities.



**Figure 4.13: Reasons for which respondents reared livestock in the three study communities (Source: author, 2015)**

**4.6.1.2 The Black Volta River water as a livelihood capital for respondents in the communities**

For the purposes of this study, human activities that required water from the river water as a resource to meet livelihood goals in the three communities were assessed. Major livelihood activities of respondents in the three communities that required water from the river included; animal watering, harvesting of oysters, fishing and fetching of water for domestic uses; while minor activities of respondents that required water from the river included; swimming, navigation, and spiritualism (prayers to the gods). These were categorized and presented as “others” (Figure 4.14).



**Figure 4.14: Livelihood activities of respondents that required the Black Volta as a resource in the three communities (Source: author, 2015)**

**Table 4.9: Respondents Livestock production and ownership in the three communities**

Livestock productivity in study area		Number of respondents in the communities			
		Kantu (n=58)	Kpanfaa (n=65)	Toule (n=70)	Total (n=193)
<b>Livestock production In communities</b>	Yes	46	45	51	142
	No	12	20	19	51
<b>Types of livestock reared in communities</b>	Cattle	11	4	10	25
	Sheep	4	5	3	12
	Goats	15	13	17	45
	Pigs	7	7	5	19
	Poultry	9	16	16	41
	None	12	20	19	51
<b>Quantity of livestock of respondents</b>	<10	23	20	18	61
	11-20	17	15	14	46
	21-40	6	8	13	27
	41-60	3	2	1	6
	>60	3	0	5	8
<b>Mode of feeding livestock</b>	Free range	46	45	51	142
	Cultivation of feed	0	0	0	0

*(Source: author, 2015)*

Animal watering was the most important livelihood activity that required the river water (32%) as a resource according to respondents for livestock production (Figure 4.14). Cattle were mostly watered at the river because transportation of water from river to cattle enclosure comes with difficulty. Other livestock like pigs, sheep and goats could be easily watered with transferred water from the river or other sources according to respondents. Another important livelihood activity of respondents that required the river water as a resource in the three communities was harvesting of oysters. 23% of respondents indicated they harvested oysters from the river both for sale and for home consumption (Figure 4.14).

Fishing was another livelihood activity done by respondents in the three communities where the water served as a natural capital (Figure 4.14). In all the study communities fishing was done for both subsistence and commercial purposes. Few respondents (16%) engaged in fishing on a commercial basis (Figure 4.14). Respondents in the communities used the river water for domestic activities such as construction of houses and household activities like washing, cooking and drinking. Kpanfaa community recorded the highest dependence (28%) on the river water at the Black Volta among the three communities (Figure 4.14).

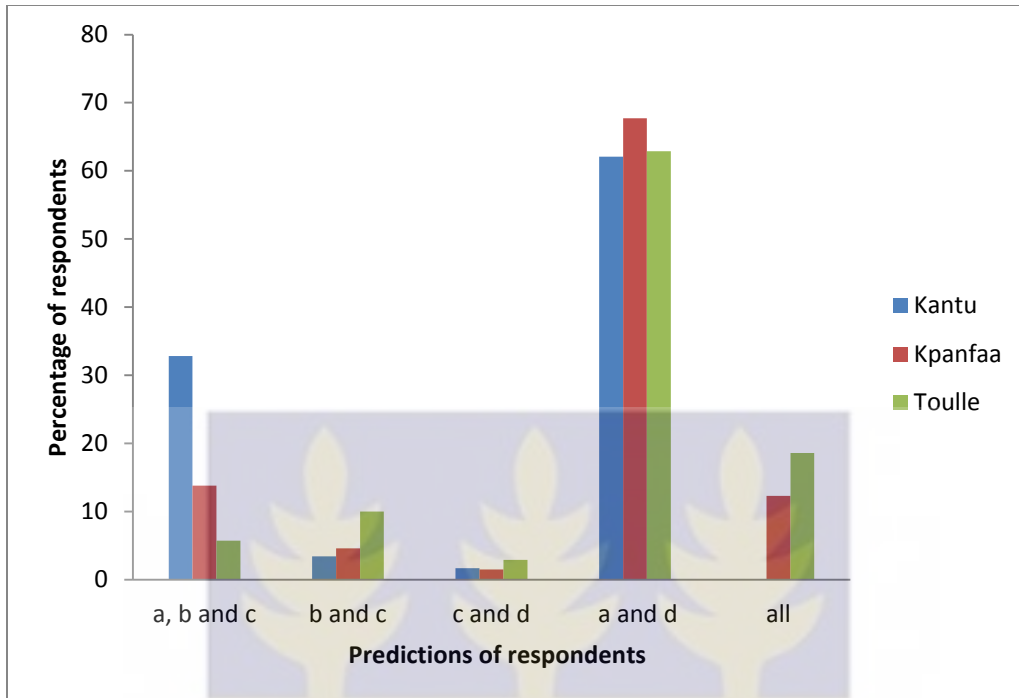
#### **4.6.2 Respondents' predictions of the implications of the implementation of the policy on livelihoods in the three communities**

Respondents predicted some general impacts that could come with the implementation of the policy in their communities (Figure 4.15). A respondent's prediction was largely based on his/her activities and the overall activities of their community. These predicted general implications of the policy implementation were: (a) =affect food availability, (b)

=disruption in animal watering, (c) =Disruption of fishing activities and (d) = affect households' incomes.

Respondents gave more than one prediction of likely impacts of the implementation of the policy on people's livelihoods (Figure 4.15). Majority of respondents (64%) predicted "a and d", which represented implications on food availability and incomes of respondents. 17% also predicted "a, b and c" which referred to likely impacts on food availability, animal watering and fishing activities (Figure 4.15). Few respondents (6%) also predicted "b and c" which referred to disruptions in animal watering and fishing while 11% predicted all ("a, b, c and d") as likely impacts of the policy implementation. These referred to impacts on food availability; livestock production and animal watering; fishing activities and incomes of families. Only 2% of respondents predicted "c and d" which referred to likely impacts of the implementation of the policy on animal watering and incomes of respondents (Figure 4.15).





**Figure 4.15: Respondents predictions on the implications of the implementation of the policy on livelihoods in the three communities (Source: author, 2015)**

#### **4.7 Existing regulations at the Black Volta and suggested modifications by respondents for policy implementation in the three communities**

