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EFFECT OF POND WATER HARVESTING ON FOOD SECURITY OF SMALL SCALE FARMERS IN MISHG, AHFEROM WOREDA

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Abstract

The research was focused on identify the effect of pond water harvesting on food security of small scale farmers in Mishg, Ahferom woreda. The main objective is to assess the purpose of pond water harvesting, construction of pond for irrigation and identify the major constraints of pond water harvesting in Ahferom woreda.

In order to achieve the objective of this research and adequately answer the research equations both primary and secondary data source were used in gathering data questionnaire, interview and observation were used as a tools data gathering in addition random sampling method was selected 26 respondents took in the study area.

The finding of this study shows most of the farmers were consecutively affected by the problem of constriction of pond water harvesting. The problems are lack of finance and skilled labor force, location and material problem and after the construction of the pond faced constraints such as shortage of water, lack of water pump, seepage over topping, accident and diseases.

Key Words - pond water harvesting, food security,

1. Introduction

Various form of water harvesting has been used traditional throughout the world. Some of the earliest agriculture, in the Middle East, wasted based on technique such as diversion of (spate flow from normally dry water courses) on to agricultural fields. In the Niger Desert of Israel, water harvesting system dating back to 4000 years or more has been discovered (Evanari,1971). Life as we know it is not possible without water. Water is a valued because it

sustained life. Since the dawn of civilization, man has worked to make water serve him. He has been able to create gardens with in desert by means of intricate irrigation systems. However, when glistening salt covered the field of ancient Babylon, the hanging gardens collapsed with it. Throughout history, man has struggled to survive in areas with limited water resource. The findings of numerous archaeological investigation, made all over the world, strongly indicate that man has long devised ways and means of hard vesting (capturing and storing) rain water, for use on crops or supply of water to human and animals (Falken mark, 2001).

In sub Saharan Africa, the important of traditional small scale systems of water harvesting is just beginning to be recognized and a number of water harvesting projects have been set up during the post decade (Critchley and ReiJ, 1989). Their objectives have been to combat the effects of drought by improving plant production and in certain areas rehabilitating abandoned and degraded land. However, few of the projects have succeeded in combing technical efficiency with low cost and acceptability to the local farmers or agro pastoralists. This is partially due to the lack of technical” know how” but also often due to the selection of an in appropriate approach with regard to the prevailing socioeconomic conditions.

In addition, Irrigation is the supply of water to a agricultural crops by artificial means, designed to permit forming in arid regions and to affect the effect of drought in semi arid regions. Even in areas where total seasonal rain fall is adequate an average, it may be poorly distributed during rain fed farming is a high risk enterprise. Ensure stable agricultural production and also has a used in crop production, which include protecting plants against frost, suppressing weed growing in grain fields and helping in preventing soil consolidation(FAO, 1997).

The history of water harvesting in Ethiopia date back as the pre Axumite period 500 BC. During the period of this water harvesting structures such as pond, hand dug well, micro dames and rivers diversions were designed and which many house hold can be benefited, have been constructed in Axum and Gonder (Asmelash, 2001). Indicated that the oldest cost less in Gonder, constructor in the 15th – 16th C, hand a water harvesting set up and a pool that was used for religious status by the kings. In Tigray, now day water harvesting pond can be considered as a rudimentary form of irrigation. The difference is that with water harvesting the farmer has no control is that with water harvesting the farmer has no control over timing run off can be only harvested when it rains. The house hold ponds are constructed not only for animal watering, but also for different purposes. Water harvesting for livelihood of small scale farmers level is aimed to reduce poverty and to reduce food shortage, food security on massive scale is increasing by making water available to irrigate and reduce higher value of crop and provided water for watering livestock. The water harvesting at house hold level with livelihood is one option to increase water available and agricultural production. The presence of the technique of water harvesting pond and other hand dug well, allows for different purposes like vegetable production (minister of agriculture, 2003).

Similarity, in Tabia Mishg, the water harvesting pond is practices to improved livelihood of small holder farmers. Therefore, the study will assess the effect of water harvesting pond on the food security of small holder farmers in Tabia Mishg.

2. Location and Size

Ahferom woreda is found in the northern part of Ethiopia central Tigray. This Woreda is the administrative city of Enticho city. Ahferam woreda is bounded by Eritrea in north, Woreda Adwa in west, woreda ganta aseshum in east and woreda gullomekeda in north east.

