

UNIVERSITY FOR DEVELOPMENT STUDIES

THE CONTRIBUTION OF SMALL - SCALE IRRIGATION SCHEMES TO  
THE LIVELIHOODS OF RURAL WOMEN IN SANKANA AND  
DAFFIAMA IN THE NADOWLI DISTRICT

BY

MORNAH BUOANKPE THOMAS

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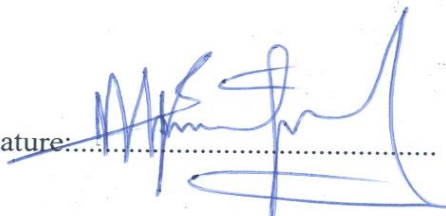
JUNE, 2011



### Declaration

I declare that this dissertation is the result of my own original work and that no part of it has been presented for another degree in this University or elsewhere:

Candidate's Signature:.....



THOMAS BUOANKPE MORNAH

Date.....24-11-2011

### Supervisor's Declaration

I declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the University for Development Studies.

Supervisor's Signature:.....



Dr. Kanton I. Osumanu

Date.....24/11/2011



## ABSTRACT

This study examines the contribution of small-scale irrigation to the livelihood of rural women in the Nadowli District of the Upper West Region. The case study approach was used focusing on Sankana and Daffiama small scale irrigation schemes. Data collection techniques included questionnaire administration, focus group discussions and personal interviews. The main findings of the study were that: customs and tradition prevent women from participation in the management of irrigation facilities. Hence their involvement in the management of irrigation facilities through the water users associations is minimal. There is also bias against women when it comes to access to and use of land and other irrigation facilities. The study further revealed that Irrigation contributes enormously to the livelihood of rural women through food security and income generation. Conditions under which irrigation as a business can be promoted include encouraging women's active participation in the management of irrigation facilities such that they will be part of the decision-making process, ensuring independent access and use of irrigable land, and providing financial assistance to women to boost their farming activities.



## ACKNOWLEDGEMENTS

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## DEDICATION

This work is dedicated to my wife, Florence, my two lovely daughters; Theodora Kaaramwine, Thelma Mwinmantire, and also to my mother.

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## LIST OF ACRONYMS

CRS.....	Catholic Relief Services
CCEIR.....	Centre for Continuing Education and Interdisciplinary Research
DA.....	District Assembly
FABS.....	Food and Agriculture Budget Support
FAO.....	Food and Agricultural Organisation
GIDA.....	Ghana Irrigation Development Authority
GPRS.....	Ghana Poverty Reduction Strategy
ISSER.....	Institute of Social, Statistical and Economic Research
IDA.....	Irrigation Development Authority
IFAD.....	International Fund for Agricultural Development
JICA.....	Japan International Cooperation Agency
INPIM.....	International Network on Participatory Irrigation Management
LAC.....	Land Allocation Committee
MOFA.....	Ministry of Food and Agriculture
NGO.....	Non – Governmental Organisation
PRS.....	Poverty Reduction Strategy
SSA.....	Sub-Saharan Africa
SPSS.....	Statistical Package for Social Sciences





TA.....Traditional Authority

UWADEP..... Upper West Agriculture Development Project

UWR.....Upper West Region

WAEJ..... West African Economic Journal

WUA.....Water Users' Association

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the Study

Agriculture has always been important and continues to play a central role in the socio-economic lives of many Ghanaians. The sector employs more than half the population on a formal and informal basis and accounting for almost half of GDP and export earnings (GoG/NDPC, 2005). Agriculture's contribution to foreign revenue also increased from 33.9% in 2001 to 35.3% in 2002 (Institute of Social, Statistical and Economic Research, ISSER, 2003). This increase in agriculture's contribution to foreign exchange was due to high revenue in all major sub-sectors, namely, food crops, livestock, fish and cocoa sub-sectors. Ghana's economy therefore continues to be dominated by the agricultural sector, even though the share of the services sector in GDP exceeds agriculture's when measured at constant prices (GoG/NDPC, 1997). That is to say that the agricultural sector is a major contributor to economic growth in the country. Ghana cannot achieve economic growth and poverty reduction targets without significant improvement in the agricultural sector (Kyei-Baffour and Ofori 2006).

A combination of climatic factors, soil, water availability, vegetation type and other physical and biotic factors divide Ghana into five major agro-ecological zones: Rain forest, Deciduous forest, Transitional zone, Guinea savannah and Coastal savannah. Each zone is characterised by variations in economic activities, population density and other socio-economic attributes, cropping pattern, livestock numbers and distribution (GIDA, 2004). These variations necessitate the establishment of irrigation schemes, particularly in the savannah zones of the country, to buttress rain-fed agriculture. Irrigation is the supply of water to agricultural crops by artificial means, designed to permit farming in arid regions and to offset drought in semi-arid or sub-humid regions (Hillel, 1987). The need of growing populations and developing national economies demand intensification of land and water use for the purpose of increasing and stabilising agricultural production (Hillel, 1987). Cornish et al, (1999) defined formal irrigation as one that is reliant on some form of fixed irrigation infrastructure that was





designed and may be operated by the government or a donor agency and which is used by more than one farm household. While informal irrigation is practiced by individuals or groups of farmers without reliance on irrigation infrastructure that is planned, constructed or operated through the intervention of a government or donor agency.

Irrigation has since played a key role in feeding populations worldwide and undoubtedly destined to play a greater role in the future. Major countries practicing irrigation worldwide include Egypt in Africa, Mexico and the USA on the American continent, and China and Japan in Asia. Irrigation can greatly improve returns to land with beneficial results on household food security and income. Irrigated agriculture has made a major contribution to food production and food security throughout the world: without irrigation much of the impressive growth in agricultural productivity in the last fifty years could not have been achieved (Vollrath, 1994).

Women are an integral part of the society and households. They contribute to household expenditure significantly through their livelihoods and take much of the responsibilities pertaining to household food security. In the environment of high rate of poverty and food insecurity, women still continue to provide food for their families, though their access to land is limited with less capital, lack of credit facilities, technology, inadequate education and training and unfavourable legal and policy environments (FAO, 2005).



## 1.2 Problem Statement

In the northern part of Ghana, which falls under the guinea savannah ecological zone, small scale farmers are in the majority. On top of the many problems confronting them is receding rainfall. Coupled with declining rainfall, inputs like fertilizer and insecticides are also not accessible to farmers due to poverty. In the quest to satisfy their food and cash needs, farmers practice small scale irrigation during the dry season (October to April) in many parts of northern Ghana at small scale dam sites. The other sources of water used for cultivation during this period include dugouts and stand pipes. Vegetables are the crops mainly cultivated during this season. The vegetables include cabbage (*Brassica oleracea var capitata*), tomatoes (*Lycopersicum esculentum*), cow pea leaves (*Vicia spp*), lettuce (*Latuca sativa*).





Women are active participants in this form of agricultural operations beginning from seed selection and storage and sowing/transplanting to harvesting. Yet women, who form a little over 50 per cent of the population, are generally worse off economically than their male counterparts, especially in rural areas. And that the bias against women with respect to access to land and credit facilities continues (GoG/NDPC, 1997). Resources are still primarily directed towards men even in situations where women are the main operators (GoG/NDPC, 1997). Furthermore, traditional believes in the non-importance of education for women have also resulted in their receiving little or no education, thereby disadvantaged and further limiting their prospects for better lives. Various customary practices continue to work against gender equality, especially in the rural areas. Consequently, women are largely discriminated against and remain deprived in their efforts to improve on their social status, conditions and circumstances. Irrigation is an area of development that needs more attention in northern Ghana. Efforts made by governments and other development partners have usually not been fully successful in providing women farmers with secured access to irrigation sites, and Sankana and Daffiama schemes used as the study area are not isolated cases.

Several studies (Hillel, 1987; Guossard, 1993; Vollrath, 1994; Shawki and Lee Moigne, 1990) have investigated the importance of irrigation to agriculture and food security. Others (FAO, 1999; Chiza, 2005) have also studied the impact of irrigation farming on income and economic development. Again, Patel and Sadangi, (2004) and FAO, (2005) have looked at women's contribution to irrigation farming. What is left is how irrigation farming affects the livelihood of rural women.

Nadowli district, which is in the Upper West Region of Ghana, has a 53 percent women and 47 percent men population, but the women are the group within which poverty is more striking (Ghana Statistical Service, 2004). Despite the poverty alleviation strategies put in place by both Governmental and Non-Governmental Organisations to improve the livelihood of women in the district, the required impact has not been achieved.

### 1.3 Research Questions

On the premise of the problem stated above, the following research questions are formulated:

- i. What is the level of involvement of women in small-scale irrigation schemes in the Nadowli District in the Upper West Region of Ghana?
- ii. To what extent are women farmers able to access irrigation facilities?
- iii. What is the effect of irrigation on the livelihoods of women?
- iv. What are the conditions under which women's involvement in irrigation as a business can be promoted?

### 1.4 General and Specific Objectives of the Study

The main objective of the study is to analyse the contribution of small-scale irrigation to the livelihoods of women in the Nadowli District of the Upper West Region of Ghana.

The specific objectives are to:

- i) Determine the level of involvement of women in small-scale irrigation farming.
- ii) Examine the tenurial arrangements for women under irrigation schemes.
- iii) Analyse the effect of irrigation on the livelihoods of rural women.
- iv) Identify and describe the conditions under which women's participation in irrigation as a business can be promoted.

### 1.5 Justification of the Study

Beginning with the drop in cocoa prices in the 1920s, men in Ghana migrated to the city to seek opportunities in other sectors. The exodus of men from the agricultural sector led to a greater role for women in rural areas, thus greater responsibilities in farming (Grier, 1989). This trend fluctuated over the years, with women taking more responsibility for agricultural work as men moved with changes in the economy and explored the emerging industries. It is also important to note that in Ghana, women



produced a little over 80% of food consumed at the household and sold in the market (Valentine, 1995).

Men and women spend their income in different ways and levels. Whereas women spend a high proportion of their income on food and health for children and other goods for general household consumption, men use a high proportion of their income for personal expenses (Staudt, 1985).

Society and cultural values make women house-keepers, in which they ensure that household members especially children, receive an adequate share of available food. Their effort to begin or increase income generating activities is constrained by their limited access to land, soil fertility, access to credit facilities and so on (FAO, 1995). Women generally play a vital role in agriculture as well as in the traditional setting and therefore need to be empowered by development initiatives such as irrigation.

The study is aimed at contributing knowledge to existing literature on irrigation in Ghana in order to guide policy formulators to come out with development initiatives to improve the lives of rural women.



## **1.6 Methodology**

This section provides an outline of research techniques that were used for the study. It explores the what, why and how of the research process which includes data collection, analysis and presentation.

### **1.6.1 Data Sources and Collection**

This research adopts the use of primary and secondary data. Both qualitative and quantitative primary data were solicited from individuals and groups through the

following data collection techniques: focus group discussions, key informant interviews, observations and questionnaire administration. For a detailed research, the researcher normally employs a number of techniques in collecting data, it helps the researcher to evaluate his data source and to correct inconsistent answers (Twumasi, 2001). Structured and semi - structured questionnaires were used to seek information from respondents in the two communities, Secondary data was collected from sources such as internet, reports, magazines, journals and institutions such as the Regional Meteorological Agency, the District Assembly, the Ministry of Food and Agriculture, and the District Irrigation Development Authority.

**i. Questionnaire**

This was used to collect both qualitative and quantitative data from irrigation farmers. This was employed to get information on farmer's background, the operations at the schemes, women's involvement, the land tenure, the effects of irrigation on the livelihood of women and the conditions under which women irrigation as a business can be promoted. Hundred farmers, fifty from each community were interviewed by questionnaire administration.



**ii. Focus Group Discussions (FGDs)**

This method was used to collect data from small groups of people. It is an extension of the individual interview. In this technique, the interviewer uses many of the same one to-one interview techniques but in a group setting with semi structured questionnaire. This is very stimulating; often the interaction among participants and the interviewer raises information that otherwise might not be revealed in individual interviews (Crandy, 1998). In all two focus group discussions were organised in the two study communities for the Water Users Associations. This was done by the use of a checklist and any member of the group was allowed to answer any question and where there was a problem the group was given the chance to debate on the issue to ensure consensus with regards to the answer given. This allowed me to get in-depth information on the issue at stake and also cross checked information collected through other techniques.

### **iii. Interviews**

The Interview technique was also used to solicit information from key informants and other individuals on specific issues on irrigation fanning and its effects on the livelihood of women. This was done through the use of a checklist and interview guides. Among those interviewed were the Agricultural Extension Officers at the schemes, the District Director of the Ministry of Food and Agriculture, the Irrigation Development Unit, the Nadowli District Assembly and other opinion leaders in the community.

### **iv. Observations**

Observation as a method was employed to examine how the water is used by the fanners for irrigation fanning and the crops grown by the fanners on their plots. The plot sizes as well as the state of the canals and laterals and the type of irrigation system practiced at the catchment area were also looked at.

### **1.6.2 Unit of Analysis**

The major entity that is analyzed in the study is referred to as the unit of analysis. Kumekpor (2002) defined unit of analysis “as the actual empirical units, objects, occurrences which must be observed or measured in order to study a particular phenomenon”. Unit of analysis can be an individual, group, organization and social artefacts. The unit of analysis in this study is the small scale irrigation fanners in the schemes. Their activities concerning irrigation fanning especially women is the interest area of the researcher.



### **1.6.3 Sampling Procedures**

Since all small scale irrigation farmers cannot be used for the study, there is the need to select a sample size which is representative enough to be used to generalize for the larger population of small scale irrigation farmers. Both probability and non-probability sampling techniques were used. Simple random sampling and purposive sampling were employed from probability and non-probability sampling techniques respectively.

#### 1.6.4 Sampling Size

The sample size is a part of the population from which the information is solicited. The sample size should have features that reflect the entire population such that conclusions can be generalized for the entirety of the population. The sample size for the study was determined based on Yamane's (1976) formula:

$$n = \frac{N}{1 + N\alpha^2} \dots\dots\dots \text{Equation [1]}$$

where; n= Sample Size, N=Sample Frame (Small Scale Irrigation Fanners),  
a=Confidence Level (in this study, 10% or 0.1).