##### **4.7.1 Existing regulations at the Black Volta in the three communities**

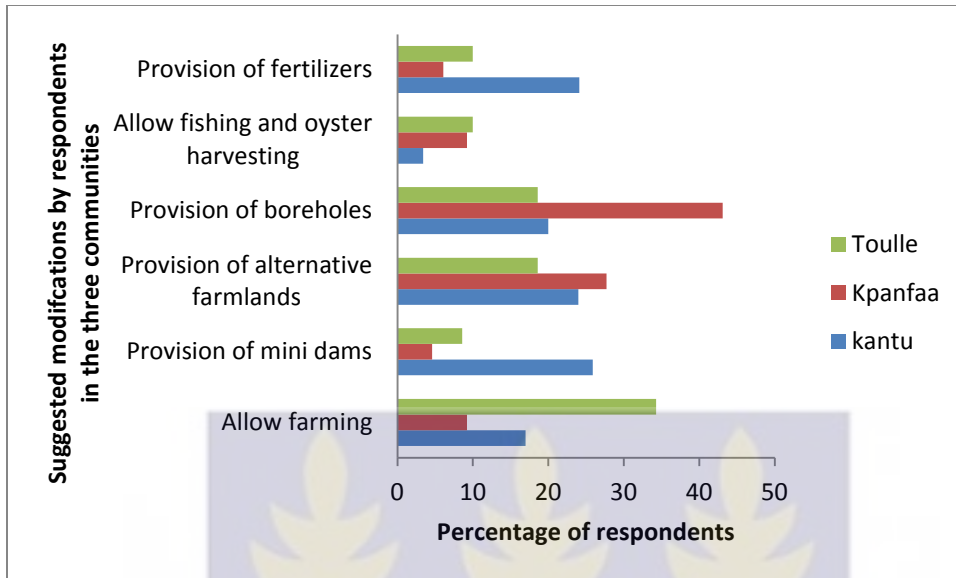
It was revealed that some regulations on human activities at the Black Volta existed in the three communities before the launch of the Riparian Buffer Zone Policy. All respondents interviewed (100%) in the three communities indicated they were aware of these pre-existing regulations. The existing regulations in the three communities were;

- No cutting of trees within the protected zone along the river

- No hunting, for both small and large sized wild animals along the river
- No farming within the protected zone along the river
- No erection of any form of structure, for example, sheds or house construction in the protected area along the river
- No Fishing and oyster harvesting on some parts of the river

#### **4.7.2 Modifications suggested by respondents for effective implementation of the policy in the three communities**

During interaction with respondents surveyed in the three communities, some suggestions were given to ease the implementation process. 23% of respondents surveyed suggested the provision of alternative farmlands for affected persons in the policy implementation process (Figure 4.16). The second most suggested modification by respondents (22.8%) was the provision of boreholes for affected communities. Other suggestions by respondents were; allow farming at the river side (21%); provision of fertilizer for farmers (13%), provision of mini dams (12%) and allow fishing and oyster harvesting (8%); to help ease the potential effects of the implementation of the Riparian Buffer Zone Policy in the three communities (Figure 4.16).



**Figure 4.16: Modifications suggested by respondents to ease the implementation of the Riparian Buffer Zone Policy in the three communities (Source: author, 2015)**

To allow farming during the implementation of the policy was particularly high in Toulle community (34%) as a suggestion while provision of boreholes was the most suggested modification (43%) in Kpanfaa community (Figure 4.16). Provision of fertilizer was highly suggested (24%) by respondents in Kantu community (Figure 4.16).

## CHAPTER FIVE

### 5.0 Discussion

#### 5.1 Introduction

Having presented the various resources that are essential by respondent in the three communities to sustain their livelihoods, the main findings are discussed in this chapter. The socio-economic status of the people is discussed and the implications of the implementation of the policy on livelihoods are also discussed.

#### 5.2 Socio-economic status of people and access to amenities in the three communities

For the purposes of this study, the indicators for the measure of socio-economic status of the people were adopted from those used for the Ghana Living Standard Survey Report by the Ghana Statistical Service (GSS, 2014). These included income sources, education, healthcare, employment, and housing.

An income source is one of the most important determinant of people's status, socially and economically (Andam, 2008; Galobardes, *et al.*, 2006). From the findings, majority of respondents (81%) depended on agriculture related activities (crop farming, livestock production and fishing) as primary income sources. Out of this number, majority (66%) obtained their income from crop production. This finding is similar to that in the 6<sup>th</sup> Ghana living Standards Survey Report (GSS, 2014) which states that about 82.5% of rural households are involved in farming; and in the rural savanna areas, the percentage is higher, 93%. In the present study, primary income sources varied among the communities studied; respondents from all three communities depended on agricultural activities as major income sources. Also, the 2014 GSS report states that more than 95% of rural

farmers are into crop production for income. This was similar in the study communities as most respondents (66%) stated crop production as a main source of income.

It has been reported that, in many parts of the savanna areas, livestock production was an important source of income to many families (Abdulai & CreleRees, 2001; Yaro, 2006; GSS, 2014). A similar trend was observed in the three communities as many respondents reared livestock for food and income. Unemployment among respondents in the three communities was high (87%) as at the time the research was conducted. According to the 2010 Population and Housing Census (GSS 2013) however, 2.9 % of the population 15 years and older in the District are unemployed. This figure is usually very high at certain times of the year due to the single rainy season in the Region because majority of people are agricultural workers – therefore less economically active when there is no rain (WWDA, 2010; Aduah & Aabeyir, 2012; Abdul- Korah 2006; Yaro, 2006). This dry period coincided with the time data was collected which led to the high numbers of unemployment in the communities.

According to GSS (2014), in Ghana, about 35.4% of households have savings accounts or are contributing to a savings scheme, while as much as 64.6 % of households have no savings accounts and are not contributing to a saving scheme. The situation in the three communities was similar, as a little over one-third (36%) of respondents had savings while as much as 64% did not have savings. Further, according to the 2014 GSS report, rural savannah households recorded the lowest (17.6%) ability to save, compared to the coastal and forest rural areas (21.5%). Financial capital availability, for example, the ability to save money, can contribute to consumption and production life styles of people (DFID, 1999; Mullan *et al.* 2010). This type of asset tends to be the least available to the

poor and therefore makes other forms of assets important to their livelihoods (DFID, 1999). In the three communities, most respondents did not have the ability to save due to the lack of cash. However, female respondents had the ability to save money in comparison with men in all the three communities. The women explained that females easily find alternative livelihood activities during the dry season than men (Gladwin *et al.*, 2001; Niehof, 2004; Dei, 1994). From the findings, these alternative livelihood activities carried out by the women during this dry period in the three communities included brewing of local drinks, charcoal production, oyster harvesting and petty trading.

The healthcare situation of the respondents in the three communities was also assessed to determine their social status (Grundy & Holt, 2001; GSS, 2014). From the findings, respondents (43%) mostly preferred traditional forms of treatment (herbal). This could be largely due to long distances they have to travel to access modern health care (O'Donnell, 2007) due to the absence of health centers in their communities. Herbs on the other hand are readily available and accessible to respondents (Berkes, 2004; Nagendra, 2008) for treatment during illness. Main walls of houses of respondents were mostly built of mud and roofed with thatch and/or mud. This corresponds with GSS (2014) which reported that 56.9% of houses in rural areas in Ghana are made of mud. Among the rural areas (coastal, forest and savannah), the highest number of mud houses are found in the savannah rural (78.1%). Mud type of roofing was high (56.5%) in all three communities. This according to respondents was because labour is readily available and raw materials (mud, water and cow dung) are easily accessible (Berkes, 2004) for the mud type of roofing, compared to other forms.