A administrative, this Woreda has 33 Kebeles and 4 sub Woredas administration areas like egela, hahayle, Adiahferom and Enticho is the political and commercial administration center for the 4 sub woredas and 33 kebeles. aferom Woreda is located around 1011 km from Addis Abeba on the way from Addis Abeba to Adwa, and 228 km from the regional city of Tigray national state(Mekelle) on the main road from Mekelle to Adwa. It is located 55 km from the historical city of Axum and 35 km from Adwa.

Astronomically, Ahferom Woreda is situated between $14^{\circ} 38' 30''$ N latitude and $39^{\circ}18' 00''$ longitude (woreda municipality office, 2002).

3. Methodology

Nature of Data and Tools

The researcher collected data from the primary and secondary source f data. The primary source data, the researcher used from questionnaire and interview. The questionnaire was distributed and collected from selected respondents and interview used to gather information. Moreover, the researcher was used secondary source of data from both published and unpolished document such as articles, Journals, books, reports and media.

Sample Size and Sampling Technique

It is well known that studying the whole population at a time is impossible. So by this reason it was possible to describe the population of the area in 1640 house hold. From those the researcher was selected 26 respondents' f individual house hold farmers. In Taia mishg individual tried harvest water by different techniques such as from pond. The sampling techniques were based on random sampling methods creating questionnaire and visiting the field.

Data Analysis and Interpretation

In order to analyses and interpreted the collected data from the respondents and documents. The researcher used quantitative and qualitative method. The qualitative method of data presentation was used table and percentage. The qualitative method of data was used to organize, describe and in order to describe accurate and reliable data.

4. Result and Discussion

4.1 Pond construction

Pond is constructed by human labor through collaborating with community and supporting by government. Farmers constructed the pond for rain water harvesting on their formal and to gain benefit from their pond. It has different purpose. For instance, it use for irrigation, live stock and human drinking. Government which is design to create awareness about the pond for the farmer and it gives different aid for farmer financial and other materials.

Table 1 Pond construction by respondents

No	item	frequency	%	
1	Crop production rain water	yes	20	77%
		No	6	23%
		Total	26	100%
2	Methods of pond Constructed	Own self	6	23%
		Collaborating with other farmer	14	53%
		Rest	3	11.6%
		BOARD	3	11.6
		Total	26	100%
3	Get service and input from government	yes	8	30.7%
		No	18	69.3%
		Total	26	100%
4	Pond constructed by interest of the Farmer	yes	20	77%
		No	6	23%
		Total	26	100%
5	Use of pond	• For irrigation	6	23%
		• For livestock	14	53.8
		• For fish	1	3.8
		• For domestic	5	19.3
		Total	26	100%

Source: - field survey, 2015

As it indicated in table 2, item 1, most of the respondents (77%) agreed that there is enough rain water for crop production in the area. The respondents had a pond in their from land. But 23% of the respondents. So that the responds that used different techniques for crop production such as pond dug, wells, river and streams by the construction of different which have a pond and adequate and production. Most of the farmers were existed high economic situation and the farmers have living standard of quality of life.

Above 53.8% of the respondents were replied as they construct their collaboration with other farmers of surrounding areas. 23% of the respondents were constructed the pond by their own self and 11.6% of the respondents were constructed the pond by the REST and 11.6 of the respondents were said they had BOARD constructed the pond (table 2, item 2).

According to the information obtained from the survey, the pond which constructed by the contribution of communities or by the collaboration of with other surrounding of the people. As it indicated from the table 2, item 3, shows that 30.7% of the respondents were agreed that getting supportive service and in puts advice from the government and nongovernmental organizations that give to the farmers use spring water by pushing the pipe and taking water thorough gar and also the government which is designed to create awareness about the pond for the farmers fanatical and materials supports from the government and nongovernment organization on the construction of the pond. Because of this the farmers were gained less benefit and insufficient and inadequate income for me construction of the pond.

According Table 2, item 4, shows 77% of the respondents were constructed the pond by their interest of the farmers. Because, the respondents that are getting of the benefit from the rain water harvesting in the pond already to the farmers. But 23% of the respondents were constructed the yond was not based on their interest. As it indicated from table 2, items 5, 23% of the respondents were used for human and livestock drinking and 53.8% of the respondents were used for both and 3.8% of the respondents were used for fishing.

According to the information obtained from table 2, item 5, most of the respondents constructed the pond that used for irrigation, human and livestock watering and for fishing farmer's that produced crop production only from the rain water. For this reason, most of the farmers of the study area a did not have enough rain water for crop production. But currently the farmers are contract the pond by their own interest and supported by government and non government organization s. due to this, the farmers that gained efficient and adequate crop production and used do different and purpose like for livestock, irrigation and human harvesting.

