



Analysis of Rural Livelihood Challenges and Options under Climate Change Pressure: Case Study from Potato Producer Localities in Awi Zone, Ethiopia

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Abstract – The present study analysed rural livelihood challenges and options under climate change pressures in Gusha Shinkurta locality, Awi Zone, Amhara regional state, Ethiopia using focus group discussion with farmers, interviewing experts and case farmers. The results indicated that farmers are highly affected by climate change (seasonal variation of rainfall, floods, droughts, temperature change, etc.) and their livelihood is constrained by it. It was also found that there are no well-designed mitigation and adaptation strategies to help the farmers to lead decent life. The water harvesting practices applied to avert the problem of drought in the locality were found ineffective. Climate change impacts in the locality were observed by the occurrence of waterborne human diseases, malaria, crop pests, shortage of water resources, animal diseases and scarcity of fodder to feed animals. Potato which is dominantly produced in the locality is highly affected by late blight and rainfall variability. Within these prevailing conditions, it was found that farmers are seeking their own coping strategies including: seasonal migration, dietary pattern shifting, seeking remittances and credits from both formal and informal institutions, and selling their live stocks to buy goods. Therefore, there is a need to strengthen the already existing health and agricultural extension services, educating farmers about mitigation and adaptation of climate change and enabling them to diversify and intensify their livelihood means.

Keywords – Adaptation, Climate Change, Coping Strategies, Farmers' Livelihood.

I. INTRODUCTION

It is strongly argued that climate change and food security are getting two of the most topical agendas of the world today. According to Bot & Benites (2001), the number of hungry people is estimated to reach 925 million. It is also reported that 75% of the worst affected people by hunger reside in the rural areas of developing countries whose livelihood depends directly or indirectly on agriculture (Mann, et.al 2009). To improve the food security situation of these rural people, therefore, strengthening their agricultural production system is believed to be very critical (Bank, 2006; Ravallion & Chen, 2007). According to Conant (2009), cited in (Branca, McCarthy, Lipper, & Jolejole, 2011; Metz, 2007; Adger, Huq, Brown, Conway, & Hulme, 2003), improving the resilience of agricultural systems is of paramount significance for climate change adaptation since agriculture is the main economic sector of most low income developing countries. It is substantially pointed

out that the potential to provide effective sources of mitigation by maximizing carbon stocks in terrestrial systems as well as emission reduction through increased fuel consumption efficiency is possible through improvements in agricultural production systems (Mann, et.al, 2009). Similar findings by Bruinsma (2009) reported that out of the total 6 billion world population, nearly 1 billion live in persistent hunger. And most of the livelihoods of these victims who suffer chronic hunger are directly or indirectly dependent on agriculture. It is also remarked that population growth is increasing alarmingly and is expected to increase pressure on the small holder agricultural sector. Particularly, South Asia and Sub-Saharan Africa (Schmidhuber & Tubiello, 2007) will be challenged by food insecurity and their high dependence on agriculture will be strongly frustrated by climatic changes. Still Metz (2007) reported that certain regions of the world will be challenged by drop of average production and many more are likely to face increased climate change effects like rainfall variability and extreme weathers shocks which will worsen livelihood challenges.

According to Lobell et al. (2008), climate change will considerably affect agricultural production and food security up to 2030 particularly parts of South Asia and Sub-Saharan Africa due to both changes in mean temperatures and rainfall as well as increased variability associated with them. It is further stated that changes in pest and disease patterns because of climate change impacts will significantly affect livelihoods in Sub-Saharan Africa. South Asia and Sub-Saharan Africa are expected to be the hardest hit regions with the likely decreases in agricultural productivity between 15-35 percent (Cline, 2008). It is further confirmed that these are exactly the same regions that already exhibit high vulnerability to weather shocks and stresses which is followed by degradation and depletion of livelihood assets and food insecurity. Briefly, many research findings confirmed that the climate is changing and giving serious attention to empower small holder farmers' mitigation and adaptation to climate change must be the concern of researchers, politicians, and policy makers or world leaders. In relation with this, *De Wit and Stankiewicz, (2006) and IISD (2007) cited in (Hassan & Nhemachena, 2008:84) stated:*

Adaptation is therefore critical and of concern in developing countries, particularly in Africa where vulnerability is high because ability to adapt is low. Climate change is expected to affect food and water



resources that are critical for livelihoods in Africa where much of the population, especially the poor, rely on local supply systems that are sensitive to climate variation. Disruptions of the existing food and water systems will have devastating implications for development and livelihoods and are expected to add to the challenges climate change already poses for poverty eradication.

Kandlikar & Risbey (2000) also stated that adaptation helps farmers achieve their food, income and livelihood security objectives in the face of changing climatic and socioeconomic conditions, including climate variability, extreme weather conditions such as droughts and floods, and volatile short-term changes in local and large-scale markets. They further argued that empowering farmers can help them to reduce the possible climate change related risks particularly by making strategic responses to these changes. Therefore, analysing rural livelihood changes and the options taken by farmers under the pressure of climate change is of paramount importance for finding ways to help farmers be able to mitigate and adapt the risks.

Despite the fact that Ethiopian farmers have a low capacity to mitigate and adapt climate change related risks, they still have survived and coped with it in different options for centuries. These options, however, are not well understood and studied in order to exploit and design local farmer coping and adaptation experiences, skills and knowledge.