According to GSS (2014) the average household size in the Upper West Region is 8 persons. The findings from the study showed that, respondents in the three communities lived in large numbers per household –mostly 10 or more, in compound type of housing (Hesselberg & Yaro, 2006). This means, more people to feed (Hesselberg & Yaro, 2006) and more resources need to be harnessed to meet households' needs (Svanback & Bolnick, 2007; Sullivan, 2002). This puts more pressure on surrounding resources, especially natural resources; for livelihoods (Svanback & Bolnick, 2007). Respondents in all three communities accessed potable water from boreholes (Dapaa-Siakwan & Gyau-Boakye, 2000). This is in agreement with the 2010 Population and Housing Census (GSS, 2013) which indicated that Wa West District had the highest number of households (79.3%) relying on boreholes for potable water supply in the Upper West Region. The Black Volta River serves as a secondary water source in the three communities as seen in many rural areas in Ghana (Gyau-Boakye, 2001). In the Kpanfaa community however, respondents' dependence on the Black Volta River for potable water was high (34%) compared to the others. This was due to less available boreholes compared to the other two study communities (Gyau-Boakye, 2001).

In Ghana, about 41% of households use wood as main fuel for cooking (GSS, 2014) and in the rural savannah, the percentage is higher (87.4%). A similar trend was observed in the three communities. Wood is the most used fuel for cooking by respondents (88%) in the three communities (Hesselberg & Yaro, 2006; Yaro, 2006; Akudugu *et al.*, 2012). This means more pressure on surrounding forests (Aduah & Aabeyir, 2012; Abdul-Korah, 2006) for cooking fuel.

## **5.2 Awareness of the Riparian Buffer Zone Policy among respondents and expectations of respondents with the implementation of the policy in the three communities**

Conservation programs or policies are sometimes formulated and implemented to reduce pressures on natural resources exploitation (Scherr, 2000; Magee *et al.*, 2013). According to Muhuzu & Balwill (2013), the success of environmental policies can largely depend on effective involvement of stakeholders, especially local people who mostly live close to these resources. Furthermore, some authors (Andam, 2008; Blake, 1999; Nagendra, 2008; Colchester, 2004 and Wiggins *et al.*, 2004) have reported that the successes of environmental policies will largely depend on the understanding and participation of local people as they relate more to the environment. However, findings from this study suggest that, most respondents (93%) and four key informants from stakeholder institutions (out of five) did not know about the Riparian Buffer Zone Policy. Respondents in the three communities who stated they were aware (7%) of the Riparian Buffer Zone Policy related the implementation to tree planting along the banks of the Black Volta for rewards (cash) from central government. This could be largely due to a government initiative in the District, coordinated by the District Assembly and Ministry Of Food and Agriculture (MOFA) known as the Ghana Social Opportunity Project (GSOP) (Mr. Osman Adams, personal communication, 25/03/15). The GSOP project (at the time this research was conducted) involved the planting of trees by households in some selected communities in the District. Households are paid daily for planting and nurturing trees along the banks of the Black Volta and some other parts of the District (Mr. Osman Adams, personal communication, 25/03/15).

Respondents who stated they were aware of the policy also named the Wildlife Division of the Forestry Commission – popularly called “*game people*” in the three communities as the implementer of the Riparian Buffer Zone Policy. This can be attributed to the activities of the community managed tourism facility in the Wa West District–the Wechiao Hippopotamus Sanctuary–for the conservation of wildlife in that part of the Black Volta. Misrepresentation of a given policy can lead to policy failure (Andam, 2008; Muhumuza & Balkwill, 2013; Nagendra, 2008; Colchester, 2004). It is evident from the research that respondents in the three communities knew very little about the Riparian Buffer Zone Policy. Some authors (Colchester, 2004; Alcorn, 1993) say this can be direct results of poor consultation of local people in policy formulation. This could lead to difficulty or failure in the implementation of the Riparian Buffer Zone Policy in the three communities.

A participatory approach however, to water policies helps raise awareness of water issues among decision makers and local people (Xie, 2006). Xie (2006) emphasizes that decisions on water management should be taken at the lowest level, with central government retaining regulatory and support roles. According to Agyenim and Gupta (2012) the approach to Integrated Water Resource Management (IWRM) in Ghana involves delegating power and competencies to the local people to plan and implement decisions. This process also includes the integration of the different uses and users of water and the sectors controlling the use of water in decision making (Odame-Ababio, 2003). This was different in the three communities as findings suggests that, no such consultations for the Riparian Buffer Zone Policy have been held in the three communities, thus the low awareness. Stakeholders’ collaboration and involvement in

governance is increasing for integrated and adaptive management to water resources globally (Pahl-Wostl *et al.*, 2007). This involvement is needed to help cope with the complexities that normally exist in social and ecological systems in water management (Pahl-Wostl *et al.*, 2007; Odame-Ababio, 2003; Agyenim & Gupta, 2012).

During the study, respondents made some suggestions to help ease the implementation process of the Riparian Buffer Zone Policy in their communities. These were put together and termed “modifications”. Some of these “modifications” in practice however, would not help in the successful implementation of the policy. Wiggins *et al* (2004), Colchester (2004), Nagendra (2008) and Andam (2008) reported that in implementing policies to manage the environment, there is the likelihood for some cost to be felt by the poor in rural areas. When this happens, local people deliberately contravene the policy measure in order to defend their livelihoods. Schelles and Pfeffer (2009) explained further that, when livelihood options for people are denied, they may choose livelihood values over environmental values and oppose conservation. This can be said to be similar in the three communities as respondents made suggestions (as forms of modifications) that deliberately contradict the Riparian Buffer Zone Policy implementation processes. Furthermore, some authors say when local communities’ expectations in natural resources policies contradict the interest of management; the result is failure in implementation (Akama *et al.*, 1995; Infield & Namara, 2001; Wiggins *et al*, 2004; Vermeula & Cotula, 2010; Collier, 2003). For example: Akama and others (1995) examined the social issues between local small scale cultivators and park officials of Tsavo National park in Kenya. Their study revealed negative feelings existed about the program from the locals which led to an unsuccessful conservation program

implementation in the area. Similarly, Infield and Namara (2001) examined the success of a Forest policy in Uganda where the intervention failed because local expectations were not met in relation to access to the Forest resources by local people in affected communities.

From the research findings, there was a general expectation among respondents for rewards from the implementation of the Riparian Buffer Zone Policy in the three communities (Charkroborty, 2001; Kellert, *et al.*, 2000). Respondents expect the implementation of the policy to come with some benefits for affected communities (Parry & Campbell, 1992; Vermeula & Cotula, 2010; Wiggins *et al.*, 2004; Kellert, *et al.*, 2000). The three communities had received some compensation for the already existing bye-laws from the Wechiao Hippopotamus Sanctuary Management. The provision of boreholes is one of the compensations given to the people. From discussions, respondents see it as a form of motivation for compliance and also, it helps reduce the frequency of visits to the river by respondents for water for domestic related activities. This according to Agyepong and Adjei (2008) reduces human interference at the river since water is a basic necessity (Maze-Hausken, 2000) that compels households to visit the river often.

#### **5.4 Communities dependence on the Black Volta and the implications of implementing the Riparian Buffer Zone Policy for their livelihoods**

Natural capital which refers to the natural resource stock available and accessible to people to give them choices in deciding their strategies to meet their livelihood goals (DFID, 1999; Davies & Bennet, 2007); has been seen as the most important asset or resource for rural livelihoods (Lovette & Ockwell, 2010; Khan & Bagwat, 2010; DFID, 1999) in the three communities due to the low availability of financial capital (cash).

