

## **Contribution of Small Scale Irrigated Agriculture to Food Security in the Upper West Region of Ghana**

Emmanuel Amankwah<sup>1</sup> and Thomas Ofoe Ocloo<sup>2</sup>

Department of Agricultural Engineering, Wa Polytechnic, P.O. Box 553, Wa, UWR, Ghana.

The need for adequate food security is paramount for every country. The recent global economic downturn and the hike-up of food prices call for stringent measures to ensure that food is produced in abundance. Erratic rainfall and unfavourable climatic conditions in the region require farmers to adopt irrigated agriculture to guarantee all year round food production.

This research was conducted to find out the contribution of small scale irrigated agriculture in ensuring food security in the Upper West Region. Questionnaires, structured interviews, field survey and focus group discussions were employed in gathering the primary data. Secondary data was also gathered from books and other relevant institutions and ministries. The data collected was analyzed using Statistical Package for the Social Scientists (SPSS) software and other basic statistical tools. It was realized during the research that irrigated agriculture has been very instrumental in improving the lives of people who depend on it. It has improved the economic status and food security situation in communities where irrigation dams are constructed. The irrigation facilities have also employed about 30–40% of the youth in those communities especially people who normally move to the south to seek non-existing jobs. However, it was sad to note that most of the irrigation facilities are poorly maintained and for that matter the full potential of such facilities are hardly realized. The research was concluded with some recommendations.

**Key words:** irrigated agriculture, food security, nutrition, food production, irrigation dams

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### **Introduction**

The alarming rate of population growth of the world especially in developing nations without the corresponding growth in food production is likely to result in drastic hunger, poverty and disease in most African countries. The world population just hit 7 billion in October, 2011 from a figure of 5.8 billion in 1995 and it's expected to hit 8 billion by 2025 and this situation may have serious repercussion on food security (Anderson, 2007). Over 60% of the world food production is expected to come from irrigated agriculture to arrest challenges associated with food insecurity. Research has shown that 11% of population in China and 49% of population in Haiti are undernourished due to poverty (Anderson, 2007). The role of irrigated agriculture to ensure food security cannot consequently

be underestimated. Most of the developed countries got to where they are presently by embarking on the "Green revolution" through the establishment and strengthening of their irrigation sectors. According to FAO (1996) irrigated agriculture provides 40% of the world food production on only 17% of the world's cultivated land. According to Fiscal (1995) increased crop production in irrigated agriculture accounted for half of the global gains in food production in the last 3 decades. It is also stated that the area of land under irrigation has increased three-fold from 1950 to 1985 and one-sixth of the arable land of the world is now irrigated and this one-sixth of the land area produces one-third of the world food production (Wild, 2001).

However, irrigated agriculture is still not popular in Ghana as the country still depends largely on rain-fed agriculture most especially the Upper West Region.

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Received: November 26, 2011, Accepted: September 20, 2012

\* Corresponding author: Department of Agricultural Engineering, Wa Polytechnic, P.O. Box 553, Wa, UWR, Ghana.

E-mail: trustee7a@yahoo.com

Factors that affect irrigation development significantly in the region are soil characteristics, topography, high water losses through evapo-transpiration from reservoirs and water bodies as well as the harsh weather conditions which are a threat to the environment (Cleaver and Schreiber, 1994). Nevertheless, proper intervention and policies through water harvesting and storage, interception and diversion of runoff into reservoirs, small scale irrigated agriculture will improve food security situation in Ghana, transform rural economy, alleviate extreme poverty and improve the livelihood of the rural folk.

The quest for food security in Ghana is very important now than never before. The recent price hike of food substances and the global economic crunch are enough indications of the need to produce more food. Food insecurity in Ghana may have significant impact on the people of the Upper West Region as the region is the youngest and most deprived. Irrigated agriculture is known to improve the lives of farmers and to provide all year round food production.

An interview conducted by Gbireh (2003) with some farmers on the Upper West Agricultural Development Project (UWADEP) in Busa, Babile and Wellembelle indicated that farmers indeed make profits using the irrigation facilities. The farmers openly admitted that they are able to pay for their children's education, buy bicycles, roofing sheets, as well as meet other social commitments. A recent United Nations office for supervision quoted figures of GH¢341.88/ha for tomato production at the Busa dam site and GH¢683.75/ha for onion production at the Karni dam site as profits made by these farmers (Gbireh, 2003).