4.2 Living standard of farmers before and after pond construction

The rural communities of the study areas are depend on agricultural economic activates that to make their live li hood. It is a back bone of the economy and proved by the providers of employment opportunity for the total activity labor force. It is the main source of food supply and income for rural population and one of the primary the income of the benefiter through the provision of organized financial service and accomplished by engaging participants in income earning activities of house hold and community level. From the frequency analysis below, it is possible to observe before and after construction of the pond.

Table 2 Annual incomes of farmers before and after cans tractions of the pond

No	before pond construction			after pond construction		
	In come	food availability per a week	expenditure	In come	food availability per a week	expenditure
1	8000	21	100	25000	28	150
2	13000	14	40	16,000	21	90
3	11000	21	45	25,000	28	80
4	16000	14	55	30,000	28	140
5	5000	14	50	10,000	21	80
6	900	21	50	20,000	28	200
7	10,000	21	100	20,000	28	250
8	11,000	14	60	20,000	28	180
9	16000	21	60	20,000	28	100
10	15000	14	70	25,000	28	120
11	12,000	14	50	25,000	28	100
12	9000	14	70	15,000	28	120
13	15000	21	80	18,000	28	100
14	7000	21	50	60,000	28	300
15	3000	14	60	50,000	28	200
16	9000	21	86	16,000	28	140
17	15,000	14	45	18,000	21	120
18	14,000	21	70	18,000	28	95
19	15,000	21	60	22,000	28	150
20	10,000	14	50	20,000	21	80
21	18,000	21	60	40,000	28	150
22	7000	14	60	19,000	21	180
23	10,000	21	70	25,000	28	200
24	8500	21	80	20,000	28	200
25	10,000	14	50	20,000	21	100
26	5000	14	40	15,000	21	90
Ave	10515.38	17.5	61.96	23,538	26.1	61.96
SD	4327.373	3.56	16.55	10951.64	3.166	56.85

4.3 challenger of pond construction

Construction of the pond is necessary things are setting in its base line knowing farmers interest and knowing the catchment conditions understand the farms future use from the pond but constraint is problem which is facet when during and after construction of the pond. it is obvious every thinks has constraint, because without constraint such as lack of finance and skill labour force, location and material problem and after the construction of the pond that faced the constraint such as shortage of water, lack of water pump, see page and over topping and accident and diseases.

Table 4:- major constraint of pond construction

No	item		frequency	%
1	constraint during pond construction	financial and labor force problem	11	42.24%
		location and material problem	11	42.24%
		No challenge	4	15.4%
		Total	26	100%
2	constraints after pond construction	shortage of water pond and water pump	5	19.24%
		see page and over topping	10	38.5%
		accident and debases	6	23.%
		No challenge	5	19.24
		Total	26	100%

SOURCE FIELD SURVEY, 2015

As it is indicated in table 4, item 1, show 42,24% of the respondents were constraint due to the financial and skill labor force problem' 42.3% of the respondents also constraint due to location and material problem and 15.5% of the respondents are constructed the pond without any constrain or challenge.

According to the information obtained from the table 4 item 1, their reason should be financial and skill labor problem in the house hold. The respondents live under low economic status that correct labor problem. The ponds were constructed in dry season then farmers which have financial and labor force problem do not have enough time to construct the pond. It works other activity, because they do not have enough production. As it medicated in table 4 item 2, 19.24% of the respondents are replied as the constraint after constructed such as shortage of water and water pump, 38.5% of the respondents were see rage and over topping problem, 23% of the respondents were accident and diseases and 19.24% of the respondents were have not constraint.

According to the information obtained from the study, the results mostly have constraint after the construction of the pond. Some of the respondents have see page problem faced their pond due to the soil texture. The soil type that occur the seepage where coursers and soil, which have high in water infiltration rate and low holding water capacity In order to reduce the seepage, site selection should be in clay soil which have high holding and low infiltration rate. The accident was children and livestock are fall in the pond in order to the pond in order to reduce this problem the pond should have fence. The diseases were due to the pond by its nature as suitable for mosquito reproduction which the farmers are suffered by malaria.

The households suffered by disease during the construction of the pond which are caused by the poor quality of water. The diseases such as Guardia, Typhoid and cholera are the most problem suffered offer the pond is constructed.

In order to minimize the diseases were the farmers should apply treatment to kill mosquito and protected the other disease during and after the construction of the pond.

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