Generally, sustaining the coping and adaptive mechanisms of local farmers through participatory researches, appropriate public policy, credit, saving, and market strategies can help them boost the coping and adaptation measures, which in turn, will help them reduce the negative consequences of climate change related risks on their livelihoods.

Many empirical studies measuring the socio-economic impacts of climate change on agriculture in Africa (Kurukulasuriya & Mendelsohn, 2006; Seo & Mendelsohn, 2007; Mano & Nhemachena, 2007; Benhin, 2006) showed that such impacts can be significantly reduced through adaptation. The present study was devised with the objective of analysing rural livelihood challenges and options under the prevailing conditions of climate change pressure in the rural households of Gusha Shinkurta locality, Awi Administrative Zone, Amhara regional state, Ethiopia; which was assumed to add some values to earlier livelihood studies.

II. CONCEPTUAL FRAMEWORK FOR RURAL LIVELIHOODS ANALYSIS

A notable definition of livelihoods is given by Chambers & Conway (1992) as follows:

A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable which can cope with and recovers from stress and shocks, maintain or enhance its capabilities and assets, and provides sustainable livelihood opportunities for the next generation; and which contributes net benefits

to other livelihoods at the local and global levels and in the short and long term.

It is to be noted that the livelihoods framework offers a comprehensive and complex approach to conceptualize about how people make their living. According to Kanji, MacGregor & Tacoli (2005), it can be used as guide to a range of issues which are supreme important for livelihoods or it can be thoroughly investigated in all its aspects. It is also argued that livelihood, essentially, highlights understanding of the scenario or context within which people live, the assets obtainable for them, livelihood strategies they follow in the face of existing policies and institutions, and livelihood outcomes they intend to achieve (Scoones, 1998). The central tenets of addressing livelihood analysis, as suggested by (Ellis, 2000) include: policy setting, politics, history, agro-ecology and socio-economic conditions. Furthermore, it should address key questions like what combination of livelihood resource results in the ability to follow what combination of livelihood strategies and with what outcomes?

Chambers and Conaway (1992) and Ellis & Allison (2004) defines vulnerability context related to rural livelihood analysis which refers to season-ability, trends, and shocks that affect people's livelihoods. It is emphasized that the dominant features of these factors are that they are out of the mandate of rural people to be controlled by their capacity. The other decisive component is livelihood assets which refers to the resources on which people draw in order to carry out their livelihood strategies (ibid). And it is stated that the members of a household combine their capabilities, skills, and knowledge with the different resources to their ultimate efforts to create activities that will enable them to achieve the best possible livelihood for themselves.

Similarly, Farrington (2009) and Bezemer & Lerman (2004) stated that the livelihood assets are human capital like age, education, gender, health status, household size, dependency ratio, and leadership potential. Physical capital consists of the basic infrastructure and producer goods that are needed to support livelihoods; social capital which refers to networks and connectedness; financial capital like savings, credit, and remittances from family members working far from home; and natural capital which is mainly about the natural resource stock.

DFID (1999) pointed out that analysis of rural livelihood encompasses scrutinizing livelihood strategies which are composed of activities that generate the means of household survival and are the planned activities that men and women undertake to build their livelihoods. Furthermore, it should examine the ends of livelihood strategies called outcomes which are the achievements of livelihood strategies, such as more income, increased well-being, and reduced vulnerability, improved food security and a more sustainable use of natural resources (Fig.1).

| | | |
|---------------------|----------------------------------|------------------|
| Key: | | |
| H=Human capital | P=Physical capital | Ag = Agriculture |
| S=Social capital | N=Natural capital | NF= Non-farm |
| F=Financial capital | PL= Political and leader capital | OF= off farm |