### **Irrigation Development and Population Growth**

There is a nexus between population growth and agricultural development. According to Alexandratos (1995), the population growth rate in developing countries has reduced from 2.1% to 1.7% in 1980–1990 and in developed countries from 0.7% to 0.4% in 2000–2010. Food production has also drastically reduced from growth rate of 3.0% from 1960–1969 to 1.8% in the period 1993–2010 (Alexandratos 1995) which probably resulted in the upsurge of food prices in 2007. Statistically, population growth may seem to reduce but in reality it is not. The world population keeps increasing especially in developing countries and such increase may not commensurate with food production.

It is estimated that the world population increases by 90 million yearly (WRI, 1994). In Africa, the population was about 221 million in 1950 but has now grown to over one billion in 2010 (WPP, 2010). Ghana's population is now 24,658,823 from a figure of 18,912,079 in 2000. The population in the region has also increased from 576,583 in 2000 to 702,110 in 2010 (GSS, 2012)

Grigg (1995) stated that the demand for food is determined by population growth and changes in income. In Africa, the demand for food is likely to double due to population explosion, changes in income levels and lifestyles which will exacerbate the plight of many Africans. In Ghana, the discovery of oil in commercial quantities is likely to worsen the food security situation in many communities around the discovery area as many people from all over the country are trooping to the oil city for jobs. The absence of irrigation facilities will compel the youth in rural areas that depends on rain-fed agriculture to migrate to the cities to seek greener pastures especially during the dry season. The rapid increase in population in the city centres will affect food production and leads to food importation which may eventually affect the economic development and render the populace impoverish. Farm lands will also be affected as the cities expand drastically. The need for small scale irrigation to promote agricultural production is therefore very paramount in Africa.

### **Agriculture and Food Security Situation in the Upper West Region**

Food security as defined by the Ministry of Food and Agriculture (MoFA) is "good quality nutritious food, hygienically packaged and attractively presented, available in sufficient quantities all year round and located at the appropriate places at affordable prices (MoFA, 2007)." The World Food Summit held in Rome in 1996 also adopted a definition of food security as "when all people, at all times, have both physical and economic access to sufficient, safe, nutritious food to meet their dietary needs and food preferences for an active and healthy life".

The region is predominantly agrarian with 86% of the population engaged in agricultural. The region depends mainly on rain-fed agriculture; however, the few irrigation facilities scattered around are not properly utilized. Problems normally associated with irrigation facilities are leakages, spillage, erosion, siltation

(weeds in canals) and corrosion of gates (FAO, 1993) and these problems are common in the study area. Surface irrigation is the principal type of irrigation practiced followed by the use of watering cans with motorized pump being the least. Many organizations such as Agricultural Services Sub- Sector Investment Project (AgSSIP), Village Infrastructure Project (VIP), Plan Ghana, and Nandom Agricultural Project (NAP) have been working to promote agriculture and food security in the region.

In the area of food security, report released by Ministry of Health (MoH) in Wa indicated that food security situation in the region is very threatening. The region cannot boast of adequate household food security let alone store food for the lean season. Due to food insecurity in the region, the World Food Programme (WFP) and Catholic Relief Services (CRS) have been providing supplementary feeding programmes within selected communities in the region (MoH, 2008).

As at December, 2007, a total of 13,234 children between 1–5 years and 2,689 pregnant and lactating mothers in 56 communities were catered for under the WFP. CRS also provides support for severely and chronic malnutrition for children under 5 years (MoH, 2008).

