ORIGINAL ARTICLE

Utilization of Water Resources and Food Security in Seka Woreda, Jimma Zone

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Abstract

This study was conducted to investigate the level of water resources utilization for small scale irrigation agriculture and to examine the food security of households of Seka woreda. A sample of two hundred-ten households were taken using stratified random sampling method. Questionnaire and observation were used to obtain primary data. As per the findings of the study indicated the majorities of the respondents have access to pond, spring, swampy, stream and river, well and get abundant rain water. Despite this, 72.86% do not utilize water resources for small-scale irrigation. The findings of the study revealed that households who practice irrigation ensure better food security as compared to those households that do not utilize water resources for small-scale irrigation. There are many operational problems that impeded the efficiency of water resource utilization for small-scale irrigation. For efficient utilization of water resources for small-scale irrigation, the households need supports such as guidance, skilled manpower, access to loan services, fertilizers, selected seeds, access to market, cooperation, water pumps. Thus governmental and non-governmental bodies found at different levels should endeavor to do all what is expected of them in this regard.

Key-words: water resources, small-scale irrigation and food security

INTRODUCTION

In most developing countries of the world, water is not treated as a scarce resource. People in these counties treat water as an abundant and unlimited resource; consequently, the water resource is vulnerable to wastage, pollution, misuse, etc. However, there are few nations that treat water as a scarce resource and use it appropriately (Winpenny, 1994). Though it is not possible to entirely prevent water shortages, effective water resource management can minimize problems (Grigg, 2000). There are basically two things a society can do when its growth is threatened by a limited supply of water. It can find new sources of supply or it can utilize its limited supply more efficiently, where the latter is better method.

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The estimated over the last decade indicate, that, on an average annually, around 4.5 million people regularly need external food assistance which amounts to about one million tons of additional food to bridge the gap between domestic supply and the demand which keeps growing every year. During the drought years of 2002/03 Ethiopia was experiencing a very serious problem of food insecurity when an estimated 14 million people were in need of external food assistance to survive. Although the 2002/03 problem was perhaps the worst so far, Ethiopia indeed has been facing food shortages for the last three decades (Choadhokas, 2003).

As one of the largest recipients of food aid in sub-Saharan Africa, food security is a major concern in Ethiopia. The proportion of food aid in the total production amounted to about 10% between 1985 and 2000. The intensity and severity of food insecurity has been rising over the years. On average, some 6.6 million people were affected each year between 1991/92 and 2002/03, compared to 4.5 million, over two times the number in 1984/85. Food production was estimated to have declined by 20% (Getahun Bikora, 2003).

Though Ethiopia's agriculture is dependent on climatic factors, mainly conditioned by availability of rainfall, there exist abundant water resources, which have tremendous irrigation potential. Nearly 6 billion cubic meters of water finds its way into the Mediterranean Sea annually only from river Nile. The potential for irrigated agriculture is currently estimated at 3.7 million hectares, of which only about 5% is under irrigation, contributing about 3% of the annual food production (Mulat, 2003).
Most parts of the highlands generally receive adequate amount of rainfall in normal years, which eventually drains into lakes and rivers. Unfortunately, much rainwater is lost in absence of adequate conservation and harvesting activities. It has been estimated that from about 110 billion cubic meters annual surface water supply only one percent is used for irrigation and hydropower. It also has groundwater resources estimated at 2.6 billion cubic meters and many springs and small streams that can be used for water harvesting. The country has a potential of irrigation about 3-4 million hectares but presently just about 160,000 hectares are under irrigation (Choadhokas, 2003).

However, Ethiopia has not made significant progress in the field of water resource development. The total renewable fresh water of the country is estimated to be nearly 110 billion cubic meters. Hence, the overall objectives of the national water resources management policy of the country is to enhance and promote efforts towards an efficient, equitable and optimum utilization of the available water resources and contribute to the country's socio-economic development on sustainable basis (Gulilate,2002; MOFED,2003; Choadhokas, 2003).