The population of small scale irrigation fanners according to the Water Users Associations for Sankana is 150 and that of Daffiama is 65. From the above formula, the sample for Sankana and Daffiama would be 60 and 40 respectively. However the researcher elected 50 fanners from each community (25 male: 25 female). This is to ensure that enough women are represented in view of the fact that the research is centred on women. In all, a total of 100 Small Scale Irrigation fanners were interviewed from the two communities.



#### 1.6.5 Simple Random Sampling

Simple random sampling technique was employed for the selection of individual fanners. This method ensured that each member of the population had a chance to be part of the sample selected. Number of plots were written on pieces of paper and put in a calabash for fanners to pick until the required sample was obtained for the study.

#### 1.6.6 Purposive Sampling

This is normally used where there are a limited number of people with expertise in the area being researched. It was used to select groups and institutions, such as the Water



Users Associations, Nadowli District Assembly, the Agricultural Extension Officer of the area, the District Director of Nadowli Agricultural Development Unit and Ghana Irrigation Development Authority (GIDA). This technique allowed the researcher to get information from people who have in-depth knowledge on irrigation activities on the schemes and also clarify certain issues raised by farmers. The information from the purposive sampling was used to augment what was obtained using the simple random sampling technique.

#### **1.6.7 Data Analysis**

Data collected went through editing, coding, entering and analysis. Data was analysed using Statistical Package for Social Sciences (SPSS). Descriptive statistics such as frequencies, pie charts, bar charts, tables and percentages were used to present the result. Non-parametric statistical analysis (mainly the student t- test) was used to examine the relationship between variables at 0.05 significance level.

#### **1.7 Organisation of the Study**

The study is organised in six chapters. The introduction, chapter one, presents the problem, objectives of the study and the methodology employed. Chapter two consists of a profile of the study area. Chapter three reviews relevant literature on irrigation to rural livelihoods. The empirical results obtained from the study are presented and discussed in chapters four and five. Finally, chapter six presents a summary, conclusions and recommendations of the study and also suggested areas for future research.



## CHAPTER TWO

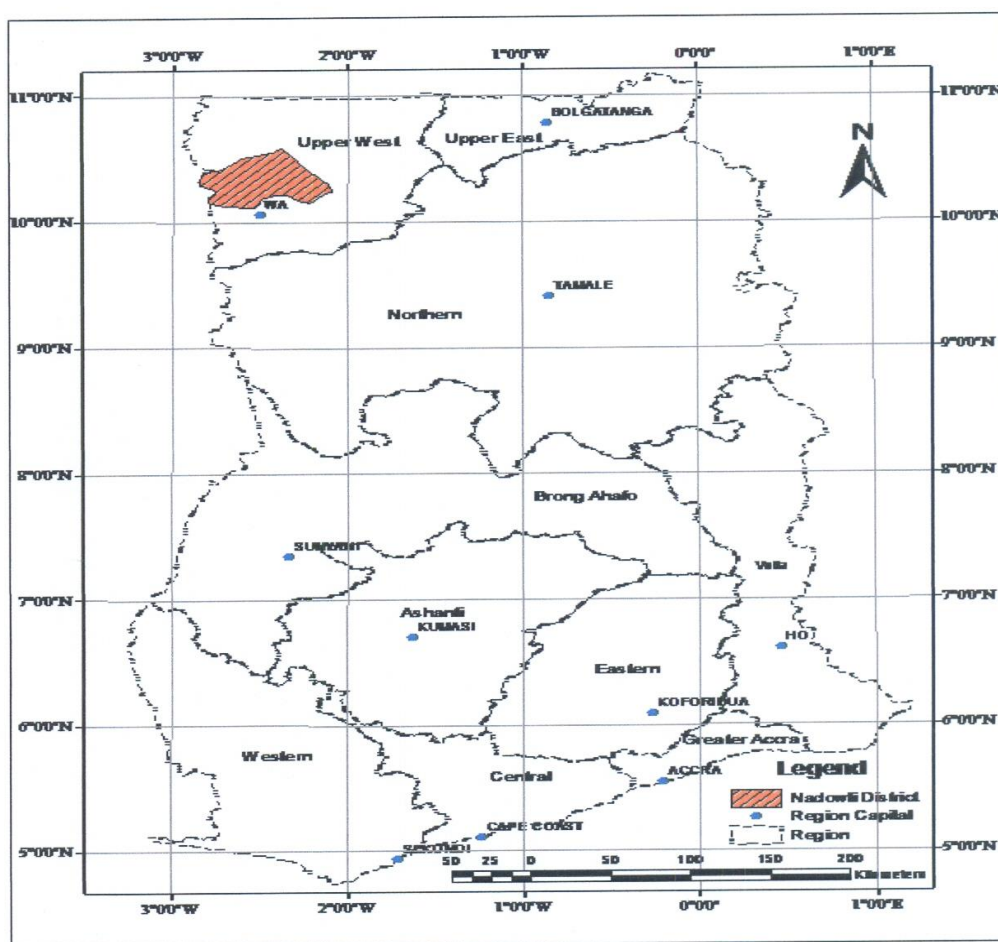
### PROFILE OF THE NADOWLI DISTRICT

#### 2.1 Physical Characteristics

##### 2.1.1 Location and Size

Nadowli district is centrally located in the Upper West Region of Ghana. It lies between latitude  $11^{\circ} 30'$  and  $10^{\circ} 20'$  north and longitude  $3^{\circ} 10'$  and  $2^{\circ} 10'$  west (Figure 2.1).

Figure 2.1: Location of the Nadowli District in the regional and national contexts



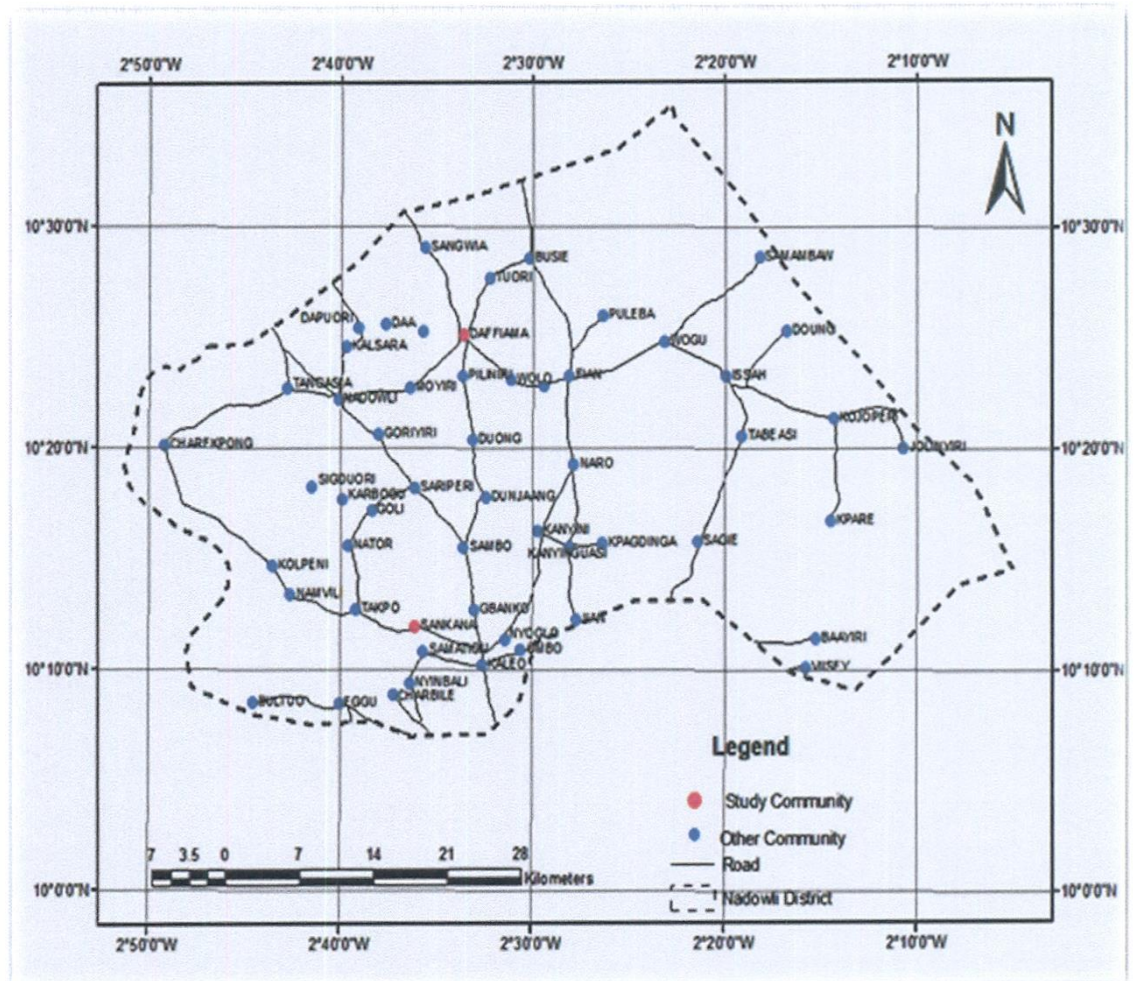
Source: Author's construct

It is bordered to the south by the Wa Municipality, to the west by Burkina Faso, to the north by the Jirapa/Lambussie district and, to the east by the Sissala West district. It



covers a total land area of 2,742.50km<sup>2</sup> and extends from the Billi Bridge (4km from Wa) to the Dapuri Bridge (almost 12km from Jirapa) on the main Wa – Jirapa- Hamile road and also from West to east it extends from the Black Volta to Wahabu (Figure 2.2). The distance between the district and the regional capital covers about 40 km. The location of the district promotes international trade between the district and neighbouring Burkina Faso.

**Figure 2.2: Map of the Nadowli District indicating study communities**



Source: Author's construct



### 2.1.2 Relief and Drainage

The topography of the district is low lying and undulating at altitudes ranging between 150m-300m above sea level though some parts average 600m. The only major stream, Bakpong and several ephemeral streams, flow into the Black Volta. These limited number of rivers and streams, coupled with the seasonal drought, seriously hamper dry season farming, resulting in low output and food insecurity that is experienced almost every year.

### 2.1.3 Vegetation and Climate

Nadowli district lies within the tropical continental or guinea savannah woodland ecological zone characterized by shrubs and grassland with scattered medium sized trees. Some economic trees found in the district are kapok, shea tree, baobab, mango and dawadawa which are resistant to both fire and drought. These trees provide a major source of income to households particularly women who play important roles in the provision of household needs. These economic trees provide a potential for the establishment of processing industries to increase employment opportunities for the people.



The district lies within the tropical continental zone and annual rainfall is confined to 6 months i.e. May to September, and is also unevenly distributed. Mean annual rainfall is about 110mm with its peak around August. Mean annual temperature of 32°C and a mean monthly temperature ranging between 36°C around March to 27°C around August. Between October and March there is virtually no rain and this long dry season is made harsh by the dry northeasterly Harmattan winds. This unfavourable climatic condition promotes only rain fed agriculture. This climatic condition calls for the construction of dams and dugouts to support irrigation agriculture.

### 2.4.1 Geology and Soils

Three main types of rocks underlie the district. These are Birimian and granite to the west and some parts of the east, and basement complex to the east. Current studies have also revealed large mineral deposits in the district. The soil types are laterite, sandy and



sandy loam (savanna ochrosols). They are generally poor in organic matter and nutrients as a result of the absence of thick vegetative cover due to bush burning, overgrazing, over cultivation and protracted erosion. Consequently the soils are heavily leached. Relatively fertile soils (sandy loams) occur to the east of the district around Issa and Tabiesi and support crops such as yams, cereals, legumes and rice. On the other hand soils in the west are generally poor and support limited agricultural activity. This situation is responsible for the seasonal migration from the west to east for farming purposes.

## 2.2 Demographic Characteristics

According to the 2000 population and housing census, the district had a total population of 82,716. This population compared with the 1984 census figure of 65,529 indicates a growth rate of 1.5% per annum as depicted in Table 2.1.

**Table 2.1: Population Growth and Trend**

Year	Male	Female	Total Population	Growth Rate
1984	30799	34730	65529	1.5%
2000	39375	43341	82716	

Source: Ghana Statistical Service (GSS), 2002

Using the 2000 population as the base year and an annual growth rate of 1.5% the population in the district is currently estimated at 89158. The district's share of the region's population is about 14.3%. (GSS, 2002)

While about 45% of the population is aged between 0-14 years, the economically active population also constitutes 49%, with the remaining 6% being the aged. Table 2.2 presents the age distribution from 2000 to 2005.



**Table 2.2: Age Distribution**

Age Group	Years		
	2000	2002	2005 (Estimated)
0-14	37222	39550	40121
15-64	40531	43066	43687
65+	4963	5274	5350
Total	82716	87890	89158

Source: Ghana Statistical Service, 2002; District Assembly Projections, 2005

It can be observed from the table that, out of the current estimated total population of 89158, males make up 41,904 and women 47,254. This situation amplifies the need to mainstream gender in the pursuance of development in the district, as females constitute the majority of the population.



The current population density is about 33.5 persons per square kilometre as compared to 31.0 persons per square kilometre in 2000. The distribution is, however, uneven throughout the district. Population density around Nadowli and Kaleo areas is about 52.3 persons /Km<sup>2</sup>, but as low as about 15 persons per square kilometre in the eastern portions of the district due to inadequate social amenities in those areas.

## **2.3 Economic Activities**

### **2.3.1 Agriculture**

Agriculture is the mainstay of the people in the district employing about 85% of the population. Food crop production in this sector remained largely subsistent with low output levels. The main activities, practiced include food and cash crop production as well as animal rearing.



According to the Nadowli District Assembly (2005), the sector is estimated to be growing at 2.1 % per annum, which is below the national target of 6% per annum. Even though efforts have been made to boost the sector, production still remains at subsistence level, as there are no large plantation holdings in the district. The major food crops grown in the district are millet, sorghum (guinea com), maize, cowpea and yam. Cash crops cultivated include groundnuts, cotton, cowpea, soybeans, cassava, tiger nuts and pepper. The cultivation of cash crops has not received much attention as a result of market uncertainties. Economic trees like the shea, dawadawa, and baobab, which constitute a major source of income for women, are still wild and prone to destruction by annual bushfires.