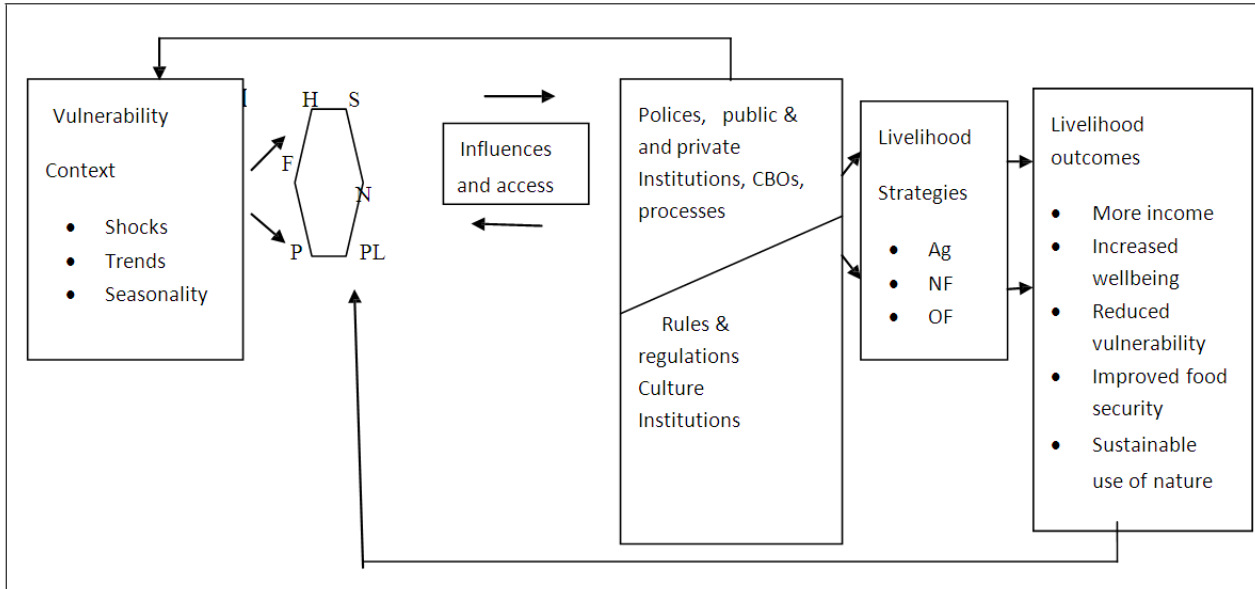


Fig.1. Sustainable Livelihood Framework adapted from DFID, 1999

III. DESIGN AND METHODOLOGY OF THE STUDY

3.1 Description of the Study Area

The study presented here was undertaken in one Kebele Administration (lower administrative unit in Ethiopia), *Gusha Shinkurta* of *Guagusa Shikudad* district (Woreda), in Awi zone of the Amhara regional state, Ethiopia. Awi zone is situated between 10°23'N and 10°85'N latitudes and 36°35'E and 36°57'E longitudes with an altitude ranging between 1800 to 3100 meter above sea level. It has a mean annual rainfall of 1,750 mm and a mean monthly temperature that ranges from 17°C to 27°C. The zone has a nitosol soil type which mainly

grows crops. Major staple crops grown in this district include potato, teff, maize, wheat, barley, millets, peas and beans. Animal husbandry in the zone is dominated by sheep followed by cows, oxen and horses respectively. Mixed farming system is largely practiced as the main means of farmers' livelihoods. The zone is characterized by small landholdings supporting the ever increasing populations. Farm size distribution is not uniform and smallholders own minimum of 0.5 hectare and maximum of 1.5 hectares (Fig. 2). This zone is selected for this study since it dominantly grows potato (the target crop) to be studied on the one hand and to examine famers' knowledge and practice about adding value to it.

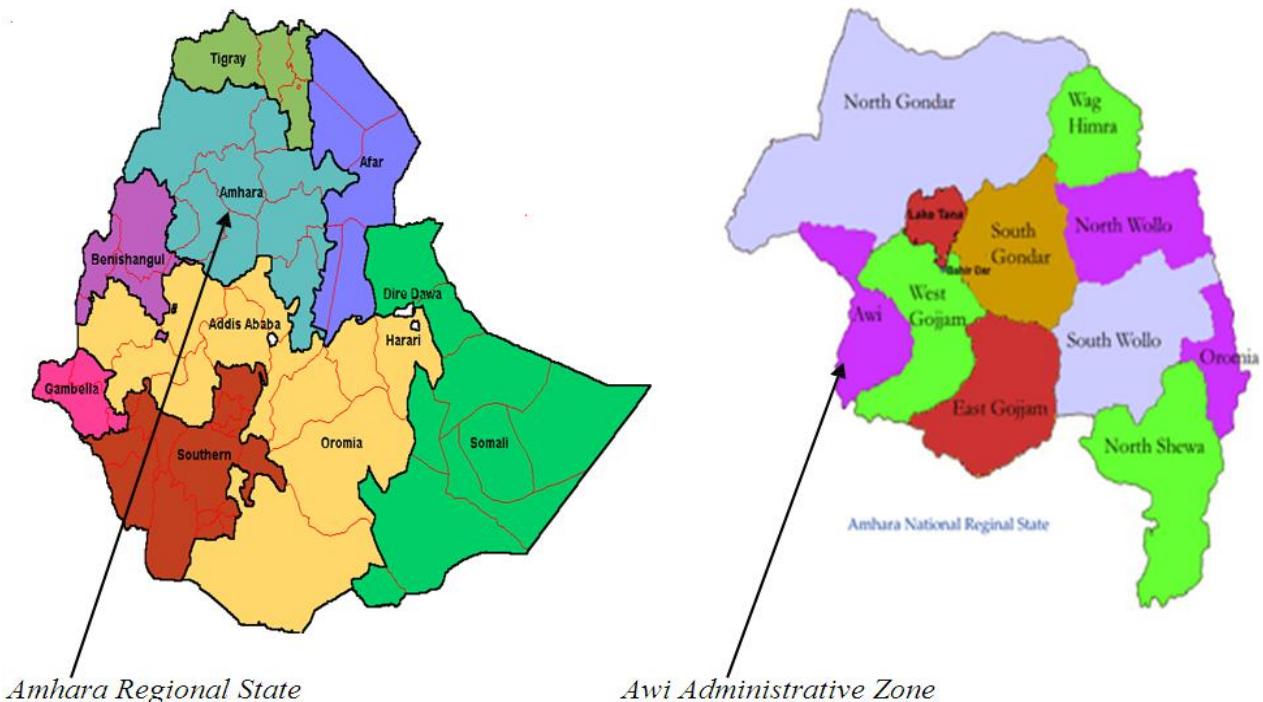
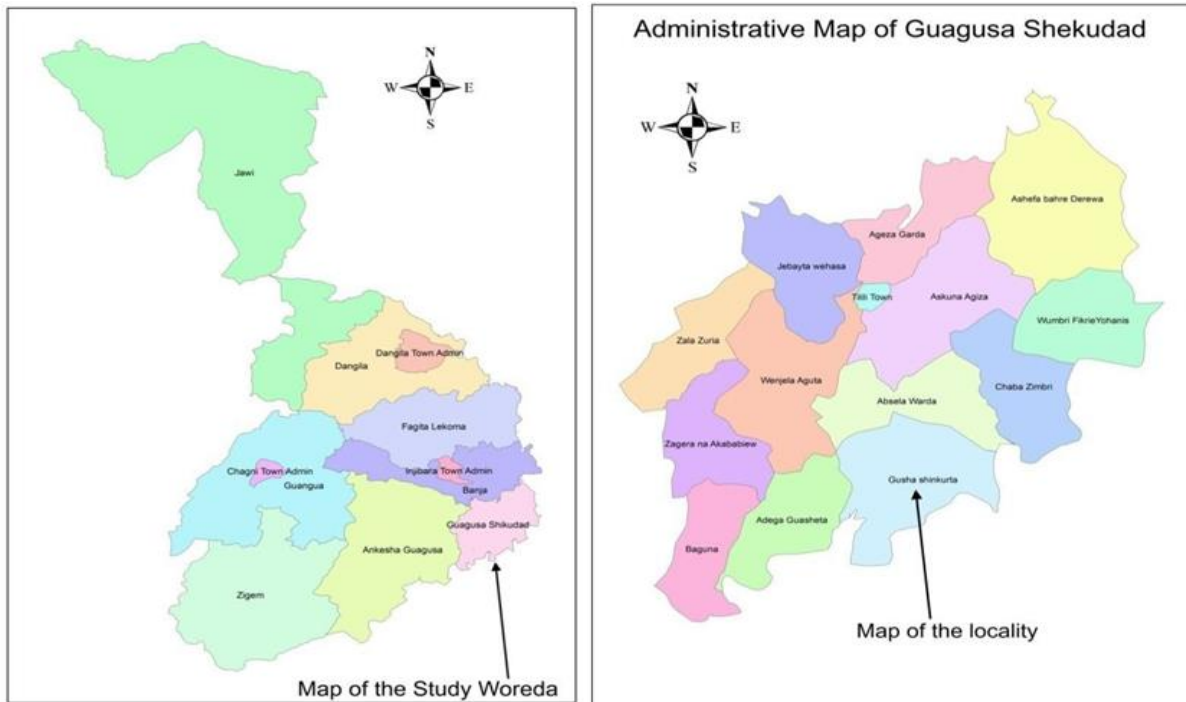