Seka woreda is endowed with ample water resource and receives abundant rainwater. However, the low level of water resource utilization for irrigation observed at the national level is also seen here. The problem is aggravated due to the fact that the majority of the farmers are highly dependent on natural coffee and rain-fed agriculture (Seka Woreda Agricultural Development Bureau, 1994). Thus, sound and rational community water utilization requires in-depth and rigorous study on such complex set of problems and salient features of the existing water resource utilization, on the basis of which future water resource system can be developed. The central aim of this study, therefore, was to investigate the major causes of low level utilization of water resources for small-scale irrigation and its effect on household food security.

Objectives of the study

The general objective of the study is to investigate the major factors that influence the utilization of water resources for small-scale irrigation in Seka woreda, Jimma Zone and its effect on food security.

Specific objectives

- To identify the availability and accessibility of water resources in the study area;
- To examine the extent to which the households utilize water resources for small-scale irrigation;
- To identify the major crops produced through small-scale irrigation;
- To investigate the main factors those affect the utilization of water resources for small-scale irrigation.
- To examine the level of food security of households that practice irrigation and those who do not practice irrigation.

Research questions

- What are the water resources available in the study area and to what extent do the households access to them?
- What is the level of water resources utilization of the households for small-scale irrigation?
- What are the major crops produced through small-scale irrigation?
- What are the main factors that affect the utilization of water resources for small-scale irrigation?
- What is the level of food security of households that practice irrigation and those who do not practice irrigation?

Significance of the study

- In addressing the problem of water resource utilization and minimizing the risk of dependence on rain-fed agriculture and natural coffee, this study may help to promote small scale irrigation scheme, water harvesting and designing incentive schemes for the farmers.
- It could have also importance to show the gaps among the zone, woreda officials and the surrounding farmers in implementing the general objective of the country's overall poverty reduction program.
- It may provide a standing point to Jimma University, College of Agricultures to conduct a community based research to help the farmers.

METHODOLOGY OF THE STUDY

Study Area and Design: The study was delimited to Seka Woreda, Jimma Zone .The woreda was selected due to first its proximity to market center (Jimma); secondly, it has more water resource (i.e. underground, small and manageable perennial streams) and more than these it has abundant water logged and swamp areas. Besides, the relief feature is more of plain which is conductive atmosphere for agricultural purpose. The focus area of the study was to investigate the main factors that influence the utilization of water resource for small-scale irrigation and the effects on food security of the households. Hence, across-sectional study design was used because the study was survey type, where the respondents were visited once to collect the data.

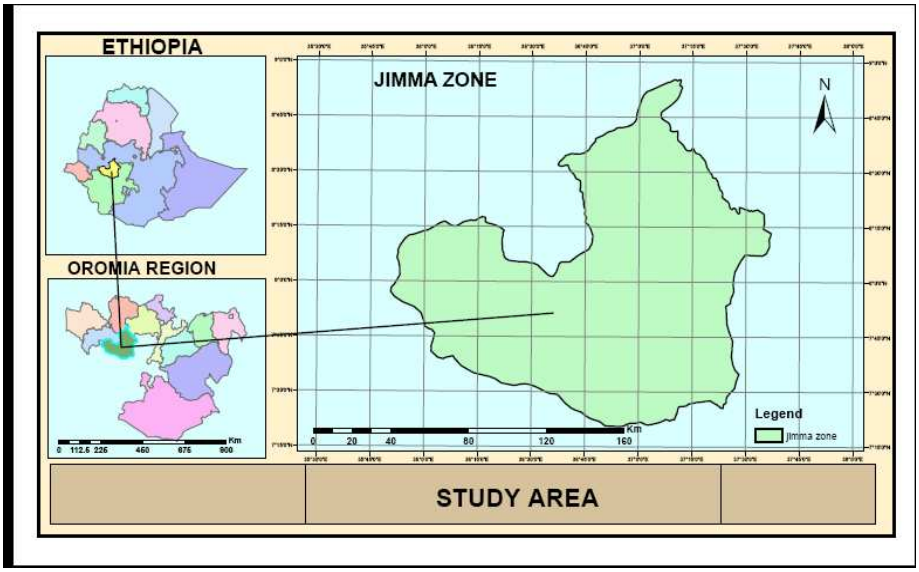

Figure 1: Map of Jimma Zone
Source: JU, Dep. of Geo. and Env. Studies (Dec.2011)

Study population and Sampling Techniques: Rural households of Seka Woreda were the population of the study. Thus, three peasant associations were selected based on their proximity and their method of farming. Hence, 210 households were taken as a sample using stratified random sampling method.

