EUROPEAN ACADEMIC RESEARCH
Vol. II, Issue 1/ April 2014

Impact Factor: 3.1 (UIF)
DRJI Value: 5.9 (B+)

ISSN 2286-4822
www.euacademic.org

Pastorals and Agro-Pastorals Perception on Rainwater Harvesting Technology in Deboweyn Woreda, Qorahe Zone, Somali Regional State, Ethiopia

MELKAM ASRESIE
R. UTTAMA REDDY[1]
Department of Geography and Environmental studies
College of Social science and Humanities
Haramaya University, Dire Dawa
Ethiopia

Abstract:

Rainwater harvesting could be one of the most important strategies to increase agricultural production from cropping of a given area of land more frequently and more intensively. This paper tries to study the cases of adoption of Rain Water Harvest Technology (RWHT) by pastoralists and agro-pastoralists in the study area and to assess the perception of farmers on adoption of RWHT. The research method employed in this study was descriptive survey approach aimed at examining and describing the major situations associated factors affecting adoption of rainwater harvesting technology in the study area. 176 sampled households were randomly selected from the study area to generate the data set. The selected main variables were drought, low fertility of soil, high input price, lack of input supply on time and the nature of dry land utilization are persistent constraints and have resulted in considerable reduction of ecosystem productivity in the study area. Most of respondents perceived (86.3%) that the study area of arid and semi-arid rangelands are characterized by unstable climatic conditions, which make drought unpredictable, droughts result from the disruption of rainfall pattern failure or extended dry season. The majorities of sampled household were perceived that RWH technology reduces soil erosion, RWH technology decreases the effect of drought, RWH technology increases agro- pastoral production, RWH technology is consistent with existing pastorals and agro-pastorals

[1] Corresponding author: drreddyhu@gmail.com

practice and RWH technology generates benefits. Rainwater harvesting also played a significant role in promoting ecological and environmental management.

Key words: rainfed agriculture, rainwater harvesting, socio-economic factors, biophysical factors.

Introduction

In Sub-Saharan Africa (SSA)including Ethiopia more than 95% of the farmland is rainfed, while almost 90% in Latin America, 60% in South Asia, 65% in East Asia and 75% in the near East and North Africa are rainfed. In India, 60% of water use in agriculture originates from directly infiltrated rainfall. Low and variable productivity is the major cause of poverty for 70% of the world's poor inhabiting these lands (UNEP 2009).

Rainfall is the major source of agricultural water supply for most of the subsistence farming system in SSA. However, its distribution is also unreliable particularly for the semi arid & dry sub humid areas that crop production as well as animal rearing has become risky enterprise & the lives of the people extremely precarious. National governments and international organizations have been picking up one and throwing another approach to ensure the reliability of the availability of water for agriculture (Merrey *et al.* 2005).

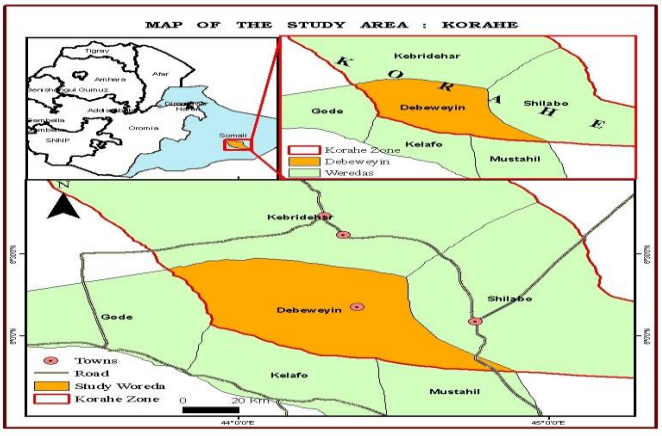
Rainwater harvesting has been recognized by the Ethiopian government as a promising way for improving the water availability for crop production, domestic use and water for livestock. To mitigate the erratic nature of rainfall in the arid and semi-arid parts of the country, a national food security strategy based on the development and implementation of RWHT either at a village or household level was adopted (Wolday Amha 1999). The majority of the budget was used by regional states for the construction of RWH schemes including household ponds (Rami 2003).

In general, adoption of resource conservation technologies is a function of the characteristics of the technology proposed, farmers' perception of its advantages and need, as well as availability and distribution of production factors (i.e. land, labour/time, capital, knowledge, skills, etc). Other factors are farmers' attitude towards experiments and risk, institutional support/knowledge sharing and the policy environment (Guerin *et al.* 1994).

The present study was designed to assess major biophysical factors affecting adoption of rainwater harvesting technology at household level in the study area.

