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COMMUNITY'S PERCEPTION AND ADAPTATION STRATEGIES TO CLIMATE CHANGE AT JANNAMORA DISTRICTS, NORTH EAST ETHIOPIA

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ABSTRACT

Climate change is the major environmental challenges which have wide range of economic, social and environmental impacts. In adaption of these impacts, it is important to assess and change the perception of local community to climate change and adaptation response. So, the overall objective of this study was to assess the community perception and adaptive response to climate change at Jannamora District, North East Ethiopia. The result of the study shown that majority of the respondents perceived there were the existence of climate change. However, more than half of respondent response link the cause of climate change with the act of God and natural process of climate who had limited knowledge about the cause of climate change. Shortage of rainfall, recurrent drought and unexpected heavy rainfall, increasing temperature, flood and poor crop production yield are impacts of climate change. Access to safety net, access to extension services, access to credit, migrate to other place, use of small scale irrigation, rain water harvesting, use of drought tolerant crops, use of mixed cropping, and soil and water conservation practices are adaptation strategies. However, the local community had problem for effective adaptation of impacts which include lack of information on climate change and adaptation measures, lack of capital, poor infrastructure and land degradation. Thus, efforts of all stakeholders should focus on improving the community's knowledge to climate change through training, conference and extension services. Moreover, diversifying the livelihoods of the farmers, expansion of irrigational agriculture, facilitating the availability of credit and participating the local community in environmental conservation program will be improved.

Keywords: *Perception, climate change and adaptation strategies*

1. INTRODUCTION

1.1. Background of the Study

Climate change is the major environmental challenges which have wide range of economic, social and environmental impacts. Climate changes is a change of composition of the global atmosphere due to human induce causes and natural factors, but human activities taken the large share. Natural factors such as cycles and trends in the Earth's orbit, incoming solar radiation, the atmosphere's chemical composition, ocean circulation,

the biosphere and volcanic eruption. Human induced causes also like extensive use of land, widespread of deforestation, the major technological and socioeconomic shifts with reduced reliance on organic fuel, and the accelerated uptake of fossil fuels that increases the emission of greenhouse gases concentration in the atmosphere. These change the composition of global atmosphere especially the precipitation and temperature patterns (Temesgen *et al.* , 2014; Parry *et al.*, 2007). Hence, climate change affects all countries and people but disproportional affecting the poorest countries and the poor people. This is due to poor agricultural practices, weak economic status, low saving capacity and low level of technology development for mitigation and adaptation National Metrological Agency (NMA, 2007).

The Intergovernmental Panel on Climate Change (IPCC) findings showed that developing countries like Ethiopia is more vulnerable to climate change due to social, economic and environmental factors. In specific, high level of poverty, rapid population growth, and high level of reliance on rain fed agriculture, high level of environmental degradation, chronic food insecurity and frequent natural drought cycles are the major vulnerability drives in the country (Aklilu *et al.*, 2009).

Ethiopia's climate is naturally highly diverse and variable. However, the climate is dramatically changed in recent years which could lead to extreme temperatures and rainfall events, as well as more heavy and extended droughts and floods (Mekuria *et al.*, 2017; Eshetu, 2011). For instance, in 1988, 1993, 1994, 1995, 1996 and 2006 flood hazards have occurred in different part of the country. The 2006 catastrophic flood led to the destruction of huge infrastructure and the death of more than 650 people and displacement of more than 35,000 people in Diredawa, south omo and west Shewa (Dereje and Tamiru, 2009; NMA, 2007). But, it is possible to reduce adverse effects of climate change by formulating effective and efficient adaptation strategies.

Based on IPCC (2001) adaptation to climate change refers to adjustment in natural or human system in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities. Adaptation to climate change requires that farmers that first perceive that the climate is changing, and then identify useful adaptation measures to cope with the problems and implement them effectively and efficiently (Temesgen *et al.* , 2014).

In fact perception is not the only factors that influence farmers use of adaptation measures. Adaptation to climate change takes place in a dynamic social, economic, technological and biophysical context that varies over time, location and sector. This complex mix of conditions determines the capacity of system to adapt negative impacts of climate change (Kates, 2000).