The overall increase in underweight may be attributed to shortage of food supply and ill health and the situation is very prevalent in the Lawra district. Available statistics indicates that there is an increase in stunted growth from 22.1% in 2006 to 26.4% in 2007. The highest prevalence was realized in Lawra district with 39.1% and the lowest one was in Nadowli with 19.6%. On the average, the regional prevalence stood at 26.4% below the WHO cut off point of 12%. In the same vein, under nutrition among mothers has increased from 14.9% in 2006 to 16.5% in 2007. The highest seen (17.9%) was in Wa East and the least seen (15.9%) was in Nadowli (MoH, 2008). This situation may be similar in other regions thus improvement of nutrition should be a major concern in the planning of all agricultural and economic development (Pacey and Payne, 1985). Food security will only be a reality if there is increased production of food and greater stability in availability (Cleaver and Schreiber, 1994). This could only be possible when there are adequate irrigation facilities for farmers to continue working during the dry season. However, it is worth noting that improper application of irrigation may lead to salinization

which affects the quality of the soil. According to Brinkman (1980), salinization problems occur in about 23% of cultivated land in the world. It is also observed that evaporation, capillary rise when a shallow water table layer is present, weathering, and the input of salts with the irrigation water, are the main causes of salinization. There is therefore the need to improve irrigation water management and apply proper irrigation practices to avoid salinization.

It is also important that the irrigation facilities provided are properly managed to enable farmers cultivate all year round. The Ghana Irrigation Development Authority (GIDA) is the body mandated to provide irrigation facilities to promote irrigated agriculture in Ghana. Unfortunately the few irrigation facilities are poorly maintained thus farmers are not able to derive the best from such facilities. In a report prepared by GIDA (2009), it was also observed that most of the dams in the region were constructed by road contractors with little or no knowledge in dam construction. There were no surveys or designs of existing dams and this situation has resulted in the poor management of the dams. Dam construction goes beyond a mere closing up of breached sections of embankments. However, a properly constructed and maintained irrigation scheme is expected to last over 30 years (FAO, 1996).

## Methodology

### Overview of the Upper West Region

The Upper West region is situated in the North-Western part of Ghana. It lies between longitude 1°25'W and 2°45' and latitudes 9°30'N and 11°N and is bordered to the South by the Northern region, to the North and West by Burkina Faso, and to the East by the Upper East Region. It covers a geographical area of 18,476 km<sup>2</sup>, which constitutes about 12.7% of the total land area of Ghana and has an estimated population of 702,110 in 2010. The region is made up of 9 districts namely: Jirapa, Lambussie, Lawra, Nadowli, Sissala East, Sissala West, Wa East, Wa West and Wa Municipality (WMA, 2009)

The rainfall pattern in the North is unimodal with the maximum rainfall month normally in August/September. The rainfall reduces eastwards and northwards to about 800 mm and 1000 mm respectively. The climate is tropical with an average minimum temperature of 23°C that decreases to about 18°C in December and average maximum temperature of about 35°C that in-

creases to about 40°C in March. The relative humidity ranges between 70–90% but falls to 20% in the dry season.

### Methods of data gathering

The methods used to gather relevant data were questionnaires, structured and non structured interviews, field observation and compilation of reports from relevant institutions. The research was carried out in Busa and Nyamati irrigation dams all in the Upper West Region. Apart from these two communities, other irrigation facilities were visited to observe the general conditions of irrigation dams in the region. In all 40 farmers were selected from Busa and 45 farmers from Nyamati and their surrounding communities and to ensure a fair gender balance, 45 males and 40 female farmers were selected. Fifteen (15) officers made up of agricultural extension officers and field engineers were also selected to complete questionnaires specifically designed for them. These officers were selected because of their constant interaction with farmers in the chosen communities.

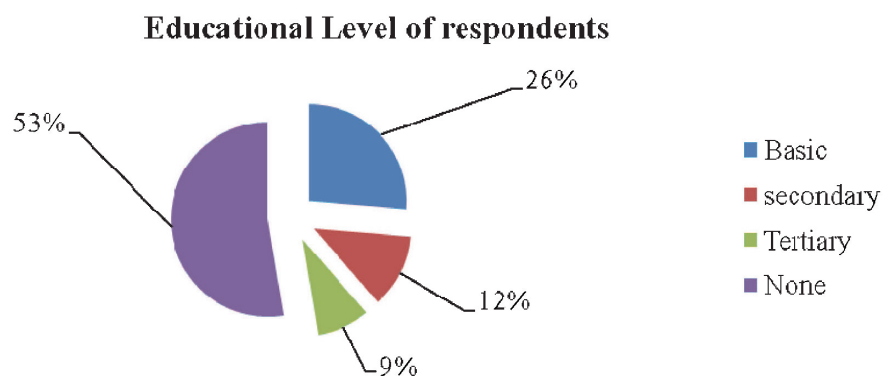
Since most of the farmers can neither read nor write, such farmers in the two communities were assisted to answer the questionnaires. Others were interviewed in the local language to gather adequate information for analysis. The total respondents were 100 in number. The questionnaires centred mainly on their economic status before and after the construction of the dam. During the interaction with some of the farmers, questions relating to poverty reduction, emigration of the youth, nutritional level of their meals, and health condition of the people as a result of the dam were solicited. Secondary data on irrigation development