Assan and Kumar (2009) stated that, rural poor are more dependent on their surrounding ecosystems for products and services to cater for their various needs including food, fuel, shelter, water and medicine. The findings from the three communities were similar as many respondents depended on natural resources for their livelihoods (Wiggins *et al.*, 2004; Berkes, 2004; Khan & Bagwat, 2010). The livelihood activities included crop farming, livestock production, fishing and charcoal production. The natural resources in relation to the Black Volta that contributes to respondents' livelihoods in the three communities were forest/agricultural land and the river water (Assan & Kumar, 2009; Lovette & Ockwell, 2010). It was observed that access and use of these natural resources is a very important factor in the building of livelihoods in the three communities (Khan & Bagwat, 2010; DFID, 1999).

Respondents in the three communities depend on the river for potable water and for other domestic uses. In Ghana, rural communities have traditionally relied on surface and groundwater sources for their water supply needs (Gyau-Boakye, 2001; MWRWH, 2013; Odame-Ababio, 2003). Besides the collection of rain, the non-existence of improved water sources in some rural areas compels households to use of surface sources including rivers and streams for all domestic uses (Gyau-Boakye, 2001). This was similar in the three communities, where about 35% of respondents depended on the river for domestic water supply (Dapaah-Siakwan & Gyau-Boakye, 2000; Odame-Ababio, 2003). Fishing and oyster harvesting are done in the Black Volta River by respondents in the three communities for both subsistence and commercial purposes as seen in many riparian communities (Assan & Kumar, 2009; Ekins *et al.*, 2003; Richter, *et al.*, 2003; Yang *et al.*, 2003). Fish and oysters are sources of protein for the respondents in the three

communities (Yaro, 2006; Assan & Kumar, 2009). With the exception of food, about 15% of surveyed respondents fish regularly at the river as a source of income (Richter *et al.*, 2003). Only women and children were observed to have engaged in the harvesting of oysters at the Black Volta in the three communities. This is a form of income diversification for women (Akudugu *et al.*, 2012; Yaro, 2006; Nicol, 2000), particularly in the dry season in the three communities. According to the women, the oysters harvested are processed for sale as food without the shells. The shells are also sold separately for cash (Doss, 2001; DFID, 1999; Rakodi, 2000).

From the research findings, livestock production was common and an important livelihood activity in all three communities that depended on the Black Volta. Yang *et al.*, (2003) reported that on the average, agriculture uses about 70% of the total water withdrawals from natural sources, making it the largest water user among all sectors globally. This includes livestock rearing; especially in Africa and Asia where the activity is highly dependent on water from natural flows like rivers, lakes and streams for animal watering. Respondents in all three communities depend on the river for animal watering (Yang *et al.*, 2003; Parry & Campbell, 1992). From discussions with respondents, cattle are mostly watered at the river (Hesselberg & Yaro, 2006; Yang *et al.*, 2003). Other livestock like sheep and goats can be easily watered with water fetched from the river or other sources. None of the study communities had an alternative watering point for livestock than the Black Volta River (Yang *et al.*, 2003). Restrictions in the three communities on animal watering at the Black Volta during policy implementation process without any alternative watering points would bring about difficulty in livestock

production (Nicol, 2000; DFID, 1999; Yang *et al.*, 2003). This will impact on livelihoods of the people (Niehof, 2004; Yang *et al.*, 2003; DFID, 1999).

Land is an important natural resource to rural people (DFID, 1999). From findings, the sale of land is not a commercial activity in the District and for that matter in the three communities. Lands are customarily owned by the “Tendaana” (land custodian) but belong to clans or families (Assembly man of Wechiao, personal communication, 22/03/15). Land basically is accessible to everyone since everyone belongs to a family (household), except for non-natives in the communities (Abdul-Korah, 2006, Yaro, 2006; Akudugu *et al.*, 2012). Non-natives can only have access to land as gifts from owners but cannot buy them. Family lands are shared among members for farming activities in the three communities (Abdul-Korah, 2006; Yaro, 2006; Yaro, 2002). Lands along the Black Volta in all three communities belong to families and are used as agricultural lands (Yaro, 2006). From the study, 10% of respondents own lands along the Black Volta. Farmlands for respondents in all the communities are usually in pieces (Hesselberg & Yaro, 2006; Abdul-Korah, 2006) and at different locations. According to respondents, they choose what crop to cultivate on each piece of land depending on the nutrient levels of the soils. This agrees with Abdul-Korah (2006) who stated that, people choose to cultivate a particular crop depending on soil nutrients in rural northern Ghana. From findings, out of those who owned lands along the Black Volta River, 24% of them cultivated crops on them. This finding agrees with Kangalawe and Liwenga (2005) who stated that, wetlands and flood plains are seen as fertile grounds for the cultivation of crops for food in rural communities, especially in Africa and Asia.

From findings in the three communities, respondents mainly eat what they produce from their farms (Aduah & Aabeyir, 2012; Dei, 1994; Niehof, 2004; Yaro, 2006). Families that would lose lands through the policy implementation process would have less space to farm on, meaning less food for affected households (Nega *et al.*, 2003; Kangalawe & Liwenga, 2005). Food quantity and quality are likely to be affected by policy implementation in the three communities as reported by Alcorn (1993), Wiggins *et al.* (2004), and Kangalawe and Liwenga (2005) in their policy impacts studies. Policy implementation process might affect farming activities in the communities (Nicol, 2000) as land sizes may decrease, the complete loss of farmlands and in some cases, may lead to shorter fallow periods which in turn results in declining soil nutrients (Nega *et al.*, 2003).

It was also revealed by respondents during the research in the three communities that farming at the river side is done only in the rainy seasons. During the dry seasons, water levels in the Black Volta get very low (WWDA, 2010) which makes manual watering of plants difficult due to steep slopes of the river banks. Water pumps are alternatives to pump water up to the banks of the river for plant watering. This is cash intensive (Assan & Kumar, 2009) for respondents since one needs diesel powered generators to power the pumps, making dry season farming less attractive for people (Assembly man of Wechaio, personal communication, 22/03/15). The Wa West District Assembly therefore, as part of its jobs creation for the youth to reduce seasonal migration (Abdul-Korah, 2006; WWDA, 2010), have planned to construct water reservoirs from feeder tributaries of the Black Volta and along the banks of the Black Volta for irrigation farming during the dry season. Also, there are plans to construct reservoirs at the banks of the Black Volta River to

retain flood waters for dry season farming in communities along the Black Volta in the District (Madison Iddrisu, personal communication, 25/03/15).

According to Yang *et al.* (2003), lands along Rivers serve as grazing fields for livestock. In this study, some portions of the flood plains were also observed to be grazing fields for livestock in all three communities, especially during the dry season when river banks still have some moisture in the soils. Besides grazing lands, the forest serves as source of non-timber forest products for respondents (Carr & Mc Cusker, 2009; Vleg & Steg, 2007). Respondents obtain their main cooking fuel which is wood (88%) from nearby forest (Amoah & Wiafe, 2012). Herbs and wild vegetables are also searched for and harvested in surrounding bushes and forest (Wiggins *et al.*, 2006; Colchester, 2004) including the forest along the Black Volta. Respondents also revealed that spiritual worship was an important activity at the Black Volta River in all communities as indicated by Postel (2000), who said Rivers are spiritual symbols. The Black Volta also served as a means of transportation to and fro neighboring Burkina Faso for economic activities (WWDA, 2010; Postel, 2000; Postel & Thompson, 2005).