Studies have been done on climate related issue and adaptation mechanisms in Ethiopia, for example (Yesuf *et al.*, 2008); (Yohannes and Mebratu, 2009) and (Getachew, 2013). They have identified different adaptation methods. The adaptation methods most commonly cited in literature includes production of different crops, planting of special variety crops, using of natural fertilizers, irrigation farming, planting of trees, soil conservation, changing cropping time and off-farm income source. However, the specific climatic characteristics of the area dictate the need of specific adaptation methods to climate change and the local perception on climate change might be different from others area. Moreover, there is little study related to this issue in the study area. Therefore, this study was designed to address the local community's perception to climate change and their adaptation strategies at Jannamora district, North East Ethiopia.

1.2. Objectives of the Study

The overall objective of this study was to assess the community perception and adaptive response to climate change in Jannamora District, North East Ethiopia. The specific objectives of the study derived from the main objective were assessment of community perception to climate change and their adaptation strategies.

1.3. Research Questions

1. What is the local community's perception towards climate change?
2. What are the adaptive response of local community to climate change?

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2. DESCRIPTION OF THE STUDY AREA AND RESEARCH METHODS

2.1. Description of the Study Area

The study was conducted in Jannamora District. Jannamora is a part of North Gondar Zone which is located 948km far in the North East direction from Addis Ababa. It is bordered in the south by East Bellessa, in the southwest by Wegera district, in the west by Debark, in the north by Addiarkaay and Tselemt, in the east by Beyeda Distric and in the southeast by Waghemra Zone. The district has a total area of 203,737.857 hectares and subdivided into thirty-three rural and one small urban kebeles. Altitude of the district range from 1500 to 4,433 meter above sea level. It has 'Dega' 38.2%, 'Weina Dega' (29.4%) and 'Kola' 32.4% agro- ecological zones. Out of the total land cover 65, 143.817 hectares is used for crop production, 54,154.622 hectares for grazing, 35 319.188 hectares for forests and bush, and 17, 670.896 hectares is water body. Due to high population growth coupled with misuse of natural resources, poor diversification of livelihood and the environment is strongly depleted, which returns high venerability of the community to climate change and its adverse impacts. The location of sample kebeles are shown in the following figure.

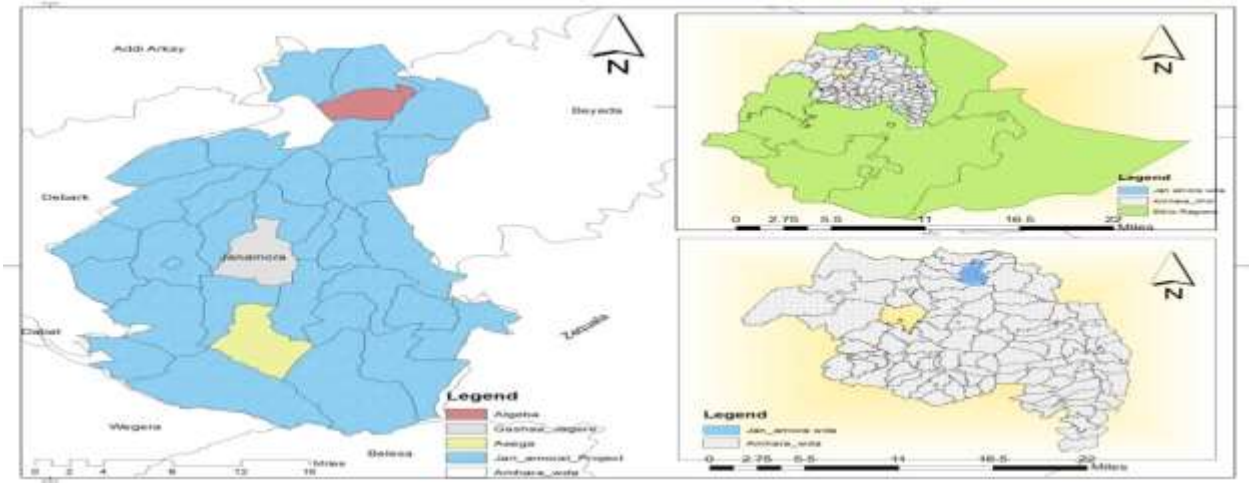

Figure 1: *Map of the study area*

2.2. Research Methods

2.2.1. Research Approach

Mixed research approach used. It provides more comprehensive evidence for studying a research problem than either quantitative or qualitative research alone. Because it is giving a chance to use all of the tools of data collection available rather than being restricted to the types of data collection typically associated with qualitative research or quantitative research (Creswell, 2007).