About 75% of farmers rely on traditional methods of farming using simple tools such as cutlass and hoes and are highly dependent on rainfall for crop production. Only about 25% of the farmers rely on intermediate technology using tractor services, animal drawn implements and irrigation. These methods of farming do not only lead to the depletion of the soils, but also, result in low yield which is responsible for the low income and hence low standard of living, as well as food insecurity in the district.



Promoting the use of improved methods of farming and the adoption of improved crop varieties should not be over looked in any attempt to improve agricultural productivity in the district. Land tenure has been identified as one of the major constraints to agricultural production in the district due to its implications on large scale farming. The main methods of land acquisition identified in the district are freehold and lease hold.

There are few dams in the district to support farming but only three in Sankana, Daffiama and Goli have been developed for irrigation purposes. These three irrigation facilities are, however, grossly underutilized. These water bodies if properly utilized will go a long way to improve the food security situation in the district particularly in the dry season when most farmers are idle.

The main farming system in the district is mixed farming based on bush fallowing and compound farming. Majority of the farmers (97%), mainly subsistence farmers, practice mixed cropping, 25% practice mono cropping and 30% plant with fertilizer and improved seeds (Nadowli District Assembly, 2005). Bush fallowing is practiced on a large scale as a method of replenishing soil fertility.

### **2.3.2 Commerce/Service**

The commerce/service sector is the second largest employer of the district's labor force after agriculture. It encapsulates a wide range of tertiary activities. These include retailing and petty trading, transport and financial services and services provided by civil servants. The sector is dominated by informal small scale trading, especially in agricultural produce and limited modern consumer products. It is characterized by family ownership.

The district has three (3) major periodic markets. These markets centers are located in Sankana, Tangasia and Bussie. However, these markets are not so brisk, as revealed by the volume of endogenous and exogenous inflows of goods to and from the markets.

Nadowli, the district capital is the main commercial center in the district and most of the settlers in the district depend on it for their shopping needs. The trading activities in the district particularly in the periodic market centers form one of the major sources of revenue to the District Assembly. The transport sub-sector plays a crucial role in the district's economy with regard to getting the produce to the market as well as supplying inputs and other needs of the people in deprived areas. Nevertheless, the sub-sector is poorly developed.

There is only one financial institution in the district. This is the Sonzelle Rural Bank Agency in Nadowli and its branch in Kaleo. The main focus of rural banks is to: provide loans for agricultural activities provide loans for commerce and small scale industries and provide security for client savings. However, this financial institution has failed to provide the needed support for the various economic sectors in the district particularly agriculture. As could be seen from the agricultural and industrial sub sectors, the people still depend on their savings to finance their businesses and farming. This limits their



ability to expand. Another important area of the services sector is the formal sector comprising civil and public servants. These are mainly in the government, NGOs and other line agencies but logistics, inadequate office and residential accommodation is greatly affecting their performance. There is the need to establish linkages between this sector and other sectors of the economy to facilitate growth.

### 2.3.3 Industry

This sector is characterized by small-scale activities and the use of labour intensive production technology. These include basketry, cloth/smock weaving, blacksmithing, pito brewing, pottery and shea butter extraction. With training and credit interventions from the District Assembly, National Board for Small Scale Industries and some NGOs, small scale industrial activities have stepped up in the district. Nevertheless, inadequate financial management skills, inadequacy of available credit facilities, low level of technology and inadequate socio-economic infrastructure stand as teething issues militating against the development of this sector of the district's economy.



All industries in the district are small scale and can be categorized into agro-based, wood-based, textile-based, metal based, clay and sand based and leather based industries (Table 2.3). This classification was based on the type of raw materials used in production.

**Table 2.3: Type of Small Scale Industries**

TYPE	INDUSTRIES	%
Agro-Based	Milling, pito brewery, chop bars, shea butter processing	75.5
Wood-Based	Carpentry, Carving, Weaving, Charcoal burning	11.5
Textile Based	Tailoring, Smock weaving	7.4
Clay and sand Based	Block making, Pottery, sand winning	3.6
Metal based	Blacksmithing	2.0

Source: Nadowli District Assembly, 2005.

From the table it can be seen that majority of the small-scale industries are agro-based (75.5%), wood based (11.5%), textile based (7.4%) with clay and sand and metal based industries accounting for the other proportions. The high proportion of agro-based industries in the district indicates the strong relationship between industry and agriculture, which can be further, developed to enhance incomes. The dependence on the depleting savannah woods of the district for charcoal bunting and carving can have dire consequences on the environment if measures are not put in place to regulate it.

Most of the small-scale industries in the district are one-man businesses. This attitude of business ownership has limited their ability to secure the needed funds to expand their businesses as most of them are operating below capacity. Table 2.4 depicts the types of business ownership in the district.

Table 2.4: Type of Business Ownership

Type of Ownership	%
Sole Proprietor	93
Family Owned	5
Cooperation	2
Total	100

Source: Nadowli District Assembly, 2005.

It can be observed from the table 2.4 that as high as 93% of businesses are solely owned by individuals with only 7% being owned by relatives and cooperatives. To enhance growth and expansion of the small scale businesses the proprietors need to be encouraged to form groups and associations through which funds can be channeled to benefit prospective small scale business enterprises.

The small-scale operators in the district mobilize their initial working capital from their own saving. Other sources include relatives, friends, and moneylenders. These sources give them only small capital to start with, which limits their ability to expand their businesses. Table 2.5 shows the sources of finance and the proportion of industrialists who depend on them.



**Table 2.5: Source of Capital**

Source	%
Own saving	55
Relatives	36.5
Friends	2.5
Co-operatives	2.5
Financial Institution	3.5
Total	100

Source: Nadowli District Assembly, 2005.

From the table it could be seen that financial institutions play a limited role in supporting small-scale industries in the district. The inability of the industrialists to secure loans from such financial institutions is because they are not able to provide the necessary collateral security to guarantee for loans. The need to form joint venture for assistance is therefore imperative if financial assistance which has since been a major constraint to small scale businesses can be overcome.



About 85% of the products from the small scale industries in the district are sold within the settlements of production usually at the working site. Out of the remaining 15%, 10% are sold outside the settlements but within the district and the remaining 5% are sold outside the district. It could be inferred from the foregoing analysis that the small scale industries in the district are:

- Producing to meet local needs
- Creating jobs;
- Mobilizing small savings in the non-banking sector and channelling them into productive activities.
- Making use of local resources thereby contributing to the resource development of the district
- Expanding the range of goods produced in the district and diversifying the goods on the market.
- Improving incomes and therefore the living standards of the people.

In spite of these important roles, the small-scale industries are beset with a number of problems. These include the following: poor marketing opportunities, limited finance and poor technology in production. In order to bring about the desired diversification in the economy, these problems have to be addressed.

## **2.4 Festivals**

The major festivals celebrated in the Nadowli District are the Willaa, Sankana Kalibi and the Zenbenti Festivals. Except for the Wilaa, the others have been dormant for some time now. The revival of these festivals is very essential since they create a forum for deliberations on key issues and finding solutions to problems affecting community development.

## **2.5 Conditions of the Natural Environment**

Traditional belief systems and human activities in the District tend to regard the land as a reservoir of unlimited resources. Human activities particularly annual routine bush burning, indiscriminate tree felling for fuel wood, charcoal and other purposes and poor animal husbandry practices have led to decreasing the vegetation cover and increasing soil erosion and depletion of soil fertility.



Inappropriate farming practices such as shifting cultivation, road construction, sand and gravel winning increases land degradation. Farming along, and in watercourses has also resulted in the silting of water bodies like dams and ponds and destruction of vegetation protecting the water bodies.

There is growing awareness of the need to maintain and sustain the environment. A manifestation of this is the existence of women groups in agro-forestry. Individuals have also adopted the habit of planting trees around their buildings. Developing economic trees plantations examples, Cashew, Mangoes has also gained popularity over the years.



## 2.6 Historic and Scientific/Aesthetic Areas

Scenic and historic sites abound in the district. These are viable and potential tourist sites that can attract the badly needed investment and revenue to spearhead the development agenda of the district. The following are some of the sites that have been identified and investigated to be viable:

- Cluster of Anthills (Falanta Anthills) at Bayero near Nanville
- Rocks and caves at Sankana
- Ombo Wura Rock at Ombo near Kaleo
- Pizaga Caves at Tabiesi
- Crocodile Pond at Papu
- Bone-Setting Clinic at Duong
- Porcupine Sanctuary or Village at Gure near Sombo
- Palm Thicket in the middle of the savanna and
- Pond at Vogonni.

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Unfortunately none of the sites have been developed. Presently tourism committees have been set up in tourism potential areas and efforts are being made by the District Assembly to create accessible roads to these sites and attractions. Planned development interventions include the provision of accommodation and recreational facilities and the production of souvenirs for tourists.

## 2.7 Social Infrastructure

### 2.7.1 Education

There has been a general improvement in the educational sector between the periods of 2002-2010. This improvement can be realized in physical infrastructure development at the pre-school level (Day Nursery) as well as enrolment at the Primary level. Currently more than 65% of the current District Population can now access primary education within 4-5km distance. The achievement is through the collaborative efforts of Ghana Education Service and NGOs operating in the education sector.

The district has a total of 137 educational institutions comprising twenty-four (24) Day Nurseries, Seventy (70) Primary, thirty-five (35) Junior Secondary Schools, five (5) Technical/Vocational and three (3) Senior Secondary Schools. A number of NGOs have played and continue to play various roles in the development of educational infrastructure in the district.

Nevertheless, there is still much to be done in view of the increasing demand for basic education. Some of the schools seriously lack furniture as children sit on stools and stones in class. Twenty two (22) Primary Schools need pre-school facilities since it is the goal of the nation to integrate early childhood development centers in the formal education system.

At the primary school level 7 schools have average condition and need rehabilitation while three (3) need new structures (reconstruction). At the JSS level three (3) schools need rehabilitation while five classrooms blocks need reconstruction works. Dormitories and classrooms blocks are seriously required in the SSS level as well as workshops and vocational training schools for JSS and SSS leavers.



The schools in the district are distributed according to eight circuits namely Daffiama, Fian, Issa, Kaleo, Nadowli, Takpo, Jiang and Charipong. This aim is to enhance effective monitoring of school activities by circuit supervisors in view of the increased enrolment in primary schools and the need to improve upon the quality of teaching and learning.

There is a relatively fair distribution of educational facilities among the circuits as far as Pre School and basic educational facilities are concerned. With the exception of Issa that has no Day Nursery, all circuits have Nurseries, Primary and JSS. Only three circuits (Daffiama, Kaleo and Nadowli) have SSS.

Currently the gross average enrolment rate in Primary schools is about 91 % which is far above the national target of 88.5%. Girls' enrolment at the primary school level is

higher (97%) than that of the boys (85%). This has been the result of a number of interventions put in place by government (capitation grant) and some NGOs to arrest low enrolment and high dropout rate particularly for girls at the JSS level. The gross enrolment at JSS level (58.4%) is not encouraging when compared to enrolment at the Primary level. Contrary to the situation in primary, enrolment for boys supersedes that of girls. This according to education authorities is due to elopement, teenage pregnancy and the unwillingness of some parents in maintaining girls in school because of the prevailing poverty and patriarchal beliefs among some of the people.

There has not been any significant change in the staffing situation even after the appointment and posting of the pupil teachers. Most schools in the remote areas are still poorly staffed. The current teacher-pupil ratio is 1:45 and 1:25 at the primary and JSS respectively as compared with 1:57 and 1:25 in 2002. The high pupil teacher ratio at the primary is due to increasing enrolment levels and the decreasing number of teachers posted to the district.

### **2.7.2 Health**



The District health mobilisation team (DHMT) in collaboration with the sub-district health mobilization teams (SDHMTs) implement and manage national and regional health policies in the district. To ensure participation and maximum use of resources the district health administration collaborates with relevant stakeholders including the District Assembly and Non-Governmental Organizations in the delivery of services. The district health sector can be categorized into 2 sectors, public and private. The Ghana health service runs the public sector providing both curative and preventive care in the district hospital, health centers and outreach stations. Community based disease surveillance volunteers have also been trained to assist in surveillance activities.

Drug outlets form a large proportion of the private sector including chemical sellers and unlimited number of drug peddlers who are mostly semi-literate but very good salesmen. These drug peddlers can be categorized into three mainly peddlers of herbal medicine, Peddlers of biomedicine moving from community to community and the neo herbalists

who sell both herbal and modern drugs. A very important group of practitioners in the health care system are the Traditional Birth attendants who have since 1978 formed part care services.

There has been a significant change in the number health facilities in the district between the periods 2002 and 2010. Apart from the increased number of outreach stations the number of facilities has more than doubled with the number of outreach points increasing from 132 to 148 during the same period. Currently there are two Hospitals, one government (District Hospital) and one private (Ahmadiyya Moslem Hospital) are located in Nadowli the district capital and Kaleo respectively.

### **2.7.3 Transport and Communication**

Apart from the main Wa-Jirapa road that is tarred, roads in the District are feeder roads. The condition of most feeder roads has slightly improved over the period as a result of ongoing reshaping and rehabilitation works. Despite the ongoing works on the feeder roads some of communities are still inaccessible especially in the rainy seasons where most feeder roads become unmotorable. There is therefore the

need to improve accessibility in these areas by upgrading of some feeder roads into second class status to facilitate easy movement of people, goods and services.

Transportation service provision in the district is dominated by the private sector with operators using minibuses and pickups in the provision of services. Non-conventional means of transport including bicycles and head loading also play a major in the carriage of goods to major marketing centres.

The tele-communication sector is poorly developed with no ICT services. Currently only three communities (Nadowli, Kaleo and Bussie) out of the 158 are served by national telephone system. Apart from institutional telephones in some offices, most public telephone booths have broken down and are incapable of providing the required services. However, mobile phone services are privately operated by individuals in some communities across the district. These services are reliable and can be accessed by

average income earners. An ICT centre is currently being established in the district capital. This facility on completion is expected to link the district with the rest of the world.

#### **2.7.4 Energy**

Energy especially electricity is one of the main elements that influence the rate of economic development in any locality. It is a key to production and lures investments. The importance of its availability cannot therefore be overemphasized in the development efforts of any given people.