According to Andam (2008) and Campo (2011), the potential impact of protected areas on livelihoods of local communities is one of the important issues among experts in conservation biology and poverty alleviation. Previously, assessments of the impacts of protected areas through policies/programs have been based on findings that, communities living in or around these conserved areas tend to become poorer or face hardships due to a particular policy (Soun *et al.*, 2014). Protected areas however, may tend to give some social and economic benefits or outcomes (Andam, 2008; Soun *et al.*, 2014; Campo, 2011) to participating communities and also lead to environmental improvements for local

livelihoods (Scherr, 2000; Matse *et al.*, 2013; Soun *et al.*, 2014). The successful implementation of the Riparian Buffer Zone Policy can produce such benefits for participating communities. The policy implementation will help enhance and maintain the natural functions (Moran *et al.*, 2008; Postel, 2000; MWRWH, 2013) of the river, which in turn will improve local livelihoods dependent on it (Kangalawe & Liwenga, 2005; Yang *et al.*, 2003). Growing demands for water is on the high (Postel, 2000; Dapaah-Siakwan & Gyau-Boakye, 2000) as many fresh water bodies get contaminated from improper agricultural practices and rural domestic uses (Postel, 2000; MWRWH, 2013); they therefore need to be protected (Poestel, 2000). Also, Maste *et al.* (2013) stated that rural livelihoods have a direct linkage with water. Access to good quality water from a reliable source significantly enhances households' social and economic growth. Similarly, Clement *et al.* (2010) also reported from their study that, protected fresh water areas in Cambodia made local people in those areas better off as the resource base and water improved with the implementation of conservation policies.

Environmental policies, besides enhancing the resource base, also give some economic opportunities like jobs from the implementers (Andam, 2008; Clement *et al.*, 2010; Campo, 2011). Local people may gain some form of employment in the three communities during policy implementation process. For example, some community members could be employed as range officers (Campo, 2011) to monitor activities at the parts of the Black Volta River that will be demarcated for protection by the policy (Andam, 2008). Also, part of the Black Volta running along the three communities is an ecotourism site and the effective implementation could improve the tourist site. This could in turn give economic opportunities (Akama *et al.*, 1995; Clement *et al.*, 2010;

Infield & Namara, 2001) for the locals as tour guides in the three communities and economic returns to the government as well.



## CHAPTER SIX

### 6.0 Conclusions and Recommendations

#### 6.1 Introduction

In this final chapter, a summary of the research and an overview of the main findings are presented. The conclusions and recommendations are also presented.

#### 6.2 Key findings

The research was centered on the sustainability theory. Also, it centered on the principles guiding integrated water resources management and the need for sustainable uses of water resources. It also focused the Sustainable Livelihood framework which explains the relationship between assets availability and livelihoods activities/options of rural people. The Riparian Buffer Zone Policy is a harmonized policy tool to manage and protect fresh water bodies in Ghana. For development to be sustainable, the systems that up every society must all function effectively; these are the social, environmental and economic systems. Water is a basic need and rural people depend on water resources for various benefits. The research was therefore conducted to evaluate the potential impacts of the implementation of the policy on livelihoods. The focus for data collection was in three communities along the Black Volta in the in the Wa West District. Primary and secondary data were collected with appropriately designed techniques and findings presented.

Respondents in the three communities depended highly on natural resources for their livelihoods, particularly for income. The main income sources of respondents in the communities included: crop production, livestock production, charcoal production,

fishing, and trading; with majority (63.7%) depending on crop production as their primary income source. The main source of drinking water in all three communities was machine drilled boreholes. About 80% of respondents in the three communities depend on the water resources from the Black Volta for several livelihood activities. Besides crop cultivation, forest lands along the Black Volta served as grazing fields for livestock in all three communities. Respondents (93%) of the three communities were not aware of the Riparian Buffer Zone Policy. However, about half (51%) of respondents stated they would comply with the policy while, 27% of respondents stated they would demand compensation from implementers before they comply. The remaining (15%) indicated they would do as told by their Chiefs. Majority of respondents (64%) predicted the implementation of the policy would impact on food availability and on incomes in the three communities. The study revealed that, the implementation of the Riparian Buffer Zone Policy will highly affect food availability, mostly crops and livestock due to loss of grazing and farmlands in the three communities.

### **6.3 Conclusions**

The following conclusions are made based on the findings of the research in the three selected communities;

- Respondents in the three communities largely depend on natural resources, including those at the Black Volta for their livelihoods
- The implementation of the Riparian Buffer Zone Policy will highly affect agricultural activities, particularly livestock production and crop production in the three communities

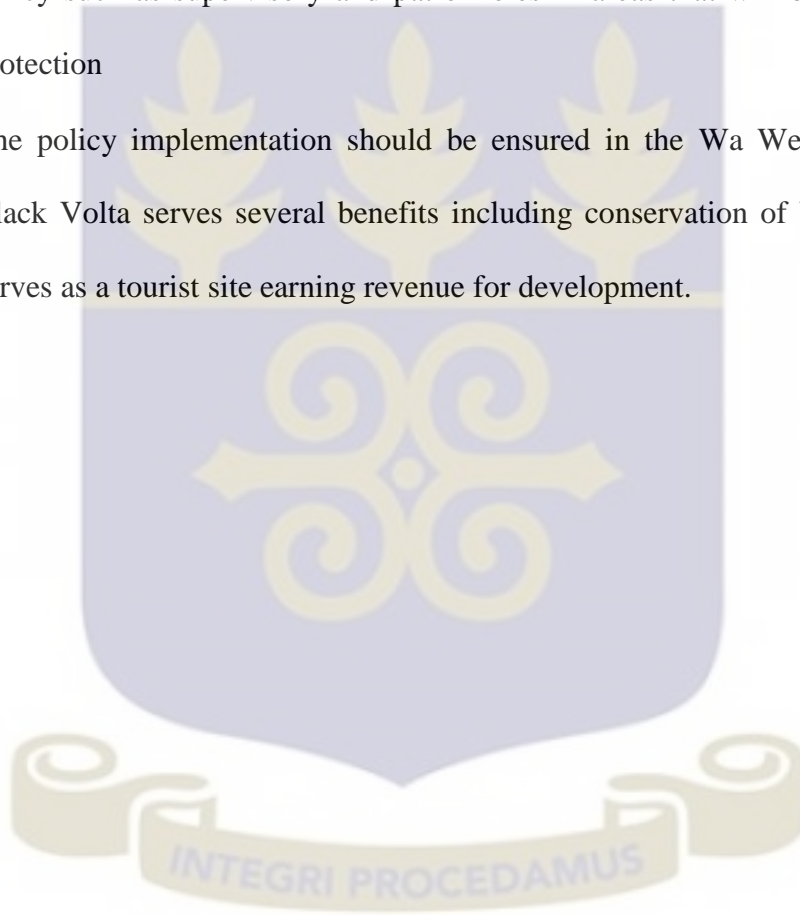
- Respondents in the three communities were not aware of the Riparian Buffer Zone Policy and its implementation processes
- Potential impacts of implementing the policy in the three communities would largely be on access and use of the natural resources at the Black Volta by people in the communities.
- Respondents in the three communities expect some forms of compensation for affected households and participating communities during the implementation process.