Fig.2. Administrative Map of Ethiopia

Administrative Map of Amhara Regional State



Source: Amhara National Regional State Bureau of Finance and Economic Development

3.2. Research Design

Despite the subjectivity and unrepresentative nature of the issue being addressed and the lack of scientific bases to substantiate claims usually solicited from local ecological knowledge (Reed, Dougill, & Taylor, 2007), qualitative approach is useful and effective for exploring rural and peri-urban issues in a rapid and cost-effective manner (Chambers, 1992). Besides, it is very valuable to obtain a diverse understanding of a community's attitudes, beliefs and behaviours (Mukherjee, 1995). In contrast to the qualitative approach is the quantitative approach which assumes technical, scientific and deductive solutions to environmental and related local problems. However, the mere adoption of such classic reductionist approach has its own limitations as it cannot always provide accurate solutions to the complex rural problems (Fairhead & Leach, 1996; Thomas, 1997). Another weakness of the quantitative approach is the requirement of detailed understanding of statistical tools, considerable data requirements, and potential hidden errors that usually arise from inappropriate assumptions and approximations of adopted scientific models.

Qualitative research is, therefore, of timely importance if a sustainable livelihood is to be realized in the local communities where the impacts of climate change are highly felt and experienced. Its adoption in this study, hence, was based on those justifications stated above.

3.3 Sampling Technique

Since the present research was a qualitative research design, purposive sampling technique was used to select the studied district *Gusha Shinkurta* taking into account large potato production as a criterion. In addition, 30 farmers (6 females and 24 males) were selected purposively to conduct 3 focus group discussions based

on: their engagement in potato production, water harvesting endeavour, compost preparation, deep indigenous knowledge, mixed-farming practice, agricultural diversification attempt, and their active involvement in community development programs, among others. Experts for interview (8) were also selected purposively based on their exposure to climate change and livelihood concepts. Finally, 3 case farmers (1 female and 2 males) were also selected purposively for qualitative interview based on their food deficits experiences which they faced it as a result of seasonal variation of rainfall.

3.4 Data Collection

Primary data on the impacts of rainfall variability, temperature change, floods, and droughts on smallholders' livelihood and the coping strategies taken by them were collected using focus group discussion with farmer groups (three FGD with 10 participants). Besides, interviewing experts who are working with relevant local, zonal, and regional organizations was held to further triangulate the climatic shocks experienced by farmers and recognize the trends. Similarly, interview with case farmers was conducted to exactly realize stallholders' living situations. Secondary data was also collected through documentary analysis and review of unpublished reports from different local, woreda (district), zonal and regional institutions.

3.5 Data Analysis

The collected qualitative data were analysed using discourse analysis followed by thematically organizing (categorizing) concepts into: Farmers' perception of climate variability, change and related impacts on their livelihood; climate related changes and their consequences on rural livelihood and socio-economic conditions of

farmers; responses, adaptation and constraints to climate change in the locality, and major options taken during climate change pressure according to their relative order of significances.