Currently about 15 communities out 158 in the District are connected to the national electricity grid. This forms less than 10% of the total number of communities with electricity services. Pockets of formal and informal workers currently use liquefied petroleum gas (LPG) which is obtained from Wa, the regional capital. Majority of the households in the district rely on firewood and charcoal for cooking at the expense of the environment. Shea butter oil and kerosene are also predominantly used by households for lighting.



## CHAPTER THREE

### SMALL-SCALE IRRIGATION AND LIVELIHOODS: A CONCEPTUAL REVIEW

#### 3.1 Irrigation Farming

The Encyclopaedia Britannica has it that archaeological investigations has identified evidence of irrigation in Mesopotamia and Egypt as far back as the 6<sup>th</sup> millennium BC, where barley was grown in areas where the natural rainfall was insufficient to support such a crop. Irrigation is an artificial application of water to the soil usually for assisting in growing crops. In crop production it is mainly used in dry areas and in periods of rainfall shortfalls, but also to protect plants against frost (Snyder and Melo-Abreu, 2005).

At the global level, 2,788,000 kilometres square of agricultural land was equipped with irrigation infrastructure around the year 2000 (Siebert et. at, 2006). About 68% of the area equipped for irrigation was located in Asia, 17% in America, 9% in Europe, 5% in Africa and 1% in Oceania. The largest contiguous area of high irrigation density are found in North India and Pakistan along the rivers Ganges and Indus, in the Hai He, Huang He and Yangtze basins in China, along the Nile River in Egypt and Sudan, in the Mississippi-Missouri river basin and in parts of California. Smaller irrigation areas are spread across almost all populated parts of the world (Siebert et al, 2006). Sources of irrigation water can be surface water from dams, rivers, and underground water from wells or springs. In the Sankana and Daffiama irrigation schemes water is extracted from dams for small scale irrigation farming.



#### 3.2 The Concept of Livelihoods

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base (Ian, 1998). Livelihood enhancement can be viewed in terms of poverty reduction, well-being and



capabilities. The poverty level is a key criterion in the assessment of livelihoods (Ravallion, 1992).

The notions of 'well-being' (Chambers 1995) and 'capability' (Sen 1984) provide a wider definitional scope for the livelihoods concept. Sen (1984) sees capabilities as 'what people can do or be with their entitlements', a concept which encompasses far more than the material concerns of food intake or income. Such ideas represent more than the human capital which allows people to do things, but also the intrinsically valued elements of 'capability' or 'well-being'. Chambers (1997) argues that such a well-being approach to poverty and livelihood analysis may allow people themselves to define the criteria which are important. This may result in a range of sustainable livelihood outcome criteria, including diverse factors such as self-esteem, security, happiness, stress, vulnerability, power, exclusion, as well as more conventionally measured material concerns (Chambers 1989).

This relates to the ability of a particular combination of livelihood strategies to create gainful employment for a certain portion of the year. This may be on or off-farm, part of a wage labour system or subsistence production. Sen (1975) note three aspects of employment - income (a wage for the employed), production (employment providing a consumable output) and recognition (where employment provides recognition for being engaged in something worthwhile). In terms of the income/production aspects, various target levels have been suggested, but 200 days a year appears to be widely used as a minimum level to create a livelihood (Lipton 1991). Overall, the number of livelihoods created will be dependent on the proportion of the population available for work.



### **3.3 Livelihood Resources: combining different types of 'capital'**

The ability to pursue different livelihood strategies is dependent on the basic material and social, tangible and intangible assets that people have in their possession. Drawing on an economic metaphor, such livelihood resources may be seen as the 'capital' base from which different productive streams are derived from which livelihoods are constructed. Four different types of 'capital' are identified and simple set of definitions offered each amenable to empirical investigation.

- ❖ Natural capital - the natural resource stocks (soil, water, air, genetic resources etc.) and environmental services (hydrological cycle, pollution sinks, etc) from which resource flows and services useful for livelihoods are derived
- ❖ Economic or financial capital - the capital base (cash, credit/debt, savings, and other economic assets, including basic infrastructure and production equipment and technologies) which are essential for the pursuit of any livelihood strategy.
- ❖ Human capital - the skills, knowledge, ability to labour and good health and physical capability important for the successful pursuit of different livelihood strategies.
- ❖ Social capital - the social resources (networks, social claims, social relations, affiliations, associations) upon which people draw when pursuing different livelihood strategies requiring coordinated actions.

This is clearly not an exhaustive list, and other forms of ‘capital’ can be identified. In order to create livelihoods, therefore, people must combine the ‘capital’ endowments that they have access to and control over. These may be made up of personal capabilities, tangible assets (e.g. stores and material resources) and intangible assets (claims and access) (Chambers and Conway 1992). At any scale, livelihoods are composed in complex ways, with multiple and dynamic portfolios of different activities, often improvised as part of an on-going ‘performance’ (Richards, 1989).



### 3.4 Small Scale Irrigation Farming

Irrigation is the most common means of ensuring sustainable agriculture and coping with periods of inadequate rainfall and drought. Irrigation can play a significant role in improving food security and household income in Africa. Africa’s river systems have been the target of development planners since the 1960s, and many of the major rivers of the continent have been dammed for irrigation, for power generation and flood control (Rahmato, 1999). Rahmato argued that water policy in Africa should enable the development of different categories of irrigation systems, namely, large, medium and small-scale. However, he argues that given our past experience and the fact that large systems have failed in many African countries, a concerted effort should be made to encourage small and, user-based water development schemes. Such schemes are less

costly, more sustainable, environment friendly and do not involve human displacement, as is the case with large schemes. Moreover, small schemes provide beneficiaries the opportunity to manage them directly. The purpose of agriculture water development should be to increase social benefits, and promote food security and poverty alleviation. Small scale irrigation schemes which are at the crust of this research have been defined differently by different authors;

Rahmato (1999) defined small-scale irrigation schemes as “schemes that are controlled and managed by the users themselves”. He stressed that the success of small-scale systems is due to the fact that they are self-managed and dedicated to the felt needs of local communities. According to him small-scale irrigation widespread and has a vital role to play because modern large irrigation schemes have had a very poor record, and because small schemes are less costly in the fullest sense of the term. To buttress this view, Vaishnav (1994), indicated that the major reasons given for the failures of the major irrigation schemes in sub-Saharan Africa are related to cost, institutional problems, policy environment, design issues and cultural factors. Generally, the cost of large scale irrigation schemes have been much higher in Africa than elsewhere in the world due to the reliance on imported materials, equipment and expertise.



### 3.5 A History of Irrigation Development in Ghana

Estimates of Ghana's irrigation potential are wildly divergent, ranging from 0.36-1.9 million hectares to slightly more than 33,000 have under irrigated cultivation (Agodzo and Bobobee 1994). Although cultivation of vegetables using hand dug wells dates as far back as pre-independence era, modern irrigation agriculture started in Ghana under the land planning unit of the Ministry of Food and Agriculture (MOFA) in 1955. The function of the above mentioned unit was mainly land planning for future development and successful agricultural use. In addition, land conservation was another function. In 1962, the land planning unit was expanded to the divisional level in the Ministry of Food and Agriculture and named the Irrigation, Reclamation and Drainage Division. In 1974, the Irrigation Department was established. The department had the broad responsibility for promoting irrigation including technical studies and infrastructure development. The Ghana Government recognized the need to integrate the agriculture and engineering functions to achieve irrigation development in the country, and thus

established an institution named the Irrigation Development Authority (IDA), in April 1977. Today, the Ghana Irrigation Development Authority (GIDA) is the statutory organization charged with the responsibility for irrigation development in the country (Ghana Irrigation Development Authority, 2010).

The FAO (2008) postulated that in 2000, the total water-managed area in Ghana was estimated to be 30900 ha. It is believed that overall about 27900 ha of the total of 30900 have equipped, or 90%, were actually irrigated in 2000, while the 22 public irrigation schemes that existed by 2003, only 5600 ha of the 8587 have equipped, or 65% were actually irrigated. The Kpong Scheme in the greater Accra Region had a development cost of US\$2200/ha (year 2000 cost). In contrast, the Tono Scheme in the Upper East Region had a development cost of US\$40,000 - 50,000/ha (IFAD, 2005).

Upper West Region is one of the poorest regions in Ghana, with an annual per capita GDP of US\$ 170 and on most social indicators, the most neglected region in the country. Infant mortality, seasonal hunger, cash incomes, school attendance, transport networks are weaker in UWR than other regions (IF AD, 2005). Despite this, UWR has benefited from very few targeted development projects, and until recent years, not many NGOs were operating there. UWR has abundant land both for crops and livestock and much lower population density, but access to market and off-farm opportunities is constrained by poorly maintained feeder roads and lack of transportation services. After the end of Upper West Agriculture Development Project (UWADEP) extensions, the project finally closed, leaving irrigation infrastructure (dams and canals) incomplete on several sites including Sankana and Daffiama schemes (IFAD, 2005).

In 1985 and 1986, the Government of Ghana with the assistance of the World Bank carried out a review of the irrigation sub sectors. A major finding of this review was that pervious large irrigation projects in the country have had a poor record of success. They have been handicapped by many factors some of them are high investment cost and land tenure problems, high operation and maintenance cost, insufficient extension and input supply services. Other problems include low level of community support (financial and otherwise) for construction and maintenance of the schemes, conflict with traditional rain fed farming and overestimated yields. The review therefore suggested that the



focus of future irrigation development should be on small scale community based schemes (IFAD, 2005).

Currently activities (since 1990) of the Ministry of Food and Agriculture (MOFA) in cooperation with other relevant organizations, include promotion of small and micro scale irrigation, provision of water for livestock (especially in northern Ghana) and the exploit of coastal and inland water for fish culture. The emphases are also on construction and rehabilitation of dugouts in the drier parts of the country. This trend is accomplished with the development of other rural infrastructure mainly in the area of drinking water supply for the convenience and health of the rural work force, majority of whom are engaged in agriculture.

To facilitate GIDA's improved performance, a research wing was initiated at Ashiaman near Tema in 1991, with assistance from Japan International Cooperation Agency (JICA). The research section is known as Irrigation Development Centre (IDC) and it presently concentrates on studies chiefly related to the agronomy of irrigated rice which is the main product of many Ghanaian irrigation schemes (Kranjac-Berisavljevic, 1998).



### 3.6 Importance of Irrigation Agriculture

Irrigation is the supply of water to agricultural crops by artificial means, designed to permit farming in arid regions and to offset drought in semi-humid regions (Hillel, 1987). The need of growing populations and developing national economies demand intensification of land and water use for the purpose of increasing and stabilising agricultural production (Hillel, 1987). According to Guossand (1993), improved water management (including irrigation and drainage) can probably do more towards increasing food production and income for farmers in irrigated areas of the world than any other agricultural practices. Irrigation can bring about improvement in food sufficiency and foreign exchange as well as employment opportunities in most rural areas where it is intensively practiced (CTA, 1988). Irrigated agriculture has made a major contribution to food production and food security throughout the world; without irrigation much of the impressive growth in agricultural productivity in the last 50 years

could not have been achieved (Vollrath, 1994). Irrigation is therefore an important sector in agriculture which needs to be given the desired attention.

Irrigation development, together with new varieties, extension services and fertilizer supplies is among the most important factors behind the impressive agricultural growth experienced in recent years in south East Asia (Shawki and Lee Moigne, 1990). Consequently, many countries in Africa have been wondering whether irrigation plays a similar role in the development of their agriculture. The two most relevant questions in this regard are: How much of Africa could eventually be irrigated? and What would it cost to develop that irrigation potential (Shawki and Lee Moigne, 1990).

Africa, south of the Sahara irrigates some 5 million hectares. The irrigated area has been growing at a rate of about 1500,000 hectares per year since the mid 1960s. This is equivalent to 5% a year in 1955 - 1974 and less than 4% in 1974 - 1982 (Shawki and Lee Moigne, 1990). It is difficult to define what constitute irrigated agriculture in West Africa and in fact in the other parts of the world. This is because there are many types of agricultural production systems which involve lifting water for plants and which are not readily regarded as irrigated agriculture. Most researchers in irrigation have concerned themselves mainly with public (formal) irrigation (West African Economic Journal, 1991). In West Africa and elsewhere, however areas under informal (private small pump) irrigation have been estimated to be many times more than those under formal irrigation but almost no attention is being paid by governments to that type of irrigation (FAO, 2005).

The last century has seen unprecedented growth in irrigation projects on a global level. The use of tube well irrigation has decreased the cost of using groundwater, and the subsidization of large reservoirs and canals has been used to achieve food security. Worldwide, irrigated land increased from 50 million hectares in 1900 to 267 million hectares in 2000 (Gleick, 2000). Much of this increase has been in developing countries. Between 1962 and 1996, the irrigated area in developing countries increased at about 2 percent a year, leading to a near doubling in irrigated land. For example, in 1950 India





had an irrigation potential of 22.6 million ha. By 1993-94, this had grown to 86 million ha (Saleth, 1996).

Land values in a region are a function of the productive potential of the land. The development of irrigation systems allows farmers to grow higher yields of existing crops, or more profitable cash crops. Because of this, the benefits to landholders of irrigation development can be large. A 1997 study in Kenya and Zimbabwe showed that the average net increase in income from irrigation was \$150 - \$1000 per family farm (FAO, 1999). One question of importance in developing countries is that of land security. Areas where land rights are ill-defined will have lower benefits accruing to the local population than those areas with well-defined rights.

### **3.7 Role of Irrigation in the Development of Agriculture**

Cornish et al. (1999) defined formal irrigation as one that is reliant on some form of fixed irrigation infrastructure that was designed and may be operated by the government or a donor agency and which is used by more than one farm household, while informal irrigation is practiced by individuals or groups of farmers without reliance on irrigation infrastructure that is planned, constructed or operated through the intervention of a government or donor agency. Irrigation has since played a key role in feeding populations worldwide and undoubtedly destined to play a still greater role in the future. Major countries practicing irrigation worldwide include Egypt in Africa, Mexico and the USA on the American continent and China and Japan in Asia.

In the drought prone areas of humid tropics, water quantity is the main factor constraining the development of irrigation projects. The system of intermittent water application is therefore generally practiced. It does not only increase the yield of specific crops but also prolong the effective crop growing period in areas with prolonged dry season, thus permitting multiple cropping when only a single crop could be grown otherwise. In this respect the term irrigation can range from simple facilities of soil moisture control to complex automated irrigation systems (GIDA, 2004).