and food security in the region to support the research were obtained from Plan Ghana, GIDA, Ministry of Food and Agriculture and other sources. Field observations were embarked upon to ascertain the state of irrigation facilities and agricultural practices in the two farming communities. Every effort was made to guarantee the quality and reliability of the data.

### Results and Discussions

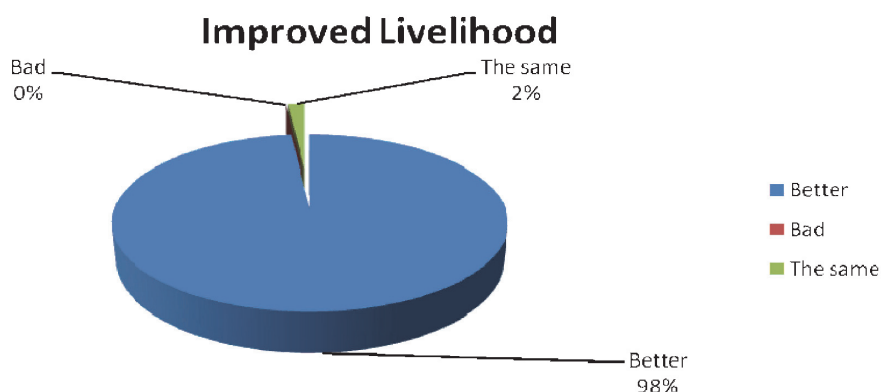
It was observed during the research that, 68% of farmers in Busa and Nyamati who uses irrigation facilities were of age between 30–49 years while those below 30 years forms 32%. This indicates that about 1/3 of the farmers are youth below 30 years. Even though this is a positive sign, there is the need for government and NGOs to encourage and support the youth to go into farming instead of running to the cities to seek non-existence jobs. It was also realized that the rate of illiteracy was quite high as 53% of the respondents had no formal education, 26% and 12% had basic and secondary education, respectively. Only 9% of the respondents had tertiary education (Fig. 1).

Even though majority had no basic education, yet they know how to prepare the land, when to plant and manage their crops, and harvest to avoid losses. They also know how to irrigate to avoid water logging on their farms. This is an indication that farming could be a good business for both the literate and the illiterate if they are all given the needed training. Both the educated and the uneducated can contribute to food security by engaging in active farming. The 9% farmers with tertiary education are quite impressive and this could help curb the rate of graduate unemployment in the country if graduates are given the needed support to



Source: Field Survey, 2009

Fig. 1. Educational Level of Respondents



Source: Field Survey, 2009

Fig. 2. Benefits of the Irrigation facilities

also enter into agriculture.

It was also observed that farmers use the dams only after the rainy season. The common crops cultivated are tomatoes, cabbages, lettuce, onions, okro, leaves (ayoyo and alefi), green peper and sometimes beans and groundnut. Most of the farmers engage in mono-cropping while a few of them do mixed cropping. They are able to harvest twice before the onset of the rainy season. Most of the crops mature within 2 1/2–3 months. The presence of the irrigation dam is therefore very important as it provides jobs for these farmers during the dry season as compare to other farmers who only depend on the rainy season. The production of these food crops during the dry season serves as a backup to food security as people get access to these vegetables to improve upon their dietary requirement. The malnutrition problems outlined by MoH (2008) in the region could be resolved if small scale irrigated agriculture is given the needed boost. FAO (2005) also stressed on the need for the production of enough food to meet current and future needs in response to continued population growth especially in developing economies. Irrigated agriculture therefore cannot be relegated to the background if the country wants to address her food security challenges as testified by Cleaver and Schreiber (1994).