IV. RESULTS AND DISCUSSIONS

4.1 Farmers' perception of climate variability, change and related impacts on their livelihood

The focus group participants were asked to define climate variability. Most respondents answered in the same way. It is the seasonal variation of the rainfall, unusually burning sunlight which damages skin colour, high gully erosion, and the changes in the seasonal flow of rivers. When asked to tell the impacts of these climatic factors, respondents unreservedly answered food insecurity at household level, drying of rivers, and death of animals and migration of family members. Still, participants were asked to define food insecurity and they answered eloquently that it is when the harvest is smaller than what the family needs to consume on the one hand and when the family suffers shortage of cash to cover expenses. Informants were also asked whether different forms of food insecurity exist as a result of rainfall variability. And they distinguished three forms of food insecurity: the normal which can be controlled by different coping strategies while residing in the locality, the medium one which can be controlled by migration of family member for employment and send money to family, and the extreme food insecurity in which people starve to death because of lack of alternative strategies to cope with it. A thirty-eight old woman whose husband was dead and who is heading the household while this study was conducted described the three types of food insecurity that occurred as a result of rainfall variability in the following manner.

Usually, rainfall variability in this locality is followed by three forms of food insecurity: the first is the complete food insecurity which is caused by harvest destruction

either by floods, drought or damage of crops with hailstones and which may lead to migration. The second is the food insecurity situation in which people started selling assets or changed their dietary patterns to secure their household food consumption. The third one is to eat little and pray for God to escape death. (Excerpt from a woman FGD participant's speech: Source: Own translation from Amharic to English).

A study conducted by Aklilu and Dessalegne (2000) also focused on poor people's perception of food insecurity. The authors in correspondence with the World Bank approach have looked into the well-being expressions of the poor in selected urban and rural sites in Ethiopia. The authors grouped the answers into three types: expressions indicating no future; expressions indicating desperation and hopelessness; and finally expressions indicating hunger and food insecurity. In relation with the final expression, the following responses perceived sound:

'We eat when we have the means, and we go to bed hungry when we don't!'

'We live on coffee'

'We live as dependents on others'

'We are pitiful'

'Life of hunger is as bad as the hyena'

(Aklilu and Dessalegn 2000, 21-22)

As it was already noted by the authors and in accordance with the excerpts from the woman's speech in the present study, the responses described by the respondents indicated the state of ill-being instead of well-being which was aggravated by rainfall variability, floods and drought incidences.

Likewise, qualitative interview held with male farmer as a case revealed that farmers have started to pray for God so that rain comes on time. He stated that potato production is getting poorer and poorer from year to year since the rain usually used to go early or come late which is followed by household food insecurity (Fig. 3).



Fig.3. Potato harvest after the rain had stopped raining in the middle of August 2012

(Photo: Chalachew Tarekegne)



This year, my household food security is challenged. Mostly, my children prefer eating boiled potato to 'injera'. Yet, as you have seen it, its size is too small to be boiled and children prefer bigger potatoes. Hence, I have to sell this small size potato to buy bigger one. Still, the problem is that small size potatoes does not have good price on the market as compared to bigger ones. Therefore, I will sell with cheaper price and buy with expensive price. I have to sell other crops to supplement the deficit. Because of seasonal variation of the rainfall, we are challenged by different problems like paying for fertilizer price which I have taken from government by credit. (Quoted from case farmer's speech: Source: Own translation from Amharic to English).

4.2 Climate related changes and their consequences on rural livelihood and socio-economic conditions of farmers

4.2. 1. Human Health

The significance of good health to rural people cannot be ignored. "If we are healthy, we can be engaged in our farming activity long hours and be able to harvest more," remarks a farmer who is an FGD participant. Physical health is fundamental for the types of livelihoods on which rural poor people ultimately depend on. The interview with case farmers and focus group discussion participants regarded malaria and waterborne diseases as the most common in their locality. Furthermore, TB and diseases caused by cold weather are common. Though there were health centres in the locality, it was found that they were challenged by shortage of skilled manpower and drugs to help the farmers get treatment. Similar findings were also reported from (NAPA,2007). Since there was no surplus harvest because of shocks and stresses, farmers were not able to afford to go to towns for better medication. This study confirmed (Keller, 2009) findings which stated that projected increases in the inter-annual variability of precipitation in combination with the warming air will be followed by increases in the incidence of droughts, heavy rains and floods in Ethiopia; which in turn, will be followed by waterborne diseases and incidences of malaria in areas of the highlands where malaria was previously not endemic. The following "Sickness Story" illustrated the trend of malaria by comparing its current status and what it was earlier in the locality.

Quoted from farmer's speech who was interviewed as a case:

Before ten years, nobody knew the disease of malaria in this locality.

It was a disease of Low- Landers ('kolegnas'). But, quite recently, everybody is getting victim of it (in the highland). Even, some tablets

are not curing it. It is getting adaptive to it. "Beshitaw medhanitun telamidotal".

(Source: Own translation from Amharic to English)

4.2.2 Education

It is already known that attendance at primary and junior secondary schools in Ethiopia is assumed to be compulsory and free. Yet, it was found that migration of

parents in search of job opportunity because of food insecurity was followed by child school dropout. The interview held with experts discovered that poor households with many children are said to be more affected by climatic changes. It was found that some people sell assets such as live stocks, eucalyptus trees and possessions to afford clothing and stationery fees. Rarely, it was found, they tried to borrow money from both formal and inform institutions to cover the fees and pay it back when the harvest is good.