Irrigation has a multi-faceted role in contributing towards food security, selfsufficiency, food production and exports. It encompasses a wide range of interventions that enhance productivity and result into profitability for the rural farming population and the nation as a whole. For the substantial areas managed by smallholder farmers through traditional irrigation systems or water harvesting, it assists with both food production and cash-crops enabling farmers and surrounding communities to benefit both directly and indirectly from the crops produced. In large-scale commercial farms, it enables crop production for local and export markets with significant impacts on the country's economy (Chiza, 2005).

When approached holistically, with equal levels of support for both the software and hardware aspects, irrigation has major positive impacts at household and village level and contributes significantly to Poverty Reduction Strategy (PRS) objectives. When examined purely in investment terms, it seems that irrigation development requires high investments that benefit relatively few people. This ignores the substantial spin-off effects to the surrounding communities who not only become involved in direct activities, but who also benefit from the improved irrigation facilities and supporting services (Chiza, 2005).



Government wishes to reduce the migration of rural population, especially the youth, from country to town. This can only be achieved if both existing productivity in the rainy season is increased and made more reliable and if the returns to dry seasonal casual labour exceed the opportunity cost of alternative casual urban or construction employment. With the highly unpredictable rainfall patterns, the absence of irrigation for agricultural production makes intensification as a growth strategy a risk if not losing proposition (Chiza, 2005).

For the smallholder farmers, the use of fertilizers for rain-fed crops is on the decline as they are proportionally very expensive for them and in many cases they borrow to purchase. If rains fail then they suffer both from lack of production as well as from cash losses or increased indebtedness. If farmers have both irrigated and rain-fed land, they

will make their investments in fertilizer for the irrigated rather than the rain-fed. They are thus more likely to achieve the projected yields than they will for rain-fed land through their risk aversion measures.

Irrigation has thus an extremely important role to play. Increases in agricultural production will not be achieved through area expansion of rain-fed crops, but through intensification and improvements in production from the existing cultivated lands. Current yield levels on unassisted irrigation projects are well below potential, although still above rain-fed production. Recent support for irrigation has shown that with full beneficiary involvement, these yields and returns can be significantly increased (Chiza, 2005).

### **3.8 Women's Role in Irrigation Agriculture**

Women are active participants in various agriculture operations beginning from seed selection and storage and sowing/transplanting to harvesting. Women's level of participation in the economy is generally high. This is even higher in the agricultural sector, where women constitute 51.9 percent of the labour force and produce 70 percent of the national food crop output (Awumbila, 2001).



According to Patel and Sadangi (2004), in Bhubaneswar, 23% of farm women (including self-cultivating women and women as agricultural labourers) participate in irrigation management in Orissa. Women's contribution is not through physical labour but also through active participation in decision making. Planning and execution of agriculture operations are a joint responsibility of both spouses. Crop planning is critical in improving water use efficiency. A crop production system in which women are visible partners cannot yield desired results without providing an opportunity to them in irrigation management.

Women in most societies play a crucial role as food producers, providers and managers. In rural communities women are responsible for fetching fuel wood and water for cultivation. This reflects the essential contribution of women to agriculture in Africa, which Boserup (1970) describes as "fanners par excellence". Women farmers

contribute immensely to agriculture in their capacity as farm owners, farm partners and farm labourers.

### 3.9 Women's Access to Irrigated land

There is a strong gender imbalance fostered by the process of agricultural transformation and concentration of production and resources, as most women farmers tend to hold small-scale and family farms while men, more likely to own medium-sized or large scale commercial farms, are in a better position to capitalize on the expansion of agricultural tradable goods (Young and Hoppe, 2003). Ghanaian women who form a little over 50% are generally worse off than their male folks, especially in rural areas. For example, the incidence of malnutrition in many parts of the country is higher among women than men. Also, despite the predominance of women in agriculture and rural non-farm activities and the increasing dependence of households on woman's earnings, the bias against women with respect to access to land and credit facilities continues. Thus, resources are still primarily directed towards men even in situations where women are the main operators. Furthermore, traditional beliefs in the inefficacy of education further limit their prospects for betterment. In addition, customs and laws continue to work against gender equality, especially in the rural areas. Consequently, women are largely discriminated against and remain deprived in their efforts to improve their social status, conditions and circumstances. Currently, human development indices show that women are still a vulnerable group. Female unemployment is about 50% higher than that of their male folks. While about 49.8% of females have never attended school, about 3% attained secondary or higher education compared to 29.1% and 9% respectively for males. It is acknowledged that a conscious effort has to be made to provide an extra boost or efforts to enhance the status of women in society. As such, any limitations on women as a social and economic group will adversely affect the socio-economic development of the country (GoG/NDPC, 1997).



Access of women both to the irrigated land and to Water Users Association (WUA) membership was viewed in terms of:

- Economic benefits to women and their households;

- Easing of women's domestic workloads (through combining supply of irrigation water with provision of domestic water), thus freeing up some of women's time for production; and
- Empowerment of women (IFAD - Office of Evaluation and Studies, 2000).

Often women's independent access to land, and especially to top-quality lands, is highly value assets. In order to ensure that such benefit to women occurred, several projects try to give women extra help. The measures often taken include:

- Gender-sensitization and training of staff;
- Training of the women themselves;
- Organization of women into farmer associations or similar groups;
- Negotiations with traditional leaders and husbands; and
- Involvement of women's NGOs in the project activities (IFAD - Office of Evaluation and Studies, 2000).



In spite of all the efforts made, experience has not been very encouraging. Studies found that out of eight irrigation projects with WUAs, which also had gender goals, active participation of women occurred in only five. Even in these, benefits to women are not always direct or secure (IFAD, 2000). In Ghana, considerable negotiations take place with traditional leaders and husbands, and a proportion of the irrigated plots are often allocated to women. However, women's plots turn out to be only about a quarter the size of male farmers' irrigated plots, yet women still have to pay the same price for irrigation water, thus threatening their profit margin (IFAD - Office of Evaluation and Studies, 2000).

In several instances, including where gender issues had not been addressed, women participate in irrigation scheme at the tertiary level in construction or rehabilitation work. As a result, the number of women members of WUAs increases during the start-up phase. But in some cases, women's membership declines after construction have been completed. Under other projects, women could be members of WUAs, but it is unusual

for them to take an active decision-making role or to be represented in the WUA executive (IFAD - Office of Evaluation and Studies, 2000).

The review shows how difficult it is to direct benefits of irrigation schemes to women farmers. In the intense competition for valued land, women tend to lose out. One of the best approaches seems to be to give the considerable ongoing support, for instance, through effective women's NGOs. There is a need for understanding the reasons why women who are initially involved later drop out or else lose their land and WUA membership rights after having acquired them.

IFAD Rural Poverty Report 2001, p. 93, argues for raising poor people's control over water-yielding assets. Irrigation can greatly improve returns from land, with beneficial results on household food insecurity and incomes. But the report also notes that the poor, and particularly poor women, have a difficult time obtaining access to irrigation water.

Efforts by development initiatives have usually not been fully successful in providing women farmers with secure access to irrigated assets. Sometimes women obtain access indirectly or acquire irregular or seasonal access, but even when they do obtain use of irrigated land, they may end up losing it. In Burkina Faso, some women are lent irrigated land during the dry season so that they can grow vegetables (IFAD, 2001). In Ecuador, women have to rely on social networks to get annual and ad hoc access to irrigation water. They do not obtain secure rights (IFAD, 2001).



### **3.10 Irrigation Agriculture and Rural Livelihoods**

Irrigated agriculture can make an important contribution to food security, improved nutrition and rural prosperity. In a study of the whole of Asia, the FAO (1996) shows that yield for most crops have increased by 100-400 percent as a result of the combination of irrigation and improved seed and fertiliser technology. Food grain prices fell by 20 percent relative to the price index for all commodities.



Angood et al., (2003), study in Bangladesh and Nepal reveals that there are positive impacts of irrigated agriculture on livelihoods. By examining three typical rural communities in each country, they indicated what initiatives and policies have been most successful for sustaining livelihoods in these and other communities and in what ways they can be improved. Irrigation development has been essential in allowing villagers in the six communities studied to grow enough food for home consumption. Furthermore, the aggregate impact of irrigated production in both Nepal and Bangladesh has helped to increase the supply of food, making basic foods affordable for a greater proportion of the population.

The application of water to the land to produce crops, both food and fibre, can in most cases extend the growing season, giving the opportunity to grow more than one crop a year. It also allows the extension of agriculture into dry areas, taking advantage of land resources that would or otherwise not be used. Irrigation planners need to look closely at how water is applied and in some situations question whether further irrigation development is desirable and justified. Overall, it is clear that irrigation can increase food production. However, irrigation is not just a means to increase food production: most countries can import relatively low-cost food. Of particular importance is the fact that irrigation development can offer opportunities for poverty reduction in rural communities. This in turn, as the studies in Nepal and Bangladesh show, can improve social and economic development and the creation of sustainable rural livelihoods.



Irrigation development in Bangladesh has had a profound impact on rural livelihoods through significant improvements in cropping intensity, grain production, (predominantly rice) household incomes, increased wages, employment and livelihood diversification (Hasnip et al, 2001).

Irrigation brings increased food security and the production of more food of wider variety each year and clearly improves family diet and health. Greater productivity also increases incomes for farmers and service providers and creates greater employment opportunities for farm labour. Increased incomes are commonly spent on education, evident in the rise of the number of children now attending school and the increase in literacy levels. It is increasingly common for young people to move from the schemes

as further education and non-agricultural employment possibilities have widened. Not only are more children attending school but also there is a marked increase in the numbers of girls and women now receiving education.

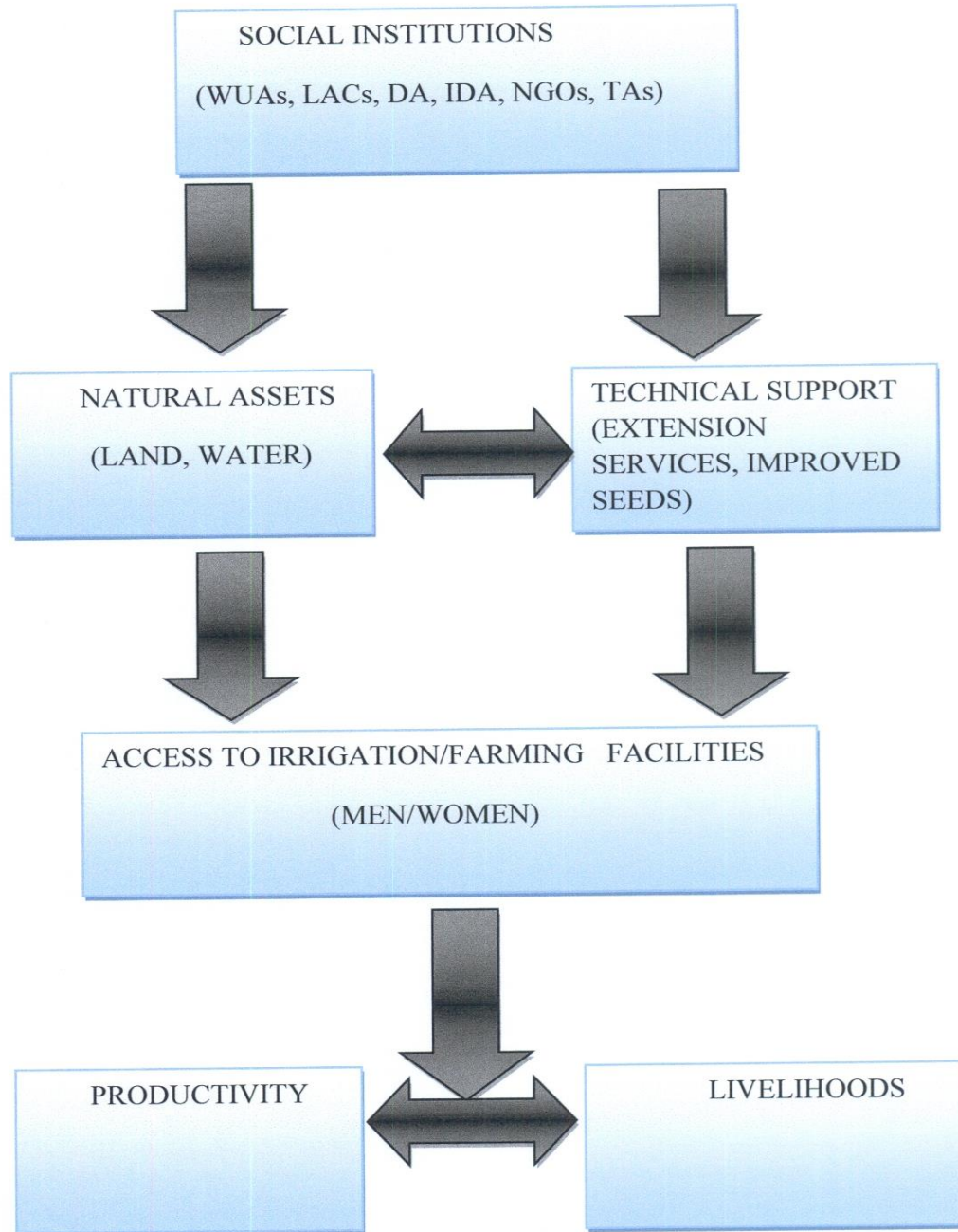
According to Hasnip, 2001, the direct and indirect benefits of irrigated agriculture over rain-fed production are: Improved levels and security of production, employment and incomes for farm households and farm labour. These are direct effects derived from security against drought, water control, extended cropping season(s), improved yields and better production quality.

### 3.11 Conceptual. Framework

Figure 3.1 depicts the conceptual framework for analysing the contribution of small scale irrigation to the livelihood of rural women. Irrigation farming as a livelihood activity can only be possible if there are livelihood resources available. These livelihood resources include; natural capital (land, water), economic or financial capital (credit, inputs, technical support), social capital (networks, social relations, affiliations, associations), and human capital (labour, skills and knowledge). There are institutions (Water Users Associations, Land Allocation Committees, Irrigation Development Authority, District Assembly, Traditional Authorities, and NGOs) which manage and ensure that the livelihood resources are put to good use for the benefit of the large group or society through productivity. These institutions are equally in charge of the allocation of facilities needed for irrigation farming. The decisions made by them determines to a large extent the differential access to land, water and other resources for farming between men and women. It is the outcome of such decisions that will result in enhancing the livelihood of the women irrigation farmers through food security, poverty reduction, capacity building and improvement of livelihoods.