Instruments of Data Collection: Both primary as well as secondary data sources were used. In orders to obtain the required information, two data collection methods were used. These are questionnaire and observation.

Questionnaire: - was used to collect first hand information from farmers, which contains both open-ended and close ended questions.

Observation:- The researcher collected information through observation during the field survey. observation was made in orders to make FGD with the households and discuss the problems related to water utilization for small-scale irrigation and to collect data that may not be obtained with the questionnaire. It was used to cross-check the data collected through questionnaire.

Method of Data Analysis: The collected data was analyzed using descriptive statistical methods. The data obtained from the questionnaire was sorted and checked. After this, relevant statistical computation was made such as percentage and frequencies. Finally, tables were used to interpret and discuss the results.

Ethical Consideration: The permission letter from the university was given to the concerned bodies. The purpose of the study was explained to the woreda officials and kebele leaders and permission was asked from them with written letter. During the training time, a proper and adequate orientation was given to the data collectors on how to approach and interview the respondents. In addition, they were also informed to tell the objective of the study and obtain the willingness of the households.

RESULTS

Demographic Characteristics of the Respondents

This study was conducted to investigate the level of water resources utilization for small-scale irrigation and to examine the food security of households. Hence, the following information was provided about the background of the target population.

Table 1: Sex Composition, Marital Status and Education Status of the Respondents

Martial status	No.	Percent	Sex	No.	Percent	Grade level	No.	Percent
Single	9	4.28	Male	138	65.71	1-8	81	96.43
Married	183	87.14	Female	72	34.28	9-10	3	3.57
Divorced	3	1.43				11-12	-	-
Widowed	15	7.14				Illiterate	126	60
Others	-	-						
Total	210	100		210	100		210	100

The result in Table 1 shows that the cumulative sample size was 210, of which, 65.71% were males and the rest 34.28% females. The majority of the respondents (87.14%) were married, 7.14% were widowed, 4.28% were single and the remaining 1.43% were divorced. As it is depicted in the table above, 60% of the respondents were illiterate and 40% of them were attending school. Out of these, 96.43% were at primary school and the rest 3.57% were at secondary school.

Table 2: Family Size and Extended Family they Support

Range	No. of children		No. of family they support	
	No.	percent	No.	percent
1-5	156	74.29	111	52.86
6-10	42	20	90	42.86
>10	12	5.71	9	4.28
Total	210	100	210	100

As it can be inferred from Table 2, 74.29% of the respondents have 1 to 5 children, 20 % of them had 6 to 10 children. Meanwhile, 52.86% and 42.86% of them had supported 1 to 5 extended families and helped 6 to 10 additional families respectively. This indicates that the households need more food to support their family.

Availability and Accessibility of Surface Water Resources

In this part based on the collected data the following results were obtained.

Table 3: Availability and Accessibility of Water Resources

Type of water resources	Distance from farm							
	0-2km		3-4		>4		No.	Percent
	No.	Percent	No.	Percent	No.	Percent		
River	150	71	33	15.74	27	12.86	210	100
Stream	141	94	6	2.86	3	1.43	150	71.43
Swamp	168	93.33	12	5.71	-	-	180	85.71
Spring	210	100	-	-	-	-	210	100
Pond	210	100	-	-	-	-	210	100
Harvest Rainwater							33	15.7
Well							6	2.86

As shown in Table 3, the entire major water supply systems are available in the study area. If we make a kind of analysis for accessibility of water resources, we find that again, the overwhelming majorities 93.33%, 94% and 71% of the respondents have access to swamp, stream and river respectively within 2 km radius. Again, 100% of them have access to spring and pond within 2 km radius. Besides, 15.7% of the respondents harvest rainwater and 2.86% them have well, which shows that they are mainly dependent on major water sources.