Research Methodology

Deboweyn woreda is located at about 1194 kilometres away from Addis Ababa, the capital of Ethiopia, and 566 km from Jigjiga, the capital of the Somali National Regional State. The Woreda is geographically located $5^{0}00'$ N-$6^{0}30'$N latitude and $39^{0}30'$E-$45^{0}00'$E longitudes. The woreda has shared boundaries with Shilabo woreda in the East, Kebridahar woreda in the North, Kelafo woreda in the Southeast and Godey zone in the West.



Source: Ethio-GIS

Data collection

Primary data sources were original data sources that mostly collected by researcher directly or indirectly through observation, focus group discussion, interview as well as questionnaire. Secondary data was gathered from published such as books, journals, maps and unpublished materials involve reports and studies as well as data organized in concerned sector offices if the district and other sources were used Secondary sources of data were collected from relevant sources such as Woreda Finance and Economic Development Bureau, Agriculture and Rural Development Bureau, Deboweyn woreda, water supply office, and other related bureaus, offices and officials. The available data was analysed through using SPSS software.

Results and Discussion

Adoption Status and Major Constraints in RWH Technology

According to the woreda agriculture office reported that population benefiting from the harvesting of rainwater pastoral and agro-pastoral households in the study area. The dominant observable problems of RWH structures which are loss of water through evaporation and drought effects as most of the structures lost their water. Of the total ponds 33.5% are mortar cemented and the remaining 66.5 % are devoid of any lining material. During the time of survey, according to the woreda agriculture office report, 615 RWH structures were found with water while the other ponds were without water (Figure 1).

Figure 1 Rainwater harvesting structure without water

Pastorals and agro-pastorals' perception on constraints of new technology

Pastorals' and agro-pastorals' individual perception of the degree of a given constraints may influence his/her decision on possible solutions. The researcher selected main variables to sampled households, were perceived that include drought; low fertility of soil, high input price, lack of input supply on time and the nature of dry land utilization are persistent constraints and have resulted in considerable reduction of ecosystem productivity in the study area. Most of respondents were perceived (86.3%), the study area of arid and semi-arid rangelands are characterized by unstable climatic conditions, which make drought unpredictable, droughts result from the disruption of rainfall pattern failure or extended dry season. In addition, interview and observation revealed that with scarce water resources, forage in limited be utilized as well as extended time and distance to watering points and lack of forage induce increases livestock mortality, which is followed scarcity of food for the human population. Of the total sampled households (89.7%) were agreed, seasonal herd mobility plays key management approach that role reducing land degradation,

improving availability of rangeland resources, and increasing local drought coping in the area.

Respondent categories						
Agro-pastoral constrains	Users		Non-users		Total	
Drought	N	%	N	%	N	%
don't know	9	8.7	14	19.2	23	13.1
Agree	88	85.4	56	76.7	14.4	81.8
Disagree	6	5.8	3	4.1	9	5.1
High input price						
don't know	17	16.5	13	17.8	30	17.0
Agree	82	79.6	56	76.7	138	78.4
Disagree	4	3.9	4	5.5	8	4.5
Shortage of input supply						
Don't know	15	14.6	14	19.2	29	16.5
Agree	84	81.6	57	78.1	141	80.1
Disagree	4	3.9	2	2.7	6	3.4
Dry up nature of land						
don't know	12	11.7	10	13.7	22	12.5
Agree	87	84.5	57	78.1	144	81.8
Disagree	4	3.9	6	8.2	10	5.7
Low soil fertility						
don't know	19	18.4	15	20.5	34	19.3
Agree	74	71.8	47	64.4	121	68.8
Disagree	10	9.7	11	15.1	21	11.9
Food shortage of respondent in the past five years						
No	12	11.7	8	11.0	20	11.4
Yes	91	88.3	65	89.0	156	88.6

Table 11. Respondents' perception on farm constraints

Source: Field survey, 2013 N=176

Pastoralists' and agro-pastoralists' perception towards RWHT

Perception on the merit and demerit of a given technology leads to rational decision on the adoption of new technology. The perception of the respondents was assessed using the same type of scale as it was aforementioned agree, disagree and don't know. The Survey result showed that as household's utilization pattern varies, the harvested water may stay from one up to six months. Of the total sampled respondents 72% witnessed that it serves from two up to five months. The majorities of

respondents perceived that the time interval three to four for the use of harvested rainwater comprised 40%.

Time interval (in month)	*N*	%
1	7	3.5
1-2	21	17.5
2-3	26	22.5
3-4	40	50.2
4-5	6	4.3
5-6	3	2.0
Total	103	100

Table 2 Time interval response for use of harvested rainwater
Source: Field survey, 2013 N=103

While responding for not using RWH technology, 68% of non adopters' pastorals and agro pastorals cited shortage of cash as the major constraint. Out of the total non adopters 60% of them believe that the cost of RWH is difficult to be covered by individual household level adding their readiness to have it if half the cost is covered by external support.