**Figure 3.1 Conceptual Framework for analysing Irrigation Farming and its contribution to livelihood enhancement**



Source: Author's Construct

## CHAPTER FOUR

### OVERVIEW OF IRRIGATION DEVELOPMENT IN THE UPPER WEST REGION

#### 4.1 Introduction

Ghana's agricultural sector is heavily dependent on rainfall, but the rainfall pattern is erratic, making the sector a high-risk venture for many investors. The Upper West Region (UWR) annually experiences a short rainy season and a relatively long dry season (i.e., October to April). Irrigation is therefore essential for enhancement of agricultural production in the region.

#### 4.2 History of Irrigation Development in the Upper West Region

Early records of agriculture suggest that all types of irrigation or flood-retreat agriculture were virtually unknown in the pre-colonial era. These labour-intensive production systems were probably inappropriate for populations which depended heavily on gathered produce and rainfed agriculture. A factor that would have been a discouragement is the presence of river-blindness (onchocerciasis) along all the major water-courses. This caused populations to retreat from the most fertile areas and subsequently to return to them once health equilibrium has been established (Hunter, 1966; Patterson, 1978).



However, the pressure on land and the need to produce cash crops for sale has gradually brought about innovative farming techniques. Muslim migrants such as the Zanna and Hausa were the first to practice horticulture in riparian areas. Many of the larger rivers are still not exploited in this way for lack of adequate methods of lifting water. However, many shallow rivers and seasonally flooded land are now given over to dry-season gardening in UWR, often using water lifted by hand.

From the 1950s to the 1960s there was an extensive programme to create 'dugouts', small dams for trapping water for both humans and livestock in the dry season.

Typically, gardens can be established along their edges as well as in places where seepage allow shallow wells to be dug. Some of these dugouts were later converted to irrigate cropping by the Ghana Government. Later, with World Bank projects such as URADEP in the 1980s, to cover both Upper East and Upper West at the time when they constituted a single region and IF AD projects like UWADEP (appraised 1995, closed 2004), farmers dams and dugouts were rehabilitated to form more structured small-scale irrigation. At smaller dam sites, dry-season cultivation was mainly vegetables, most commonly onions and tomatoes. In the early period, lettuce, pumpkins, cucumbers and watermelon were brought in, but these are now of minor significance. Onion cultivation was particularly popular and represents one of the most important agricultural exports from the region then. The storability of onions made it possible for astute producers to play the markets. Producers can establish when prices are favourable in southern markets, rapidly aggregate stocked onions and sell within a couple of days. The situation with tomatoes was much less attractive since the trade was controlled by ‘market queens’ who use their perish ability to force producers to accept low prices.

### **4.3 Water Resources in the Region**



Water resources in the UWR consist of surface waters and groundwater. The UWR lies within the Volta River basin, and all three main rivers in the region flow southwards: the Black Volta River (forming part of the border with Burkina Faso), the Kulkpawm River, and the Sisili River (which forms the border with the Upper East Region). Only the Black Volta is perennial. Small earth dams in the region are located on minor tributaries, which flow only intermittently and only during the wet season. There are no hydrological data from small streams in the region, but reservoir depth, which is constrained by local topography, is shallow, and evaporation is high in relation to storage volume. The groundwater potential in the region is variable and depends on the degree of decomposition and fracturing of the impervious granite and hard limestone that constitute the bedrock (GIDA-Regional Office, Wa, 2010).

#### **4.4 Upper West Agricultural Development Project (UWADEP) / International Fund for Agricultural Development (IFAD) Projects in the Region**

In, 1995, MOF A and the International Fund for Agricultural Development (IFAD) formulated the Upper West Agricultural Development Project by various government

agencies, non-governmental organisations, creating a Water Resources component to handle irrigation. Among other infrastructure achievements, the project successfully rehabilitated 19 of the 20 earth dams targeted. As a result, a total irrigable area of 154 ha of the appraisal target of 220 ha has been made available for dry season gardening. According to the draft project completion report (MOFA/IFAD, 2005), 455 family units cropped 41.5 ha of the 154 ha currently available during the dry season, but the irrigation facilities are not fully utilized because of insufficient participation of communities, a low sense of ownership and responsibility for the dam facilities to be that of the users, and poor functioning of Water Users Associations (WUAs). GIDA-Wa ( 2010) further described several general problems with regard to WUA participation: (a) the WUAs were poorly guided and informed and did not really grasp the concept of farmer participation and involvement in the design and implementation of the irrigation systems, or their management after completion; (b). they mistakenly believed that all irrigation facilities that were pre-identified as in disrepair would be selected for eventual rehabilitation; and (c) they were not fully committed to the project's objectives to ensure the sustained use of facilities after rehabilitation, as Letters of Undertaking between GIDA/Project Support Unit (PSU) and the WUAs were never signed.



After the end of UW ADEP extensions, the project finally closed, leaving irrigation infrastructure (dams and canals) incomplete on several sites. The draft Project Completion report (PCR) states that 41.5 ha are under dry season cropping and 154 ha available for irrigation against an Appraisal Report (AR) target of 220 ha (70%). The Ghana Irrigation Development Authority (GIDA) Technical Review on completion (June 2005) mentioned the same figure of 154 ha, but cautions that certain areas are not under the command for the canals, which means that hand watering or pumping has to be used. Farmers still largely depend on hand-dug wells, as was the case before the project rehabilitations took place. The evaluation team could find only 23 ha of additional irrigable area resulting from the project. Prescribed sanctions were not applied to Contractors in several instances by Project Support Unit. Generally,



no laboratory investigations for quality assessments of the work were conducted. This is a major problem, as many structures suffer from poor quality, and thus uncertain sustainability. Through the Ministry of Food and Agriculture (MOFA), additional funds were provided from Food and Agriculture Budget Support (FABS) to cover the outstanding works. The Appraisal Report mentions involvement and training of WUAs as well as specifically - interventions for women.

UNIVERSITY FOR DEVELOPMENT STUDIES



## CHAPTER FIVE

### SMALL - SCALE IRRIGATION AND WOMEN'S LIVELIHOODS IN THE NADOWLI DISTRICT

#### 5.1 Introduction

This chapter presents and discusses the findings from the Sankana and Daffiama irrigation schemes. The main areas discussed are socio-demographic characteristics of respondents, farmers' involvement in Water Users Association management, farmers' access to technical and financial assistance, land acquisition and tenurial arrangements for irrigation farming. Other areas also discussed include access to water supply, effects of irrigation on the livelihoods of rural Women and conditions for improving women irrigation business.

#### 5.2 Socio-demographic Characteristics of Respondents

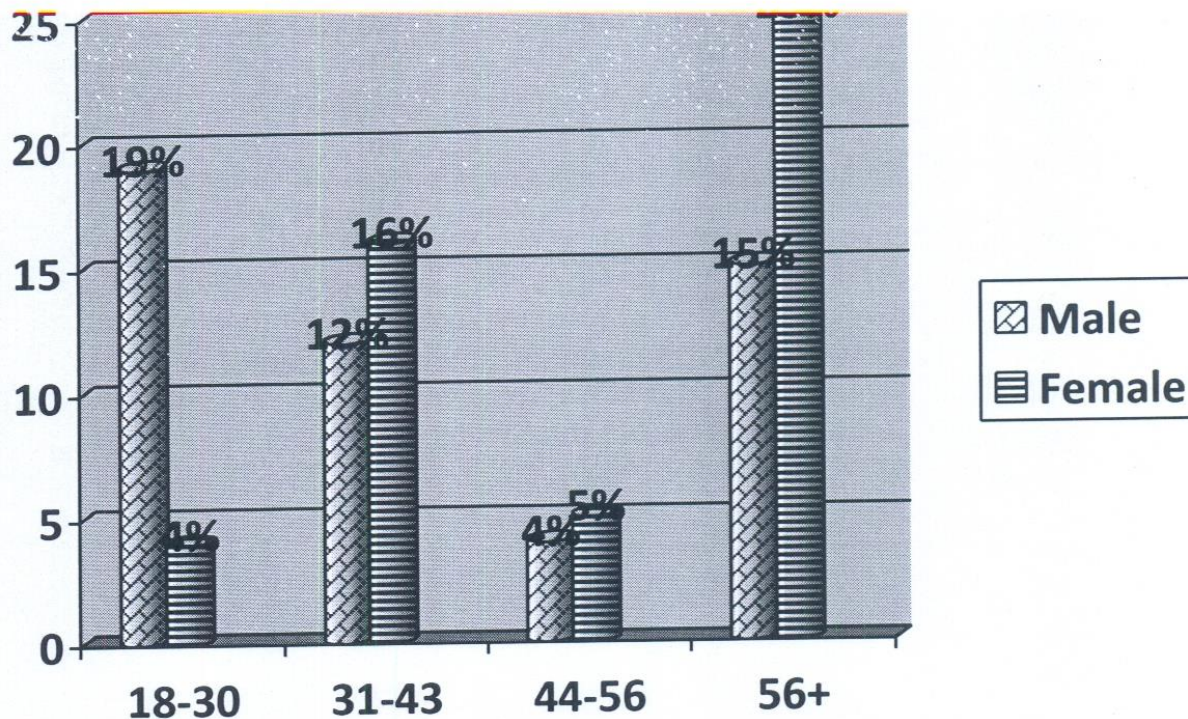
##### 5.2.1 Age and Sex Distribution of Respondents

The study revealed that 40% of the farmers were above 56 years, 28% were within the ages 31-43 years, 23% within 18-30 years and 9% within 44-56 years as seen in figure 5.1. Responses from a focus group indicated that farming activities are not attractive to the youth of today; they go looking for other forms of employment such as white colour jobs in the cities. This explains why the young and active working group (18-30years) constitutes only 23%. An elderly woman in Sankana said:

*“My son, the youth of today do not want to work, they only sit down for their old parents to work and feed them. The few that are ready to work have gone down south to find jobs”*

Most young people during the dry spell move to southern Ghana to look for jobs and only return home when the rains start, leaving more responsibilities on the shoulders of their aged parents.





Source: Field survey, 2010

### 5.2.2 Educational Status of Respondents

Formal education level of respondents was generally very low considering the fact that 62% of the respondents never had any formal education, 21% had basic education and only 17% had secondary education as presented in table 5.1.

**Table 5.1 Educational level of respondents**

Educational level of respondent	Gender of respondent		Total
	Male	Female	
None	22	40	62
Primary	14	7	21
Secondary	14	3	17
Total	50	50	100

Source: Field survey, 2010

Even though the education level of the respondents is generally low, that of women is even lower. About 80% women interviewed never had any sort of formal education, compared to 44% men that were interviewed. There is also a significant relationship between gender and level of education as shown in table 5.3 on page 52. The analysis indicate that there is a statistically significant gender difference ( $p\text{-value} = 0.000$ ) in education of respondents. The generally low education is of concern to livelihood enhancement and also to adoption of improved farming practices. Lele (1990) observed that an improvement in farm human capital through education is essential for increasing agricultural productivity. The illiteracy of most farmers in Ghana creates communication problems and constraints, proper understanding, adoption and also application of modern and improved farm technologies (Nyanteng and Dapaah, 1997). Also, the FAO and UNESCO recognised education and training as the most important weapon in the fight against rural poverty and development. With education they are better equipped to make more informed decisions in promoting the economic, social and cultural dimensions of development (FAO/UNESCO, 2003).



### 5.2.3 Marital Status and Household size of Respondents

From the study, about 81% of the respondents were married, 14% being single, 4% were widowed and only 1% divorced. It is also evident that many (42%) of the respondents had a household size above 10 people, which is about the average household size in both communities.

### 5.3 Farmers Involvement in Water Users Association Management

The two irrigation schemes had Water Users Associations (WUAs) which are self-governance and management institutions of farmers. WUAs are self-governing community-based institutions that are able to (re)define territorial, authoritative and user boundaries in the use of irrigation water and land sites (Bacho and Bonye, 2006). The role of the WUA Executives among others include; Protection and Maintenance of Dam, equitable allocation of irrigable plots and equitable and effective distribution of water to farmers.



In assessing the structure of WUA, respondents from FGDs indicated that the custodian of the land on which the commons (Dam) is located is the Titular head of the WUA, followed by the WUA Executives and the Land Allocation Committee (LAC). These executives as well as the Land allocation committee members were democratically elected and must include at least one woman. It is worth noting that only the Sankana WUA that is structured, that of Daffiama WUA is unstructured. The Sankana WUA for instance has a constitution and regularly meets to review guidelines in order to be able to carry out the said tasks on their shoulders for the total benefit of the association. Office positions such as Chairman, Vice Chairman, Secretary, Treasurer and Organiser and seven other members for the Land Allocation Committee existed. In addition, the association had a Bank account where they deposited levies and other contributions from members and other groups and individuals. Such monies are subsequently used for maintenance of the irrigation facility.

Women, although, were actively involved in irrigation farming, were not much involved in the management of these irrigation facilities. Only 19% of the WUA executives were women. A statistical test in table 5.2 indicates a statistically significant (0.030) gender

difference in involvement in the leadership of WUA. Women's low participation in the management simply affirms the patriarchal nature of the society, where decision making at the community level rest with male members (Apusigah, 2004).

**Table 5.2 Independent Samples Test on Gender and WUA Leadership**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
WUA Leadership	Equal variances assumed	22.914	.000	-2.214	98	.029	-.16000	.07228	-.30344	-.01656
	Equal variances not assumed			-2.214	83.007	.030	-.16000	.07228	-.30376	-.01624



Source: Field survey, 2010

Responses from a focus group indicate that where women are involved in the management of WUA, they did not play active roles. They regularly absent themselves from WUA meetings because of customs and traditions such as women not allowed to talk freely in the mist of elderly men in the community. Such customs and traditions prevented many women from taking leadership positions in the WUA. According to a male respondent who is also the Chairman of the Sankana WUA,

*“Women become arrogant and disrespectful to their husbands when they are empowered. Giving them leadership positions in WUA management will make them more arrogant and disrespectful to their husbands”.*

This is to suggest that there is a deliberate attempt by men in some communities to prevent women from taking leadership positions and women themselves do not want to take such positions because they would be seen as arrogant and disrespectful women (Pogandou), because of that their involvement in WUA management is minimal.