The Type and Level of Water Resources Used for Small-scale Irrigation and the Challenges

Table 4: The Type and Number of Respondents that Utilize Water Resources (other than rain water) for Small-scale Irrigation

Type of water resource used	No.	Percent
River	45	57.7
Swamp	15	19.2
Streams	18	2.31
Ponds	-	-
Well	-	-
By harvesting rain water	-	-
Total	78	100

As clearly presented in Table 4, 37.14% of the respondents utilize water for small scale irrigation. Out of the total water users, 57.7% use rivers, 23.1% use streams and the rest (19.2%) use swamp. However, none of the respondents use ponds, well and rain water gathered for irrigation. Here, the term river refers to a large or big running or flowing water body.

Table 5: The Causes for Low Level Utilizing of Water Resources for Small-scale Irrigation

Reasons	No.	Percent
Shortage of land	99	75
Depend on rain fed agriculture	45	34.1
Emphasize on coffee and khat	69	45.5
Distance of water	72	54.5
Lack of knowledge	15	11.4
Lack of material support	9	6.8
Lack of capital	27	20.45
Lack of water pump	9	6.8

As illustrated in Table 5, most of the respondents indicated at least three to four reasons. This implies that the causes for low level utilization of water resources for small-scale irrigation purpose are multifaceted and complicated. Hence, 75% responded problems related to land, 54.5% said distance of water sources from farm , 45.5% indicated that they emphases more on coffee and khat, 34% said they depended on rain fed agriculture, 20.45% due to lack of capital.

Table 6: Type of Crops Produced through Small-scale Irrigation

Type	No.	Percent
Vegetables	72	92.1
Maize	3	3.85
Both	3	3.85
Others	-	-
Total	78	100

The results in Table 6 indicate that, 92.1 % of the respondents produce vegetables during dry season using water resources, 3.85 % and 3.85% cultivate maize and both maize and vegetables respectively.

The Level of Food Security

In this part, the level of food security of households who use water resources for irrigation and those who do not utilize are compared.

Table 7: Level of Food Security among Respondents who Practice Small-scale Irrigation and those do not practice

		No.	Percent		No.	Percent	Total	Percent
Utilizes	Faced food deficit	67	85.89	Never faced food deficit	11	14.10	78	100
Non utilizes	Faced food deficit	123	93.18	Never faced food deficit	9	6.8	132	100

The above Table indicates that households who faced food deficit in both categories are those who do not practice irrigation.

Table 8: Type of Support the Respondents Need for Efficient Utilization of Water For Small-scale Irrigation

Type of support	No.	Percent
Farm land	99	47.1
Guidance	84	40
Oxen	45	21.4
fertilizers and selected seed	60	28.6
Material (water pump)	12	5.7
Market, cooperation's	24	11.4
Loan services	54	28.7

The results in Table 8 illustrate the type of support the respondents need for efficient utilization of water resources for small scale irrigation. Accordingly, 47.1% of them need farmland, 40% need guidance. Moreover, 28.7% need loan services, and 28.6% fertilizers and selected seeds. Likewise, 21.4% need oxen, 11.4% market and cooperation. The rest (5.7%) need water pump.

DISCUSSION

If we analyze the accessibility of water resources, we find that the overwhelming majority (93.3%, 94% and 71%) of the respondents have access to swamp, stream and river within 2 km radius respectively. Again, 100% of them have access to spring and pond within 2 km radius. Many people in the world still receive water from sources such as ponds and tanks which are either natural or man made reservoirs, and irrigation canals. Isolated farm families have traditionally obtained the water needed for domestic and livestock use from nearby surface water/stream or groundwater (Adams, 1992).