2.2.2. Sampling Technique and Sample Size Determination

Probability sampling techniques were used to select the sample kebeles and sample respondents. Stratified sampling is applied to group kebeles with the same agro- ecology because nature of study area was heterogeneous and then simple random sampling techniques were employed to select representative sample kebeles and respondents in each stratum. The study populations were 2,486 farming households in the sample kebeles. Sample size was determined from each sample kebele using probability proportional to size method to make equal representation of farming households in each sample kebele (Yemane, 1967) because this sampling method was relatively simple for selecting larger samples from each kebele. The Yamane's mathematical formula provided 147 sample populations who were proportionally distributed to the three kebeles (see Table 1).

Table1: Distribution of sample kebeles with their sample households

No	Selected kebeles in the study areas	Agro-ecological zone	Number of household	Sample household farmers
1	Atgeba	Dega	723	43
2	Gasha-jagere	W/Dega	962	57
3	Asega	Kola	801	47
	Total		**2,486**	**147**

2.2.3. Data Sources and Data Collection Methods

This research used both primary and secondary data sources. Primary data were collected from sample respondents using focus group discussion and key informant interviews. Secondary data were gathered from all available published and unpublished documents.

2.2.4. Methods of Data Analyses

The collected data were analyzed using both quantitative and qualitative methods. The quantitative data gathered through household survey was analyzed using descriptive statistics. The quantitative data were inserted and processed using Statistical Package for Social Sciences (SPSS) version 20 and Microsoft Excel spreadsheet. The qualitative data were analyzed using narration.

3. RESULTS AND DISCUSSIONS

3.1. Perception of Community on Climate Change

Regarding the perception of local community to climate change, majority of the respondents perceived that there were the existence of the problem.

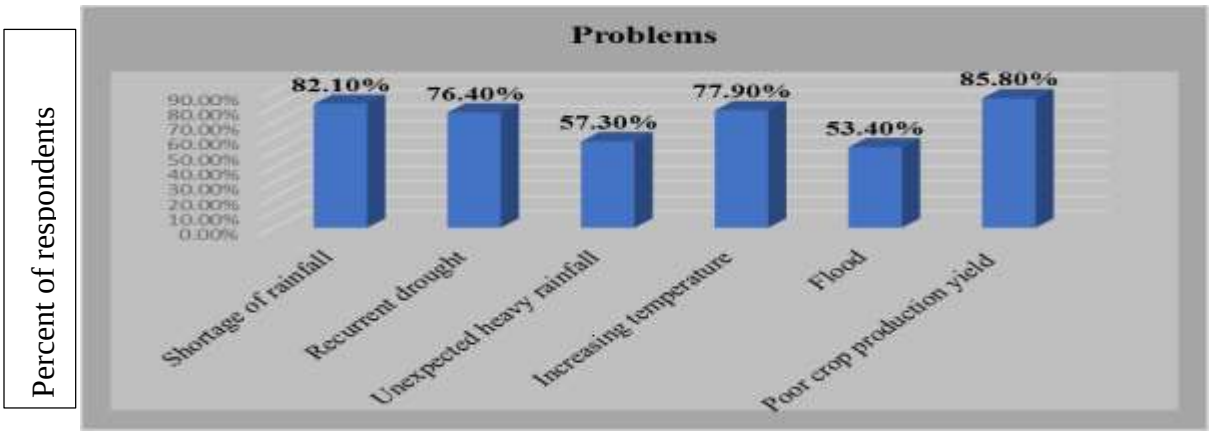

Figure 2: *Perception of respondents to the existence of problems (multiple response)*

As shown in figure 2 above, there were climate change due to poor crop production yield (85.8%), shortage of rainfall (82.1%), increasing temperature (77.9%), recurrent drought (76.4%), unexpected heavy rainfall (57.3%) and flood (53.4%) in the study. The results are also confirmed through FGD and key informant interview. This also coincides with (Mekuria *et al*., 2017;

Eshetu, 2011) climate is dramatically changed in recent years which could lead to extreme temperatures and rainfall events, as well as more heavy and extended droughts and floods.

3.2. Perception to Cause of Climate Change

Table 2: Respondent perception about cause of climate change

Perception of cause of Climate Change	Respondent response (%)
Act of God	72.5
Natural Process	67
Human Activities	56.7

As it is presented in table 2, 56.7% of the respondents replied the human activities are the cause of climate change, which are deforestation (87.3%), poor agricultural practices (67%) and over grazing (49.6%). On the other hand, (72.5%) and (67%) respondents reflected that act of God due to the immoral activities of human being and natural process are the cause of climate change respectively. This implies that, majority of the respondents had limited knowledge about the cause of climate change. The results are inconsistent with (Temesgen *et al.* , 2014; Parry et al., 2007) as climate change is largely caused by human induce activities and natural process respectively.