#### **6.4 Recommendations**

Based on the above conclusions, the following are recommended for the implementation of the Riparian Buffer Zone Policy;

- Alternative livelihoods in the form of employment opportunities should be provided by the implementing institution through the District Assembly for people in the communities particularly households that would be affected by implementation of the policy.
- Intensive awareness creation by all stakeholder institutions involved is needed in the District on the Riparian Buffer Zone Policy and its implementation processes particularly on the Black Volta
- Land compensation for households that would lose lands from the implementation process would be most appropriate in the District. Extensive consultation with traditional authorities through the District Assembly would help achieve this.

- Other forms of compensation would encourage participation and compliance, particularly boreholes which were mostly suggested by surveyed respondents in the communities during the study
- Local level participation in the communities will be encouraged by giving ownership to the people in the form of roles in implementation process of the policy such as supervisory and patrol roles in areas that will be demarcated for protection
- The policy implementation should be ensured in the Wa West District as the Black Volta serves several benefits including conservation of Wildlife and also serves as a tourist site earning revenue for development.



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## APPENDICES

### Appendix A

#### UNIVERSITY OF GHANA- LEGON

#### MPHIL.CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT

**TOPIC:** *EVALUATION OF THE POTENTIAL IMPACTS OF THE RIPARIAN BUFFER ZONE POLICY ON THE LIVELIHOODS OF PEOPLE IN COMMUNITIES ALONG THE BLACK VOLTA IN THE WA WEST DISTRICT.*

#### Household Questionnaire

*This research is mainly for academic purpose. Therefore, answers given will be treated as confidential.*

*Thank you.*

#### Section A: Demographics

1. Name of Interviewee:  
.....
2. Date of interview :  
.....
3. Name of community :  
.....
4. Age: ..... (i) 15- 25yrs (ii) 26-35yrs (iii) 36- 45yrs (iv) Above 45      5.  
Sex: (i) Male (ii) Female
6. How many children do you have? (i) None (ii) 1-3 (iii) 4-6 (iv) more than 6
7. Are your children in school? (i) Yes (ii) No  
  
If yes, how many of them are in school? (i)One (ii) Some of them (iii) All of them
8. Level of education: (i) None (ii) primary (iii) JHS/Middle school (iv) SHS/ Secondary (v) A/O level (vi) Tertiary
9. Marital Status: (i) single (ii) Married (iii) Divorced (iv) Widowed
10. How long have you lived in the community? (i)less than 1 year (ii) 1-4yrs (iii) 5-7yrs (iv) > 7yrs

11. What is your reason for being here?
- (i) Was born here
  - (ii) Here to farm
  - (iii) Married and moved here
  - (iv) On a visit for a time period
  - (v) Here to work
12. How many people are in your household? (i) Just me (ii) 2-6 (iii) 7-10 (iv) More than 10

**Section B: Socio- Economic Status of the people**

13. What is your primary source of income? (i) Crop farming (ii) livestock production (iii) charcoal production (iv) Oyster harvesting (v) Fishing (vi) Black smith (vii) Weaving (viii) Carving

(ix) Other, specify.....  
 .....

14. What is your secondary source(s) of income? Please tick from the table below

(i) Crop farming	
(ii) livestock production	
(iii) charcoal production	
(iv) Oyster harvesting	
(v) Fishing	
(vi) Trading	
(vii) Other, specify	

15. Of the crops you cultivate, which one is the most important to you and your family? Please tick (✓) from the list below the 3 most important crops

(i) Guinea corn	
(ii) Maize	
(iii) Yam	
(iv) Millet	
(v) Cowpea	
(vi) Rice	

16. How large is your farm? (i) 1-5 acres (ii) 6-10acres (iii)11-15 (iv) 16-20 (v) more than 20
17. Do you have more than one farm land? (i) Yes (ii) No
18. How did you acquire your land(s)? (i) Family land (ii) land on lease (iii) bought it (iv) Gifted to me (v) Other, specify.....
19. Do you own the house you live in? (i) Yes (ii) No
20. What type of house do you live in (i) compound family house (ii) Detached house
21. How many rooms are in your house? (i) 1 (ii) 2 (iii) 3 (iv) 4 (v) 5 (vi) more than 5
22. What is your house built of? (i) Cement blocks (ii) Mud (iii) Partly mud, partly cement blocks
23. What type of roofing do you have for your house? (i) Aluminum (ii) thatch/grass (iii) Mud (iv) Partly Aluminum, partly mud
24. What is your family's source of food? (i) Produce it ourselves (ii) buy from the market (iii) Both
25. How many farming seasons do you have in a year? (i) One (ii) two
26. Do you own any of the following? (i) Bicycle (ii) Phone (iii) Motorcycle (iv) Bicycle & Phone (v) Motor & Phone (vi) Bicycle and motorcycle (vii) Motorcycle, bicycle & phone (vii) other, specify.....

**Section C: Social Services Available in the community**

27. What is the source of drinking water in the community? (i) Pipe born (ii) bore hole (iii) well (iv) River/Stream (v) others, specify.....
28. Are there schools in the community? (i) Yes (ii) No ( 28b) If yes, please indicate the schools you have by ticking [ $\sqrt{\quad}$ ] from the table below

(i) Primary	
-------------	--

(ii) JHS	
(iii) Primary and JHS	
(iv) SHS	
(v) Tertiary	

29. Is there a health facility in the community? (i) Yes (ii) No,  
If yes, what type of facility is it? (i) Clinic (ii) maternity home (iii) hospital  
(iv) Traditional healing house (herbal)
30. How far is the facility from your home? (i) <1km (ii) 1-5 km (iii) 6-10km (iv) > 10km
31. Do you have electricity in your community? (i) Yes (ii) No
32. What type of fuel do you use for cooking? (i) Wood (ii) Charcoal (iii) Wood & Charcoal (iv) LPG

**Section D: Employment/ Financial Status of the people**

33. What is your current employment status? (a) Self employed (b) employed by government (c) not employed
34. What is your main occupation? (i) Farming (ii) Fishing (iii) Carving (iv) Weaving/Spinning (v) Black Smith (vi) Charcoal production (vii) Trading (viii) other, specify.....
35. Do you have savings? (i) Yes (ii) No If yes, where do you keep it? (i) At home (ii) with a financial institution (iii) with a friend (iv) other, specify.....