The study area receive abundant rainfall and is endowed with ample underground water resources; only 15.7% of the respondents harvest rainwater and 2.86% they have well. Rainwater gathering is among the major water supply systems, particularly in areas where alternative sources of water are not available or are too costly to develop, and where good quality fresh surface water or ground water is lacking. One of the advantage of rainwater harvesting systems is their flexibility. The system can be developed by one household, collecting rainwater from one house roof, or it can be built by a group of households. Besides, by using this system water can be harvested even from very light showers which may be too small to cause runoff from soil catchments (Grigg, 2000; OAS, 1997; Bagelhole Organization, 2004; Peterson, 1982; Geber-Emanule, 1977). Simple wells and bucket lifts are widely used in Africa. A more sophisticated version of this simple well technology was a shadoof, a balanced beam on a trestle with a weight to counter-balance a bucket (Adams, 1992; Campbell and Sylvester, 1968; Kneese, 1964).

Another popular way of collecting rainwater in Ethiopia, particularly in the southern regions, is digging shallow ponds at carefully selected areas where runoff can be collected. When carefully built, this type of pond is a convenient and reliable source of water supply for households. Rainwater harvesting is possible in areas with as little as 50-80mm average annual rainfall. However, in Ethiopia, having an average annual rainfall of 744mm, rainwater harvesting traditional has not been known and carried out for a long period of time (Geber-Emanule, 1977).

Out of the total water users ((37.14%), 57.7% use river, 23.1% use stream and the

rest 19.2% use swamp. However, none of the respondents use ponds, well and rain water gathered for irrigation. Though Ethiopia's agriculture is dependent on climatic factors, mainly conditioned by availability of rainfall, there exist abundant water resources, which have tremendous irrigation potential. However, it has not made significant progress in the field of water resource development (Gulilate, 2002; MOFED, 2003; Choadhokas, 2003; Mulat, 2003).

The study revealed that the causes for low level utilization of water resources for small-scale irrigation purpose are multifaceted and complicated. Hence, 75% responded problems related to land, 54.5% of the respondents said distance of water sources from farm, 45.5% indicated that they emphases more on coffee and khat, 34% said they depended on rain fed agriculture, 20.45% due to lack of capital. This result is similar with that of (James and Lee, 1977). The various methods used in extracting water from surface sources depend on many different factors such as the nature of the water source, the topography of the area, the need which has to be satisfied, the available technology, the quality and quantity of water required, the location of the source in relation to where water is needed, and, the cost of extracting water (Adams, 1992).

Hence, for efficient utilization of water resources for small-scale irrigation, the respondents need supports such as guidance and skilled manpower, access to loan services, fertilizers and selected seeds, access to market and cooperation and water pumps.

CONCLUSION

Though Ethiopia's agriculture is dependent on climatic factors, mainly conditioned by availability of rainfall, there exist abundant water resources, which have tremendous irrigation potential. However it has not made significant progress in the field of water resource development. Similarly way although the study area is endowed with abundant surface water resources and rainfall, there is low level of water utilization for small-scale irrigation. The findings of the study reveal that households who practice irrigation achieve better food security as compare to those households that do not utilize water resources for small-scale irrigation.

There are many operational problems that impeded the efficiency of water resource utilization for small-scale irrigation. Hence, for efficient utilization of water resources for small-scale irrigation, the respondents need supports such as guidance, loan services, fertilizers and selected seeds, access to market cooperation and water pumps. In general, the overall objective of the national water resources management policy of the country should be achieved in the study area for optimum utilization of the available water resources in order to contribute to the food security of the households on sustainable basis.

RECOMMENDATIONS

The issue of food security in Ethiopia is complex and multidimensional. For proper and efficient utilization of water resources and to promote and accelerate food production in general and food security of the households in particular, the following points are recommended.

- Rain water harvesting technology needs to be considered as one of the many options. Households can collect rainwater from individual roof or it can be built by a group of households.
- The households should improve the use of water logged areas for agriculture.

- Raising the technical knowledge and skill of the farmers.
- The households should the land intensively by using family labour and produce additional food during the dry season through utilization of surface and ground water.
- Irrigation development program should be given emphasis for small scale and medium scale irrigation and medium–size river diversion and dam construction.
- There is a need to establish peasant associations and cooperation that will enable to provide credit and saving, marketing agricultural products and local transportation for producers.
- The concerned bodied should facilitate credit services that will enable the households to have initial capital to buy water pumps and other agricultural inputs.

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