Perception of sampled household towards the advantages of RWHT

In addition rainwater harvesting is one of effective water technology for adoption to be increased variability in water supply and rainfall and also key instrument to use primary source of water for different purposes. The majorities of sampled household were perceived that RWH technology reduces soil erosion, RWH technology decreases the effect of drought, RWH technology increases agro- pastoral production, RWH technology is consistent with existing pastorals and agro-pastorals practice and RWH technology generates benefits. From the total sampled households 88.6 percent of them responded that RWH technology reduces erosion caused by runoff. The runoff that causes erosion on agro-pastoral land diverted to the RWH structure to collect the water for future use. The rest of 7.4 percent of the respondents were not clear to

respond for the items presented. In line with concerning the categories of users and non-users sampled respondents 89.3 and 87.2 percent responded that RWH technology reduces soil erosion.

Respondent categories						
Statement	Users		Non-users		Total	
	N	%	N	%	N	%
RWH reduce erosion						
don't know	9	8.7	4	5.5	13	7.4
Agree	92	89.3	64	87.7	156	88.6
Disagree	2	1.9	5	6.8	7	4.0
RWHT reduce drought						
Don't use	9	8.7	14	19.2	32	13.1
Agree	88	85.4	56	76.7	144	81.8
Disagree	6	5.8	3	4.1	9	5.1
RWHT mitigate natural resource destruction						
Don't know	22	21.4	16	21.9	38	21.6
Agree	73	70.9	50	68.5	123	69.9
Disagree	8	7.8	7	9.6	15	8.5
RWHT reduces flood						
Don't use	26	25.2	11	15.1	37	21.0
Agree	68	66.0	54	74.0	122	69.3
Disagree	9	8.7	8	11.0	17	9.7
RWHT increases agro-pastoral production						
Don't know	17	16.5	13	17.8	30	17.0
Agree	76	73.8	56	76.7	132	75.0
Disagree	10	9.7	4	5.5	14	8.0

Table 3 Respondents' perception towards the merits of RWH technology

Source: Field survey, 2013 N=176

All pastoral regions in Ethiopia are highly prone to the adverse impacts of climate change, the problem is more prevalent in the north eastern lowlands of the country, including, Somali regional state (Yohannes 2009). Ethiopia has faced problem with a rapid population growth that contributes to environmental degradation, which manifests itself by lowering agricultural productivity. According to Sisay Asefa and Adugna

Lemi (2012), the population growth has resulted in high absolute poverty that has induced the rural poor to become both agents and victims of environmental degradation. Furthermore, some forms of environmental degradations are caused by natural disasters such as draught and desertification of a given area of land more frequently and more intensively in order to increase the output per unit area and per unit of time (Mintesnot *et al*. 2006).

Summary and Conclusion

The study described the adoption status of indigenous RWHT as well as the perception of pastorals' and agro-pastorals' towards RWH technology is essential for introduction and promotion of the technology. The introduction and promotion of RWH technology involves appropriate extension approaches and technically equipped experts for effective promotion and efficient utilization of the technology.

BIBLIOGRAPHY

Sisay Asefa and Adugna Lemi. 2012. "Eradicating rural poverty and food insecurity in Ethiopia: The Quest for sustainable institutions and technologies." *Ee-JRIF* 4(1):68-98

Guerin, L.J. and T.F. Guerin. 1994. "Constraints on the adoption of innovations in agricultural research and environmental management: a review." *Australian Journal of Experimental Agriculture* 34: 549-571.

Merrey, D. J., A.B. Kamara, B. Van Koppen, Penning de Vries, F., Boelee, E., and Makombe, G. 2005. "Experiences and opportunities for promoting small scale micro irrigation and rainwater harvesting for food security in Ethiopia. Colombo, Sri Lanka." *IWMI.V.86.* (Working paper 98).

Mintesinot Behailu. 2006. "Fighting famine and poverty through water harvesting in Northern Ethiopia." Comprehensive Assessment Bright Spot Final Report. http//www.iwmi.Cigar.org/brightspots/PDF/Africa/Fighting-Famine and poverty through water harvesting. pdf. Accessed on 13 November 2012.

Rami, H. 2003. "Ponds filled with challenges." Water harvesting - experiences in Amhara and Tigray.

UNEP. 2009. "Rainwater harvesting a life line for human being." A report prepared for UNEP by Stockholm Environment Institute.

Wolday Amaha. 1999. "Improved seed marketing and adoption in Ethiopia." *Journal of Agricultural Economics* 3: 42-44.

Yohannes, Gebre Michael. 2009. "Local innovation in climate-change adaptation by Ethiopian pastoralists PROLINNOVA–Ethiopia and Pastoralist Forum Ethiopia (PFE)." Final report. Addis Ababa University, PFE.