4.2.3 Land Use and Mixed Farming

With very high frequency, discussion groups identified shortage of land as the most pressing problem in their locality. FGD participants directly related their uncertain livelihoods to shortage of land and natural resources depletion. With small plots of landholdings, it was found, fallowing and mulching were impossible which were followed by less soil fertility and poor productivity. Other serious problems reported by the participants were decline of livestock population because of shortage of fodder and fields for cattle grazing. Accordingly, therefore, FGD participants confirmed that the possibility to use cow manure and prepare compost to increase soil fertility is difficult. Though there was little attempt to introduce fuel saving stoves in the locality, shortage of firewood was another grave problem encountered by the farmers.

4.2.4 Major Impacts of Seasonal Stresses and Shocks

Focus group participants reported that their livelihood outcomes are seasonally affected by heavy rainfall which threatened their well-being. They considered the months of June to August as "the periods of starvation." This is attributed to the fact that these months coincided with the sowing seasons where farmers need more seeds and chemical fertilizers (Urea and DAP). During these times, it was believed that farmers do not have enough harvests to feed the household or cash to buy food items. The chance of getting credit services during these times was found very competitive. The elongation period of this kind of starvation was estimated to continue until the middle of September in which the new harvest of potato and barely respectively was to save their lives. It was also discovered that famine was not the only event engendered by heavy rainfall which was accompanied by floods and hailstones. Participants also reported outbreak of waterborne diseases, crop pests and late blight cases of potato, and malaria epidemic following heavy rainfall. Sometimes, destruction of crops by heavy rainfall used to force farmers replant their farmland. Damage of rural feeder roads by heavy rainfall also imposed problems on accessibility of health centres, schools and markets in the locality. Drought incidences usually occurred from January till the ends of June were also investigated terrible to get water and fodder for their livestock.

Qualitative interviews held with experts as well confirmed that change in rainfall amount, seasonal variation of it, flooding followed by stresses and shocks, incidences of drought/famine worsens household food insecurity. Yet, they remarked that there were no responsible institutions to address climate change impacts

except Global Climate Change Alliance (GCCA) and National Adaptation Plan of Action (NAPA) piloting attempts. Research institutions were disseminating new varieties although the number of farmers who were using these varieties was limited. They concluded that farmers' perception, development agent's poor competence and commitment, and lack of financial capital were main hindrances to challenge climate change

impacts. Consequently, they foresee that production will decrease by some amount in the coming decades if the rainfall variability continues as it is now. Their prediction is found valuable when it is triangulated with the total crop harvest reduction in the locality for the last three years 2010-2012 (Fig.4). This observation was found similar to (Cline, 2008; McCarthy, 2001; Metz, 2007) reports.

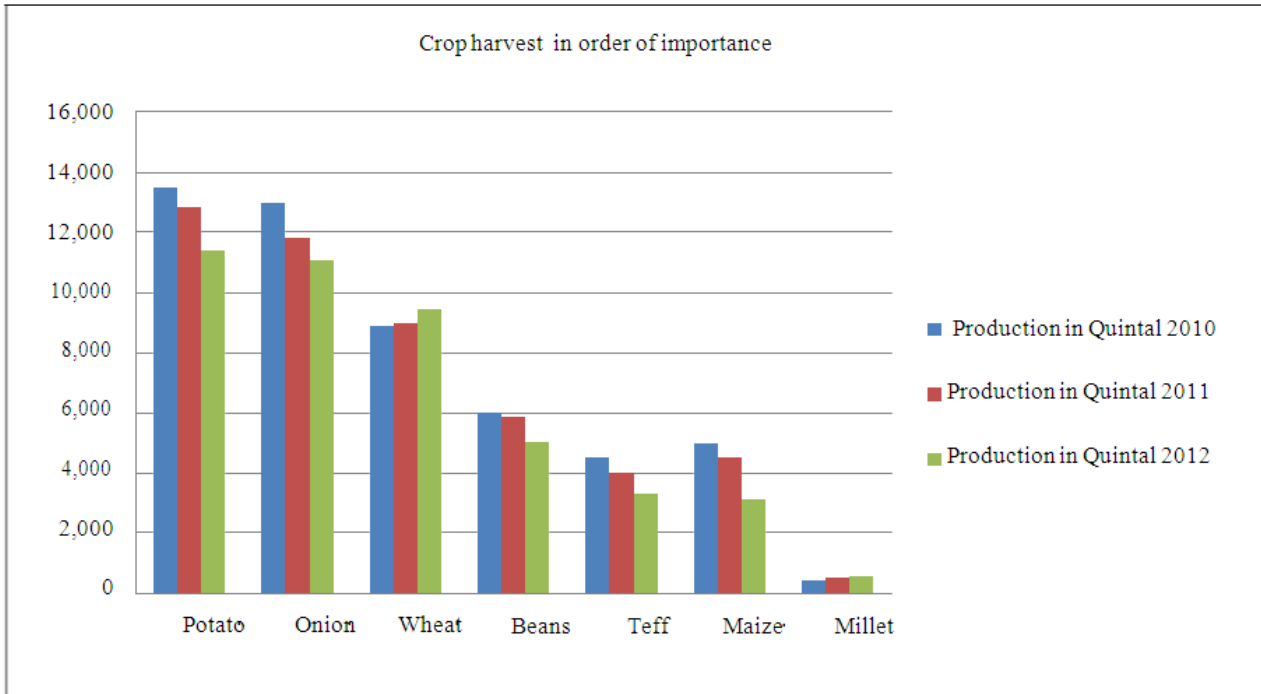


Fig.4. Potato and others harvest reduction in the locality

Source: Farmers

4.3 Responses, Adaptation and Constraints to Climate Change in the Locality

Interview held with case farmers and FGD participants showed that the attempt to adapt climate change impacts through rain water harvesting was not successful. River water was scarce to alleviate the problem using irrigation; instead, it is getting source of conflict. They further noted that they were not able to buy water pumps, treadle pedals, and geo-membranes because of shortage of financial capital. Poor adaptation capacity of African farmers is reported from earlier research findings like that of *De Wit and Stankiewicz, (2006) and IISD (2007) cited in (Hassan & Nhemachena, 2008)*.