The benefit of the irrigation facilities for farmers cannot be overemphasised. Almost all the farmers interviewed admitted making a lot of profits from their farms. From Fig. 2, 98% of the respondents agreed that the irrigation facility has improved their living conditions. The 2% were actually those who do not have much experience and sometimes suffer crop fail-

ure. Most of the farmers are able to purchase other food items for keep against the lean season thus improving their household food security. They are able to pay certain fees of their wards in school, buy books for them; purchase other items like radio, bicycle, cooking utensil, and clothes which confirm the findings of Gbireh's research in 2003 and also in line with the United Nations' researched findings in the region.

Investigation into their input and output of their activities revealed that some of them make profit margin ranging from GH¢100–GH¢320 at the end of each harvesting season. This is far better as compare to farmers who rely solely on the rainy season because they sometimes run at a lost due to the erratic nature of the weather. However, the farmers complained about the frequent drying of the irrigation dams which makes their work difficult. Most of them have to walk long distances to fetch water with their watering cans when the water in the dam reduces. Indeed the provision of irrigation facilities will ensure all year round food production thus improving household food security in the region. Considering the recent climate variations, irrigated agriculture seems to be the only solution to food security especially in the UWR. Wild (2001), Fiscal (1995) and FAO (1996) have all attested through their research works that irrigated agriculture have increased food production and that is the only way forward.

Other observations were lack of regular education and training for farmers as to how to improve farming activities and the use of the irrigation facilities. It was also observed that the water in the dam becomes so low to the extent that no water flows through the canals





Dam level during the rainy season



Dam level during the dry season

**Fig. 3.** Shortage of water in the dam during the dry season

(Fig. 3). Another unfortunate situation that was observed was the lack of maintenance culture. Most of the irrigation facilities visited revealed a deplorable state of the irrigation dams. The problems identified were spillage, weeds in canals, leakages, water logging and corroded gates. This is in line with FAO (1993) observation on maintenance. Consequently, the need for proper maintenance through inspection, repair works, cleaning and coating cannot be grossed over. These conditions affect the sustainability of irrigation dam projects and hamper food security situation in the region and Ghana as a whole.

### Conclusion and Recommendations

#### Conclusion

From the research findings, it could be concluded that small scale irrigation facilities play a crucial role in ensuring food security in the Upper West Region. Farmers have affirmed that they benefit greatly from the facility and that has improved their livelihood and household food security in the region. It is therefore paramount for government, NGOs, interest groups and individuals to give small scale irrigated agriculture the needed attention to ensure adequate food supply in the region all year round.

It is also important to take note of the maintenance aspect of the facilities. So much is invested in the construction of irrigation facilities, thus the need to ensure that there is proper maintenance of such facilities. Food security in the country and livelihood of our peasant farmers could be improved adequately if more

irrigation facilities are provided and maintained. Proper road network, adequate storage facilities, market accessibility and diversification of crop varieties are all necessary to guarantee food security in the region and Ghana at large.

### Recommendations

Based on the research outcome, the following suggestions are drawn for consideration

1. Improving accessibility to credit and financial assistance to farmers: this is very important to help farmers buy the needed inputs to expand their farms.
2. Maintaining existing irrigation dams and construction of new ones should be a priority of the government and NGOs so that more food could be produced for local consumption and for export.
3. It is also important to provide boreholes and dug- out wells for farmers to practise dry season farming where there are no irrigation dams.
4. Improving road network, maintenance of irrigation facilities and making agriculture attractive to the youth are all very important to ensure food security in the Upper West Region.

### Acknowledgement

We would like to express our heartfelt gratitude to Mr. George Tagoe, Regional Engineer, GIDA for releasing information on irrigation development in the Upper West Region. We would also want to thank

some of our students for working tirelessly to make this research a success. We are grateful to all the staff of GIDA and MoFA who in one way or the other provided reliable information during the research. May the almighty God bless you.

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