3.3. Adaptation Strategies to Climate Change

Adaptation is one of the main ways in which societies can deal with climate change. However, it has relation with community perception and adaptation capacity.

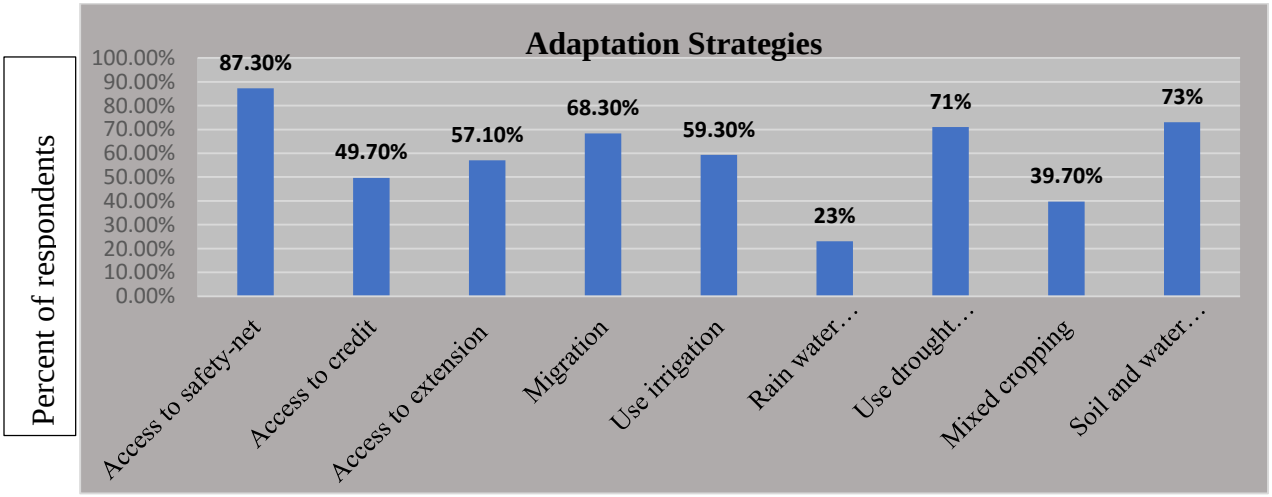

Figure 3: *Adaptation Strategies in the study area (multiple response)*

Access to safety net, access to credit, access to extension services, migrate to other place, use of small irrigation, rain water harvesting, use drought tolerant crops, use mixed cropping, and soil and water conservation were the adaptation strategies of the local community. However, majority of the respondents were access to safety net (87.3%), soil and water conservation (73%), use drought tolerant crops (71%) and migration (68.3%) were the main adaptation strategies to climate change. Both FGD and key informants confirmed similar result. They also added that the local community had problem for effective adaptation of impacts due to lack of information on climate change and adaptation measures, lack of capital, poor infrastructure and land degradation.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusions

This study was tried to assess the local community's perception and the adaptation strategies to climate change at Jannamora District in North eastern Ethiopia. It is known community's perception is one of the main input to adaptation strategies to climate change. Hence, majority of the respondents replied that there were the existence of climate change. However, more than half of respondents proved the cause of climate change were associated to the act of God and natural process of climate. This implies that, majority of the respondents had limited knowledge about the cause of climate change. Shortage rainfall, recurrent drought, unexpected heavy rainfall, increasing temperature, flood and poor crop production yield were the major impacts of climate change in the study area.

The local community adaptation strategies to climate change include access to safety net, access to extension services, access to credit, migrate to other place, use of small scale irrigation, rain water harvesting, use of drought tolerant crops, use of mixed cropping, and soil and water conservation practices. However, the local community had problem for effective adaptation of impacts. These include lack of information on climate change and adaptation measures, lack of capital, poor infrastructure and land degradation were the main one.

4.2. Recommendations

Based on the conclusion drawn, the following recommendations can be put forwarded:

- Efforts of all stakeholders including Non-government organization and government should focus on improving the community's knowledge to climate change through training, conference and extension services.
- Diversifying the livelihoods of the farmers, expansion of irrigational agriculture, facilitating the availability of credit and participating the local community in environmental conservation program are advisable to be improved.

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