4.4 Major options taken during climate change pressure according to their relative order of significance

Different studies dealing with coping or survival strategies (Corbett, 1988; de Waal, 1989; Dessalegne, 1991a) argue that the strategies pursued by people during a severe food shortage or a famine can be classified into a number of stages. Corbett (ibid), therefore, has developed a three stage model of household coping strategies.

- Stage one: Insurance mechanism: changes in cropping and planting practices; sale of small livestock;

reduction of current consumption levels, collection of wild foods, use of inter- household transfers and loans; increased petty commodity production; migration in search of employment or relief; sale of possessions.

- State two: Disposal of productive assets: sale of livestock; sale of agricultural tools; sale or renting out of land; credit from traders and money lenders.
- Stage three: The terminal stage: destitution, distress, migration (to road or roadsides looking for charity or relief).

This “model” of the stages of coping strategies as suggested by Corbett retained that the stages will be contextual and they are not universally applicable. It is plausible to argue that the concept of diverse forms of strategy might be useful in seeking to describe the action that people pursue in order to cope with shocks and stresses provoked by climate change effects. Corbett’s conceptualization of sequencing of the stages, however, is not convincing as the same strategy might have been chosen for different circumstance. It has the possibility to be interpreted vaguely as indicating the degree of deprivation of the livelihood of the household’s addressed in the study. Hence, attempt was made to adopt the concepts of (Davies, 1996), who differentiated between “coping strategies” and “adaptive strategies” to indicate

different states of deprivation in the same household. Consequently, Davies (1996:60) defines “coping” as, “a short-term response to an immediate and in habitual decline in access to food”, whereas “adapting” describes, “a permanent change in the mix of ways in which food is acquired, irrespective of the year in question.” Briefly, coping means surviving within the prevailing challenging situations; on the contrary, when adapting takes place, the prevailing challenging situation and accordingly as well the livelihood systems change. This study also examined the strategies pursued by FGD participants in the context of food insecurity caused by climatic shocks and stresses. And all informants stated that the first safety measure to take in the case of household food deficit was the sale of livestock followed by shifting dietary pattern and reduction in consumption amount. It was found that the strategy pursued by farmers is coping strategy. Yet, based on Davies expression as stated above, the strategy pursued by farmers in the locality can also be demonstrated as adaptive strategy since the productive assets were found eroded in many cases like sale of livestock, possessions and renting out of land to privileged farmers which has implication to a change in livelihood system. Lastly, it was also found that off-farm (9th) and non-farm (7th) activities did form less part of the coping strategies in their livelihood (Table 1).

Table 1

| Coping strategies during climate change pressure | Ranking in their relative order of significances |
|---|--|
| Sale of small livestock, and other possessions | 1 |
| Shifting dietary pattern, reduction in consumption amount | 2 |
| Credit from formal institutions or local money lenders | 3 |
| Claiming for relatives to get remittances | 4 |
| Changes in cropping and planting practices | 5 |
| Sale or renting out of land for privileged | 6 |

| | |
|---|----|
| farmers | |
| Increased petty commodity production | 7 |
| Allowing children to work for others on contractual basis | 8 |
| Migration in search of employment | 9 |
| Looking for aid, charity or relief | 10 |
| Begging, stealing | 11 |

Note: 1 (most significant); 11 (least significant)

4.5 Climate change pressure indicators according to their relative order of impacts/risks on farmers’ livelihood

It is indicated that the causes for vulnerability of Ethiopia to climate variability and change include: very high dependence on rain fed agriculture which is very sensitive to climate variability and change, under-development of water resources, low health service coverage, high population growth rate, low economic development level, low adaptive capacity, inadequate road infrastructure in drought prone areas, weak institutions, lack of awareness, etc. (National Adaptation Program of Action, 2007). Vulnerability assessment based on existing information and rapid assessments carried out under NAPA has pointed out that the most vulnerable sectors to climate variability and change are Agriculture, Water and Human health. In terms of livelihood approach smallholder rain-fed farmers and pastoralists are found to be the most vulnerable. The arid, semi-arid and the dry sub-humid parts of the country are affected most by drought. Furthermore Keller (2009), citing (Schneider et al. 2008) and (Brohan et al.2006) explained that harmful impacts of the ongoing climate change and observed variability are prevalent in both socio-economic and natural systems of Ethiopia. These impacts include: lowering agriculture production and food security, scarcity of water resources, health problems, ecosystem and biodiversity loss, and destruction of infrastructure (Fig. 5).