**Section E: Community's Awareness of the Policy**

36. Do you know about the Riparian Buffer Zone Policy (RBZP)? (i) Yes (ii) No  
36b. If yes, what is it? Explain what you know about the policy (i) Farming not allowed at the river side (ii) Don't clear vegetation at river side (iii) No use of fertilizers at farms close to river
37. How did you hear about it? (i) Radio (ii) town announcement (iii) District Assembly (iv) Now finding out about it (v) Family member (vi) other, specify.....
38. What modification would you like to add to make to the policy for implementation? (i) Allow farming (ii) Provision of mini dams for communities

- (iii) Provision of alternative farm lands (iv) Provide bore holes for communities
- (v) Provide fertilizers for farming season

**Section F: Implications of Policy if implemented on the livelihoods of the people**

39. Do you farm by the river side? (i)Yes (ii) No
- 39b. If yes, how did you acquire it? (i) Family land (ii) Land on lease (iii) Bought it (iv) Gift (v) other, specify.....
40. Which season in the year do you farm there? (i) Dry Season (ii) Rainy Season (iii) all year
41. How often do you go to the river side? (i) Everyday (ii) Once a week (iii) when I feel like it (iv) When there is the need (v) other, specify .....
42. What do you go to do? (i) to the farm (ii) Watering of animals (iii) fishing (iv) Oyster harvesting (v) To fetch water (vi) other, specify .....
43. Do you keep livestock? (i) Yes (ii) No
- 43b. If yes, what kind of livestock do you keep? (i) Cattle (ii) Sheep (iii) Goats (iv) Pigs
- How many do you have? Tick in the table below

Type of Livestock	< 10	11-20	21-40	41-60	>60
(i) Cattle					
(ii) Sheep					
(iii) Goats					
(iv) Pigs					
(v) Fowls					

44. Why do you keep the livestock? (i) To sell for income (ii) for family consumption (iii) for social security (iv) Both for sale and family consumption (v) other, specify.....

45. How do you feed your livestock? (i) Free range (ii) cultivated feed (iii) other, specify.....
46. How do you water your livestock? (i) Take animals to the river side (ii) Transport water from the River to housing of animals (iii) Create watering ponds close to animal housing
47. What in your opinion will be the general impacts of the policy implementation on your family? Please tick [ $\sqrt{\quad}$ ] in the table below

(a) it will affect the availability of food	
(b) it will affect animal watering	
(c) it will affect fishing at the river side	
(d) it will affect family's income	

- (i) a and b (ii) a and c (iii) a, b and c (iv) b and c (v) c and d (vi) a and d (vii) All

48. What will the community do about the policy if effectively implemented? (i) Comply (ii) Listen to chief and authority and do as they say (iii) Make demands and then comply (i) other, specify .....
49. Are there any existing regulations in relation to activities at the River side? (a) Yes (b) No
- 49b. If yes, what were they? (i) No cutting of trees (ii) No farming (iii) No hunting (iv) All of the above

**Section F: Community Dependence on Water Resources**

50. Do you depend on the river for any activity? (i) Yes (ii) No
51. What do you depend on the river for? (i) Water supply for domestic use (ii) dry season farming (iii) animal watering (iv) Fishing / fish production (v) Oyster harvesting (vi) food supply (vii) Housing construction (viii) other, specify.....
52. If policy is effectively implemented, will it affect any daily or regular activity? (i) Yes (ii) No
53. Please specify the activity (I) Farming (ii) Watering of animals (iii) Oysters harvesting (iv) Fishing (v) Water fetching for domestic use

54. How will the policy implementation affect this/ these activities? (i) Difficulty in animal watering  
(ii) Affect water availability (iii) Less food for family (oysters, farming. Fishing)  
(iv) Less money for family



**Appendix B**

**UNIVERSITY OF GHANA- LEGON**

**MPHIL.CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT**

**TOPIC:** *EVALUATION OF THE POTENTIAL IMPACTS OF THE RIPARIAN BUFFER ZONE POLICY ON THE LIVELIHOODS OF PEOPLE IN COMMUNITIES ALONG THE BLACK VOLTA IN THE WA WEST DISTRICT.*

**Focus Group Discussions Checklist**

**Name of community:** .....

**Date of discussion:** .....

**Socio economic status of People**

1. How is your yearly calendar for farming?
2. What are the sources of income, which is the most important and why?
3. What are the social amenities or services available in your community? Is what you have available enough? : Water supply, schools, clinics, infrastructure, market, etc.
4. What are the crops you cultivate? Which of them are very important and why?

**Dependence of People on the Water Resources**

5. What are some of the activities you carry out at the river side?
6. How important are these activities at the river side to you?
7. How often do you carry out these activities?

**Community's awareness of the Buffer Zone policy and its Implementation**

8. Are there any regulations in the community about the river?
9. Do you know about the buffer zone policy? How do you understand it? How did you hear about it?
10. Modifications on the policy implementation

**Implication of Policy Implementation on the livelihoods of the people**

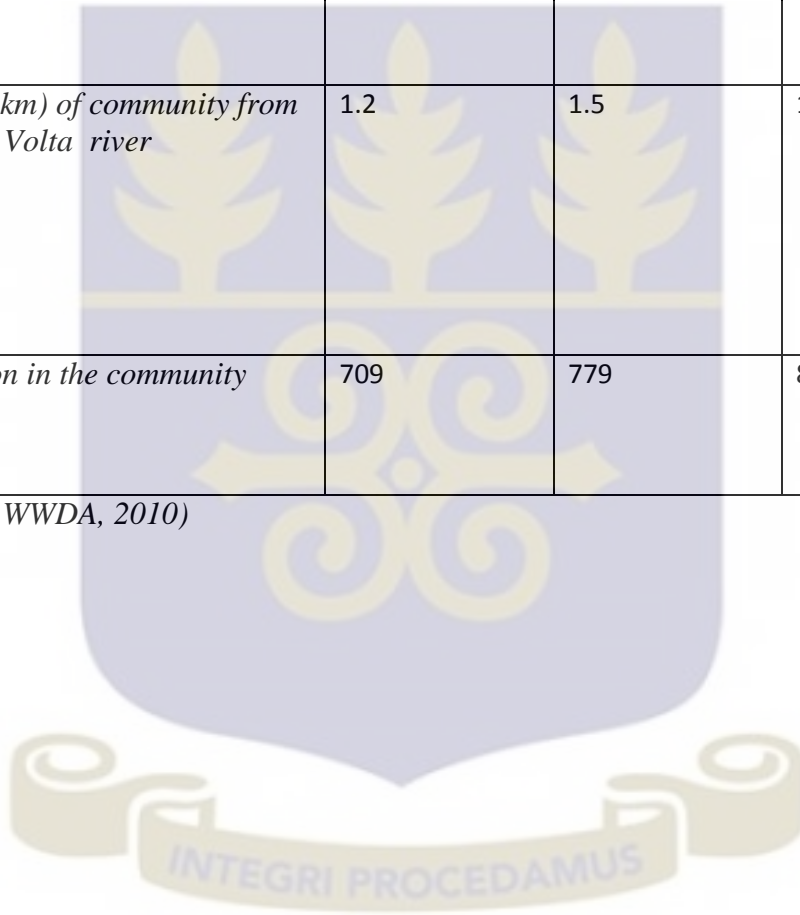
11. How will you be affected if the policy is implemented?
12. What will change in your families?
13. What will change in the community?
14. What will be implications of the policy implementation on your livelihood?