However, there existed cordial relationship between the executives and other members. About 90% of them said their relation with the Executives and the other fanners were good. The 10% who said that they are indifferent about their relation with others were not even aware that they are automatic members of the association.

#### 5.4 Farmers Access to Technical and Financial Assistance

Farmers need technical assistance in the form of extension services for best farming and land management practices in order to improve output and also conserve irrigable lands for posterity. Here the study seeks to find out whether sex does matter in accessing technical assistance and how accessing technical assistance affect the output of the fanner. It was revealed that majority (58%) of irrigation fanners have access to technical assistance out of which 36% were men and 22% women. Twenty-eight percent of women never had any form of technical assistance as compared to sixteen percent of their male counterparts. To buttress the above the t-statistic from table 5.3 under the assumption of unequal variance has a value of -2.93 and degree of freedom (df) 97.03 with an associated significance value of 0.004. The significance level indicates that the probability that gender does matter in ones access to technical assistance is great. This disparity according to the extension officer in Daffiama is because male extension officers prefer dealing with male fanners to female fanners in order for them not to be accused of having intimate relationships with the women. However, more fanners in the Daffiama scheme had access to technical assistance than fanners in the Sankana scheme and this was attributed to the fact that the Sankana scheme extension officer was indisposed for sometime due to ill-health.

Technical assistance offered to fanners is in the form of extension services and provision of improved seeds to the fanners and is provided by Ministry of Food and Agriculture (MOFA), World Vision Ghana, and Catholic Relief Services (CRS). Ministry of Food and Agriculture alone provided 76.7% of the assistance in the form of extension services, World Vision 8.3% and Catholic Relief Service 15%. These services were meant to boost output.





Table 5.3 Independent Samples Test on gender and other variables

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Technical assistance	Equal variances assumed	9.239	.003	-2.928	98	.004	-.28600	.09562	-.46975	-.09025
	Equal variances not assumed			-2.928	97.030	.004	-.28000	.09562	-.46978	-.09022
Water supply	Equal variances assumed	241.084	.000	-4.760	98	.000	-.34000	.07143	-.48175	-.19825
	Equal variances not assumed			-4.760	57.277	.000	-.34000	.07143	-.48302	-.19698
Educational level	Equal variances assumed	17.814	.000	4.046	98	.000	.58000	.14334	.29554	.86446
	Equal variances not assumed			4.046	85.667	.000	.58000	.14334	.29503	.86497
Women acquisition of land	Equal variances assumed	15.185	.000	-3.421	98	.001	-.32000	.09355	-.50564	-.13436
	Equal variances not assumed			-3.421	95.864	.001	-.32000	.09355	-.50569	-.13431
Quantity of produce	Equal variances assumed	2.677	.105	5.342	98	.000	1.20000	.22464	.75420	1.64580
	Equal variances not assumed			5.342	60.567	.000	1.20000	.22464	.75073	1.64927
Plot size	Equal variances assumed	17.113	.000	5.237	98	.000	.46000	.08783	.28570	.63430
	Equal variances not assumed			5.237	93.513	.000	.46000	.08783	.28560	.63440

Source: Field Survey, 2010



In assessing farmers' ability to access financial assistance (micro credits), respondents indicated that it was difficult to access financial assistance for their farming operations. For instance 76% of respondents said they never had any financial assistance with regards to their irrigation activities and majority (54%) of them are women. Those who had the facility had it from Sonzelle Rural Bank, the only financial institution in the district. Responses from a focus group indicated that their inability to access loans from , the bank could be as a result of their low repayment capacity. In the context that rural households can improve upon their main source of livelihood (mainly farming) if they had access to small loans, Feder et al, (1985) argue that with the provision of credit, the cost of technology (capital intensive) and assets will be reduced relative to family labour. Thus, instead of growing low yielding local varieties with low level of fertilizer, access to credit may allow for use of improved varieties, fertilizers and high unit per labour and land.

### **5.5 Land Acquisition and Tenurial Arrangements for Irrigation Farming**

Land as a livelihood resource draws many people with various interests together. The role that land acquisition and tenure plays in the livelihood demands a tenure system that is secure enough to allow people to undertake full investment on land. Food and



Agriculture Organization (2000) outlines the attributes of land tenure security as: clarity of physical location and boundaries, clarity of rights regarding the allocation and regulation of its use and transfer. There should be clear 'rules of the game', freedom from fear that the land rights will be arbitrarily taken away or diminished. There should be an expectation that the 'rules of the game' will be enforced, and freedom from fear that rules will be unilaterally changed without resulting damages being compensated and there need to be accessible, affordable, fair and effective avenues for seeking protection of rights and solving disputes.

Since majority of the poor in Ghana are subsistence rural farmers who depend on land heavily for survival (Ghana Statistical Service, 2000), ensuring land tenure security for rural farmers is very crucial for poverty reduction and if Ghana would achieve the millennium development goal one (poverty eradication).

Responses from the focus group strongly indicated that the Land Allocation Committee sought to address this issue of land access and tenure by allocating irrigable plots to members and ensuring that there is security of tenure. Respondents also indicated that there are three types of tenurial arrangement at the scheme: inheritance, through husband and acquired from land allocation -committee. Acquiring by inheritance means it was passed on to them by relations either dead or alive. This is in line with the view that, 'Land belongs to a vast family, of which many are dead, few are living and countless yet unborn' (West African Lands Committee, (1916 in Berry 1993:107). Land acquired from the site can also be passed to other family members. Women had relatively small size of the land (about ½ of an acre) compared to that of the male farmers (1 acre of plot) as seen in Figure 5.2 below, and it is also located far from the canals making the water supply to their plots unreliable.

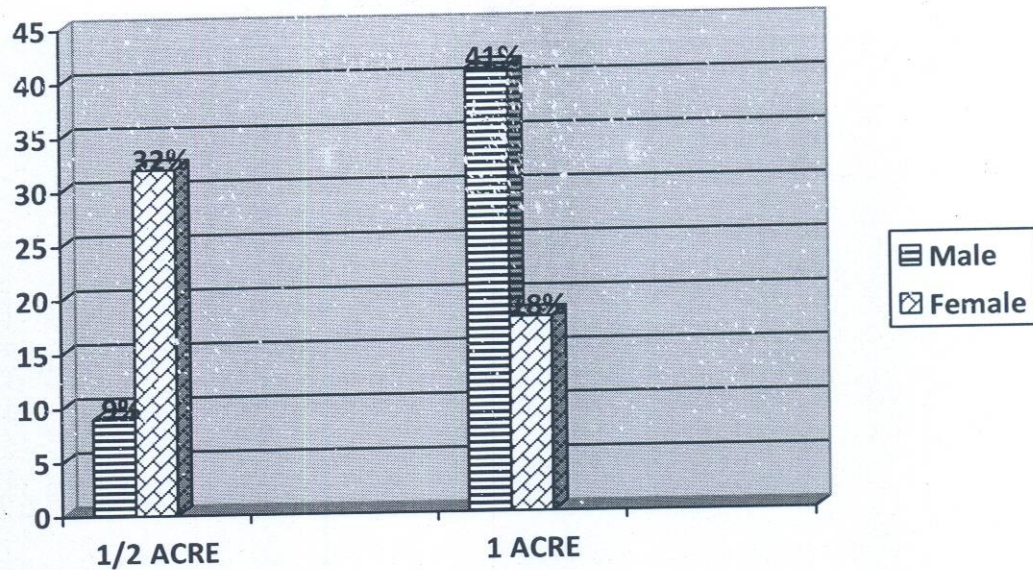


In response to why women were allocated small plot size, the Extension officer for Daffiama revealed that, Polygamy is a common practice in the study district; hence most of the men are married to more than one wife. And that sharing a piece of land among them may result in smaller plot size. This finding provide evidence to support the argument of Wheathead and Tsikata, (2002) that land acquisition, use and control is not gender sensitive because women do not own land and their access to land depends on their relationship with men.

About 80% of the women responded 'yes' when they were asked if they have plans to increase the size of their plots. Reasons for their dissatisfaction in their current plots size include; my current plot is too small, I want to make more money, and I have many mouths to feed. These reasons suggest that most women on the scheme would welcome an increase in plot size.

It was also revealed that 60% of respondents said women do not have the same opportunity to acquire land as men. They rather rely on their husbands for irrigable land. In table 5.3 an independent sample test conducted also shows that the probability of gender being a factor in plot size allocation is great with a significance value of 0.000.

Figure 5.2 Plot Size of Respondents



Source: Field Survey, 2010

### 5.6 Access to Water Supply

The water supply in the two schemes was of great concern to almost all the fanners, due to the deplorable nature of the distribution canals and laterals; supply to most of the plots were inadequate in particular months of the year. Majority (87%) of the respondents do not get adequate supply of water to their plots. Women alone form about 60% of that, their plots are relatively distant from the dams and much water is lost during the distribution through cracks in the canals and laterals. The canals are also not extended to most parts of the irrigable area. This makes watering of plots cumbersome to the extent that some of the fanners have to dig wells on their plots from which they can water their fields. This is the most common irrigation method used in the study areas. Fanners use watering cans to fetch and manually carry water from a water source, mostly shallow dug wells, or dugouts, to their plots. This is followed by watering of crops through the spout or shower head of the can making it an overhead irrigation method. The volume one watering can as used in the schemes has a capacity of 15 litres.



The period of March - April is always the problem months of water shortage as indicated in Table 5.4. It is this time that the water level in the dams reduce, however, the dry spell is normally from November to April.

**Table 5.4 Months of Water Shortage**

Months	Frequency	Percent
Nov – Dec	1	1.0
Jan – Feb	24	24.0
Mar – April	75	75.0
Total	100	100.0

Source: Field Survey, 2010

### 5.7 Correlation Analysis

In view of the fact established earlier that a person's gender as an influence on the person's access to technical assistance, water supply, plot size and educational level, a correlation analysis was carried out. This was to measure the linear relationship between the variables. Table 5.5 displays a correlation matrix between gender and educational status of respondents. There exist a statistical significant ( $0.1 > .00$ ) linear relationship between gender and educational status of the respondents.

**Table 5.5 Correlations matrix on gender and educational status**



		Gender	Educational Status
Gender	Pearson Correlation	1	-.378**
	Sig. (2 – tailed)		.000
	N	100	100
Educational	Pearson Correlation	-.378**	1
	Sig. (2 – tailed)	.000	
	N	100	100

\*\* . Correlation is significant at the 0.01 level (2 – tailed).



Considering gender and access to technical assistance, as in table 5.6, the positive correlation coefficient (0.284) though weak indicates that there is a statistically significant (0.004) linear relationship between the two variables. This implies that being a female reduces your access to technical assistance. With gender and access to water supply there is however a moderate positive correlation (0.433) which indicates that there is a statistically significant (0.000) linear relationship between these two variables such that one's gender is a factor in the supply of water to one's field.

**Table 5.6 Correlations matrix for Gender against access to technical assistance and access to water supply**

		Gender	Technical Assistance	Water supply
Gender	Pearson Correlation	1	.284**	.433**
	Sig. (2-tailed)		.004	.000
	N	100	100	100
Technical Assistance	Pearson Correlation	.284**	1	.206*
	Sig. (2-tailed)	.004		.040
	N	100	100	100
Water supply	Pearson Correlation	.433**	.206*	1
	Sig. (2-tailed)	.000	.040	
	N	100	100	100

\*\* . Correlation is significant at the 0.01 level (2-ailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

On gender and plot size, it was also observed that there is a statistically significant (0.000) correlation (-0.468) between gender and plot size (see table 5.7).

**Table 5.7 correlation matrix on gender and plot size**

		Gender	Plot size
Gender	Pearson Correlation	1	-.468**
	Sig, (2-tailed)		.000
	N	100	100
Plot size	Pearson Correlation	-.468**	1
	Sig. (2-tailed)	.000	
	N	1.00	100

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The variables analysed above intern have an influence on the quantity of produce. It is also evident from table 5.8 that there are statistical significance between access to technical assistance and quantity of produce, access to adequate water supply and quantity of produce, and plot size and quantity of produce.





**Table 5.8 Correlation matrix on access to technical assistance, access to adequate water supply, and plot size against quantity of produce**

		Plot size	Water supply	Technical Assistance	Quantity of produce
Plot size	Pearson Correlation	1	-.196	-.320**	.282**
	Sig. (2-tailed)		.050	.001	.004
	N	100	100	100	100
Water supply	Pearson Correlation	-.196	1	.206*	-.386**
	Sig. (2-tailed)	.050		.040	.000
	N	100	100	100	100
Technical Assistance	Pearson Correlation	-.320**	.206*	1	-.248*
	Sig. (2-tailed)	.001	.040		.013
	N	100	100	100	100
Quantity of produce	Pearson Correlation	.282**	-.386**	-.248*	1
	Sig. (2-tailed)	.004	.000	.013	
	N	100	100	100	100

\*\* .Correlation is significant at the 0.01 level (2- tailed).

\* .Correlation is significant at the 0.05 level (2- tailed).

### 5.7 Livelihood of Rural Women prior to Irrigation Farming

In the quest to become financially empowered, rural women in the study area engaged themselves in several enterprises including pito brewing, shea butter extraction, and various combinations of these enterprises. With a low working capital of ranging from GH¢20 to GH¢50, these women enter into these rural enterprises to generate income to support their households in terms of food, clothing ,education, health and other supports. Average annual income from these enterprises is GH¢700. Comparing an annual this



average annual income to an average annual expenditure of GH¢1500 indicates that though women were engaged in rural enterprises, income from the enterprises were not enough to meet their household financial needs. To meet the financial needs of the household and also to food secured, women also engaged in irrigation fanning.

### 5.8 Effects of Irrigation Farming on the Livelihoods of Rural Women

Observations from the study show that almost all the fanners cultivate vegetables on their plots. The survey further reveals that 88% of them, mostly women, grow vegetables and the 12%, mostly men, grow other food crops. The specific vegetables grown include Okra, tomatoes, cabbage, lettuce, bean leaves and pepper with tomatoes and okra being the commonest crops in that category. That of the food crops is mainly maize and rice. About of the vegetable fanners cultivate twice per season and about 41 % cultivate thrice.