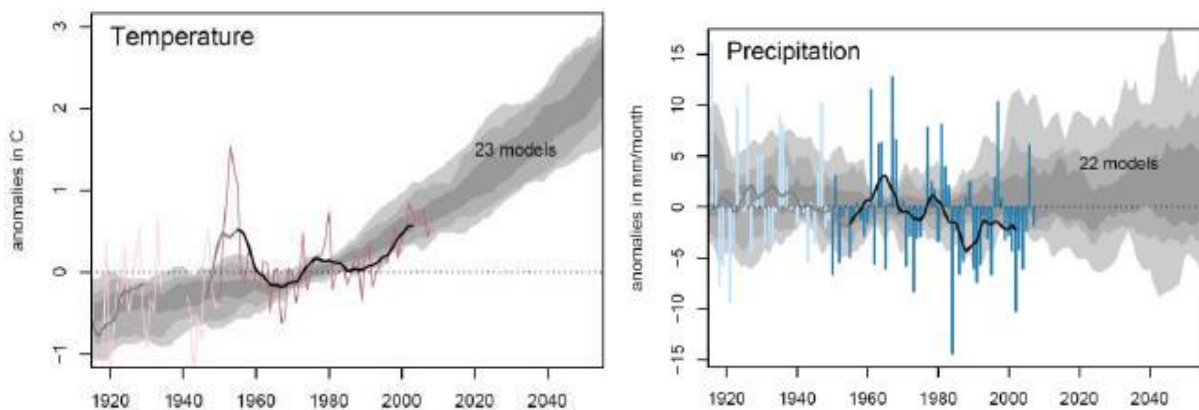


Fig.5. Observed Precipitation (Schneider et al. 2008) and temperature Brohan et al. 2006) changes in Ethiopia annual averages) along with simulated Changes by 22/23 Global Climate Models (IPCC, 2007) (adopted from Keller, 2009:5)

FGD participants were also asked to rank climate variability and change indicators in accordance with their relative order of impacts/risks (Table 2).

Table 2

| Climate Change Pressure Indicators | Ranking in their relative order of impacts/risks on farmers' livelihoods |
|--|--|
| Seasonal variability of rainfall in the locality | 1 |
| Floods | 2 |
| Droughts | 3 |
| Temperature (extreme cold or warm) | 4 |

Note: 1 (impacts most); 4 (impacts least)

V. CONCLUSION

Based on the study, it is possible to conclude that climate change is imposing many impacts on the livelihoods of farmers in the locality. Depletion of assets and food insecurity at household level are getting defining features of it. Health problems associated with malaria and waterborne diseases are the daily experiences of farmers and their families. Furthermore, school dropout of children as a result of seasonal migration of parents is observed though the number of migrant parents in search of employment is small in number. These findings, it is learnt, are against to some of the Millennium Development Goals. Loss of confidence and feeling of hopelessness is also observed among elderly people. Farmer selected for interview as a case says, "I am 56 now. What I am scared now is for my children's futurity." The repercussions of climate change are demonstrated further by conflict, domestic violence, disintegration of social networks and values. Yet, it is found that farmers use different alternative strategies to cope with climate change related risks; among many others: sale of small livestock, shifting dietary pattern, searching credit from both formal and informal institutions, claiming for relatives to get remittances, renting out of land for privileged farmers and migration to get employment according to their relative order of significances.

RECOMMENDATIONS

Enabling farmers mitigate and adapt climate change effects so as they can ensure sustainable livelihoods requires multi-pronged approaches. Policy-makers need to work aggressively to communicate climate adaptation and mitigation strategies into local level. There is a need to maximize farmers' coping and adaptive capacity by providing plastic rain gauges so that they can capture rain shower. Strengthening local early warning system, institutionalization of crop insurance, and dissemination of drought/pest resistant varieties to farmers is urgent necessitate. Farmers are reporting that they are not able to diversify and intensify their farm. They attributed this to mainly two essential points: inefficiency of agricultural education to them and shortage of financial capital to buy water pumps, geo-membrane, and agricultural inputs sufficiently. In addition, policy makers need to evaluate and monitor the performances of health and agricultural extension services provided to farmers.

It is also undeniable fact that non-farm and off-farm strategies make an important contribution to increase household incomes and shelter them from prevailing climate change effects. In this regard, interventions that enhance these activities in sustainable manner need to be formulated and planned contextually to increase livelihood assets. Therefore, the rural development strategy should not only emphasize in increasing agricultural production but considerable attention should be given in ensuring sustainable livelihoods of the rural people. Additionally, the locality is characterized by farming land scarcity and consistent fragmentation of the already existing small farm yards. Owing to this fact, the farming economy is not accessible to the poor and female-headed households. Hence, giving priority to the non-farm and off-farm sector is of supreme importance to absorb the continually increasing population in the district.

The social capital harnessed by formal (cooperatives) and indigenous (*Ekubs, Edirs, Senbetie, and Mahiber*) institutions also appear to have the potential to shield rural households from unexpected climatic shocks, stresses, or even household food deficits. Supporting these institutions may have positive effects on enabling farmers achieve sustainable livelihoods. The policy to provide credit services to farmers so that they can adopt high yielding, diseases resistant varieties, and use of chemical fertilizer (Urea and DAP) has not been very successful to enable farmers achieve their sustainable livelihoods in the study area. This is mainly because of its inaccessibility to those farmers whose livelihood is hand-to-mouth.

Lastly, farmers reported that they don't have any knowledge about value addition. With regards to this, there is a need to educate them about market, price, and value addition to boost potato and other crops production in the locality. This has also to be a policy option to enlarge farmers' resilience and adaptive capacity to climate change.

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