**Appendix C**

**Characteristics of study communities**

Characteristic	Study Community		
	Kantu	Kpanfaa	Toulle
<i>Distance(km) from Wechiao, the district capital</i>	4.8	8.5	8.9
<i>Distance(km) of community from the Black Volta river</i>	1.2	1.5	1.0
<i>Population in the community</i>	709	779	871

(Source: WWDA, 2010)



**Appendix D**

**Respondents for primary data collection**

Sample Population	Methods of data collection	Type of data collected	No. of Respondents
Household members 15years and older	Questionnaire survey	-demographics -employment/financial status -socio economic status -policy implications on livelihoods -social services availability -policy awareness and its implications -dependence on water -pre existing regulations	1. Kantu=58 2. Kpanfaa = 65 3. Tuolle = 70
Key informants from stakeholder institutions	Face to face interviews	-awareness of policy -potential impacts of policy implementation in the sector -pre existing regulations	1.District Agric extension officer 2. Assembly man 3.District NADMO Officer 4.Human Resource/ information district officer 5.The manager, Wechiao Hippo Sanctuary
Focus group discussions	In-depth discussions	-community's dependence on water -community's awareness of policy -potential impacts of policy( income, food security)	Focus group discussions a. <b>Kantu</b> Male group=7 Female group=4 Mixed group=5 b. <b>Kpanfaa</b> Male group=6 Female group =0 Mixed group=8 c. <b>Tuolle</b> Male group= 7 Female group=4 Mixed group= 7
<b>Total No. of Respondents</b>	1. Focus Groups= 48 participants 2.Household survey= 193 3.Key informants = 5		

(Source: author, 2015)

## Appendix E

Pictures from the study communities



Plate 1: Participants of a focus group discussion (All male) in Toulle community (Source: author, 2015)



Picture 2: Focus group discussion in Kpanfaa community (male and female) (Source: author, 2015)



Picture 3: Cattle grazing on lands along the Black Volta River in Kpanfaa community (Source: author, 2015)



Picture 4: The Black Volta in Kantu Community (Source: author, 2015)



Picture 5: Vegetation along the Black Volta in Toulle community (Source: author, 2015)



Picture 6: Trees cut for fuel for cooking along the Black Volta in Kpanfaa community  
Source; author, 2015)



Picture 7: A thatch roofed compound house in Kantu Community (Source: author, 2015)



Picture 8: Households fetching water from the Black Volta River (Source: author, 2015)



Picture 9: A passenger being transported on the Black Volta River in Kantu community to neighboring Burkina Faso (Source: author, 2015)



Picture 10: Domestic activities at the Black Volta in Kpanfaa community (Source: author, 2015)

**APPENDIX F**

**Frequency Tables showing Chi square test results from data analysis**

**I. The difference in the number of respondents among three employment categories**

**What is your current employment status?**

	Observed N	Expected N	Residual
Self employed	15	64.3	-49.3
Employed by government	10	64.3	-54.3
Not employed	168	64.3	103.7
Total	193		

**Test Statistics**

What is your current employment status?	
Chi-Square	250.767 <sup>a</sup>
df	2
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 64.3.

**II. Employment status depended on the ages of the respondents**

**What is your current employment status? \* Age group Crosstabulation**

Count		Age group				Total
		15-25yrs	26-35yrs	36-45 yrs	Above 45yrs	
		What is your current employment status?	Self employed	9	5	
	Employed by government	5	5	0	0	10
	Not employed	37	35	53	43	168
Total		51	45	53	44	193

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.333 <sup>a</sup>	6	.000
Likelihood Ratio	33.177	6	.000
Linear-by-Linear Association	18.531	1	.000
N of Valid Cases	193		

a. 8 cells (66.7%) have expected count less than 5. The minimum expected count is 2.28.

**III. Employment Status was related to education attained by respondents**

**Level of education \* What is your current employment status? Crosstabulation**

Count		What is your current employment status?			Total
		Self employed	Employed by government	Not employed	
Level of education	none	5	1	132	138
	primary	4	0	12	16
	JHS/ Middle school	5	0	17	22
	SHS/ Secondary school	1	4	4	9
	A/O Level	0	0	2	2
	Tertiary	0	5	1	6
Total		15	10	168	193

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.281E2 <sup>a</sup>	10	.000
Likelihood Ratio	63.332	10	.000
Linear-by-Linear Association	22.118	1	.000
N of Valid Cases	193		

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.281E2 <sup>a</sup>	10	.000
Likelihood Ratio	63.332	10	.000
Linear-by-Linear Association	22.118	1	.000

a. 11 cells (61.1%) have expected count less than 5. The minimum expected count is .10.

**IV. D. The difference in the number of female to male ratio who had savings**

**Sex \* Do you have savings? Crosstabulation**

Count		Do you have savings?		
		No	Yes	Total
Sex	female	58	34	92
	Male	66	35	101
Total		124	69	193

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.111 <sup>a</sup>	1	.739		
Continuity Correction <sup>b</sup>	.034	1	.855		
Likelihood Ratio	.111	1	.739		
Fisher's Exact Test				.765	.427
Linear-by-Linear Association	.111	1	.739		
N of Valid Cases <sup>b</sup>	193				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 32.89.

b. Computed only for a 2x2 table

**V. Difference in the number of respondents who were aware of the Riparian Buffer Zone Policy**

**Do you know about the Riparian Buffer Zone Policy?**

	Observed N	Expected N	Residual
No	179	96.5	82.5
Yes	14	96.5	-82.5
Total	193		

**Test Statistics**

Do you know about the Riparian Buffer Zone Policy?	
Chi-Square	141.062 <sup>a</sup>
df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 96.5.

**VI. Difference in the number of people who stated they would comply with Policy and those who stated otherwise**

**What will the community do about the policy if effectively implemented?**

	Observed N	Expected N	Residual
Comply	99	48.2	50.8
Listen to chief and authority and do as they say	29	48.2	-19.2
Make demands and then comply	53	48.2	4.8
other, specify	12	48.2	-36.2
Total	193		

**Test Statistics**

	What will the community do about the policy if effectively implemented?
Chi-Square	88.762 <sup>a</sup>
df	3
Asymp. Sig.	.000

- a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 48.3.

## VII. The difference in the number of respondents who depended on the Black Volta River

Do you depend on the river for any activity/ anything?

	Observed N	Expected N	Residual
No	39	96.5	-57.5
Yes	154	96.5	57.5
Total	193		

**Test Statistics**

	Do you depend on the river for any activity/ anything?
Chi-Square	68.523 <sup>a</sup>
df	1
Asymp. Sig.	.000

- a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 96.5.

**VIII. The difference in the number of respondents who farmed at the river side compared to those who did not**

**Do you farm by the river side?**

	Observed N	Expected N	Residual
No	147	96.5	50.5
Yes	46	96.5	-50.5
Total	193		

**Test Statistics**

Do you farm by the river side?	
Chi-Square	52.855 <sup>a</sup>
df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 96.5.

**IX. The difference in the number of respondents among the three forms of land ownership**

**How did you acquire the land (s)**

	Observed N	Expected N	Residual
Family land	161	96.5	64.5
Gifted to me	32	96.5	-64.5
Total	193		

**Test Statistics**

How did you acquire the land (s)	
Chi-Square	86.223 <sup>a</sup>
df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 96.5.

**X. The difference in the number of respondents among the given reasons for livestock production**

**Why do you keep livestock?**

	Observed N	Expected N	Residual
To sell for income	126	38.2	87.8
For family consumption	2	38.2	-36.2
For social security	1	38.2	-37.2
both for sale and consumption	11	38.2	-27.2
not applicable	51	38.2	12.8
Total	191		

**Test Statistics**

	Why do you keep livestock?
Chi-Square	295.990 <sup>a</sup>
df	4
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 38.2.