Harvesting according to the respondents is done daily or weekly in some cases with regards to the vegetables. Though difficult, fanners were able to estimate the quantity of produce from their plots. Those who cultivated food crops got at least three and half bags from half an acre plot. Table 5.9 displays the disparity in vegetable output per ½ an acre in a season between men and women. The two main vegetables here are tomatoes and okra, and the disparity was as a result the differential access to technical assistance, water supply and the poor educational status of women in the - study area. Only one woman was able to get up to the maximum output range of 11-15 boxes of tomatoes or okra.



**Table 5.9 Gender and Quantity of produce**

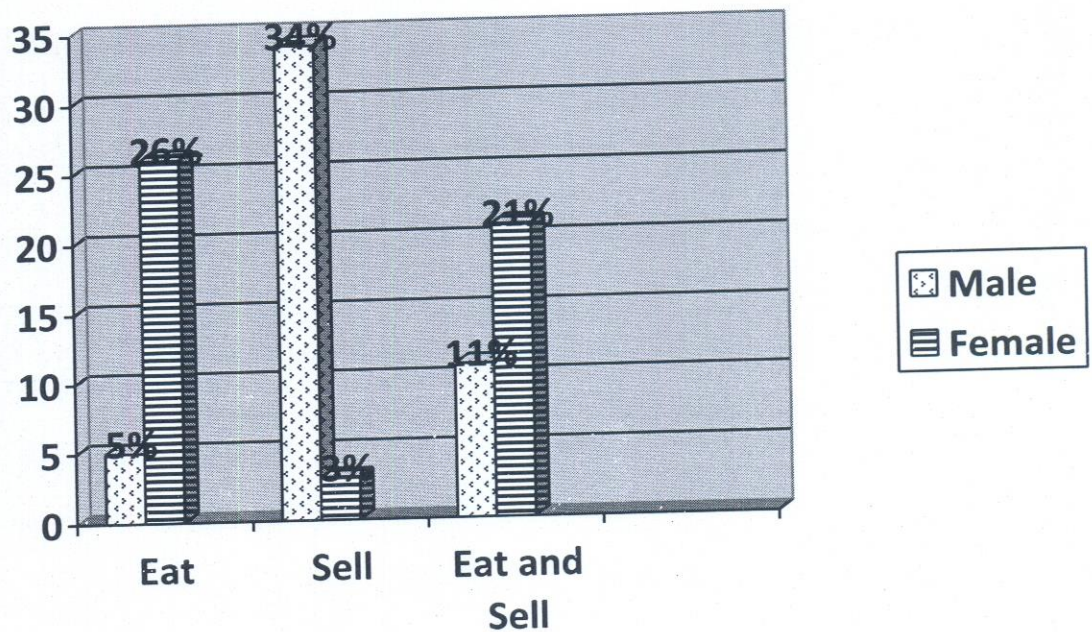
Gender	Quantity of produce per ½ acre			
	1-5 boxes	6-10 boxes	11-15 boxes	Total
Male	5	24	21	50
female	34	15	1	50
Total	39	39	22	100

Source: Field survey, 2010

Produce from the field are either for household consumption or sale or both. Figure 5.3 shows what women as well as their male counterparts use their produce for. Thirty-seven percent (37%) of farmers sold all their produce and 32% sold part (about half of their produce). The diagram also shows what other uses men and women put their produce to, while more men (34%) sell theirs, more women (26%) rather use theirs for household consumption.

Their objective is to ensure food security in the family. The FAO (2005) indicates that women are an integral part of the society and the household. They contribute to household expenditure significantly through their livelihoods and take much of the responsibilities pertaining to household food security. The FAO (2005) also went further to say that in the environment of high rate of poverty and food insecurity, women still continue to provide food for their families, though their access to land is limited with less capital, lack of credit facilities, technology, in adequate education, training. These rural women who hitherto were food insecure are now food secured.

**Figure 5.3 Use of Produce**



Source: Field Survey, 2010



Considering the output level in table 5.9, with an amount of GH¢60 per box and an average of 5 boxes for women and 10 boxes for men, the revenue was estimated. An average amount of three hundred Ghana cedis (GH¢300) for women and six hundred half the amount in each case for those who sold half of their produce.

The revenue obtained is also put to various uses such as support the family, paying children school fees and packet money as displayed in table 5.10. Four women as against 24 men use revenue as packet money; 20 women as against 16 men use it to pay children's school fees; and 26 women as against 10 men use it to support family upkeep. According to Staudt (1985), men and women spend their income in different ways and levels. Whereas women spend a high proportion of their income on food and health for children and other goods for general household consumption, men use a high proportion of their income for personal expenses.

**Table 5.10 Gender and use of revenue**

Gender	Use of Revenue			
	Support family	Pay school fees	Pocket money	Total
Male	10	16	24	50
Female	26	20	4	50
Total	36	36	28	100

Source: Field Survey, 2010

### 5.9 Challenges facing women irrigation farming

There are several challenges confronting women irrigation farming. These challenges may differ, from scheme to scheme or community to community. The following were identified by the respondents as challenges facing women in their quest to improve on their irrigation farming in the study area. They include;

- unequal opportunities between men and women in the access of irrigable plots resulting in smaller plots for majority of the women farmers,
- unequal opportunities between men and women in the access of technical assistance resulting in the access skewed towards men,
- deplorable nature of canals and laterals leading to inadequate water supply to plots far from the dams most of which belong to the women farmers,
- inadequate credit facilities, and
- animals straying into farms and destroying crops.

### 5.10 Conditions for Improving Women Irrigation Business

Respondents suggested the following as steps to improving women irrigation business. These include repair of canals and laterals, expansion of irrigable area, provision of financial assistance (credits) and fencing of irrigable area.



#### a. Repair of Canals and laterals

The inadequacy of water supply to the plots can either be as a result of decisions made by an individual using the water provided by the conveyance system, or the type and state of water conveyance. At the conveyance system, water can be lost either through evaporation or seepage. Evaporation is difficult to manage but that of seepage can be reduced drastically by improving on the state of the distribution canals and laterals. Respondents indicated that since the canals were constructed in the 1970s, there have not been any major repairs on them making much of the water to be lost through cracks on these canals. It is for this reason that farmers identified the deplorable nature of the canals as one of the major problems they encounter as a hindrance to their irrigation business. Among them women are hardly hit since men can easily dig wells to supplement the inadequate water from the canals. This explains why most of them use watering cans to water their plots.

### **b. Expansion of Irrigable Area**

Majority (84%) of the farmers desire to increase their plot size (Table 5.11). This is because their current plots are too small and that they capacity to manage bigger plots. The Sankana scheme, for instance, has a total land area of about 120 acres, but only 50 the site and farmers do not have the capacity to extend water to such areas, they are left to lie fallow. Women alone form about 75% of farmers who their desire for increase of plot size. They are of the view that if the irrigable area is expanded they can get larger plots.

**Table 5.11 Responses to increase in plot size**

Responses	Frequency	Percent
Want an increase in plot size	84	84
Do not want an increase in plot size	16	16

Source; Field data, 2010



### **c. Financial Assistance (credits)**

Small scale farming and, for that matter, irrigation farming needs some amount of financing in order to flourish. Eighty percent (80%) of farmers said they need other stakeholders in development to provide them with financial assistance in the form of small loans for them to be able to buy inputs and also carry out their irrigation farming operations. It is argued that credit programmes empower women by strengthening their economic roles, increasing their ability to contribute to the family's income, helping them establish their identity outside of the family, and giving them experience and confidence in the public sphere (Sinha, 1998).



#### **d. Fencing**

Fencing refers to restricting the irrigable area from access to unauthorised people and wandering animals. According to farmers, people sometimes go there in their absence to harvest their crops especially vegetables and this affects their earnings from the plots seriously. Animals also disturb them sometimes, especially during the afternoon when they leave the site for home. Normally they go to the site in the mornings and evenings to water their crops, it is this time that the weather is cool and proper for watering of crops.





## CHAPTER SIX

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 6.1 Summary of Major Findings

##### 6.1.1 Background of Respondents

Majority of the respondents never had any form of formal education. This group accounted for a total of 62 per cent. In terms of sex disparity women constituted a greater percentage (65). Respondents who had formal education accounted for a total of 38 per cent, 21% had basic education and 17% had secondary education.

##### 6.1.2 Women's Involvement in Irrigation Farming

The level of women's involvement in irrigation farming in the two schemes is not encouraging. For instance women constitute only 36 per cent of the total fanner population in the Sankana scheme and 40 per cent in the Daffiama scheme. Their participation in the management of irrigation facilities by taking leadership positions in the Water Users Association (WUA) is very low. Where women were even involved in the management of WUA they did not actively participate in decision-making because they were not regular at meetings. It was in these meetings that decisions were made concerning the management of the schemes. Their absence from these meetings could be for fear they would be called 'poggandou' (disrespectful women).

##### 6.1.3 Tenurial Arrangements for Women under Irrigation Schemes

Responses showed that access and control to land is gender related. Access here refers to temporary ownership and seasonal use of land for fanning. Men were in a better position to have access to land than their female counterparts. Even among women, married women had greater opportunities in having access to irrigable land and irrigation facilities through their husbands since access to land was seen as all men affair in the study area.



Three types of tenurial arrangements were indicated in both schemes. They were; access by inheritance, access through husband and access from the land allocation committee. Inheritance in this case referred to land being handed over to fanners by parents and relatives dead, or alive. Most women accessed land through their husbands. The men normally acquired the plot and subsequently released it to their spouses. This explains why married women have greater opportunities in having access to irrigable land and irrigation facilities. This is in conformity with IF AD (2000) which underscored the fact that women's independent access to land, and especially to top-quality lands, is highly unusual and challenges traditional land-allocation patterns and male control of high value assets. Also the irrigable plots that were acquired by women through their spouses were too small- in size. This is because polygamy is a common practice in the study area; - hence most of the men are married to more than one wife. Sharing a piece of land among them may result in smaller plots. The women fanners who acquired land through the land allocation committee were also allocated relatively small plots.



Access to water supply is another area where gender disparities occurred. Even though water supply is a problem to most of the fanners on the irrigation schemes especially around the months of March and April, women suffered it more. Due to the deplorable nature-of the distribution canals and laterals, water did not get to some of the plots and fanners-had-to dig wells for water and employ the use of watering cans in order to water their fields.

#### **6.1.4 Effects of Irrigation on Livelihood of Women**

The average plot size per woman was half acre; quantity of farm output was also measured per half an acre of land for, both men and women. For food crops, at least three and half bags per an acre were realised, and that of vegetables an average of five and ten boxes for women and men respectively. Produce from irrigated plots were put to various uses; selling, household consumption or both. It was released that more women used their produce for household consumption and more men sold theirs.

Where women sold their produce, they use the revenue to support their family upkeep, pay their wards school fees. According to them, their earnings from irrigation are more than that of what other people get from rain-fed agriculture farming. This agrees with Drechsel et al, (2004) study of irrigation farming conducted around Kumasi, that farmer's income from irrigation can be several times the income of farmers engaged in rain-fed agriculture.

#### **6.1.5 Conditions for improving women irrigation farming**

For women to actively take part in irrigation farming, certain measures were suggested by respondents. The measures included; encouraging their active participation in the management of irrigation facilities such that they will be part of the decision-making process, ensuring independent access and use of irrigable land, repairing distribution canals, providing financial assistance to women to boost their farming activities, expanding the irrigable area such that women can get larger plots of land to farm.

### **6.2 Conclusion**

Due to patriarchal nature of the communities women are not comfortable talking freely in the mist of men making women's participation in the management of irrigation facilities is minimal. Development partners should make conscious effort to involve them in the management process even if it demands giving women the opportunity to talk freely and also giving them a quota in WUA management. This will make them participate actively in decision making.

There is bias against women when it comes to access to and use of land and other irrigation facilities in the study area. Land is a livelihood resource and livelihood demands access to land and its use to enable women to invest fully in irrigation to improve their livelihoods. Though irrigable land in the area is not sold, women do not have independent access to it, instead they acquire such lands through their husbands. Even in such situations the plot sizes are usually small.

Irrigation contributes enormously to the livelihood of rural women. Women who participate in irrigation hitherto were not food secured and were relatively poor as



compared to now that they are into irrigation fanning. They are better off with irrigation since they now channel their energies especially during the dry season into fruitful ventures and become food secured and are financially enhanced.

There were several other challenges confronting women irrigation fanning. The following were challenges identified unequal opportunities between men and women in the access of irrigable plots resulting in smaller plots for majority of the women fanners, unequal opportunities between men and women in the access of technical assistance resulting in the access skewed towards men, deplorable nature of canals and laterals leading to inadequate water supply to plots far from the dams most of which belong to the women farmers, inadequate credit facilities, animals straying into farms and destroying crops.

To address some of these challenges respondents suggested the following: repair of canals and laterals to enable free flow of water to their plots, expansion of irrigable area such that they can get larger plots, provision of financial assistance to enable them buy inputs, and fencing of the irrigable area to prevent of unauthorised persons and stray animals,



### 6.3 Recommendations

The importance of every research is its ability to contribute to theory, policy building and development of society (Bacho, 2001). The study is intended to contribute to the development of many rural poor's search for improved irrigation services to enhance the livelihood of rural women. Based on the findings, the following recommendations are proposed as steps towards improving women's involvement in small-scale irrigation fanning and hence their livelihoods:

- More female extension officers should be trained to provide technical assistance to women fanners. This is in view of the fact that most extension workers are men and are not comfortable working with women farmers.

- Land Allocation Committees should be given regular training and sensitization to let them understand that irrigable lands should be allocated equally irrespective of a person's sex. Women farmers should also be allocated land independently and not through their husbands.
- A micro credit scheme should be set up to offer financial assistance in the form of loans to farmers, particularly women farmers. This will empower them to buy inputs for their farming activities:
- The irrigation schemes should be improved by extending and renovating the distribution canals and laterals to ensure adequate supply of water to their fields and to reduce water losses through seepage.
- Government, Non-Governmental Organizations (NGOs) and other stakeholders should come out with policies that will improve women access to land and irrigation facilities.
- Gender sensitization and training workshops should be organized for communities and farmers in irrigation schemes to educate them on the role of women in uplifting the social needs of the household.



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